

Andreas J. Obrecht (Ed.)

APPEAR II

New pathways towards participative
knowledge production through
transnational and transcultural
academic cooperation

StudienVerlag

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StudienVerlag

Innsbruck
Wien

The publication of this book was made possible by financial support from APPEAR. APPEAR is a programme of the Austrian Development Cooperation. The opinions expressed in this book are those of the authors and do not necessarily reflect the views of the editor, the APPEAR-team or the Austrian Development Cooperation.



© 2022 by Studienverlag Ges.m.b.H., Erlersstraße 10, A-6020 Innsbruck

E-Mail: order@studienverlag.at

Internet: www.studienverlag.at

Typesetting and Cover: Studienverlag/Maria Strobl · www.gestro.at

Translation: Irmgard Schmoll (OeAD)

Proof-reading and copy-editing: Jamie McDonald, Dan Brown, Rainer Einzenberger

Selection of photos, editing of references: Anna Geiger

All printed photos have been made in the context of the described APPEAR projects and have been made available for publication in this book by the project leaders. Therefore, individual authorships are not listed separately.

Printed on acid-free and chlorine-free bleached paper.

ISBN 978-3-7065-6108-2

Bibliographic information published by Deutsche Nationalbibliothek

The Deutsche Nationalbibliothek lists this publication in the Deutsche National – bibliographie; detailed bibliographic data is available at <http://dnb.dnb.de>.

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1 PREFACE

Sustainable Development through Higher Education

A decade has passed: More than 10 years ago, APPEAR – one of the most successful programmes of the Austrian Development Cooperation – was established. With APPEAR, and in partnership with the OeAD¹, the Austrian Development Agency pivoted its paradigm for cooperation in the field of higher education and science. The focus shifted from individual scholarships to institutional cooperation, building lasting North-South and South-South partnerships and higher capacities for research, teaching, and institutional management. Although scholarships still have their important role in international cooperation on higher education, they have an added value to institutional capacity development if they are embedded in the context of a broader cooperation between two or more institutions.

It appears that we have done something right. During the past 11 years, APPEAR has developed into a well-established and internationally respected programme through which 43 cooperation projects in 20 countries have been completed. In the six-year period of APPEAR II (2014–2021), a total of 17.000 students benefitted directly, and 80.000 indirectly. 84 scholarships for study in Austria were implemented, of which the majority were embedded in cooperation projects. In this perspective, APPEAR has clearly had an impressive footprint, both internationally and in Austria.

The introduction of the Agenda 2030 and the Sustainable Development Goals (SDGs) was an important milestone for international harmonization of cooperation in the field of education. Whereas previously the education-related focus of the Millennium Development Goals (MDGs) was on universal primary education, the SDGs include targets for secondary and tertiary education as well. This is to the benefit of the overall attention given to the importance of higher education for development. However, APPEAR does not only contribute to SDG targets in the area of education, but to virtually all other SDGs as well: the knowledge and evidence generated and disseminated via APPEAR cooperation projects touches on so many of the grand challenges – from poverty reduction to clean water, zero hunger to climate, and clean energy to gender equality, to name a few.

Impacts and outcomes

As initiators and funders of APPEAR, we need to ask: has the programme achieved the desired outcomes? The APPEAR programme theory is based on creating impact through institutional capacities in the fields of research, teaching and management. In combination with a positive culture of scientific dialogue and the individual competences of graduated scholarship holders, the programme should translate into tangible contributions to the achievement of SDGs. A glimpse at just a few of the cooperation projects gives a flavour of the types of lasting outcomes that have been achieved.

1 OeAD GmbH – Austria's Agency for Education and Internationalisation

In Burkina Faso, despite its relatively limited access to water resources, sweet water fish can play an important role as a source of protein, but also as a source of income. The government faced many challenges related to the sustainable management of fishery resources. Over a span of 10 years, the SUSFISH² project has contributed to a better understanding of fishing and aquaculture and guided decision-making for policy and planning. Another impactful project is TEMACC-Ethiopia³: participatory action research was used to search for significant improvement in maternal and child healthcare practices in rural areas using information and communication technologies. Women from different communities benefit from this research into taking better care of the health of mothers and children.

APPEAR also improves teaching capacities. In the case of the transnational CaucaSusT⁴ project on sustainable tourism development in the Caucasus region, the results were not only changes in the academic structures. Importantly, the support of young scholars and university-practitioners in applying transdisciplinary approaches to research effectively contributed to shaping the scientific agenda and regional cooperation towards sustainable tourism. Another remarkable example is the AER⁵ project in the Rwenzori Region in Western Uganda. To benefit higher education and research as well as the community, a Master's programme in agroecology at the Mountains of the Moon University was established, informing ecologically friendly agricultural practices.

Management practices within higher education institutions need to be improved to build sustainable partnerships. One outstanding example is the INEDIS⁶ project on Inclusion in Education for People with Disabilities in cooperation with three public universities in Ethiopia. Among many other results, a guideline on "Inclusion of Students with Disabilities at Higher Education Institutions" and a certificate course on inclusive community and school development were developed. Moreover, support for labour market access as well as cultural and sportive events were initiated to maximize the social participation and interactions of students with disability. Another successful cooperation with Ethiopia is PSICPCT⁷. The partnership between the Haramaya University and the University of Innsbruck enabled academic staff to acquire and employ strengthened capacities in handling and administering peace and development education, as well as skills in conflict analysis and peace facilitation. Both universities agreed to keep on working together in the future.

A pioneer in the field

The examples clearly demonstrate that the cooperation projects delivered services that are highly relevant to development, and hence APPEAR achieved its outcomes. This was confirmed by a programme-level evaluation in 2019, which attests that APPEAR plays a pioneering role in the area of cooperation in the tertiary education sector; it demonstrates

2 Sustainable Management of Water and Fish Resources in Burkina Faso, see page 280–297

3 Technology Enabled Maternal and Child healthcare in Ethiopia, see page 135–145

4 Transdisciplinarity for Sustainable Tourism Development in the Caucasus Region, see page 333–347

5 Strengthening of Higher Education, Research and Community Outreach in Agro-Ecology in the Rwenzori Region in Western Uganda, see page 182–197

6 Inclusion in Education for Persons with Disabilities, see page 158–170

7 HU-UIBK Partnership for Strengthening Institutional Capacity in Peacebuilding and Conflict Transformation in Ethiopia, see page 146–157

an efficient programme implementation, and coherent and complementary activities with other initiatives of the ADA portfolio in the area of higher education/research.

In our view, the unique features of the programme constitute the foundation of its success. The participatory approach and a concept of culturally open-minded knowledge are two important principles that guide the programme. Moreover, a practically- and empirically-oriented approach is implemented, along with gender sensitivity and bottom-up and demand-driven activities. In other words: the thematic priorities for academic cooperation are defined by our partners in the global South, answer to the specific development challenges of the respective target country or region, and are addressed with a view to generating inclusive and tangible impact for communities.

To a bright future

To sum up, based on the solid foundation of its previous phase, APPEAR II flourished and continued to make impact. We are grateful to the entire APPEAR community for their hard work and incredible dedication, without which we could not have reached as far. Not to forget, the onset of the global COVID-19 related crisis in 2020 required yet additional efforts in many of the cooperation projects. We would like to thank all the project teams for the consistent quality of their contributions, our programme-level partner, the OeAD, for their tireless support and leadership, the members of the Selection Board for countless hours of valuable time and competent contributions, and the members of the Advisory Board for expert insight and guidance.

The journey does, however, not end here. The next, third phase of APPEAR has already started – with a timeframe of seven years and renewed commitment: to leave no one behind, and to maximise the benefits that universities can bring to their communities.

Heinz Habertheuer, Director Programmes and Projects International, Austrian Development Agency (ADA)

Matthias Themel, Advisor Education and Science (ADA)

Sebastian Palasser, Trainee (ADA)

2 INTRODUCTION

Austrian Partnership Programme in Higher Education and Research for Development. Eleven years of development policy-relevant teaching and research – and this is just the beginning!

Eleven years of APPEAR

When a programme like APPEAR is in the midst of life, it becomes significant for thousands of people, and hundreds of institutions, it creates approaches to solutions, improves structures of knowledge generation and knowledge exchange, influences political, economic and cultural and social decision-making processes and basically operates on multidimensional levels of development policy. When we launched the first APPEAR call in 2010, we would not have dared to hope that APPEAR would enter another phase eleven years later with a longer term – until 2027 – and increased funding. APPEAR Phase III began at the end of 2020 and the 8th call of the internationally acclaimed programme was published in the spring of 2021. The generous continuation of the programme is due to the great number of high-quality projects in development research that have been carried out successfully, the provision of teaching relevant to development policy, the support for the management of higher education institutions in the partner countries, and the many years of excellent cooperation between the Austrian Development Agency (ADA) as the commissioning organisation of the programme and the Austrian Agency for Education and Internationalisation (OeAD) as the implementing organisation. This cooperation has always endeavoured to ensure the best possible framework conditions for the selected APPEAR partnerships and the management of the APPEAR scholarship programme, which is closely linked to the projects.

This book documents phase II of APPEAR, i.e., the activities and the projects carried out between 2015 and May 2021. 26 academic partnerships were carried out during that period. For about half of the projects, the term was extended in a cost-neutral manner due to COVID-19 so that they were not finalised until the spring of 2021. This is also the reason why this book will not be published in the autumn of 2021, as originally planned, but in the spring of 2022. In addition to the 26 academic partnerships and the total of 20 preparatory funding measures, 41 students from the partner countries were able to successfully complete their studies at Austrian universities with the help of an APPEAR II scholarship. Another 33 students from the partner countries were transferred to the third programme phase and will complete their studies within APPEAR III.

This book is an ambitious undertaking – a research documentation that covers a wide variety of approaches to knowledge production relevant to development policy, and illustrates the diverse possibilities of transdisciplinary development research. As with the pub-

lication of the book on the first APPEAR phase¹, the editor encouraged the 105 authors – 46 female, 59 male – to also address questions, problems and dimensions of knowledge production that are usually not addressed in research and project reports. Project planning, no matter how successful, can only partially anticipate the social reality of implementing a project. Flexibility, creativity and improvisation are indispensable prerequisites for successful project implementation in often-difficult research conditions. The fact that reality often turns out to be different from the research designs and their underlying programmatic guidelines is also addressed in this book. Thus, this book is not only a documentation of APPEAR II but also a discursive contribution on practical approaches to transdisciplinary and transcultural knowledge production, the overarching goal of which is defined by the criteria of the UN Sustainability Agenda 2030.

APPEAR basically pursues a lively intervention and interaction strategy, the developmental goal of which is the concrete improvement of people's living conditions in the partner countries and regions. The focus is on participatory generation of knowledge as a basis for its application-oriented implementation. Knowledge production that does not follow hierarchical structures and paternalistic principles aims to achieve knowledge shared at the same level. In research, teaching, and the management of higher education institutions, APPEAR contributes to capacity development and creates spaces for transcultural and transdisciplinary thinking, and action oriented towards development policy goals. APPEAR is an ambitious programme of the Austrian Development Cooperation that is also characterised above all by flexibility and an empathetic approach to project contexts that are not always easy.

The APPEAR II instruments and principles

The programme contains two components that are closely interlinked and coordinated in the implementation. By funding master's and PhD scholarships (component 2: ¼ of the direct costs) primarily within the framework of current higher education cooperations (component 1: ¾ of the direct costs), capacities in tertiary education institutions in the partner countries are strengthened significantly. Here the programme follows international trends that aim to prevent brain drain and favour institutional strengthening over "discretionarily" awarded scholarships.

Component 1, in turn, contains three instruments. Preparatory Funding allows applications for Academic Partnerships to be prepared jointly. Academic Partnerships allow cooperation between Austrian higher education institutions and universities or scientific institutions in the addressed countries to be carried out in congruence with national development plans – the thematic orientation of the programme for a maximum period of four years makes regional networks with extended project budgets possible. And the Advanced Academic Partnerships, with a maximum duration of three years, build on successful projects of APPEAR I whereby new and qualitatively substantial research questions, goals, etc. are set and implemented based on the results.

1 Andreas J. Obrecht (Ed.): APPEAR – Participative knowledge production through transnational and transcultural academic cooperation. Böhlau Verlag Wien, 2015

In APPEAR II, the principles of APPEAR I were continued programmatically and consistently. The programme management and the projects and activities followed a participatory and partnership-based, knowledge-plural, application-oriented, gender-sensitive and “bottom-up” approach. These normative, research-strategic orientations and guidelines for action are based expressly on the following five APPEAR principles: Cultural open-mindedness as an expression of respect for other cultures, social orders, knowledge systems and epistemologies; practical and empirical approaches, which also change social reality in a solution- and application-oriented way and thus contribute to poverty reduction; gender sensitivity as an expression of systematic support for young female researchers in particular and as an expression of the integration of gender-specific issues in the research design and in the analysis of the results; and bottom-up and demand-driven approaches, which basically address social, ecological, economic, cultural, etc. problems against the background of local and regional contexts and clearly define both the intent of the research and the use of the results. Moreover, social inclusion is considered as a cross-cutting theme in programme and project design and implementation.

The 26 Academic Partnerships from the programme phase APPEAR II presented in this book are, on one hand, strongly rooted in the social realities of the addressed countries and on the other hand part of a new transnational culture of knowledge that does not want science and tertiary education to be pursued for their own sake – or to exercise social distinction – but to help to concretely change the actual living conditions – especially the conditions of poverty – through practice-oriented utilisation of results. This approach also resolutely counters the “knowledge hegemony of the West”, which is often perceived in post-colonial contexts, sometimes also in the scientific context of colleagues from countries of the global South. APPEAR is just as little interested in a one-sided transfer of knowledge as in a dominant role of the “funding provider” – joint research and teaching across the boundaries of cultures, languages and knowledge systems require practised participation, a clear articulation of the respective cognitive interests and an egalitarian understanding of cooperation. The practice of “development-relevant” research in recent decades has often shown that scientific questions, project designs and, above all, methodologies tend to be oriented more towards the cognitive intent of the “donors” than towards the articulated problems and “institutional needs” of their partners in the global South. The often-used phrase “at eye level”, which on closer examination often obscures the analysis of real power relations, has far-reaching consequences in research practice. Thus, in APPEAR II, it was also of great importance that the entire project responsibility – from personnel decisions and reporting to the complete financial management and accounting of project funds – could be assumed by the partner institutions in the global South. In nine Academic Partnerships, out of a total of 26 that were carried out in APPEAR phase II, higher education institutions and scientific institutions in the partner countries used this possibility.

Geopolitical, development policy- and knowledge-relevant changes during APPEAR II

APPEAR is embedded in global, national and regional developments, discourses, conflicts and efforts to use science and research constructively to address problem situations. APPEAR operates on multidimensional levels of development policy – from poverty reduc-

tion, coherence and consistency with various (government) programmes to strategies for implementing the SDGs. APPEAR is thus not a static programme for the achievement of a certain target but a highly flexible intervention and interaction plan, as well as a living process that defines targets according to what is possible, to principles of what makes sense in development policy, defines mechanisms of implementation that require a high degree of quality assurance and enables participation and project implementation based on partnership. In order to meet these demands, a high degree of flexibility in the programme implementation is necessary, which has also been positively acknowledged in the programme evaluations carried out so far. This flexibility also requires empathy, i.e., responsiveness to the individual and institutional situations, to the project partners and scholarship holders, and to the national and transnational framework conditions. Accordingly, APPEAR has been constantly modified, developed and optimised over the past eleven years.

The “micro level” of the programme and project implementation is set against the “macro level” of political developments and global societal transformations that have gained particular significance in recent years. This also directly affects APPEAR – as a programme exposed to geopolitics and embedded in international communication and convention. Poor countries are also particularly vulnerable politically, which is also evident in the national problem situations of some of the countries addressed by APPEAR. Projects implemented in those countries require empathetic support and, of course, continuous vigilant monitoring on the part of the programme management. Here, too, flexibility is required, which cannot necessarily be described schematically but is of course within the normative framework of the APPEAR programme goals.

The approval of APPEAR II took place before the adoption of the Sustainable Development Goals (SDGs) by the United Nations, before Brexit, before the election of Donald Trump as US President and before the emergence or aggravation of a whole series of geopolitical changes or newly emerging problem situations that in any case play a part in development policy, including in the relationship between countries. Seven central problem or discourse areas will be briefly described in the following, all of which are globally significant, have had an influence on the programme implementation and will likely continue to do so. Since 2015, the geopolitical background and development policy context in which the programme is implemented has changed dramatically. Some project descriptions directly address aspects of the macro-political changes outlined here and especially conflicts, while in others the changed framework conditions for development-relevant research are implied. Common to all project contributions is the strong focus on the SDGs, which may seem too ambitious to some but which is also of fundamental importance for the third phase of the APPEAR programme. In the following, fundamental geopolitical changes that occurred in the second phase of APPEAR will be outlined briefly in order to contextualise the background of research and teaching relevant to development policy, especially in times of major crises and conflicts.

Wars, refugee movements, radicalisation

In 2015, massive migration movements to Europe took place. With mass migration of people from the new war zones in the Middle East and from African countries, the discourse on development policy also turned. Due to the widespread lack of a concerted EU refugee man-

agement policy, the Austrian Development Cooperation (OEZA) was confronted on one hand with a thematic upgrading – keyword “aid on site”, etc. – and on the other hand with the problem of compensating for the lack of national and transnational measures without a significant increase in bilateral and multilateral funds. The new war in Syria, the entry of Turkey and Iran into this war as regional powers of order, the direct confrontation between Russia and the USA in this war, the unresolved humanitarian catastrophes due to waves of refugees in the Mediterranean – all this has contributed to a profound feeling of insecurity within the “Fortress Europe”. Quantitatively speaking, African countries are most affected by migration movements, and the European perception of the “refugee problem” is mostly selective. Internal migration within Africa also affects partner countries of APPEAR II – for example, large refugee camps in northern Uganda or a large number of “internally displaced people” in Ethiopia and other African countries, currently also due to the brutal civil war in the Ethiopian province of Tigray.

Moreover, there were further regional political and religious radicalisations during the term of APPEAR II, which have also affected projects: Islamic fundamentalism in East Africa, Boko Haram in West Africa, particularly affecting the north of Burkina Faso, border conflicts in Armenia over Nagorno-Karabakh, then open war and radicalisation in the Israel-Palestine relationship due to a unilateral US foreign policy. Due to the project activities carried out so far, this region has a special significance for APPEAR II.

Recapture of Afghanistan by the Taliban

The editorial deadline for this book coincides with an event with proportions of historic significance for the whole world. On 15 August 2021, the radical Islamic Taliban marched into Kabul, having conquered the whole of Afghanistan in barely two weeks, and after a whole series of provincial towns had been handed over to them without a fight. These developments could have a significant impact on APPEAR III. This refers both to the above-mentioned Islamic fundamentalism and, in particular, to the entire Middle East and to the context of migration and refugee movements, which is so important for development policy.

The withdrawal of troops by the US administration under President Joe Biden has led to a radical system change in Afghanistan much faster than expected. The Afghan national army, which was highly armed by the West, above all the United States, was hardly able to counter the triumphant advance of the Islamic militia. In the first few days after the recapture of the entire country, chaotic scenes – especially at the airport in Kabul – occurred, thousands of people wanted to flee because they were afraid of revenge and retaliation, and the horrors of the deobandist Taliban regime (1996 to 2001) – a fundamentalist dictatorship where neither human nor women’s rights were respected, where there was no TV, no music, no secondary school for girls, where women had to wear burqas and were only allowed to leave the house with male consent – are deeply rooted in the collective memory. Although the Taliban currently claim to be more moderate, saying that although they will not establish a democratic system they will respect women’s rights within the limits of the Sharia, observers are extremely sceptical and assume that this is just a propagandistic strategy.

Apart from the question of how it was possible for the country to fall entirely into the hands of the Taliban in such a short time – contrary to all expectations and forecasts, especially those of the “Western world” – there is justified concern that an enormous wave of

refugees from Afghanistan will be the result of this conquest. Moreover, the rush campaign has brought the Taliban into possession of military equipment – weapons, tanks, aircraft, drones – worth around 80 billion US dollars. This makes the Taliban the best-equipped radical Islamic organisation in the world. It remains to be seen what influence this will have on other jihadist movements such as Al Qaeda or IS – Islamic State, what general boost they will experience as a result of the Taliban's victory and what possible impact this will also have on intervention areas of APPEAR III.

US Palestine policy, trade war with China, Russia as a power of order in the Middle East

The drafting of APPEAR II took place before the election of Donald Trump as US president. After this election and the installation of the new US administration, which was particularly supported by right-wing and fundamentalist religious parties in Israel, the regulations of coexistence between Israel and the occupied Palestinian territories that are legitimate under international law have been successively disavowed with the aim of creating a two-state solution in accordance with the Oslo Accords. Examples of this include the transfer of the US embassy to Jerusalem, the “recognition” of Jewish settlements in the occupied territories and the presentation of a “US peace plan for Palestine” that attempted to legitimise positions contrary to international law and was in no way agreed with by the Palestinians. The aggravation of the situation has led to a permanent war-like situation in Gaza, which has also effectively made entry and exit impossible in the second APPEAR project phase and also escalated into open warfare in the spring of 2021. It remains to be seen and hoped that the new US administration under President Joe Biden – which in principle is in favour of a two-state solution and is also critical of Israel's settlement policy – can contribute to de-escalation in the region.

The trade war between the USA and China has contributed to further geopolitical and, especially, geo-economic uncertainties. Linked to this unilateral policy of the former US administration was also a systematic weakening of the UN and its component organisations – for example, through withdrawal or suspension of US membership payments. The trade war with China has been followed very closely in many African countries and has in any case strengthened China's position in Africa in the perceptions of relevant observers and commentators. Although the new US administration has taken the first few steps towards de-escalating the relationship between the USA and China, as far as the economy is concerned the Democratic president – at least in the first half of 2021 – has continued the combat rhetoric towards the world's most populous country and also uses old and new enemy images towards the transatlantic allies, which give little hope for a reasonably conflict-free coexistence of the two superpowers.

The massive organisational, financial and military support of President Assad's Syrian war regime by Russia, the Iranian axis, the dangerous entry of Turkey – as a NATO member – into the Syrian war, especially against US-backed Kurdish units and infrastructure, the US sanctions against Iran, which are visibly tightening, the enormous war-induced refugee rates in Lebanon but also in Turkey and thus in Greece present us with scenarios that lead us to expect a geopolitical radicalisation of the use of violence as a political means.

Systematic disinformation and new knowledge discourses

Due to the worldwide rise of right-wing populist parties and discourses during the APPEAR II programme phase – from Trump to Bolsonaro, Orban, Erdogan or Duterte – the systematic functionalisation of fake news has become, so to speak, acceptable. Allegations have been and are made that satisfy the emotions of their own clientele in particular without this “information” needing to have anything to do with reality. The means for this have increasingly become social media, the content of which is subject to no or only very peripheral quality and legitimacy controls. Systematic disinformation has become en vogue again as a political strategy. In this respect, too, the current situation differs from the initial situation of APPEAR II. For, in the “post-factual age”, science, evidence-based thinking, the structure of the method of research and the problem-solving proposals that can be derived from it are increasingly confronted with a legitimacy dilemma that has been exacerbated in a demagogic way. Rationally structured argumentation often seems powerless in the face of emotionally charged claims – “there has always been climate change, we humans are not to blame for it”. The method of science is rationality; where rationality is negated, rational analysis and interpretation of results can achieve nothing. A paradox – in a world that is thoroughly characterised by scientific knowledge and the resulting technology, scientific knowledge is called into doubt to make political pocket money out of it.

APPEAR is a flexible intervention and interaction programme that promotes science, research, teaching and higher education management in the partner countries in order to develop and offer evidence-based solutions to development policy-relevant problems. APPEAR is thus also in the discourse on the importance of evidence-based knowledge and its impact on the – sustainable? – future of all of us. This discourse on knowledge is also conducted above all in the partner countries that suffer equally from knowledge deficits and from being patronised by knowledge – of whatever kind. Only knowledge conceived and developed in partnership can balance out this imbalance between “North” and “South” and be a bulwark against the demagoguery of disinformation and its proponents.

Sustainable Development Goals (SDGs) and normative consensus on education

The preparations and approval of APPEAR II took place before the adoption of the SDGs, which took place on 25 September 2015 at the United Nations World Summit. Although the terms of reference of APPEAR II anticipate the SDGs, the thematic priorities were assigned from the perspective of the Millennium Development Goals (MDGs), which at that time were still being implemented – sometimes successfully. With the entry into force of the 2030 Agenda, no more differentiation will be made between industrialised and developing countries when it comes to sustainable development efforts; the focus will be on the gradual implementation of the 17 goals and 169 sub-goals in partnership. The thematic priorities of APPEAR II directly or indirectly affect a large number of goals. This strong focus on the SDGs gives APPEAR an additional fundamental transnational thematic anchoring oriented towards sustainable development, which above all promotes the achievement of the 2030 Agenda goals.

APPEAR is also contextualised in particular by SDG 4, which aims for “inclusive, equitable and quality education” for all. This goal basically subsumes all education sectors, including the tertiary sector. Education and knowledge are no longer negotiated “in a neutral way” in SDG 4 but on the basis of a clear normative definition: As Goal 4.7 states, “all learners should acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development.” This normative definition, to which the previous phases of APPEAR were also committed, has now been made binding as a transnational political consensus by the 2030 Agenda.

Eco and new youth movements, and the “last decade”

The discourse on climate change of course already played a central part globally in 2014 – predominantly seconded by established environmental organisations that are also present in the media. Nevertheless, it has intensified and become even more polarised in recent years. The adoption of the Paris climate goals on 12 December 2015 should have been the beginning of a spirited global action against the incipient ecological catastrophe. This was followed by the withdrawal of the USA – which did not become legally binding – from the transnational legally binding agreement, which was one of the first decisions to be reversed by the new US administration. The past years were also marked by a denial of climate change by right-wing populist politicians in particular. At the same time there has been an increase in extreme weather events – floods, droughts, fires – an exponentially accelerated melting of glaciers, polar ice, permafrost, a progression of species extinction due to climate change, etc. As a consequence of these dramatic events, new ecological protest movements have formed worldwide, the most prominent example of which being the pupils’ movement “Fridays for Future”.

The analyses and reports of the Intergovernmental Panel on Climate Change of the United Nations and the World Meteorological Organisation have impressively shown that limiting atmospheric warming to an average of less than 2 degrees Celsius worldwide can only be achieved with rigorous political measures that would have to entail far-reaching changes in people’s behaviour – especially in the richer countries. Based on the scientific findings analysing climate change, the discourse on the “last decade” has developed; between 2020 and 2030, radical climate policy action could still prevent the worst effects of the climate change. European climate policy under the new EU Council Presidency and the measures laid down in the coalition agreement of the Austrian federal government are based on these scientifically substantiated scenarios. In the past decade, research and evidence-based teaching within the framework of APPEAR have made an important contribution to the understanding of the changing ecological framework conditions in the addressed countries and regions and have also provided insights into the possibilities of socio-ecological transformations, and the new programme phase APPEAR III will also set significant accents in dealing with the consequences of climate change. As the contributions in this book show, it is not only technological or agricultural solutions that count but always also the social framework conditions under which evidence-based problem solutions can be implemented in the reality of human interaction.

COVID-19 pandemic and its research-practical and science-strategic implications

The last one and a half years of the programme phase of APPEAR II were marked by a worldwide exceptional situation – the pandemic spread of the COVID-19 virus and the resulting “lockdowns” led to economic and social upheavals in almost all countries of the world, which have also affected and continue to affect Austria and the target countries of APPEAR II. Research and teaching were also affected here and there, and many activities that should have been carried out at the end of the respective projects could no longer be carried out. The APPEAR II projects should have been completed by the autumn of 2020 at the latest; in agreement with the contracting body, the Austrian Development Agency (ADA), the programme was extended until May 2021 but there was no real easing of the situation even at that point.

Development research mostly takes place in conditions that are not so easy to manage, and during the COVID-19 crisis the project staff did a great job within the limits of what was possible. All of the APPEAR II projects presented in this final report were eventually completed successfully.

Although the global situation eased in the summer of 2021, mainly due to the widespread use of vaccines, the further development of the pandemic cannot be predicted, also due to newly emerging virus mutations – currently, for example, the delta variant. The situation may soon ease largely but new waves of infection may also emerge, the consequences of which cannot be assessed at the time.

In the partner countries, provided that reasonably valid data is available at all, the situation is very divergent. Based on the statistics, the situation in most African countries, for example, is not exactly comprehensible. It is to be hoped that the hypothesis that “young populations” are less affected by the pandemic has proved or will prove to be true in social reality. Only 4% of the population on the African continent are older than 64 years – this might indicate a low mortality rate despite a sometimes-high rate of infection. Especially in developing countries, measures to limit the spread of infection can only be implemented to a limited extent. In the informal sector, the basic necessities of life have to be earned day by day, hand washing at regular intervals requires running water, and social distancing is difficult in urban informal settlements. The lack of healthcare facilities and treatment options exacerbates the situation. The macroeconomic impact is already huge: developing countries are particularly affected by the slump in commodity prices and global trade, currency devaluations of up to 25% on average, increases in the price of imported goods and foodstuffs, capital flight and the lack of family support from abroad. COVID-19 exacerbates national and global inequality but also contributes to questions being asked in new contexts that reach far beyond the current pandemic.

Transformation of knowledge – from APPEAR II to APPEAR III

What do knowledge and insight contribute to our coexistence in this world, on this blue planet that has become so vulnerable and perhaps more familiar to us for that very reason? Haven't we known for a long time how peaceful coexistence based on socially and culturally compatible and resource-saving technologies would be possible and what preconditions for

gender-equitable participation would have to be created so that human rights, education for all and democracy will not remain empty promises? Living and doing business – for a fair, intergenerational and sustainable future that provides all those not yet born with the same opportunities to enjoy life as we are able to? Generations of researchers have compiled the relevant knowledge for sustainable development, for a future worth living that is available to all the earth's citizens, down to the smallest details, written it down and made it accessible to an interested global society. There is much resistance to this knowledge – there are science sceptics, nationalists who instrumentalise everything that does not correspond to their interests; there are conflicts, violence, poverty and wars. But all this resistance cannot change the fact that for quite some time now scientists have put themselves at the service of people, of humanity, analysing questions concerning the future in a solution-oriented way and deriving from them concrete options for action that can gradually lead to a sustainable future.

Development research is part of this scientific tradition. APPEAR considers itself to be part of this scientific tradition and to continue it with regard to development policy goals. Development research aims to contribute through evidence-based knowledge to eradicating poverty and hunger, to enabling gender equality, achieving food security and food sovereignty, transforming conflicts, enabling economically meaningful coexistence – without exploitation and systematic degradation of human beings, etc. A difficult but all the more fascinating task.

In order to accomplish this task step by step, Austrian researchers cooperate with scientists in the partner countries in APPEAR. For Austrian science, too, development research is an enrichment of the research landscape and teaching in higher education. APPEAR has enabled many, especially young Austrian researchers, to gain fundamentally new experiences in transcultural contexts, to participate in the elaboration of solutions to problems that transcend the boundaries of languages, legal spaces, disciplines, culturally self-evident facts and epistemological certainties. Entering new international fields of research that see themselves as an active contribution to sustainable global developments transforms and universalises knowledge and leads out of the narrowness of a specialisation in subdisciplines. This requires multiple skills that can only be acquired in research practice.

This reciprocal approach, which no longer allows for a substantial separation between science from the “hegemonic North” and the “global South”, has received fundamental confirmation through the integration of the SDGs into the knowledge discourse, which is also programmatically continued in the third phase of APPEAR. It is not only the modes of interaction and the participatory possibilities of joint knowledge production that are important but above all the research interests themselves. In the new, holistic understanding of universal science there is no local solution to sustainability challenges that will not also be globally relevant, and no global problem-solving strategies that do not also have a local significance – whether in the social, technological or natural sciences – and gain relevance for regional contexts. Just as the SDGs remove the semantic – and ideological – division between “developing countries” and “industrialised countries” to make it clear that all people face similar issues, problems and possible solutions and that all governments of the world are responsible for the well-being of all, the division into disciplines in science is also, if not obsolete, at least strongly relativised. Science that does not contribute to a sustainable future fit for humanity is useless and loses its legitimacy – especially if it is financed by public funds. What is needed is systemically linked thinking, evidence-based, realistic anticipation of the

future that opens up new spaces, a sustainable understanding of complexity and comprehensible explanations that form a good part of individual and social reality construction. And a new self-image of science is also important because responsibility for the future of humans can neither be hidden behind useless data graveyards nor – as has happened for centuries – fundamentally denied.

Acknowledgements

This book presents the activities of the Academic Partnerships of APPEAR II, and also the challenges and difficulties that projects faced. These difficulties include internal problems and misunderstandings at project level, aggravations of external conditions due to crises and wars, and the consequences of the COVID-19 pandemic, which could not be foreseen in the originally formulated “expected risks”. With partial cutbacks, the projects – the terms of which were extended due to COVID-19 – could nevertheless be successfully completed. The 45 female and 60 male authors of this book reflect in a discursive way on their project work, most of which lasted several years, and summarise their findings in a cursory fashion.

I would like to sincerely thank the authors of this research documentation as well as all project leaders and project staff of the 26 Academic Partnerships carried out in APPEAR II. Their commitment, their academic expertise and their efforts to carry out in the best possible way a teaching and research programme inspired by development policy have contributed significantly to the success and international reputation of APPEAR. I would also like to thank the scholarship holders for the valuable scientific and personal contributions they made to APPEAR II during their university education. Moreover, I would like to specially thank the members of the APPEAR II Selection Board who, with great dedication and expenditure of time and in an honorary capacity, selected the best and most interesting projects from the abundance of submissions. Special thanks also go to the members of the APPEAR II Advisory Board, who contributed to the strategic monitoring of the programme, also on a voluntary basis.

The cooperation with the contracting body, ADA, has always been constructive, effective and aligned with the principles and contents of the programme. The OeAD APPEAR office team, which has cooperated with the contracting body in a mutually appreciative manner for many years, would also like to express special thanks here. Any problems that arose – both at the project and the programme level – were discussed promptly and good solutions were always found together.

Last but not least, I would like to express my heartfelt thanks to the APPEAR office team at the OeAD. With great humanitarian commitment, utmost professionalism and the always necessary optimism, the team has contributed significantly to APPEAR becoming a lively, discursive, internationally recognised instrument of new forms of knowledge production with central developmental implications.

In this sense, I am looking forward to a continuation of the programme in a third phase until 2027, in which important experiences and findings from APPEAR II can be used and further deepened.

Andreas Obrecht, Editor and Head of APPEAR programme at Austria's Agency for Education and Internationalisation (OeAD), September 2021

3 PALESTINE

3.1 Rooting Development in the Palestinian Context

Project Coordinator: Ayman Rezeqallah

Coordinating Institution: Birzeit University, Centre for Development Studies (CDS)

Partner Institution: University of Vienna, Department of Development Studies, Al-Azhar University, Deanship of Planning and Quality Assurance

Partner Country: Palestinian Territories

Project Duration: 15 January 2016 – 15 March 2019

3.1.1 The advanced academic partnership – ROOTDEVPAL

The advanced academic partnership *Rooting Development in the Palestinian Context* successfully established academic partnerships between the Centre for Development Studies (CDS), Birzeit University, Al-Azhar University, and the Department of Development Studies, University of Vienna (DDS). Furthermore, it transcended academic borders by closely connecting the aforementioned partners with two community-based organisations (CBOs) working in Palestinian refugee camps in Jordan and Lebanon, namely the Community Development Committee (CDC) in Zarqa, Jordan, and Mousawat in Mar Elias, Lebanon. The partnerships were based on the following components:

Working out the development agenda Rooting Development

The project partners further deepened, articulated and promoted an alternative vision for development by integrating and building on the developmental challenges, experiences, and popular strategies of various segments of the Palestinian population in their different locations. This strategy allowed the partners to bridge the divide between academic knowledge producers, community-based knowledge and development strategies.

The project enabled 17 rounds of discussion about alternative and resistance development amongst various academics, activists, CBOs, NGOs and community leaders in Jordan, Lebanon, the West Bank, the Gaza Strip and Vienna. The significance of conducting comprehensive debates on development among Palestinian refugee communities in all four localities lies in connecting critical readings, experiences and practices under conditions of settler colonialism in the West Bank and the Gaza Strip, and the denial of the right to return for Palestinian refugee communities in Jordan and Lebanon. This enabled the establishment of common ground to continue and deepen our understanding of various developmental issues, practices and theories in the Palestinian context.

The final conference held in the Dheisheh refugee camp in Bethlehem, came about as the culmination of all the rounds of discussion and ideas about alternative and resistance development.

Training of new fieldworkers in Jordan and Lebanon

47 out of 73 trainees from Jordan and Lebanon completed a three year training program in social science research methodologies with a special focus on community-based research in Palestinian refugee camps.

The program provided additional spaces for Palestinian students and social workers, most of them living in refugee camps themselves, to engage with theoretical, epistemological and methodological questions about social science research in the Palestinian context. Due to the lack of applied research training programs at public universities and limited access to higher education institutions in Lebanon and Jordan in general, such long-term engagements and possibilities to collectively discuss research projects are extremely necessary. The critical knowledge that the trainees gained through conducting fieldwork in various Palestinian refugee camps and their active engagement with the local communities were reflected within their research papers focusing on a variety of topics, i.e. renting apartments to Syrian refugees in the Burj Barajneh camp in Lebanon, the difficult living conditions of Palestinian refugees from Gaza in Jordan, as well as social media as a space for youth activism.

The most challenging questions throughout the different training workshops and collective discussions among the trainees were how engaged research practices can be employed on the ground and what are their implications. Which kind of research has to be produced in times of war, conflict and the ongoing denial of the right to return for Palestinian refugees? How can the knowledge produced be communicated back to the different communities the trainees worked with?

These debates further inspired the production of an appendix to an existing research handbook for quantitative and qualitative research methodologies in the Palestinian context that was developed in the first joint APPEAR project between DDS and CDS, which includes research in the Palestinian diaspora. Furthermore, two summer schools in Beirut (in 2017) and Vienna (in 2018) together with colleagues of the advanced training program from Birzeit and Al-Azhar university provided space to work on some of these challenging questions.

Some of the participants of the training program successfully established their own research units under the umbrella of CDC and Mousawat and are now continuing to cooperate in different projects with some of the partner institutions.

Advanced Training Program

The program strengthened the partnership between BZU and Al-Azhar University, which in turn laid the foundation for a jointly coordinated training program in social science research methodologies for MA students. The cooperation aimed to bridge the gap between theory and fieldwork practice and offered the opportunity to jointly develop research projects, discuss research processes and outcomes.

25 students successfully completed the training program which brought together workshop sessions held by various Palestinian academics from diverse fields in social science based at Birzeit and Al-Azhar university. The three year program enabled the trainees to gain in-depth knowledge about conducting fieldwork and actively engaging with local communities. They also participated in two summer schools together with their colleagues in Lebanon and Jordan to present their experiences and challenges throughout the research process.

Among the key results of this project was the production of a proposal for a Master's program in community development at CDS. The concept for the proposal was approved in November 2018 by the council of BZU and later discussed at the academic council of the university in March. It is currently being examined by the steering committee and was to be submitted to the Ministry of Higher Education in June 2019.

Academic Network for a Young Generation of Researchers and Fieldworkers

One of the main achievements of this component was the creation of sustainable personal and professional relationships among a young generation of researchers and fieldworkers from the West Bank, the Gaza Strip, Lebanon, Jordan and Austria.

Key to these networking activities was the Vienna based research cluster at DDS, which organized various lecture series, (international graduate) workshops, rounds of discussion, film screenings, radio shows and seminars at the University of Vienna. It also disseminated articles and information about the project in German-speaking news outlets and, therefore, contributed to the dissemination of the project's activities both within and outside academic circles. Furthermore, the research cluster was the responsible body for working out the topics and program for two summer schools that were held in Beirut 2017 and in Vienna 2018.

In addition, it provided a space for discussing the academic work of PhD-students from Austria and Palestine in order to be able to critically reflect on approaches, methodologies and theoretical issues underpinning each work. All of these PhD-theses focus on specific aspects of Palestinian history and current political and societal conditions in Palestine and the Palestinian diaspora respectively.

3.1.2 Reflections

by Ayman Abdul Majeed

The APPEAR project facilitated the establishment of an academic partnership between the Centre for Development Studies (CDS) at Birzeit University, Al-Azhar University, and the Department of Development Studies (DDS) at the University of Vienna.

Moreover, the project has connected the aforementioned academic institutions with the community-based organisations (CBOs) in Palestinian refugee camps in Jordan and Lebanon, namely the Community Development Committee (CDC) and Mousawat. The project offered a space to reflect upon a number of questions related to development in the Palestinian context, and provided an alternative vision for partnerships within development projects focusing on research approaches and methodologies. Therefore, *Rooting Development in the Palestinian context* aimed at transgressing borders between academic and community based knowledge production by including experiences of trainees, local activists and communities.

The following focal points engender a systematic understanding of these following issues:

Contextualising knowledge production

Development in Palestine must be discussed having regard for its economic political and social context in order to be able to assess the repercussions of colonialism, international aid and its impact on Palestinian institutions. Palestinian communities in their different localities have to be addressed through a framework of knowledge production that focuses on these pillars in order to render visible the effects on their lives, closely related to the communities' experiences on the ground.

The context issue is reflected through our need to understand the Palestinian experience on the ground. Examining this context of the experience of the Palestinians requires us to delve into the details of their economic and social life focusing on the interior rather than the exterior.

Identifying power relations

Understanding hegemonic power relations within knowledge production on development enables us to shed light on neoliberal fault lines in the Palestinian context. Intensive discussions with communities in Lebanon, Jordan and Palestine served to shed light on resistance strategies of development that reveal artificial concepts produced by the aid industry and peace agendas by siding with local economic elites or, on the other hand, moving closer to the centre rather than the margins.

Therefore, *Rooting Development in the Palestinian Context* developed alternative frameworks that have been drafted by listening to the experiences of the field. How such frameworks and multiple understandings of development will be implemented on the ground has to be decided together with different communities rather than implementing them from the top down.

The final conference “*Rooting Development in the Palestinian Context*”, also included a discussion on common grounds for a development agenda in the diaspora and refugee camps, through the question of identity, themes of authority and power dynamics exploring how current models, practices, resources and knowledge from different communities can strengthen popular forms of development as well as collective consciousness and practices.

Using alternative methodologies and tools

The exchange of experiences among participants in all different project components, and the dialogue with the local Palestinian communities enabled the development of a methodological framework that was based on different needs, which directly addressed local living conditions and challenges.

Research methods and an understanding of their influencing mechanisms reiterated the importance of interactive participatory research that responds to and draws upon a multi-dimensional picture of the historical context and future orientations. This vision and understanding privileges qualitative rather than quantitative research approaches that generalise and detach themselves from reality. While pointing to the fact that quantitative data analysis and figures are important, they have to be enhanced with lived experiences.

The involvement of trainees (advanced training and new field researchers) in the participatory training program enabled them to gain in-depth knowledge about conducting fieldwork and actively engaging with local communities, with fundamental ethics to build trusting relationships using; participatory research and interactive tools and methods, respect for human dignity, respect local community experience and knowledge, and do-no-harm principles.

Going beyond fragmentation

One main achievement of the project was to develop approaches that go beyond the failure of Palestinian liberation and the neoliberal state building project in Palestine.

Speaking of the limitations of power in this context leads to searching alternatives to theoretical approaches based on societal and geographical fragmentation of Palestinian communities, reiterating a sense of disability within the researched community, mainly refugees, restraining them to the margins of their personal life.

Knowledge production that inscribes displacement and excludes discussions on the right to return of refugees has to be overcome. New directions of knowledge production beyond fragmentation have to point towards possibilities in the future to overcome rather than reinforce stagnation.

Through the rounds of discussion on alternative and resistance development; the significance of conducting comprehensive debates on development among Palestinians refugee communities in Palestine and the diaspora went beyond fragmentation and depended on connecting critical readings, experiences and practices by establishing common ground to continue and deepen our understanding of various developmental issues, practices and theories in the Palestinian context.

Critical reading of stereotypes

Various discussions and research experience within the project period identified gaps between hypothetical assumptions and “theoretical parachuting” of knowledge production about development without grounding scientific research in everyday experiences of Palestinians. By employing a methodology of critical reading guided by collective discussions and community experiences, different problematic stereotypes and conceptual frameworks could be identified.

The final conference of the project Rooting Development in the Palestinian Context and the round of discussion on alternatives consolidated the concept of development between the various Palestinian communities, which can be defined as a unique exercise as Palestinians in the diaspora have been excluded from a joint discourse and theories on development since the Oslo Accords.

Examining these issues added a critical view on concepts of development, with the objective of eliminating the notion of surrendering to individualism, and returning to production and self-reliance as a collective act through an understanding of local experiences and expertise.

3.1.3 Transcending the academic realm in conflict and war zones

by Helmut Krieger

After having successfully finished our first APPEAR project entitled ‘Conflict, Participation and Development in Palestine’ in 2014, one of the main questions we raised when submitting the application for our second APPEAR project was how to re-connect Palestinian communities in their different localities in Palestine, Jordan and Lebanon. In light of the geographical, social, political and economic fragmentation of Palestinian society caused by the Nakba in 1948, we asked ourselves whether we would be at all able to contribute to such an essential process of re-connecting communities across borders. Therefore, how could we design a project that should include such a necessity? Why was it necessary at all?

Re-connecting Palestinian communities

One of the starting points was the question of how to deal with the uneven and nevertheless interrelated development of the different spaces of domination Palestinian communities have to deal with: An ongoing colonial power in the West Bank, the siege on Gaza imposed by Israel more than a decade ago as well as the repercussions of the war in Syria on the social and political landscape in Lebanon and Jordan, not to mention the quite different basic conditions Palestinian communities are confronted with in these two countries. Furthermore, instead of just finding solutions, the Oslo process, as an imperial conflict regulation mech-

anism starting in the early 1990s, undoubtedly enabled the occupying power to expand its settlement activities in the occupied Palestinian territories while creating the overall image of a peace process that excluded all Palestinian communities outside of Palestine. One of the consequences of such a so-called peace process was western donors' support to establish a Palestinian National Authority in the West Bank and Gaza Strip without territorial sovereignty, while disconnecting them from all Palestinian communities living outside of Palestine. These communities became what W.E.B. Du Bois once famously asked from the perspective of Afro-American communities: "How does it feel to be a problem?"

Re-connecting academic knowledge production with community-based knowledge

While such a multifaceted fragmentation of the Palestinian (refugee) society was the basic condition of our work, another important factor should be included in our project as well: our understanding of transdisciplinarity. If it is necessary to bridge the divide between academic knowledge producers and community-based knowledge and development strategies, then it is an essential task to integrate and build on the developmental challenges, experiences and popular strategies of various segments of the Palestinian population in their different locations. In order to achieve this and to draw on already wide-spread criticism levelled by (Palestinian) scholars and activists at the Oslo process and its dominant development model, we were confident of being able to establish a community of critical knowledge producers by systematically integrating Palestinian popular movements, social initiatives, community leaders and activists in our project. With that, we intended to outline alternative development ideas beyond the dominant model enforced on Palestinian communities in their different localities over the last 25 years. Such a draft should thus reflect the diversity of Palestinian society within and outside of Palestine.

While our understanding of transdisciplinarity bridged the gap between academic and community-based knowledge production, we realised that we also have to deal with academic knowledge production on another level: mainstream research approaches to Palestinian communities.

Re-connecting participatory field research methodologies and epistemologies with grassroots organisations

A fundamental problem evident in many Western research projects on Palestinian communities is that grassroots Palestinian organisations and/or NGOs, which are involved in such projects, are primarily needed to generate data. This subordinated position prevents them from taking a formative and participatory role in various projects, despite their being deeply rooted in their local communities. Such research practices reflect a colonial approach that exploits local staff as well as local respondents. If this is the mainstream way of producing academic knowledge communities, rather than working together with them, then it was clear to us that we had to fundamentally challenge these power asymmetries. By establishing a training program for fieldworkers in Jordan and Lebanon, we intended to provide well-educated young people from local communities with additional qualifications in social science research methods and, consequently, provide local fieldworkers with the knowledge and skills to better leverage and negotiate their local relations through collaboration with Palestinian academic partners. Furthermore, such professional training in participatory research methods should also extend our own research capacities for future research projects beyond the funding period to Jordan and Lebanon.

Institutionalising critical knowledge production

Mainstream research approaches and epistemologies are deeply affected by Eurocentric models of academic knowledge production and their institutional settings. This understanding has also led us to the idea to create an alternative institutional platform as one of the components of our project. Based in Vienna, a research cluster should provide the necessary space for a young generation of PhD students, researchers, and fieldworkers from Austria, Palestine, Jordan and Lebanon to establish a network of alternative knowledge production in/on Palestine and Palestinian communities. PhD students from Austria should learn from fieldworkers' experiences and analyses and thereby critically reflect on methodologies and epistemologies they use in their own research. Fieldworkers in turn should be able to classify and evaluate their work on a methodological and theoretical level. This two-way learning process should create sustainable personal and professional relationships that can be utilised beyond the project cycle as well.

While the research cluster should contribute to institutionalising critical knowledge production on Palestine at the University of Vienna, an advanced training program at Birzeit University (BZU) and Al-Azhar University should create the foundation to also establish a new Master's program in community development at BZU. With that, we intended to bridge the gap between theoretical approaches to development and the practical applications the current education system in the West Bank could not afford.

Success and limitations

Designed as a partnership between the Centre for Development Studies (CDS) at Birzeit University, the Department of Development Studies (DDS) at the University of Vienna, Al Azhar University in Gaza, as well as the NGOs Community Development Committee (CDC) from Zarqa, Jordan, and Mousawat from Beirut, our fundamental approaches and perspectives were laid down in the following four project components:

- to work out the Palestinian development agenda Rooting Development by establishing a community of critical knowledge production
- to train new fieldworkers from Palestinian communities in Jordan and Lebanon
- to establish an advanced training program at CDS
- to build an academic network for a young generation of researchers and fieldworkers from Palestine, Jordan, Lebanon and Austria.

After having successfully carried out a wide range of activities that led to impressive results during and after the project period, the question whether we have achieved what we intended to achieve is nevertheless not an easy one to answer. In terms of our objectives to re-connect Palestinian communities and transcend academic boundaries on different levels, initial steps have been taken that can be used to further develop our approaches and perspectives. In view of the more than harsh conditions Palestinian communities within and outside of Palestine are confronted with, these initial steps are only small ones on a path fraught with many stumbling blocks, but many steps might ultimately turn alternative ideas into powerful visions. By contributing to re-connect Palestinian communities in their different localities, we were able to follow one of the most necessary and, at the same time, difficult paths.

3.1.4 Enumeration of results

- Establishing sustainable networks with Palestinian communities in the West Bank, the Gaza Strip, Jordan and Lebanon with a special focus on refugee camps. A minimum of 180 CBOs and grassroots organisations participated in 17 community-based rounds of discussion and the final conference *Rooting Development in the Palestinian Context*. These organisations mainly work with youths, women, disabled individuals, local councils, agricultural cooperatives, youth initiatives and activists.
- A total of 1,700 people were directly involved in the meetings, seminars and training sessions as well as being included in research activities through various focus group discussions, in-depth interviews and surveys that were held in multiple areas.
- 73 fieldworkers were involved in different stages of the training program on social science research methodologies in Jordan and Lebanon, 47 of them (32 female and 15 male) successfully completed the training.
- The CBO Mousawat established a partnership with the Institute for Palestine Studies, which is a research centre specialised in Palestine Studies in Lebanon.
- 23 MA students from Birzeit University and 18 from Al-Azhar University participated in the advanced training program in the Gaza Strip and the West Bank. 25 of them graduated at the end of the project (16 of them female).
- The trainees of both training programs drafted 20 research papers with a special focus on socio-economic and political challenges living under occupation in the West Bank and the Gaza Strip and in the diaspora.
- More than 150 students directly participated in activities held by the project partners at Birzeit University, Al- Azhar University and the University of Vienna.
- 500 students participated in project related lectures by attending courses taught by Ayman Abdul Majeed and Abaher Al-Sakka at BZU, Ali Abu Zeid at Al-Azhar University and Helmut Krieger at BZU and DDS.
- 16 academics and researchers were involved in the training and mentoring of trainees and students in different areas (7 of them were female).
- Two summer schools were held in Beirut (2017) and Vienna (2018).
- An appendix to the existing handbook on social science research in the Palestinian context was drafted, focusing on the experiences and lessons learned through working with colleagues from Jordan and Lebanon.
- CDS developed a proposal for a Master's Program in Community Development. The university council approved the concept for the proposal in November 2018. The proposal was submitted to the Ministry of Higher Education in June 2019.
- Four scientific papers will be published in Idafat, the Arab Journal of Sociology by the end of this year.
- Numerous articles, reports and discussions about project activities were disseminated in scientific and non-scientific media outlets.
- The project raised the awareness of numerous colleagues at Birzeit University, Al- Azhar University and the University of Vienna regarding the importance of transcending borders in knowledge production between academics, marginalised communities, activists and CBOs in the four localities, and the centrality of Palestinian refugee camps as a central point of reference in discussions about alternative development.

- At the end of the project, DDS, CDS and Mousawat, together with other partners were able to successfully submit another project entitled 'Knowledge Production in Times of Flight and War – Developing Common Grounds for Research in/on Syria (KnowWar)' to the Austrian Development Agency. Designed as a capacity development and research project, KnowWar will not just further strengthen the already existing long-standing cooperation, but will extend it to academic colleagues from Syria as well.



A panel on main findings of the training program by some of its participants held at the final conference at Ibda' Center in Dheisheh Refugee Camp in Bethlehem in January 2019

*From left to right:
Anas Lahaseh,
Ghada Shafout, Karam
Abu Alhala, Khaled
Zeideldine, Horeih Hamed*



Visit at Sabra and Shatila refugee camp in Lebanon by participants of the training program in 2017



Closing ceremony at the summer school in Vienna in 2018

From left to right: Ayman Abdul Majeed (CDS), Manal E'Mar (CDC), Rawya Mousa (Mousawat), Dr. Helmut Krieger (DDS)



Public panel discussion at the summer school in Vienna in 2018

From left to right: Kassem Sabah (Mousawat), Dr. Helmut Krieger (DDS), Manal E'Mar (CDC), Klaudia Wieser (DDS), Dr. Lena Meari (IWS, Birzeit University), Ayman Abdul Majeed (CDS), Maya Zebdawi (translator)

3.2 Strengthening Higher Education Capacities in Palestine for Gender Equality

Project Coordinator: Sanaa Aboudagga

Coordinating Institution: Islamic University of Gaza

Partner Institution: University of Graz

Partner country: Palestinian Territories

Project duration: 12 June 2017- 30 November 2020

3.2.1 The project – SHE-GE

Answering the request by the Islamic University of Gaza (IUG), the Department of Sociology at the University of Graz (Uni Graz) engaged in this academic partnership for the development of gender studies. The project intended to strengthen “skills in social sciences as an instrument to systematically analyse the reasons for poverty and to empower capacities in social science research”. As such, the project facilitated the development of gender studies as a core discipline within the social sciences. In the absence of gender studies at any institution of higher education in the Gaza Strip, the IUG was a forerunner and eager to develop its staff capacity in that field.

Designed for a period of three years, this cooperation project and its ideals and activities were demand-driven, responsive to the partnership expectations, and empirically grounded based on the social and political realities of the Gaza Strip. The project was rooted in a thorough assessment by the IUG partner of the needs, potentials and circumstances of IUG, wishing to establish a Centre for Women’s & Gender Studies (WSC) with an interdisciplinary orientation, institutionalised by staff development, curriculum development and research development, and supplemented by an outreach component to women’s groups and the community as a whole.

With this approach to capacity building, the project resulted in:

- Staff development: One-year postgraduate module in Interdisciplinary Gender Studies (16 ECTS) taught in English during the first and the second year of the project and certified by Uni Graz for IUG staff. The module was taught online with the opportunity to hold personal consultations.
- Curriculum development: a) Developing an MA programme in Women’s and Gender Studies at IUG and submitting it for accreditation. b) English and Arabic-language reference library development, compiling and translating into Arabic an anthology of texts as a base for the courses at IUG. c) Reforming the curriculum of the IUG course ‘Human Rights’. The Human Rights course is one of the courses that is taught at IUG for all students from all disciplines. This activity aimed at redesigning this course to include components on women’s rights and gender equality.
- Research development: “Mirror MA theses”: This activity was an add-on to the capacity building in terms of developing research collaboration and competence in gender issues. Project staff from IUG and Uni Graz formulated four MA student research projects leading toward an MA thesis. Each of the four topics were researched by a student simultane-

ously at IUG and Uni Graz and supervised by the faculty at the respective universities, the projects thus “mirroring” each other.

- Establishment of a Women’s and Gender Studies Centre. The Centre was equipped and acted as a research and studies hub in the field. The Centre was established by the beginning of the 2nd year and led the educational and research activities in the field of Women’s and Gender Studies.
- Community Outreach: Capacity building of the local community in the field of Women’s and Gender Studies: a) As part of the Centre’s activities, the Centre’s staff and the IUG staff who received education in the field of Gender Studies at Uni Graz developed two training modules targeting higher education actors and women’s organizations in Gaza.
- Public lectures on various topics of gender issues to target women’s groups, higher education institutions, government administration and the general public.

Given the restrictions on travelling to and from Gaza, the project used creative and innovative methods of learning and academic exchange through online communication (distance learning platform, student blogs in the case of the mirror MA theses and workshops) and all of these activities provided capacity for a future MA programme in women’s and gender studies at IUG.

The whole project was based on the Palestinian National Development Strategy regarding higher education, the Palestinian National Gender Strategy, and the Palestinian National Strategy to Combat Violence against Women. The project had the full support of the Minister for Women’s Affairs, the Rector of IUG and the Rector of Uni Graz.

3.2.1 Why was it important to start the project in Gaza?

by Sanaa Aboudagga, Amani Al Maqadma

To start with a little bit of context, the Gaza Strip is the southern part of the Palestinian Territories. It is located in the heart of the Middle East directly on the Eastern coast of the Mediterranean Sea. It is administratively divided into five governorates with independent local authorities. Following the political situation in the Gaza Strip in 2006, a siege was imposed on the Gaza Strip affecting all developmental, educational, economic, and international activities in the Gaza Strip, which has had devastating effects on large segments of the civilian population, both men, women and children.

The Palestinian women, especially Gazan women, have been facing serious challenges as they have had to endure difficult circumstances due to a lack of opportunities and complex vulnerabilities in addition to the difficulties women usually face in the many parts of the world (poverty, domestic violence and violence against women, discriminatory legislation).¹ Their roles are manifold and they form the lifeline of their communities: heading house-

1 UN-Women (2011): Cross-Sectoral National Gender Strategy (occupied Palestinian territory): Promoting Gender Equality and Equity 2011-2013. Retrieved from: <http://www.unwomen.org/en/digital-library/publications/2011/5/cross-sectoral-national-gender-strategy-occupied-palestinian-territory-promoting-gender-equality-and-equity-2011-2013>, 15. In 2007, the poverty rate in Gaza was 52%, and 19% of the population suffered from severe poverty. See p. 29.

holds, raising children, sustaining subsistence livelihoods, and caring for the sick, wounded, and elderly. Women have been at the forefront of developing day-to-day survival strategies for their families.

The Palestinian Authority (PA) took its responsibility towards supporting women and enhancing their lives by being committed to equality and equity, respect for human rights, and the active involvement in eliminating all forms of gender-based discrimination.² This commitment is especially visible in the development of two Cross-sectional National Gender Strategy Promoting Equality and Equity plans 2011-2013³ and 2014-2019. These two plans have concentrated on different aspects including: 1) Supporting the institutions and organisations that work in the field of women's empowerment to enable them to provide high quality services to women in society; 2) Capacity building of Palestinian women to enable them to act as future leaders in the community.

Furthermore, during the past decade, the Palestinian government has taken several ground-breaking decisions that all demonstrate commitment to advance gender equality and the empowerment of women. In 2006, UN Security Council Resolution 1325 on Women, Peace and Security was adopted; in 2008, the Palestinian Women's Bill of Rights was developed; in 2009, CEDAW, the Convention on the Elimination of All Forms of Discrimination against Women was endorsed; in 2010, the Ministry of Women's Affairs established a UNSCR 1325 National Committee⁴; in 2011, the Palestinian National Strategy to Combat Violence Against Women 2011-2019⁵, and also in 2011, the first Cross-Sectoral Gender Strategy 2011-2013 were adopted⁶. The government established Gender Units across line ministries and national committees to combat violence against women in line with Security Council Resolution 1325 and Gender-responsive Budgeting (NDP 2014-2016, p.64).

However, with this obvious commitment from the PA's institutions and NGOs towards gender equality and the empowerment of women, in addition to the high enrolment rate of women in higher education institutions, the male-female labour market gap in Palestine is still considered to be the highest in the MENA region; adding to this, there is inequality in the daily wage and participation in the decision-making process at all levels. Based on the World Bank statistics, the unemployment rate for males with higher education in Palestine was 16.2% compared to 47.8% for females with higher education in 2016. The statistics in the Gaza Strip are even worse; according to the Palestinian Central Bureau of Statistics (PCBS) in 2018⁷, 29.4% of women in Gaza participated in the labour force, while the unemployment rate among women there stood at 74.6%. Furthermore, women's participation in

2 Rabiha Diab (2011): Foreword. In: Cross-Sectoral National Gender Strategy (occupied Palestinian territory): Promoting Gender Equality and Equity 2011-2013, 5.

3 A concrete example shows this commitment: the recently organized seminar Gender-Based Violence in the humanitarian context of the Gaza Strip brought together national and international representatives from civil society, humanitarian, development organisations and donors.

4 <http://palestine.unwomen.org/en/what-we-do/peace-security-humanitarian-response/facts-and-figures#sthash.nwstpn08.dpuf>

5 <http://mowa.pna.ps/English%20Part.pdf>

6 UN-Women (2011): Cross-Sectoral National Gender Strategy (occupied Palestinian territory): Promoting Gender Equality and Equity 2011-2013. Retrieved from: <http://palestine.unwomen.org/en/digital-library/publications/2011/1/csngs-2011-2013>. The new Cross-Sectoral Gender Strategy 2014-2016, which sets the gender equality's strategic priorities and objectives, is currently developed. <http://palestine.unwomen.org/en/what-we-do/national-planning-and-budgeting/programmes#sthash.gal8hTLe.dpuf>

7 <http://www.pcbs.gov.ps/post.aspx?lang=en&ItemID=3381>

decision-making and holding leadership positions, according to PCBS (2019)⁸ data, is still limited compared to men in both the West Bank and the Gaza Strip.

To contribute to achieving the national plans and commitment towards women's empowerment and gender equality, there is an obvious need for national collaborative integrated efforts that are distributed among different societal actors and that can bring about transformative change. Tertiary education in Gaza, as an important sector, has a crucial role to play in yielding a shift towards gender equality, as it is considered a stage through which young people form their identity, personality and perceptions towards bringing about positive change in respect women's issues in society. This indicates that the interventions made by higher education institutions in Gaza with regard to women empowerment and gender equality are of great consequence if conducted properly and in connection with the values of the Gazan community that respects the positive sides of the culture in place on the ground.

This is where the role of the Islamic University of Gaza (IUG) comes into play, one of the biggest and oldest universities in Palestine and Gaza. IUG has a respected position in both the Palestinian community and the tertiary education sector in general. In relation to values, IUG has been established, as its name indicates, to reflect the Islamic image and teachings in addition to having faculties of Sharia and Islamic Law, besides the many other applied and social sciences faculties. IUG's educational position in the community has been created through its comprehensive and strategic planning, where the university tries to keep pace with developments in different fields, as well as responding to societal needs through its national and international collaboration activities. Even though IUG's academic staff are drawn from different disciplines and graduated from well-recognised universities worldwide, there are no faculty members specialised or partly involved in the field of Women's and Gender Studies, and no programme in this field is offered at IUG or at any university in the Gaza Strip. Moreover, there is no women or gender studies centre at any university in the Gaza Strip.

The SHE-GE project at IUG aims to build the capacity of the university in the field of gender studies to enable IUG to tackle critical women's and gender issues in society. The participatory and demand-driven approach of the SHE-GE project was utilised from the very beginning of the project proposal preparation in such a way that the project was designed to cover the needs of IUG as an institution. Specifically, the SHE-GE project embarks on a pioneering journey for IUG as it combines institutional capacity in women and gender issues in addition to enhancing staff capacity, research and reaching out to the community. This was possible thanks to the remarkable partnership and cooperation with Uni Graz. The Department of Sociology at the University of Graz is the only department in Austria that has a chair in the Sociology of Gender. In addition, the Uni Graz also offers an inter-faculty Master of Arts (MA) in Interdisciplinary Gender Studies⁹. In this unique combination, the Uni Graz was able to offer outstanding experience, knowledge and skills that IUG finds important for establishing a partnership. Prof. Libora, Dr. Brigitte and her team successfully supported IUG in their efforts to establish WSC, the first of its kind in Gaza, and to implement the many different activities that were designed to promote the concept of gender equality.

The establishment of the WSC at IUG acted as the umbrella for all educational and

8 <http://www.pcbs.gov.ps/site/512/default.aspx?lang=en&ItemID=3679>

9 <https://koordination-gender.uni-graz.at/de/geschlechterstudien/masterstudium-interdisziplinaere-geschlechterstudien/>

research activities at IUG in the field of women's and gender studies. The establishment encompassed installing the equipment, developing its webpage, developing the WSC strategic plan for three years and annual plans for three years. Moreover, the centre was supported with a variety of library resources: the compilation of women's and gender studies electronic and print publications in Arabic, and the provision of more than 400 books. In addition, during the project, five online gender-specialised courses were developed by Uni Graz, many workshops and lectures were held with audiences from IUG and other higher education institutions in Gaza. In this way, the foundation of the WSC makes it possible for IUG to provide continuous learning and research in relation to women and gender issues.

The project team's approach in implementing the project helped to engage many IUG staff, students and the larger Gazan community in the project activities. In the early stages of the project, the SHE-GE team at IUG formed an internal consulting committee whose members were drawn from the faculties of Sharia and Law, Religious Foundations, Engineering, and Education. The role of this committee was to disseminate project concepts and participate in the project's various activities. This gradual approach created acceptance among different university actors with regard to the use of "Gender" and "Gender equality" terms and to understand how these concepts are connected to women's rights under Islamic Sharia law. Consequently, various projects activities were implemented successfully at the wider level of the university, which enabled the creation of a culture of acceptance of the term "Gender" at the university. For instance, a committee from the faculty of Sharia and Law developed a chapter entitled "Women Rights in the Sharia Law, International Law and the Palestinian National Law". This chapter has become part of the material of the human rights course that is offered as a university requirement course. Furthermore, different IUG staff successfully completed the "Multidisciplinary Gender online courses" that were designed by Uni Graz. In addition, many university administrative and academic staff from IUG, other higher education institutions in Gaza and the community completed the training that was designed by three IUG staff who were enrolled in the "Multidisciplinary Gender online courses".

It is possible to say that the university witnessed an interest in understanding the concept of "gender" with regard to how this term relates to Islamic values, meaning that IUG staff started to reflect on gender issues in the different student discussions, sessions, research and projects. Moreover, different departments started to recognise the term "gender" in student research projects and theses. This interest was further disseminated to other staff in Gazan universities. For instance, some of the staff from other Gazan higher education institutions who participated in the WSC training started to reflect on some of their university courses in order to reform the curriculum by placing more emphasis on gender and women's rights in the community. In other words, the SHE-GE project succeeded in pointing out the importance of applying the "gender lens" in various institutional, educational and social activities at the horizontal level.

To conclude, the importance of the project can be seen from the following factors:

- Its link to the local needs of Palestinian women in Gaza and the challenges they face.
- It's the first project that has tackled gender and women's issues academically through one of the biggest and oldest higher education institutions in Gaza.
- The approach links gender equality concepts to the existing culture in Gaza.
- The approach focuses on well-recognised international experiences in gender issues.

3.2.3 Project results: planned, collateral and contingent

by Libora Oates-Indruchova

Although I have participated in the development and institutionalisation of gender studies in the Czech Republic since the early 1990's and have been a part of several degree as well as non-degree programmes, starting this cooperation project was stepping into a great unknown. There was the cultural difference, unknown institutional dynamics and multiple logistical issues to solve at both universities. Both project partners assumed that everything that the project was going to do would be new at the Islamic University of Gaza, but as the Graz team discovered during the project-writing phase and later, several of the planned activities were if not pioneering, then at least unusual also within the institutional structure of the University of Graz. I was used to flexible structures from my previous appointments and student experience that would allow for the incorporation of a new course or teaching form into a curriculum, which in Graz met with some constraints. For example, until the COVID-19 crisis, the official regulations permitted only 20 percent of any class to be taught online. Our project assumed 1-2 *fully online* courses every year that would be offered simultaneously to Uni Graz students and participants from the IUG.

Thankfully, I was ignorant of the regulation at the time, not anticipating that a teaching method *could* be subject to restrictions, and so the project successfully taught a total of 5 MA courses either via asynchronous Moodle discussion or direct video conferencing. Although we did not ask for permission, nobody complained or tried to prevent us from engaging in this experiment in multi-site classroom practice. The courses were an unquestionable success at both universities: apart from the content set in the syllabi, they offered collateral knowledge and experience. The Graz team was perhaps the first to use the newly furnished video-conferencing classroom at the Faculty of Business, Economics and Social Sciences and both students and lecturers were together probing and learning the limits and possibilities of this mode of communication. Now, in December 2020, after almost two semesters of online teaching forced upon us by COVID-19 crisis, this feels prehistoric. We all had learned new skills before the “global pandemic” hit. Switching to online communication in all of our classes last March was not as challenging for us as it perhaps was for many other lecturers and students.

Above all, however, the teaching and learning experience was an exercise in intercultural communication. The Uni Graz team benefitted from the vast experience of Dr. Brigitte Holzner who worked, among others, in post-conflict zones and specialises in issues of gender, security and peace building—a vantage point of extreme usefulness for both, creating course content relevant to IUG and identifying potential points of contention or cultural misunderstanding that could disrupt the learning process, such as when one of our guest lecturers tried to tailor the teaching examples to the conditions in Gaza and chose for analysis a video clip about flight from a conflict zone. Fortunately, Brigitte tested all the links to the online examples before the class and while a video, but—unbeknownst to us in the classroom—an audio connection to Gaza had not yet been established. To our horror in Graz, sounds of bombing began to fill the classroom. We thought that the post-conflict reality interfered brutally in our class, that another bombing attack had just begun in Gaza. Alas, our guest speaker explained that it was merely the soundtrack accompanying the video clip. We were relieved and took this particular video off the programme, but it was a reminder

of the unstable reality in which our IUG colleagues had to work every day. We could only muse on if *they* would, actually, be much less disturbed by the video than we cushioned in the safety of our Graz classroom.

On a couple of occasions, the Graz team missed the sensitive mark of balanced understanding. The examples that were supposed to illustrate a research method or problem turned out to be too culturally distant for some of the IUG participants and either did not fulfil the explanatory function or diverted the discussion off topic. Even this was a part of our mutual learning process: to realise where exactly the differences between our (academic) cultures were greater than we imagined—or smaller. In numerous places in the online discussions, the Graz and IUG students together arrived at the conclusion that many inequalities between men and women were not that different, albeit surrounded by different historical and cultural contexts.

The video classroom also became a site of self-reflection for the Graz students. One of them observed that the IUG students had more questions to ask in the discussion than their Graz counterparts: “We are so privileged: we take it for granted that we can ask questions, so we now don’t take advantage of the opportunity.” A lecturer could hardly wish for a greater achievement in a sociology class than this critical reflection of one’s positionality due to privilege.

The enrolment in the online courses on the side of the IUG exceeded all our expectations. It was hard to predict at the beginning, what the interest among the faculty and students in the variety of gender topics that the project offered would be. Gender perspective had never been a part of the course content at IUG, consequently there was no prior point of reference for our prospective audience. The project coordinator, Professor Sanaa Aboudagga, worked hard in spreading information among her colleagues and more of them signed up for the first course than we planned for the duration of the entire project. In the end, there were 27 individual enrolments from among the faculty members and postgraduate students over the five courses—a core group to benefit from and contribute to the newly founded Women’s Studies Centre (WSC). IUG thus has a broad contingent of researchers equipped with knowledge on a variety of gender issues, on which the university can build expertise more or less across its faculties.

This expertise has been further deepened by an experiment in working on student MA projects, known as the “Mirror MAs”. A student from Gaza and a student from Graz worked simultaneously on the same umbrella topic, thus “mirroring” each other. Each proceeded from the perspective of their own disciplines and on different subtopics, but they communicated at regular intervals via Moodle discussion on their progress, needs and the overall research experience. The SHE_GE project altogether supported eight such MA dissertations supervised not only by the professors from the project teams, but also by Professor Hala El-Khozondar, the coordinator of another APPEAR project in Gaza, and two other professors at Graz. This variety achieved greater interdisciplinarity of the MA research projects than the specialisations of our professorial staff, Professor Sanaa Aboudagga and myself, would have allowed. We are proud of the amount of research that was conducted. We need to say self-critically, however, that the communication within the pairs of students could have worked better than it did. The discussion posts were not always submitted on time and not as extensive as they could have been. Nevertheless, it was an original experiment and we have certainly taken away plenty of experience from it that we hope to utilise by improving the method in the continued cooperation that we are already planning.

After three years of close collaboration, it feels like we have known each other for a long time. Yet, only Professor Sanaa Aboudagga managed to visit Graz for a week in the first year of the project. Nobody else from either side got to travel to the partner university due to the security situation in Gaza and much tougher restrictions on movement out of Gaza than at the time of drafting our project proposal. We planned for this eventuality from the start, but hoped that we would be able to get acquainted with the physical locations, the cultural environments and the people who were each other's project partners. There is no question that it would have been beneficial to our cooperation and ease of communication had we been able to do that. With hindsight, however, we turned the adverse circumstances into an advantage. We adjusted our programme, added a whole course by video conference and several lecturers, and thus made the budget stretch further: instead of two of us visiting Gaza or Graz for a week, we could offer a full course to two dozen students from both universities and address several additional topics in individual lectures, which attracted audiences from well beyond our project: university administrators, people from NGOs and representatives from the Palestinian Women's Ministry and the United Nations.

In sum, where the planned activities were able to take place, we were amazed at the level of interest they attracted. Upon reflection, they also generated plentiful collateral experience, skills and knowledge. If they were not able to take place, the contingency plans that replaced them were a source of further intellectual nourishment and increased the impact of our project. We can say with certainty that if we together started to build women's and gender studies from ground zero at the IUG, now there is a dedicated organisational unit, the Women's Studies Centre, that is firmly a part of the university structure, it has a faculty educated in gender studies, a reference library of books in both English and Arabic and, most importantly, a community of women and men from within and outside of the university interested in gender issues.

3.2.4 Enumeration of the project results

- Establishment of the Women's Studies Centre at IUG and its full incorporation into the university organisational structure;
- 5 online courses offered together as a postgraduate module in interdisciplinary gender studies;
- 27 enrolments from among IUG faculty (23 women, 4 men) into the individual online courses;
- 8 public lectures video streamed to IUG;
- A workshop series of 5 lectures on qualitative methods for gender researchers, attended by 57 faculty and students at IUG, and run as a regular MA course for students of Uni Graz;
- One-year research seminar offered at Uni Graz to consult on individual research projects of the IUG participants;
- Support for 8 "Mirror MA" dissertations (4 at IUG, 4 at Uni Graz);
- A translation into Arabic of a basic textbook in gender studies;
- A 27-page bibliography of resources on women's human rights for the reform of the Human Rights curriculum at IUG;
- Establishment of a specialised library at IUG with more than 400 volumes in English and Arabic;

- An international conference “Women in higher education” at IUG Women’s Studies Centre (WSC); 19 contribution abstracts are available online at <http://shege.iugaza.edu.ps/Publications>
- Organisation of Scientific Days at IUG:
- “The multiple roles of Palestinian women: Burdens & accomplishment”;
- “Palestinian family: Challenges and resilience”;
- Study visit at the University of Graz by Prof. Sanaa Aboudagga; further visits of more staff were prevented due to the international security situation.
- Two training programmes for the community and higher education institutions in Gaza held at the WSC.
- Three publications connected to gender studies (two articles, one book chapter):
 - Alsoofi, H, Sayma, S., Abou-dagga, S. (accepted for publication in April 2021). Woman empowerment in the Palestinian society from an educational perspective: An analytical study. Educational and Psychological Journal. Vol (18) 69.
 - Abou-dagga, S. Alsoofi, H, Sayma, S. Almasri, Sh. (2020). The attitude towards equality between men and women and its source of formation among Palestinian education post-graduate students. Sultan Qaboos University Journal of Educational & Psychological Studies. <https://journals.squ.edu.om/index.php/jeps/issue/view/244>
 - Abou-Dagga, S. (2020). Islamic University of Gaza’s (IUG) internationalization endeavors at the level of postgraduate programmes. In G. Fassetta, N. Al-Masri & A. Phipps (Eds.), “Multilingual Online Academic Collaborations as Resistance: Crossing Impassable Borders”. Publisher Multilingual Matters



ADC and UN women delegation visit to Centre for Women’s & Gender Studies at IUG



*Final press conference
organised in Vienna,
copyright Zojer-Concordia*



Leaflet of opening session at International Conference organised by IUG



*Presentation of advisory
board member Helmut
Krieger*



*Visit of Sanaa Aboudagga
at Graz University and
exchange with Austrian
colleagues*

3.3 Promotion of Energy-Efficient Buildings towards Developing a Sustainable Built Environment in the Gaza Strip, Palestine

Phase 1 – Academic Partnership

Project Coordinator: Kristina Kiesel

Coordinating Institution: Vienna University of Technology (TU Wien), Department of Building Physics and Building Ecology, Institute of Architectural Sciences

Partner Institution: Islamic University of Gaza (IUG), Architecture Department

Partner Country: Palestinian Territories

Project Duration: 1 May 2015 – 30 April 2017

3.3.1 About PEEB

The project “Promotion of Energy-Efficient Buildings towards Developing a Sustainable Built Environment in the Gaza Strip, Palestine” (PEEB), is an academic partnership project implemented by the Architectural Engineering Department at Islamic University of Gaza (IUG) and the Institute of Architectural Science at Vienna University of Technology (TU Wien). It was funded by the Austrian Partnership Programme in Higher Education and Research for Development (APPEAR) and Austrian Development Cooperation (ADC). The main aim of the project was to promote energy efficiency in buildings as a strategy to achieve a sustainable built environment in the Gaza Strip, Palestine. The project sought to develop an approach for sustainable building design and construction that contributes to reducing the energy consumption of buildings and its adverse environmental impacts.

Objectives

- Facilitate a transition towards more environmentally sustainable development in Palestine.
- Establish a research cluster in the field of energy efficiency.
- Increase public awareness of the importance of reducing energy consumption in buildings.
- Capacity building for local organisations in the field of energy-efficient buildings.
- Incorporate energy-efficient building design into the curricula of the architectural programmes.
- Develop collaborative relations between Palestinian and Austrian institutions.

Activities Conducted

- It was believed that building awareness and skills can help to drive sustainable construction forward, thereby making skills-led strategies for energy efficient buildings viable. Therefore, the project activities included developing a specific module on energy-efficient buildings to be incorporated in the curricula of the architecture department at Islamic University of Gaza (IUG).
- In addition to establishing a training programme on different sustainable construction solutions and technologies aimed at minimising the energy consumption of buildings. The programme aimed to improve the practical skills of architects and engineers working

in local organisations involved in the sector of building design and construction in the Gaza Strip.

- To facilitate the teaching and training processes, a computer lab was established at IUG, equipped with computer machines, the required fittings, thermal simulation software (DesignBuilder) and environmental measurement tools.
- Various promotional activities, including a scientific conference, workshops and lectures were organised to promote the subject of energy efficiency in buildings and create a general trend towards developing a sustainable built environment in the Palestinian Territories.
- Moreover, the project contributed to strengthening the cooperative relations between the Palestinian and Austrian institutions and established long standing academic and research links.

3.3.2 Why this project?

by Ahmed S. Muhaisen

The situation in the Gaza Strip

The Gaza Strip is a narrow land area located in the South-Eastern Mediterranean Sea, with a length of about 41 km and a width ranging from 6 to 12 km. There are approximately 2 million inhabitants living in the Gaza Strip in an area stretching over 360 km², which makes it one of the most densely populated areas in the world. The Gaza Strip is linked to the outside world through five border crossings; four with Israel and one with Egypt.

Israel has imposed a strict blockade on the Gaza Strip since the Hamas Movement took power over the Strip in June 2007. The blockade included the closure of all crossings that link the Gaza Strip with Israel, preventing the movement of people and the entry of goods and materials, with the exception of some basic humanitarian necessities. The blockade has resulted in a severe deterioration in the social and economic situation in the Gaza Strip.

Integration of the Project into the Overall Societal Context

There is currently an acute shortage of energy, drinking and irrigation water, sewage water treatment and housing services in Gaza. Therefore, development and economic growth in Gaza is severely challenged and consequently unemployment and poverty are widespread. As a result of the shortage of electricity, the electric current is cut off for at least eight hours per day, causing disruption to economic activities and all aspects of life. For example, the medical services provided by hospitals have deteriorated significantly, water supply and sewage treatment have also been adversely impacted. In addition, many small businesses, which depend on regular electricity supply, have been badly affected adding more problems to the deep economic crises prevalent in the Gaza Strip.

Applying energy conservation and efficiency measures in residential buildings is highly recommended to improve the overall energy situation in Palestine. However, there is a general lack of awareness among the public and decision-makers of the potential benefits of these measures. In addition, the number of trained designers, engineers and technicians who are able to produce energy-efficient buildings is very limited. Therefore, it was believed that the project activities aiming to provide academic qualifications, skills and training in

the field of energy efficiency will enable the introduction of practices, technologies and solutions that can be used in sustainable construction. The project was proposed as part of an overall solution to the energy problems in the Gaza Strip. It also aimed to help create new job opportunities in a number of fields, both in occupations similar to those in conventional construction, as well as in a number of entirely new ones. This was expected to contribute to reducing the unemployment rate, reviving the economic situation and, consequently, enhancing the living conditions in Gaza.

Feasibility and Limitations of the Project

The project activities were chosen carefully in order to achieve the stated objectives of the project, and in accordance with the local conditions in the Gaza Strip. According to the logical framework of the project, the majority of the project activities were feasible and can be carried out taking into consideration the overall societal context. Therefore, the main project objectives, including raising public awareness, capacity building for local staff, and developing the curricula of the architecture department at IUG, were all achievable.

However, some activities, namely, the exchange of staff and students between the northern and southern partners was not fully achieved as planned. This is due to the unstable political situation in the Middle East, and the restrictions on movement imposed on the Gazans. In order to overcome this limitation, the Palestinian and Austrian teams made extensive use of remote means of communication, such as Skype and video conference facilities, to compensate for the lack of face-to-face meetings.

Internationally Funded Projects

A number of strategic projects to improve the electricity situation in Gaza have been suggested by the Palestinian Authority. These include connecting the Palestinian electricity network with that of Egypt through the eighth Connection Project. This is a regional project aiming to connect the electricity networks of eight countries, namely Egypt, Libya, Jordan, Lebanon, Syria, Iraq, Turkey and Palestine. Another planned project is to obtain more electrical load from Israel through the Line 161 Project, which is expected to provide the Gaza Strip with 300 MW. Supplying Gaza's power plant with Egyptian natural gas, which will help to exploit the local generation plant to the fullest extent and achieve a maximum capacity of 140 MW, has also been suggested.

It is evident that implementing any of these projects could ensure adequate electricity supply in Gaza for several years in the future. However, this would not be an easy undertaking and may not be achievable as long as the Israeli-Palestinian conflict continues. Even if this could be achieved, it should be noted that using fossil fuel to generate electricity produces large amounts of greenhouse gas emissions and causes adverse effects to the human health as well as the environment, both locally and globally. This further emphasises the need to have alternative energy resources that are safe, clean, and contribute to create a green built environment in Gaza. Using renewable energy resources available in the Gaza Strip in the domestic housing sector, especially solar energy, as well as improving energy-efficiency in buildings as far as possible, has consequently been proposed as part of an overall solution to the electricity problems in Gaza.

There are some projects related to improving the energy situation in Gaza that have been recently funded by international organizations. The majority of such projects concentrate mainly on supporting PV installation on buildings to generate electricity using available

solar energy. These projects target basically public buildings, such as schools, hospitals and service buildings. Despite of the importance of these projects, they mostly do not pay adequate attention to energy conservation, especially in residential buildings. Hence, there is generally a lack of funded projects that aim to improve energy efficiency in buildings as an approach to conserve energy and contribute to minimising the adverse effects of the energy crisis. Therefore, the PEEB project came about as an attempt to bridge the gap and to complement ongoing funded projects regarding PV electricity generation.

The Contribution to a General Discussion

Recently, there has been an intense discussion on the subject of the energy crisis in the Gaza Strip and possible solutions to this. It has become evident to some of the public and decision-makers that there is a need to find alternative sources of energy, in addition to rationing the use of available energy. Most initiatives and projects that aim to achieve such an approach are focused on raising public awareness and encouraging the use of renewable energy resources, namely solar energy. Very little attention is generally paid to improving the thermal performance of buildings, as a way to reduce their energy consumption. This is mainly due to the lack of knowledge, specialised designers and technicians to produce such innovative types of buildings in Gaza.

Consequently, the project was in line with the general trend towards rationing the use of energy and increasing public awareness. It contributed considerably to supporting the current discussion in the field of energy conservation, as well as funding practical initiatives to be carried out. The project is considered unique and innovative, taking into consideration the very special societal context in the Gaza Strip.

3.3.3 Gender perspectives

by Kristina Kiesel and Asma Naim

Gender is often seen as something that only affects women, but it applies to all people and questions socially constructed behaviours and roles which are attributes assigned to individuals based on their sex at birth. Certainly, gender perspective requires the discussion of women's rights, and much work needs to focus on strengthening women's participation, recognition and exposure.

Our behaviour often consolidates the dominant notions of the roles women and men are expected to adopt and how they are expected to act. This applies to both social structures and ourselves as individuals. It is therefore important to keep a critical mind about gender so that the gender perspective will have an effect on our work. Issues relating to gender and equality are not something that can just be added in at the end along with the completed contextual analysis and project descriptions. Awareness and knowledge of gender power relations should be present from the start, in the planning of projects, in information about development issues, and in campaigns, training courses and other activities.

The unequal participation of women in numerous processes, such as decision-making, policy-making, and planning, but also in labour markets, eventually leads to inequalities and often prevents women from being engaged in final project implementations. In the engineering and research community in particular, the importance of improving gender

balance and – in this case – increasing the participation of women should be recognised and encouraged. The gender dimension should be embedded in all aspects of life, which will ensure a balanced involvement in numerous activities.

Within the PEEB project we questioned the way the gender related problems are formulated. From the very start of our work, we strived to integrate the gender perspective in every detail by placing a special focus on the team structure, including forming a gender-balanced consortium within the whole team and at all levels, and by making it possible for all members of the team to combine work and family life. To achieve this, we had the courage to question our previous descriptions and analyses, discuss the issue with partners and collaborating organisations.

Finally, the team was formed including female and male staff in both teams at the TU Wien and IUG (Islamic university Gaza):

- In the TU Wien team, two female researchers (including project coordination) and one male researcher were involved in this project.
- In the IUG team, we had two male researchers and one female researcher.

Furthermore, the gender perspective has been taken into account and reflected upon carefully throughout the whole project. As a project working on the development of a global issue, we strived to ensure that the gender analysis is ubiquitous. One part of the project was to analyse the situation regarding buildings and the construction industry, energy consumption, energy supply and efficiency, and the planning process in Gaza. A special focus in the discussions within the team was also placed on how the current situation regarding these issues affects all people (men, women and children) regardless of their social situation, gender and age. Moreover, considering the consequences are different for different people, every step in our work has taken into account how it will eventually affect both women and men. The gender analysis that was conducted answered a number of questions, such as how living conditions, rights and opportunities manifest themselves for women and men within the engineering community, and in the Palestinian context as a whole. It included information on the authority and control those women have over their own lives, their opportunities and prospects to take part in society and exercise their citizen's rights, or the way in which resources are distributed between women and men. We conducted our analysis together with our partner, and with the help of studies and reports that noted the conditions of women in Palestine, especially in Gaza. The analysis shed light on general situation in the engineering community, the Islamic University and the Palestinian context as a whole.

The project teams have also focused on carrying out the activities targeting females and males equally. This included numerous workshops, training courses and lectures that were attended by almost equal numbers of females and males. Especially after the first training courses, word of mouth led to more and more interest from female students and therefore ultimately greater levels of female participation.

Furthermore, the gender perspective was clearly apparent in the active participation of female and male researchers and audience members who participated in the International Energy Efficiency Conference held at the IUG in October 2016. Moreover, during the conference preparations, female staff were incorporated in the research activities related to the project through the inclusion of two female researchers from IUG in the scientific committee of the conference. Female staff and students were also strongly encouraged to participate

and promote knowledge, by submitting papers and by presenting their work in the conference sessions. As a result, we received 4 full papers that were submitted by females, including three females from Gaza, one member of staff at IUG and two graduates (from the students who studied the developed module last term and have successfully graduated recently) and one from Libya. In addition, 4 papers were co-authored by female researchers.

However, one obstacle that we frequently encounter is the lack of female researchers in the construction sector, and especially in energy and building physics related subjects. In TU Wien, at the department of building physics and building ecology there are currently 4 males and 1 female staff researcher, and the situation at IUG is similar. Therefore, the aim to encourage an equal number of female students to participate in the module was a particular priority for the whole team. Additionally, these students were encouraged to specialise in energy efficiency during their studies. In terms of numbers, we had 80 female students finishing the courses as opposed to 40 male students. They were very enthusiastic to learn what was offered within the module and acquire new design and practical skills. This was clearly shown in the final grades and marks achieved by female students, which were much higher than those attained by males. We hope that this new module and the high levels of female participation will eventually help to change the picture in this research field.

In fact, one of the objectives of the module was to include, promote, and consider both female and male students equally as it is an open module that has to be studied by all students regardless of their gender. It should be noted that at IUG, female graduates usually tend to specialise in their postgraduate studies or work in subjects more related to architecture design or art, and very few tend to follow the more technical subjects such as those related to the energy efficiency issues. However, using the development and teaching process of the new module, the IUG team tried and succeeded in changing this perspective by encouraging more female students to study energy related subjects without any fear or hesitation. This is expected to have a positive impact on the role of women in research, especially in Gaza. We believe that gender inclusion in research content will promote new ideas, concepts, and advance the knowledge base.

In addition, the project students in IUG were able to apply for scholarships from APPEAR in order to study on a Master's program for Building Science and Technology at the TU Wien. Out of the many applications received, three students were chosen – two male and one female. Unfortunately, due to the current political situation in Gaza, the female student has not yet been able to travel to Austria to this day. Nevertheless, winning this scholarship is a great success for all three of them.

Regardless of what the project was originally designed to achieve, gender was always present as a thread running throughout the project's planning, implementation and follow-up activities. On account of the context in which the project was implemented, the requirement that women were allowed to participate was challenging enough, as the number of women in this field still needs to increase. However, as mentioned before, we hope that this project will not only promote the idea of energy efficiency at IUG and in the Gaza Strip, but also will help to encourage more women in both parts of the world to get involved in the practice and research in this field.

3.3.4 Enumeration of PEEB results

- Conducting 10 Skype meeting between the Austrian and Palestinian teams.
- Developing and teaching an energy-efficient buildings module, with 165 direct beneficiaries each semester.
- Establishing a computer lab at IUG with 51 computers and related facilities, with 350 direct beneficiaries each semester.
- Conducting two public lectures for IUG students, with 250 direct beneficiaries.
- Conducting two public lectures for graduate architects and civil engineers, with 150 direct beneficiaries.
- Conducting three workshops for stakeholders and decision-makers in Gaza, with 65 direct beneficiaries and 500 indirect beneficiaries.
- Nominating three candidates from IUG for the related Appeal scholarship.
- Organising two training courses for engineers and architects working in related sectors, which directly benefited 34 engineers and 500 indirect beneficiaries.
- Organising the first international conference on energy efficiency of buildings, with a mass audience of 1200 engineers and stakeholders.
- Distributing 1000 copies of the conference abstracts booklet, and 350 copies of the conference proceedings.
- Developing two dissemination websites, one for the project, and the other specifically dedicated to the conference works.
- Featured in media for more than 20 times; 5 TV interviews, 3 radio interviews, 2 reports in newspapers and 15 news articles on websites.
- Published 2 research papers and one article in WOW magazine. A research paper about the evaluation and impact of the project outcomes was also published.

Phase 2 – Advanced Academic Partnership

Project Coordinator: Matthias Schuß

Coordinating Institution: Vienna University of Technology (TU Wien), Department of Building Physics and Building Ecology, Institute of Architectural Sciences

Partner Institution: Islamic University of Gaza (IUG), Architecture Department

Partner Country: Palestinian Territories

Project Duration: 1 January 2018 – 29 February 2020

3.3.5 Energy-efficient buildings as a sustainable and innovative approach of construction in Gaza – the advanced academic partnership CBEEB

by Ahmed S. Muhaisen

The Gaza strip has almost no conventional energy sources, wherefore it is almost totally dependent on the electricity and fossil fuel imported from abroad. As a result of the combined effects of the unstable political situation, blockade, and weak economic situation, the Gaza Strip has been suffering from a severe energy deficit and a worsening balance between

supply and demand in recent years. As a result of the electricity load shortage, the electric current is cut off at least eight to twelve hours per day, causing disruptions in the economic activities and all aspects of life.

As a response to this energy problem, using renewable energy available in the Gaza strip, namely solar energy and improving the energy efficiency in buildings are proposed to be part of the overall solution. It is believed that promotions, skills provision and training in the field of energy efficiency enable the introduction of practices, technologies and solutions used in sustainable construction. According to the International Labour Organization (ILO) office in Gaza, there is a need to support the introduction of new training that is better adapted to sustainable construction, which requires renewing curricula, upgrading trainers' skills and providing appropriate equipment for this, in all levels of education and training relevant to the field.

Contribution to the Palestinian National Development Strategies

The project is in line with the Palestinian national strategy for promoting energy conservation as a contribution to the sustainable development of the Palestinian territories. It is also in accordance with the Palestinian Authority's main policy of energy management aiming to ensure meeting the current and future demand of energy with optimum economic and environmental prices. The project activities considerably contributed to achieve the aforementioned national strategies, and became part of the combined efforts to develop the energy sector in Palestine. The project had special importance and was seen as an immediate action to respond to the energy crisis prevalent in Palestine, especially in the Gaza Strip. In addition, the project was aligned with the international trend towards developing and introducing alternative energy sources as well as improving the standards in order to save the environment.

Innovative Approach

The project involved various innovative approaches in various aspects, that all aim to ensure an effective implementation and productive outcomes of the project activities. Theoretically, the project examined the concept of energy saving through proper building design that takes into account all associated environmental and thermal factors, in addition to using solar energy. This approach of building design has been widely recognized to be effective in terms of creating green and sustainable built environment. Considering the harsh energy problem in the Gaza Strip, adopting the approach of energy efficiency in buildings is seen to be an innovative approach to contribute to ease the energy crisis and mitigate its adverse effects.

The project is characterized by its highly interdisciplinary nature, as it involved various fields of disciplines. It engaged people of different specializations and fields of studies to work in teams in order to achieve the main objectives. Although, the project was led by architects, other engineering specialists involved in the processes of building design and construction such as civil, electrical and mechanical engineers, were engaged and had a considerable impact on the implementation of the project activities. The project conducted the issue of energy-efficient buildings in terms of various disciplines including, building physics, architectural design of buildings, environmental factors, construction methods and inhabitants' behaviour and attitudes. This allowed gaining sufficient knowledge and valuable input from interdisciplinary fields, which effectively contributed to the success of the proposed approach.

The project methodological and educational aspects to achieve the stated objectives incorporated using various tools and activities in an innovative manner. The project was developed based on the archived results of the previous phase, and continued in the same track to build the capacity of local staff and organization as a way to move on from the promotion process to skills improvement and capacity building. Based on the archived results, CBEEB project included deep thinking and brain storming with all associated groups of people involved in the sector of building design and construction to find out the best possible strategy to achieve the results. The project included mainly, developing a professional diploma in energy-efficient buildings that target engineers and architects working in the local organizations. This diploma is a new addition to the diplomas offered by the community and continuing education centre at IUG, and is considered as the first in the Gaza Strip. Moreover, the already existing module entitled “Architecture and Energy” offered to MSc architecture students at IUG was developed in accordance with the contents and guidelines applied in the module developed for BSc students in the last (PEEB) phase. In addition, various promotion activities to increase the public and stakeholders awareness of energy efficiency, such as workshops, lectures and study days were included. To facilitate the professional training and MSc students teaching processes, the project included establishing an educational model of energy efficient room to be used in parallel with the developed computer lab established for the diploma students. The consortium of experts from both sides helped to exchange knowledge and experience in terms of research and educational aspects related to the subject. The proposed professional diploma and MSc educational module on energy efficiency were an opportunity for IUG to benefit from the experience of the Austrian partner in such a field.

Benefits of the Project to the Local Society

The project provided considerable benefits to various groups of people in the Gaza Strip and had positive reflections on the whole community and environment. As mentioned previously, the people in the Gaza Strip have been suffering from a lack of energy, which results in a daily cut of electricity for more than 12 hours. Taking into consideration that having an access to electricity is considered, nowadays, a basic need, finding out a potential solution to ease this crisis is seen as a priority for all research and involved institutions. The project included awareness and training activities on the proper design, construction and use of energy-efficient buildings, as part of the overall solution to the energy problem in the Gaza Strip. This is expected to benefit the whole community through the dissemination and then the implementation of the good practices of energy conservation in buildings. In addition, it will result in, on the long term, saving the environment and improving the public health conditions through reducing the greenhouse gas emissions produced by Gaza power plant. As a result, many new job opportunities are expected to be created in the fields of energy-efficient buildings and using solar systems. This will contribute to revive the deteriorated economic situation prevalent in the Gaza strip and ease the economic hardships.

3.3.6 Capacity building for increased energy awareness and the potential of sustainable buildings concepts in the Gaza region

by Matthias Schuß

The climate change and the predicted depletion of fossil energy sources are major challenges of the near future with significant impact on our daily life, the society and also the building sector. A significant reduction of used energy from fossil sources and emitted greenhouse gases is needed and leads in a necessary energy revolution towards renewable resources. Different international agreements, such as the latest United Nations Agreement in Paris formulating necessary reductions of greenhouse gases emissions for participating countries. In this context the building sector plays an important role because of the high potential for energy usage reductions as well as the increased use of local renewable energy sources and can help to make a necessary changeover possible. The EU commission currently quantifies the related amount for the building sector with 40% of the energy consumption, with a fraction of 36% of the CO₂ emissions.

For a significant reduction of fossil energy usage in the near future, a close focus on new buildings only will not be sufficient because of the small fraction of new and yearly-replaced buildings of the existing building stock. Investigations on the building sector have to focus on energy related developments and improvements for new and existing buildings in an adequate way. In this context new buildings or major refurbishments have to be developed in a holistic way that also considers the operation and the optimized control of various building systems in addition to general design aspects. Hence, an adequate performance assumption of new innovative and sustainable building systems is crucial to finally predict and achieve the desired performance in reality. Therefore a detailed understanding of the related building concepts, systems and components are necessary to reach appropriate design. Moreover, a clear understanding of the building control systems and influencing parameters, such as the external conditions or occupants' behaviour, are needed to reach an optimal design and sustainable building concept. Consequently, strategic capacity building with available education programs and continues dissemination activity is mandatory to achieve adequate knowledge of new sustainable solutions and the importance of building sector in the public and the corresponding communities.

Raising the awareness for higher energy efficiency and sustainability at the building sector in Gaza

Improved energy efficiency at the building sector is one of the major targets in the near future for all governments all over the world. The difficult energy supply situation of the Gaza region strengthens the importance of significant energy reduction and self-sufficiency of buildings and a resulting independence of region. The implementations of innovative concepts and applications of common solutions that are already used in the rest of the world are rare because of Palestine's complicated political and economic situation. As a result the related local communities are not aware of available technologies to increase the energy performance of buildings. Furthermore the positions of involved stakeholders are very conservative and new energy related sustainable concepts are not major objectives in new building projects as visible when existing building projects in Gaza are analysed in detail.

The before mentioned aspects highlighting the absence of related common local knowledge and expertise in the important and emerging field of energy efficiency and self-sufficiency of buildings. Related actions are necessary to build needed capacity of knowledge and awareness to support the local society in a future change-around of local energy and building industry in that very unique surrounding condition of the Gaza-region. The actual project continued an already in a previous project (PEEB) started effort targeting on the development of necessary higher educational programs at IUG and related dissemination activities to transfer knowledge to the public and relevant stakeholders. The project activities are in line with national strategies and are necessary efforts to achieve a more independent, self-sufficient energy sector in Palestine. The actual energy crisis prevalent in Palestine highlighted the importance of actions to react with adaptations of the common practice at the local energy and building sector. The project targets are in-line with international trends towards alternative energy sources for the building sector as well as improving the building standards in order to achieve a reduced impact on the environment. With the developed study program, resulting scientific and public dissemination of knowledge and study results the project has a high influence on the local but also the overall development in the area of buildings and the related domains. Future applications and demonstrations of new concepts with focus on self-sufficiency of buildings are not only mandatory for the Gaza region they are similar important for societies all over the world. The related local challenges are similar but maybe a little bit more challenging compared to those in other countries. The successful integration of new sustainable building concepts with an increased self-sufficiency will demonstrate the stakeholders the benefits and can cause a necessary transformation of the whole building sector.

Sustainable building concepts for a higher energy independency and increased living standards

The developed new educational programs at the Islamic University of Gaza will help to increase the knowledge in terms of modern and innovative solution for sustainable buildings. Those technologies increasing the self-sufficiency of the building sector and make them more independent from energy import from surrounding countries. Hence, the usual daily electricity shortages can be significantly reduced. This will improve the quality of life with a more secure availability of electricity for the local society.

The correlating dissemination activities helped to promote to benefit of better thermal insulation, passive cooling and local energy production at buildings. Future generations of planners and technicians will be influenced by those and future events. Based on these activities the importance of new innovative solutions for the building sector can be highlighted for the relevant stakeholders and legal institutions. Similar to the rest of the world this will influence the content of future standards and regulations in Gaza. The regions will surely benefit from such a change of the building stock.

3.3.7 Advanced activities and enumeration of CBEEB results

- Conducting 11 Skype meeting between the Austrian and Palestinian teams.
- Organizing a training course for 60 engineers from different organizations in Gaza. The course was organized jointly by IUG's project team and the Palestinian Engineers Syndicate. It was a 24-hour course delivered through 3 weeks.

- Establishing a computer lab at IUG with 30 computers, 30 tables, 30 chairs, camera and UPS's, benefiting 300 students each semester.
- Conducting 7 oriented lectures for IUG students, benefiting 750 students directly.
- Conducting 4 workshops for stakeholders and decision makers in Gaza, with 65 direct beneficiaries and 500 indirect beneficiaries.
- Inauguration of the first professional diploma course on energy efficient buildings, with 25 direct beneficiaries and 100 indirect beneficiaries.
- Developing and incorporating an advanced module about energy efficient buildings into the curriculum of the MSc program at IUG, with 350 direct beneficiaries and 1800 indirect beneficiaries each semester.
- Design and prepare all implementation details of an educational model (Eco-House) in the Gaza strip, with 500 direct beneficiaries and 2000 indirect beneficiaries.
- Inauguration of an energy-efficient building lab, with 230 direct beneficiaries and 860 indirect beneficiaries.
- Organizing a symposium, including an exhibition of energy- efficiency techniques in buildings, with a mass audience of 250 engineers and stakeholders.
- Upgrading an energy-efficient test room at IUG, with 600 direct beneficiaries and 1100 indirect beneficiaries.
- Providing the general library at IUG with 150 new books and references about energy efficient buildings.
- Designing online website, Facebook page, tube and flicker for the whole project information. <http://cbeeb.iugaza.edu.ps/Home>
- Featured in Media for more than 60 times, whether in direct interviews, reports or on websites. <http://cbeeb.iugaza.edu.ps/CBEEB-IN-MEDIA/CBEEB-Tube>



Visit of Mr. Andreas Obrecht, head of APPEAR programme, and Ms. Kristina Kiesel, project coordinator phase 1, to IUG on the conference day



Demonstration of thermal insulation as part of the training course



Book section on energy efficiency at the IUG



From theory to practice



Visiting and exploring the photovoltaic system on one of the roofs of IUG



Inauguration of a professional diploma course in energy-efficient buildings in Gaza



Female students participated in several of the project's events and training courses



Engineers who participated at the training on designing and establishing energy efficient buildings

3.4 Developing Maker Movement-Inspired Training Courses on Renewable Energy Sources in Gaza Strip

Project Coordinator: Christoph Pfeifer

Coordinating Institution: University of Natural Resources and Life Sciences, Vienna

Partner Institution: Islamic University of Gaza

Partner Country: Palestinian Territories

Project duration: 1 February 2017 – 30 June 2020

3.4.1 MakingFutureEnergy4Palestine

Background

Energy shortages and a dependency on imports are critical barriers for economic development in Palestine and especially in the Gaza Strip. The Gaza Strip suffers from energy shortages over the entire year due to the fact that its only power plant cannot satisfy local demand. These problems are intensified by the fact that the refinement of energy carriers is also carried out outside of the country and high prices have to be paid for final energy products such as liquid fuels and electricity. It is, therefore, of primary importance for Palestine's economic and social development to increase the degree of energy independence and to decrease the trade balance deficit from energy imports. Furthermore, it is expected for the medium-term that, driven by the climate change mitigation policies put in place in many parts of the world, energy systems will change around the world. It will be essential for Palestine to efficiently adapt to the new situation.

Decentralized energy supply systems require intelligent engineering and management in order to obtain competitiveness through efficient operations. This means that education should ideally reflect the expected requirements for energy engineering and energy management. Moving towards energy autonomy allows for the creation of high-level jobs for young engineers who keep developing solutions to increase efficiency and contribute to the beneficial further development of the energy system. In this context, a great variety of skills from highly technical to social and management sciences are required which can be achieved by adopting Maker Movement education. It is very interesting to note that, despite the primary focus on technology, the gender balance is good in the Maker community.

Project Description

The APPEAR project “Developing Maker Movement-inspired training courses in renewable energy sources in the Gaza Strip – Palestine” (MakingFutureEnergy4Palestine) is an academic cooperation project implemented by the Electrical Engineering Department at the Islamic University of Gaza and the Department of Material Sciences and Process Engineering at the University of Natural Resources and Life Sciences (BOKU). The project has a term of three years and started in February 2017, and was intended to end on 30 April 2020. Due to COVID-19 it has been prolonged until the end of August 2020. The project aimed to transfer of knowledge on teaching at universities on renewable energy technology with a focus on Maker-Movement approaches (adding art and design to the national agenda of STEM “Science, Technology, Engineering, and Mathematics” education and research. Moreover, courses at BOKU were optimized and newly set-up based on the project outcomes.

Objectives

- Development of curricula and training programs based on Maker Movement inspired educational modules for renewable energy with a special focus on female students.
- Development of a renewable energy laboratory and a research group on renewable energy related issues at IUG.
- Attract high-potential female students in Gazan society to study energy engineering and prepare them for the green job market.
- Enhancement of the capacity of faculty members in the Maker Movement concept in renewable energy.
- Set-up an academic network for a young generation of researchers and fieldworkers from the Gaza Strip of Palestine and Austria.

Conducted Activities

- To increase awareness among IUG students on renewable energy, a specific module on renewable energy was incorporated in the curricula of the Electrical Engineering Department at the Islamic University of Gaza (IUG).
- The practical skills of electrical engineering students were enhanced by incorporating Maker space education. This was blended with traditional teaching methods to enhance several practical skills, including job seeking and building and designing several modules.
- To facilitate the teaching and training processes, two laboratories were established at IUG: A renewable energy laboratory equipped with several energy modules including thermal energy, solar energy, wind energy, and hydro energy; a Maker Movement laboratory which was furnished with several tables for making skills, mechanical tools and measurement tools.
- Two products were handmade at the laboratories at IUG, a solar tracker module and inverter, and a solar tracker module was manufactured at BOKU.
- Various promotion activities, including a scientific conference, workshops and lectures were organized to promote the subject of renewable energy, Maker Movement education and the green job market and to create a general trend towards espousing standalone energy sources as a replacement for the existing utility sources.
- Exchange visits to high schools and to the IUG to empowered young females and awoke their interest to study energy engineering and prepared them for the green job market. A specialized workshop was held to enhance the skills of faculty members at IUG in the Maker Movement concept in respect of renewable energy.
- The knowledge of BOKU staff increased as part of the feedback loop of project activities resulting in new courses and methods.
- Moreover, the project contributed to strengthen the cooperative relations between the Palestinian and Austrian institutions and established long-lasting academic and research links.

3.4.2 BOKU Vienna contribution

by Rafat Al Afif

Why was it important to start the project?

The overall objective of this project is a transfer of knowledge, technologies and socio-economic competence urgently needed to Gaza Strip. The intended partnership has set up training courses at the Islamic University of Gaza (IUG) and the University of Natural Resources and Life Sciences (BOKU), Vienna, based on Maker-type organized practical courses where students create their own projects based around renewable energy technologies. The partnership provides the possibility for researchers from Gaza to gather personal experience in Austria as well as vice versa, and develop strategies to promote studying renewable energy engineering in Gaza. The expected medium- and long-term project outcomes are to increase the awareness of the role and opportunities of the Maker Movement in using and creating social innovations and achieving sustainability in the Gaza Strip.

Why Maker education is important

Maker Movement is a powerful resource to communities developing new approaches to education and training in a time of tech-driven labour market flux. Consequently, Maker Movement has an opportunity to revolutionise the current system by providing extracurricular means for students to engage in more hands-on projects and to develop a large range of skills that are currently being underdeveloped. This development is a result of an initiative to add art and design to the national agenda of STEM (Science, Technology, Engineering, and Mathematics) education and research using Maker Movement. Maker Movement is a catalyst for innovation and entrepreneurship by enabling every individual to invent and build hardware products themselves by having easy access to capabilities for designing, manufacturing, distributing and learning.

In developed economies (e.g., Austria) today, many of these capabilities are hosted in Makerspaces; places where the next great hardware product developments will occur. Moreover, lessons learned in research and development (R&D) strongly underline the importance of this approach not only for spawning a new generation of entrepreneurs but also for changing the educational landscape. Therefore, Maker Movement is an integral part of a new age of entrepreneurship.

Nevertheless, the Maker Movement approach is not yet mature in many developing economies such as Palestine (Gaza Strip). However, the specific experiences at BOKU, Austria, in Maker education are expected to be a valuable asset for this cooperation with IUG, Gaza.

Problems and needs for the Gaza Strip

- Energy shortages and import-dependency are critical barriers for economic development in Palestine and especially in the Gaza Strip. The problems are intensified by the fact that the refinement of energy carriers is also carried out outside of the country and high prices need to be paid for final energy products such as liquid fuels and electricity. Furthermore, the war between Israel and the Gaza Strip had a destructive effect on all aspects of life in the Gaza Strip and contributed considerably to worsening the already deteriorated economic and social conditions, meaning that facilities have become inadequate and many

are not functioning at all, while public services have been reduced to a minimum. There is currently an acute shortage of energy, drinking and irrigation water, sewage water treatment and housing services in Gaza.

It is, therefore, of primary importance for Palestine's economic and social development to increase the degree of energy independence and to decrease the trade balance deficit from energy imports.

- The Gaza Strip, in general, suffers from unemployment, which is of grave concern as the labour force participation rate in the Gaza Strip is 45.5%. Moreover, the gap in the participation rate between males and females in Palestine is considered to be very big; it reached 71.7% for males compared with 18.8% for females.
- The current graduates of Bachelor's degree programs are not sufficiently prepared to fulfil their role as professional technological change leaders in the market sectors.
- The Maker Movement approach is not yet mature in Gaza strip.
- It is expected for the medium-term future that, driven by the climate change mitigation policies put in place in many parts of the world, energy systems will change around the world. It will be essential for Palestine to efficiently adapt to the new situation. Decentralized production from photovoltaics (PV), without subsidies, is already cheaper than market-price electricity in Austria. In Palestine, where electricity is more expensive and the grid is less reliable, the benefits of a direct move to decentralised supply are expected to be higher than in Austria. To be among the early movers in the energy system transition will be an advantage for developing countries who can omit costs if the energy systems are directly set up in an optimised way for decentralised production. Decentralised energy supply systems require intelligent engineering and management in order to obtain competitiveness through efficient operations.

Given these challenges and opportunities, the higher education sector should ideally reflect the expected needs in energy engineering and energy management. Moving towards energy autonomy allows for the creation of high-level jobs for young engineers who keep developing solutions to increase efficiency and contribute to a beneficial further development of the energy system. In this context, a great variety of skills from highly technical to social and management sciences are required. For example, IGU is one of the largest universities in the Gaza Strip. However, the current programs focus more on theoretical aspects than the practical side, which leads to a low level of senior design projects in general. In short, merely theoretical knowledge, or copying existing products and business models, no longer helps graduates stand out in the crowd. Therefore, IGU needs scientific and material support to set up and integrate Maker spaces and making activities into the curriculum, as a first step towards strengthening the outcomes of the engineering faculties at the university to meet the labour market requirements.

The relevance of project activities to meet the needs of Gaza Strip

The activities of our project "Making Future Energy4Palestine" aiming at facilitating promotional activities, skills provision and training in the field of the renewable energy-based Maker Movement approach will enable the introduction of practices, technologies and solutions towards reducing the unemployment rate, reviving the economic situation and consequently enhancing living conditions in Gaza. The project is in line with R&D priorities of Lebanon and Jordan, and the regional priorities of the EU, and will increase the capacities of universities by improving the current curricula and teaching methods. The project examines

the adaption of the Maker-Movement momentum to attract and skill students in energy engineering. This approach has been widely accredited and recognised to be effective in developing students' skills. Considering the harsh energy problem in the Gaza Strip, the project broaches the issue of renewable energy in terms of various disciplines including engineering, physics, and social science. This will allow students to gain sufficient knowledge and valuable input from interdisciplinary fields, which will effectively contribute to the success of the proposed approach. The project methodology to achieve the stated objectives incorporates using various tools and activities in an innovative manner. It will include a study to find out the potential of attracting people to the profession and developing engineering skills in the Gaza Strip. All associated groups of people involved in the project will be part of a deep discussion to find out the best possible strategy to achieve the results. The project includes promotional activities to increase public awareness of energy efficiency, in addition to a training course which will be designed and applied properly for capacity building for the local staff. Moreover, the project will strengthen the relations between the partner universities and the related sectors as a whole. Finally, we can consider the project as a first step towards using Maker culture to inspire learning, which will attract students to engineering science and prepare them with skills necessary to carry out jobs in growing industries in Gaza.

The importance of sharing BOKU's Maker education experiences

The specific experiences at BOKU, Austria with the organisation of practical courses in renewable energy engineering based on the Maker Movement is expected to be a valuable asset for this cooperation with IUG, Gaza.

The Maker Space for Education resource has been developed at BOKU by staff members of the Institute of Chemical and Energy Engineering (IVET) to steep the student and the educator in the framework of the Maker Movement. For instance, a guideline for using the Maker Movement approach for building up the auto-tracking photovoltaic model has been developed. This guideline aims to teach engineering students how to design a mechatronic system, which includes mechanical, electrical, and software design. It is important that students are able to design a complete system from start to finish in one semester. The module "Implementing the Maker Movement to renewable energy lab -The case of auto-tracking photovoltaic model" has been integrated into one practical course at BOKU. Through the project activities, the BOKU team will support the creation of similar Maker environments at IUG, Gaza. Finally, the cooperation will significantly increase the network of the participating universities and result in increased competence and expertise of both partners.

3.4.3 ISLAMIC UNIVERSITY Gaza – gender perspectives

by Hala J. El-Khozondar

Patriarchal society

Gaza is an example of a patriarchal society. In a patriarchal society, the situation between the sexes has always been structured on the phenomenon *Herrschaft* of Max Weber. It was always political, a relationship of dominance and subordination. Women are subordinated and have the passive role. They are responsible for (unpaid) domestic services and emotional labour.

Men have the active role, are the heads of families, work full time and have the economic power in the relationship. The patriarchy has originated in the historical past and still has an impact on societies in the present. This led to a society in which women have no impact in their society. They have no right to be the head of governmental and public institutions including universities. Leadership is always handed to men. In science, for example, heads of universities, heads of conferences, heads of editorial boards of famous journals are always men.

When thinking about gender, I think of the article *“Doing Gender”*, written by Zimmerman and West, which was published 1987. In order to analyse the social construction of gender, the authors differentiate between three different terms. “Sex, Sex Category and Gender”. “Sex” refers to biological differences. “Sex Category” is the social attribution of sex, which leads us to “Gender”. It describes the proper behaviour within the sex category. Gender is not simply given by nature nor by education, but persons act gender typical due to the fact that their behaviour is mainly oriented to their knowledge on how to behave as a man or a woman. To move from a patriarchal society to a society in which women have a predominant role, women’s attitudes toward themselves need to change; their knowledge and their capabilities need to expand. Further gender equality should be considered in each step. This project aimed to empower women to have an active role in their life without miniaturising men’s role in society.

The project teams from IUG and BOKU worked together in analysing information and data in order to identify feasible steps to enhance women’s participation in science and technology education with a focus on renewable energy fields. The role of women was incorporated from the beginning of the project. Both teams (IUG and BOKU) had female staff members:

- The IUG team included 2 females, one of them is the project manager, and two males.
- BOKU also had 2 females and 2 males. A male is the project coordinator.

The project teams also focused on carrying out the activities targeting females and males equally. Workshops, training courses and lectures were attended by almost equal numbers of females and males. During the workshops and conference, both males and females were invited in equal basis. Both Dr. Rifa El-Khozondar and Prof. Hala El-Khozondar organised the events in close collaboration with Prof. Christoph Pfeifer and Dr. Rafat Al Afif. Females from the electrical engineering department, social science department and other departments at IUG actively participated in all activities performed by the project.

Additionally, team members worked with the universities to encourage female students from Gaza to pursue their studies in higher education and also motivate schools to encourage girls to opt for technical science. Therefore, the gender perspective had a special focus and importance in the project implementation taking into account the following points:

- Raising awareness about the Maker Movement concept in promoting renewable energy to female students.
- Empowering one female PhD student from IUG to pursue her PhD at BOKU under the supervision of Prof. Christoph Pfeifer and Dr. Rafat Al Afif in collaboration with Prof. Hala El-Khozondar and Dr. Rifa El-Khozondar from IUG and Alaqsa University supported by the APPEAR project.
- Empowering a female MSc student to work in the APPEAR project.
- Visiting several female high schools in Gaza to encourage female students to study electrical engineering, in particular renewable energy in order to be ready for the green job market.

- Inviting female high school students to attend several activities and visit the laboratories at IUG to widen their knowledge related to renewable energy and Maker space education. Furthermore, the gender perspective was clearly apparent from the active participation of female researchers and audience members who participated in “The 2019 IEEE 7th Palestinian International Conference on Electrical and Computer Engineering (PICECE)” held at IUG. Moreover, during the conference preparations, female staff were incorporated in the research activities related to the project through the inclusion of two females from IUG in the scientific committee of the conference. Also, female staff and students were strongly encouraged to participate with papers and presentations in the conference sessions. As a result, 12 full papers were submitted by females; ten females from Gaza, two staff at IUG, one at Alazher University, and one at Al-Aqsa University, and six graduates who work at different institutes, one professor from Algeria, and one from Singapore.

The project team was keen to bring new opportunities to female students to compete in the job market with their male peers. Thus, Maker space was opened to female student as well as male students to make sure that female students will gain the skills needed to do it themselves. They learned how to build inverters, which are devices needed to make solar systems provide AC signals to power home appliances. They also have a chance to observe the production of a solar tracker system which is manufactured by female MSc students at the electrical engineering department at IUG. They learned skills to prepare proposals, cover letters, CVs and for job interviews during workshops provided during the project. They also had a chance to meet the 3D printer designer who is a male student studying his MSc in electrical engineering at IUG. They are now equipped with the skills required to open their own spin off company or to acquire jobs on the local market.

It should be mentioned that females are always welcome to take part in the project activities, but the main obstacle is generally the limited number of female staff working at the engineering faculty.

In conclusion, female empowerment is considered a priority in this project. Female students are equipped with all of the required skills and knowledge by way of training, workshops, renewable energy classes and conferences. Thus, they learned all about the topics related to renewable energy thanks to the implementation of Maker Movement education. As a result, they are ready to embark on the green job market and compete with their male peers. However, gender balance is considered by sharing all of the aforementioned activities with male students.

3.4.4 Enumeration of results

- Conducting numerous Skype meetings and WhatsApp calls between the two partners.
- Developing and teaching a renewable energy module, with 50 direct beneficiaries each semester.
- Improving the educational facilities of the EE department at IUG by developing a renewable energy laboratory. The renewable energy laboratory is fully furnished and equipped with several modules related to different renewable energy sources in particular solar energy, wind energy and hydro energy with about 200 direct beneficiaries each semester.
- Establishing a Maker space laboratory which is equipped with all the necessary tools for a Maker space including a 3D printer. More than 300 direct beneficiaries each semester.

- Two products have resulted from using the laboratories, these are the inverter and solar tracking system. They were developed by female students under the supervision of Prof. Hala J. El-Khozondar and Rifa J. El-Khozondar.
- A 3D printer was built by a former student of electrical engineering at IUG.
- Conducting a scientific day in which general lectures are given for the direct beneficiaries, including 200 students and several professors from the engineering faculty.
- Holding of 5 workshops for stakeholders and decision-makers in Gaza, with 100 direct beneficiaries and 550 indirect beneficiaries.
- One general lecture to the engineering students in collaboration with the engineering club at IUG.
- Nominating and accepting one female student from IUG for a PhD scholarship relating to APPEAR project.
- Organising the first IEEE conference on different topics related to engineering, in particular electrical and computer engineering, with a mass audience of around 200 engineers and stakeholders.
- Conference proceedings were published from the IEEE meaning that they are available to wide audience.
- Developing two dissemination websites, one for the project (mefp.iugaza.edu.ps), and the other specifically dedicated to the conference (picece.iugaza.edu.ps).
- Featured in public relations videos 2 times; 2 TV interviews, 2 radio interviews.
- Published 7 conference papers, in which team members shared authorship.
- Published 5 journal papers, in which team members shared authorship.
- Private YouTube channel for different activities including how to manufacture an inverter, experiments using our equipment, and media videos.
- Several experiments and meetings have been published on a private YouTube channel.¹
- Creating a research group on renewable energy and related issues at IUG.
- Attracting high-potential female students in Gazan society to study energy engineering and preparing them for the green job market.
- Enhancing the capacity of faculty members in the Maker Movement concept in renewable energy
- Setting-up the powerful network between project partners in Gaza and Austria, which is going to lead to student and teacher exchange and provide a network for future collaboration.

1 Wind energy:
<https://www.youtube.com/watch?v=PAYfms0BzQU&list=PL2OhLTzaC-DX93qDaLkCmVUnyPZqOMT-e&-index=1>
 Solar energy:
<https://www.youtube.com/watch?v=WeTWuL1Cmk&t=0s&list=PL2OhLTzaC-DVzCuji2giP9JiuoW-Ww9lv4&index=2>
 Inverter:
https://www.youtube.com/watch?v=VE5SgfA39Vg&list=PL-kouAx_eHtqDIPgITdPp8jNf52QVbYOJ
https://www.youtube.com/playlist?list=PL-kouAx_eHtqDIPgITdPp8jNf52QVbYOJ
<https://youtu.be/CS7czf0AkxU>
<https://youtu.be/VE5SgfA39Vg>
<https://youtu.be/CZIQ7vrlLl8>
 Public relations:
<https://www.youtube.com/watch?v=6YzGyL7EgSA&feature=youtu.be>

- Increasing public awareness in the Gaza Strip of the importance of implementing renewable energy.
- Exchanging knowledge and strengthening the cooperative relations between the Palestinian and Austrian institutions.
- Publicizing Maker space, Maker education and renewable energy sources.
- Promoting the use of renewable energy sources.



Team members in Gaza with the 3-D printer



2019 IEEE 7th Palestinian International Conference on Electrical and Computer Engineering (PICECE 2019), Islamic University of Gaza, Palestine, 23–24 April 2019, opening session



Group photo with female high school students and their teachers at IUG



Team from IUG and BOKU meeting with Mr. Rainer Einzenberger, APPEAR programe officer at OeAD, Austria



Prof. Hala J. El-Khozondar visited the partners at BOKU. The visit started on April 22, 2018 and ended on May 5, 2018. During her stay, Prof. El-Khozondar and a team from BOKU visited the director of the center for international relations, Dr. Margarita Calderón-Peter.



Group photo for the team in Gaza with female high school students, their headmistress and their physics teacher

4 NICARAGUA

4.1 Strengthening Local Research Capacities at the Bluefields Indian and Caribbean University, Nicaragua, to Confront the Effects of Climate Change

Project Coordinator: Romero Ebanks

Coordinating Institution: Bluefields Indian And Caribbean University (BICU), Institute for Biodiversity and Environmental Studies

Partner Institution: University of Natural Resources and Life Sciences, Vienna (BOKU), Centre for Development Research (CDR)

Partner Country: Nicaragua

Project Duration: 1 January 2015 – 30 September 2018

4.1.1 Description

The Indian & Caribbean University operates in the autonomous regions of the Caribbean Coast of Nicaragua. This region consists generally of low coastal lands, frequently exposed to hurricanes and tropical storms and widely dispersed communities, which are difficult to access. The region is characterised by widespread poverty, low human development indices (14 of 20 municipalities HDI < 0.5), ethnic diversity (4 different indigenous and 2 afro-descendant groups), and limited access to basic services (education, health, water and sanitation, transport and communication). The livelihoods of the population are directly linked to the existence and regeneration of natural resources, their services and climatic stability (fishing, subsistence agriculture, forestry and community-based tourism). As a direct result, Nicaragua's Caribbean Coast is still on the list of one of the most vulnerable regions to the negative effects of climate change worldwide (German Watch Climate Risk Index 2014 – <http://germanwatch.org/en/cri>), which already amplify many of the existing problems and reduce successes already achieved in local development. The low capacity to adapt is exacerbated by the pressure on local ecosystems caused by population growth, uncontrolled urbanisation, the advance of the agricultural frontier and agro-industrial enterprises (palm oil), indiscriminate extraction of natural resources (timber harvesting, fisheries) and a series of large investment projects supported by the national government, such as a huge hydro-electrical dam and the inter oceanic canal, which can have significant environmental and socio cultural effects.

In order for the region to be able to adapt to the significant changes in the region's climate and its effects on the various vital sectors (agriculture, fisheries, forestry, tourism and health), as well as the urgent need to generate local scientific information as a base for decision-making in respect of adaptation to climate change and the substantial lack of climate data and climate and resilience research in the Caribbean region of Nicaragua, the overall objective of this project was to contribute to the establishment of BICU as an institution of reference on climate change research with high levels of technical and scientific capacity to support the implementation of the national and regional climate change strategy on the Southern Caribbean Coast of Nicaragua. In addition to this, it also aims to provide students

with the best possible preparation and foster a healthy, safe and motivating learning environment.

BICU is one of two higher education institutions in the country with a community and intercultural character (besides URACCAN), it is a member of the National Council of Universities (CNU) and was founded on 11 October 1990 in Bluefields. BICU's mission is to train professionals and technicians in academic and scientific excellence, to promote the sustainable development of the region and defend the autonomy process, respect for human dignity, gender equality, and protect and conserve the environment as a key requirement for the development of the multi-ethnic society of the autonomous regions of Nicaragua. BICU operates according to its three pillars: academia, research and social extension, supporting communities in their development process through projects related to ecotourism, agro forestry, sustainable agriculture, biodiversity conservation environmental restoration, human rights and adaptation to climate change, etc. This is done with the support of international cooperation and external funding agencies, which have around 60,000 beneficiaries (including the scholarship program).

In line with the overall objectives of the project, BICU installed a Climate Change Observatory (CCO) at the central campus in Bluefields that will serve as a local platform for climate change research and information. A climate research agenda focuses on vulnerabilities and impacts related to climate change in traditional livelihoods (fisheries, agriculture and community tourism) and disaster risk management, taking into account indigenous and afro descendant knowledge and gender issues.

To strengthen its technical, scientific and administrative staff to help foster the mainstreaming of climate change at an institutional level (academia and environmental policies), the curricula of the environmental science class of the common semester and the ecology Bachelor's program have been updated to include topics relevant to climate change. The curricula for a new Master's program in environmental sciences has been developed with a focus on climate change. Scientific capacity related to climate research at BICU was strengthened through the installation and operation of three agrometeorological stations that collect local climate data and the implementation of an applied training program by professors from the University of Natural Resources and Life Sciences (BOKU), Vienna. Furthermore, BICU developed and implemented the first activities of an environmental management program as a pilot within the central campus in Bluefields in order to reduce its own GHG emissions and demonstrate good environmental practices to the university community.

Through the establishment and strengthening of the Southern Caribbean Coast Climate Alliance (ACCSACC), BICU contributed significantly to climate advocacy on a Central American, national and local level.

4.1.2 The Nicaraguan perspective

by Jasper Rene Romero Ebanks

It was very important to start this project as the Caribbean coast of Nicaragua is vulnerable to the impacts and effects of climate change. On account of its geographical location, it is exposed to tropical storms, hurricanes and other climate events, which put the population and livelihoods of the coastal and marine population at risk, often resulting in floods, loss of biodiversity and human life and water contamination, etc. In general, housing and infra-

structure are not designed to withstand the impact from the climate. Poverty also increases the risk as the inhabitants do not have the economic means to build resilient houses and infrastructure, which are often built without considering the impact of climate change.

Institutional capacities to face up to the impact of the climate are limited. There is an urgent need to improve technical and scientific capacities to assess and reduce the impact and risks of climate change. Planning and research capacities have to be strengthened in order to establish adaptive measures against the negative effects of climate change. Therefore, initiating this project is important, as by achieving its objectives we will be contributing to the solutions to the problems and needs associated with the impact of climate change on the local population and their livelihoods.

The aims of the project underscore its importance. Therefore, I will focus on four important aspects: Firstly, BICU researchers are better prepared to carry out meaningful studies on climate change. The knowledge and skills of technical/scientific and academic BICU staff members are strengthened to generate and facilitate local scientific information on climate change and its impact on the development of local adaptation strategies. Secondly, climate change related topics are now implemented in its academic program. A focus on climate change as well as innovative learning and teaching strategies have been incorporated into the range of academic offerings at the Faculty of Natural Resources at BICU. Thirdly, BICU has established a research unit for climate change research and monitoring. The Climate Change Observatory (CCO) has been established within the institution, equipped and operates as a local focal point for climate change related information and data on the Southern Caribbean Coast of Nicaragua; Fourthly, BICU has initiated the implementation of the environmental program created by the APPEAR project. BICU's environmental management program and respective policies have been developed and institutionalised, fostering the process of adaptation and mitigation of climate change at an institutional level.

Initiating this project was very important as a way to strengthen the knowledge and skills of technical/scientific and academic staff members at BICU, who now allow us to generate and facilitate local scientific information on climate change and its impact on local livelihoods and populations. BICU staff are now prepared, as the BOKU university trained BICU professors in meteorological science to operate, maintain and process data from the weather station, which is important for climate monitoring and analysis. They also provided training on curriculum development and quality management to improve educational processes based on curriculum revision and design, along with training on participatory research methods, which will enhance female participation in research activities at the BICU.

It was also important to enhance and deepen our knowledge of climate change related topics, which is why we actively participated in the Advance Training Course on Climate Change Research Methods (a minimum of 220 hours), which was designed and facilitated by BOKU professors. This course increased our capacity to carry out climate change research which is relevant to our livelihoods and our population vulnerable to climate change, as set out in the chapter above. It was also important as a climate change focus and innovative learning and teaching strategies have been incorporated into the academic offerings of the Faculty of Natural Resources at BICU. The revision of the current curricula in the common semester environmental science class and Bachelor's degree program in ecology were also important steps in this regard. Participatory processes were carried out with professors, students, and authorities in order to guarantee institutional mainstreaming of climate change issues in these academic programs. It is so important to note that these offerings are insti-

tutionalised and approved by the BICU University Council and subsequently implemented. Students will have the opportunity to learn about climate change related topics along with its impact and potential solutions.

Moreover, designing a new Master's program "Environmental Sciences and Climate Change" was a very important step as it has been approved by the University Council and is now beginning to be implemented. The Master's program will open doors for all professors to receive more specialised training that will enable them to understand climate change phenomena, their implications and alternative measures for adaptation and mitigation.

A further important reason for initiating this project is to institutionally establish and equip a Climate Change Observatory (CCO) and operate this as a local focal point for climate change related information and data on the Southern Caribbean Coast of Nicaragua. The establishment of a CCO is very important in respect of the needs assessment for local climate change and meteorological monitoring and research. Today, the CCO is established at BICU and operates as an important project for the Institute of Biodiversity for Environmental Studies (IBEA), which represents an important outcome of the project. BICU is already allocating resources for the operation of the CCO by creating facilities and hiring responsible personnel to implement its work plan. This will allow us to carry out research on relevant climate change research topics related to the vulnerability of, threat and risk to, and impact on social systems or human settlements, agriculture, fishing, etc. With the CCO, climate change monitoring will be carried out when the meteorological stations are installed and operating. The establishment of the CCO an start as soon as the technical team is prepared and a documentation and communication centre has been set up at BICU, which includes a physical and digital library available for professors, students and the public. The CCO will permit BICU to carry out networking and advocacy as part of the Southern Regional Climate Change Alliance (*Alianza Costa Caribe Sur ante el Cambio Climático – ACCSaCC*) of which BICU is member and a leading figure in this process. This is important as we continue building BICU research capacities for both institutional technicians and professionals on the Caribbean Coast of Nicaragua.

Moreover, BICU will become an example and role model for society as we implement the environmental management plan drawn up by the project and which has already been approved by the authorities. It has been so important that professors, students, and administrative staff have provided such great support to its implementation. Currently, BICU is establishing resources for its implementation which, for 2019, include a training workshop on environmental topics and green offices practices. This project outcome is important for BICU to project itself as a green university and an institutional model for society in respect of environmental conservation.

Initiating this project was very important for the present and future contribution to climate change and environmental solutions. BICU researchers are now able to carry out scientific studies looking for alternative actions to mitigate and adapt to climate affectation and its impact on livelihoods and populations. Climate monitoring and its interrelationship with social sector (fisheries, agriculture, forestry, etc.) is a matter of the utmost urgency . Therefore, BICU staff are now able to generate scientific information and knowledge that will be shared and used by local authorities and decision-makers on the Caribbean Coast of Nicaragua. To this end, the CCO is very important to create and facilitate activities such as forums, training workshops and the communication and dissemination of environmental and climate change problems and the solutions to these problems.

4.1.3 Why international cooperation in higher education matters

by Maria Wurzinger

The Bluefields Indian and Caribbean University (BICU) is located on the Caribbean Coast of Nicaragua, which is one of the most vulnerable regions in respect of the negative effects of climate change worldwide. The university management identified the lack of sufficient expertise and infrastructure as a major hindering factor to dealing with the multitude of problems such as climate change and the unsustainable use of natural resources in the region. These challenges have to be tackled by many different stakeholders and have to be addressed at a local level, as well as at a national and international level. Therefore, different institutions and their networks are crucial to bring together a diverse range of expertise and experiences. In this context, it is important to strengthen and further develop human capacities to design adaptation and mitigation strategies. This means that higher education institutions play a key role in contributing to providing possible options for a sustainable future. Universities have to further develop their on-going research areas, but also open up new research strategies. New insights from research findings are fed back into the curricula of the universities and help to equip students with new knowledge. This can ultimately also lead to new forms of organisational structure of universities.

The APPEAR-project “Strengthening local Research Capacities at the Bluefields Indian and Caribbean University, Nicaragua, to confront the effects of Climate Change” was a unique opportunity for BICU to reach out and get in touch with Austrian researchers at the BOKU-University of Natural Resources and Life Sciences, Vienna. The project aimed to address three main topics, namely strengthening research capacities, developing new curricula and courses and supporting the formation of a new university unit at BICU.

During the planning phase, which was funded by the APPEAR-program through the preparatory funding mechanism, researchers from both universities met in Austria and jointly developed the concept for the project proposal. This face-to-face meeting was a crucial event as it allowed all partners to meet, discuss and learn from each other. Austrian scientists learned about the current situation and challenges of BICU. The colleagues from Nicaragua were able to obtain an initial insight into BOKU’s research and education portfolio. However, this did not only focus on expertise and research ideas, it is also equally important is to understand the different cultural backgrounds of all parties involved. The team agreed that the project has to address the problems relevant to BICU and tailor-made solutions should be identified throughout the project duration. A very ambitious work plan was developed, which envisaged activities such as the training of teachers, the development of a new curriculum, the improvement of the existing infrastructure and the implementation of a new university. However, changes to existing structures and workflows are very often perceived as threats by the persons involved. One trainer from BOKU explains: “My training sessions and their stimulated processes aim to achieve substantial changes – be it related to perspective, structure or curriculum – meaning that participants may have reservations at first. This has inspired me to learn about the causes of resistance to change, how to make problems visible and tangible and how to raise consciousness about institutional processes of change. Finding ways to get people to question the status quo and open up for new ideas is something I have acquired over time in my workshops and I definitely benefit from these experiences back home.”

This statement shows that it is important to take the resentment of staff members seriously and address them in workshops, where people can freely express their concerns. This “safe space” can be used to explore possible new ideas. It is necessary to give people enough time to get familiar with new ideas – this can be challenging as this is sometimes against strict project deadlines. This statement also demonstrates that cooperation between two universities from two different countries can be beneficial for both parties. Learning and gaining experiences takes place on both sides of the Atlantic and one university is on an equal footing with the other one – a key success factor for international collaboration.

Training sessions on various aspects were offered for BICU staff to update their lectures with state-of-the art knowledge on various topics on climate, climate change, resilience and sustainability. These training courses were aligned with another project activity – purchasing equipment. Through the project, BICU was able to acquire its first meteorological stations and technical training was provided for staff members. BOKU researchers provided technical support throughout the project duration to ensure that BICU colleagues will be able to manage the stations in the future. Consequently, the university was able to collect basic climate data – an important first step to be able to develop, interpret and more precisely predict climate change scenarios for the region, where data has been missing for a long time. So far, the scenarios for the region have not been very accurate due to missing information. BICU is now able to provide reliable data and can support the national meteorological service of Nicaragua.

Consequently, this project is also a good example to demonstrate that international cooperation between two universities can have positive effects for the general public – the societal mission of universities. University cooperation can contribute to reaching the UN Sustainable Development Goals (SDG). Our project addressed various SDGs such as SDG 4 (quality education), SDG 13 (climate action) and SDG17 (global partnerships), but also links to SDG 1 (no poverty) and SDG 2 (zero hunger) and other SDGs can be identified. Higher education projects, in all their diversity, represent a great way to strengthen the base and value of education and to keep it up-to-date. Exchange, reflection and networking are the key aspects that can lead to valuable, hands-on teaching and high job expectations for graduates through active cooperation between educational institutions. Finally, everyone involved in the project also benefits at a professional and personal level.

4.1.4 Enumeration of results

- Knowledge and skills of technical/scientific and academic staff members of BICU are strengthened to generate and facilitate local scientific information on climate change and its impact for the development of local adaptation strategies.
- A climate change focus as well as innovative learning and teaching strategies are incorporated into the academic offerings of the Faculty of Natural Resources at BICU.
- The Climate Change Observatory (CCO) is institutionally established, equipped and operates as a local focal point for climate change related information and data on the Southern Caribbean Coast of Nicaragua.
- BICU's environmental management program and respective policies are developed and institutionalised, fostering the process of adaptation and mitigation of Climate Change on an institutional level.



The main project team and the APPEAR representative Ms. Nikoleta Nikisianli visiting the agrometeorological station in Wawashang, set up at the regional foundation FADCANIC's land



Technic group (BICU-IBEA, Horizont 3000) giving maintenance to the meteorological station in FADCANIC, Wawashang, during a field visit



Technic group (IBEA-BICU, Horizont 3000) giving maintenance to the agrometeorological station in Wawashang during a field visit with the aim to collect the latest data



Maria Wurzinger during launching of the APPEAR project in BICU auditorium, Bluefields, Nicaragua



Presentation of posters in climate research conference

5 ETHIOPIA

5.1 Strengthening Regional Capacity in Research and Training in Fisheries and Aquaculture for Improved Food Security and Livelihoods in Eastern Africa

Project Coordinator: Peter Akoll

Coordinating Institution: Makerere University, Kampala, Department of Zoology, Entomology and Fisheries Sciences, School of Bio Sciences, College of Natural Sciences

Partner Institutions: University of Natural Resources and Life Sciences, Vienna, Institute of Hydrobiology and Aquatic Ecosystem Management, University of Eldoret, School of Natural Resource Management, Ethiopian Institute of Agricultural Research (EIAR), National Fishery and Other Aquatic Life Research Centre

Partner Countries: Uganda, Kenya, Ethiopia

Project Duration: 1 July 2015 – 31 December 2019

5.1.1 The project – STRECAFISH

STRECAFISH was an academic partnership project between Makerere University (Uganda), the University of Natural Resources and Life Sciences (BOKU) (Austria), the University of Eldoret (Kenya), and the National Fishery and Aquatic Life Research Centre under the Ethiopian Institute of Agricultural Research (Ethiopia). The consortium also included the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), the School of Women and Gender Studies and the Department of Performing Arts and Film, Makerere University. The project aimed at building capacity in higher educational institutions (HEIs) in respect of an improved response from education to the fast moving aquaculture and fisheries industry with a focus on 1) establishing a public private partnership (PPP) networking platform among private, public and academic institutions to enhance stakeholders' involvement in curricula development and training processes. 2) Establishing a platform for sharing the limited human and infrastructural resources to address the lack of vibrant institutional and regional networking in training and research in the aquatic sciences. 3) Adopting field-oriented modular approaches and developing regionally acceptable and technologically versatile audio-visual teaching aids to improve training approaches and 4) supporting graduate students and the student-staff-exchange programme to undertake critical research and organise tailored training to increase the amount of fit-for-purpose human capacity that will respond to fast-moving changes in the fisheries and aquaculture sectors in Eastern Africa. The project was guided by three objectives: a) establishing educational and research networking that is responsive to the fast moving aquaculture and fisheries industry in Eastern Africa; b) analysing and realigning curricula and supporting capacity building activities that meet the demand of the stakeholders and c) fostering aquaculture development through tailor-made training for fishery officers, development agents and farmers as well as developing model aquaculture villages.

5.1.2 The project and its people that supplemented a hands-on practical-oriented graduate training programme in fisheries and aquaculture

by Peter Akoll

Introduction

The fisheries and aquaculture sub-sectors are major contributors to securing food and nutrition, as well as poverty alleviation, rural livelihoods, employment and income generation for developing countries. Capture fisheries, the major source of fish food, is experiencing several challenges, including ever-increasing demand for fish, overfishing, environmental degradation and climate variability. As such, fish production in most lakes has either stagnated or declined, yet managing the fisheries resources is hampered by limited, scattered infrastructure and expertise. Although aquaculture is expanding rapidly to fill the fish-demand gap created by capture fisheries, the amount of fit-for-purpose human resources to make use of rapidly advancing technologies is low. Fisheries and other aquatic-based sciences are practically-oriented in their nature, and therefore require more dedicated time for hands-on activities. Consequently, training fit-for-purpose graduates in this sector requires experiential learning involving largely practical and hands-on activities as opposed to lecture and classroom learning. However, with decreasing state-funding relative to student enrolment, most HEIs have limited infrastructure and expertise to guide trainees in skills development and knowledge generation. Besides this, the rapidly evolving industry requires the timely revision of institutional curricula to address stakeholder needs. The scattered human and infrastructural capacities exist in several private and public institutions that can be harnessed for training, to encourage participation of key stakeholders in university training and for research activities for better trained graduates. In order to maintain HEIs as hubs of knowledge generation and the advancement of innovation for socio-economic development, collaboration between academia and stakeholders needs to be strengthened and promoted.

The project

Strengthening regional capacity in research and training in fisheries and aquaculture for improved food security and livelihoods in Eastern Africa (STRECAFISH) aimed at building HEI's capacity to respond to the fast-moving developments in the fisheries and aquaculture industry in the region. The goal of STRECAFISH was to increase the participation of public-private stakeholders in HEIs training in field-oriented, hands-on training approaches in fisheries and aquaculture to produce better-quality graduates. The project focused on i) creating a vibrant network among private, public and academic institutions to improve the quality of graduates and the response of academia to the fast-moving changes in fisheries and aquaculture, ii) creating a platform for the effective sharing of limited and scattered infrastructure and human resources in HEIs, whilst reducing classroom-oriented training approaches with limited practical sessions, iii) increasing access to teaching aids/tools, field studies, farmer-student-teacher interactions and case studies by university students and staff. Among other activities, the project aimed at a) increasing the interaction, involvement and participation of all stakeholders in training processes to achieve fit-for-purpose skilled human resources for stakeholders; b) establishing a platform for sharing limited and scattered human and infrastructure resources to address the lack of vibrant institutional and regional networking in training and research in fisheries and aquaculture, and c) adopting

field-oriented modular training approaches at stakeholders' facilities. The project activities were financially supported by the Austrian Development Cooperation (ADC) through the Austrian Partnership Programme in Higher Education and Research for Development (APPEAR) under the Austrian Agency for International Cooperation in Education and Research (OeAD).

The people

The project involved three groups of people, namely the researchers/academics/administrators; stakeholders (including farmers), and students to test field-oriented stakeholder-facility-based training approaches in Uganda and Kenya.

- Project research, academic and administrative team

The project was designed and implemented by a multidisciplinary research/academic staff from Makerere University (MAK), Uganda, the University of Eldoret (UoE), Kenya, and the University of Natural Resources and Life Sciences (BOKU), Austria. The aquatic scientists from the Department of Zoology, Entomology and Fisheries Sciences of MAK and the School of Natural Resource Management of UoE combined their efforts with a team from the School of Women and Gender Studies to examine gender issues, and the Department of Performing Arts and Film to design audio-visual training and dissemination materials. BOKU provided technical backstopping and brought its experience gained in managing partnerships and implementing field-oriented training approaches. In addition, the team sought support from the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) in the form of its experience in establishing and strengthening partnerships. A research team from the National Fishery and Other Aquatic Life Research Centre (NFALRC) and Ethiopian Institute of Agricultural Research (EIAR) also participated in the curricula review and training.

- Project stakeholders

This group included actors along the fisheries and aquaculture value chain including, but not limited to, public and private research institutions, farmers, service providers, farm input suppliers, fishers, development partners and local governments.

- Stakeholder identification

158 stakeholders representing farmers, farmer-groups, service providers, local and international non-government organisations, government line ministries, regional and international organisations, and research institutions were identified during the consultative meetings. This list of stakeholders was analysed and ranked using the stakeholders' power-influence matrix analysis based on their respective importance and influence on 14 different topics and criteria. These criteria-topics included: 1) Mobilising networks of expertise, 2) Facilitating dialogue with policymakers, 3) Joint research with other universities, 4) Joint research with private partners, 5) Research dissemination among stakeholders, 6) Redesigning better fish farming systems, 7) Redesigning better marketing, 8) Service provision for farmers, 9) Education and extension services for farmers, 10) Poverty reduction strategies/activities, 11) Model aquaculture villages, 12) Analysing and realigning curricula, 13) Capacity building activities that are fit to meet the demand of stakeholders and 14) Training of fishery officers, development agents and farmers.

The results of the ranking exercise were visualised in a power-influence grid. The resulting matrices were clustered and concentrated more precisely by weighting the visibility of the respective stakeholders. “Key” stakeholders, based on their overall importance and influence were selected for subsequent activities, including participation in the project and adoption of demand-driven approaches. The selection of the stakeholders to engage in hosting students and staff during training activities was based on the current mandate and/or business orientation of the stakeholders. After a preliminary selection, surveys were conducted to assess the stakeholders’ expertise and infrastructure. In Uganda, the final choice of stakeholders selected to participate in student training activities included the Aquaculture Research and Development Centre, Kajjansi (ARDC); the Source of the Nile Fish farm (SON), the Women Fish Network, and the National Fisheries Resources Research Institute (NaFIRRI), Jinja. Memoranda of understanding where necessary, and letters of agreement were prepared and signed with selected stakeholders. Subsequently, representatives of the identified stakeholders were invited to participate in project activities, in particular the curricula review and training.

- Curriculum review and alignment

In the participatory approach, the stakeholders participated in reviewing and aligning the existing fisheries and aquaculture curricula of MAK and UoE to their needs. During the review, stakeholders identified competencies required from graduates. In addition, stakeholders identified and participated in developing demand-driven courses, identified staff to participate in teaching the courses; developed modules based on the course relationship to be taught at respective stakeholder’s facilities. A total of 14 course units were developed at MAK and grouped into 2 modules for trials. Module 1, named Aquaculture consisted of fish nutrition and feed technology, production systems, fish post-harvest technology and entrepreneurship, as well as fish health and disease management. Meanwhile, Module 2, named Aquatic Ecology and Management consisted of stock assessment and fisheries mgt., environmental toxicology and biomonitoring; hydrology and hydraulics and fisheries socio-economics and extension. These modules were taught at stakeholders facilities, as described below.

- Training process

In order to facilitate the utilisation of scattered and limited human and infrastructure capacity, training activities were conducted at the respective stakeholders’ facilities. The training was organised in two parts: firstly, an introduction to general principles and concepts under each course at the university, and secondly in the field-oriented training sessions at stakeholder facilities. As such, Module 1 was taught at the Aquaculture Research and Development Centre, Kajjansi (ARDC) and the Source of the Nile Fish farm (SON), while Module 2 was hosted at NaFIRRI. At the stakeholders’ facilities, on-site, hands-on experiential training sessions ranged from one to two weeks, and consisted of lectures on additional principles and concepts in fisheries and aquaculture, followed by hands-on, practical sessions.

Observed benefits from stakeholder-university partnerships

- Close interaction between potential employers and employees facilitates the production of highly-skilled fit-for-purpose graduates to the satisfaction of employers. Consequently, the adoption of a stakeholder-university training approach, will increase the amount of

the desperately needed technologically skilled human resources in fisheries and aquaculture in order to foster development in the sector.

- The farmer-student-teacher interactions actively engage students to gain experience. While reflecting on the activities, students were able to demonstrate the application of perceived concepts and principles to solve problems and respond to fast-moving changes in the sector.
- The participation of “key” stakeholders with vast experience in the sector, especially farmers and personnel from research institutions in training activities will enhance the quality of graduates, increase the rate of problem identification and prompt innovative research by academia.
- Utilising the existing infrastructure and expertise available at stakeholders’ facilities will leverage the cost of acquiring new equipment and/or addition of expertise. As such, the university will enjoy reduced expenses for training fit-for-purpose graduates.
- Joint public-private research leads to the generation of critical innovations, followed by the effective dissemination of findings and uptake. Usually, technologies which are developed with limited stakeholder participation are poorly adopted, irrespective of performance, because the technology does not fully address the community settings/complexities, including gender, socio-economic, cultural and political contexts. Therefore, the current initiative that encourages constant interaction among farmers, students and staff during the training and research session will enable an in-depth understanding of the societal needs to guide the development of appropriate technologies. Stakeholders now appreciate the role of the university in driving community and national development, thereby improving the institution’s reputation.

• Students

This group consisted of students registered at Makerere University under the Master of Science in Zoology programme, majoring in Fisheries and Aquaculture. The field-oriented training was organised in the second semester, during which professional courses are offered. Students that were trained by stakeholders and at their facilities increase their employment opportunities as aquaculture technicians, fisheries inspectors, fish farm managers and research scientists. Furthermore, a training in the field approach increases the rate of problem identification and degree to which community participatory problem-solving research and experiential learning is conducted. Strong interaction with established farmers enables students to gain entrepreneurial skills to start up their own fish farming enterprises and/or related businesses. This approach instils confidence in problem solving and communication skills through interaction with people from different backgrounds and with different behaviours and norms. Importantly, field-oriented training exposes students to real-world demands and the challenges of the workplace and allows them to acquire a better work ethic by having an improved appreciation of the profession.

In conclusion, strong engagement of the public and private actors along the fisheries and aquaculture value chains in academic affairs can enhance graduate training, thereby producing skilled, fit-for-purpose professionals to spur sustainable development in agricultural sectors. Therefore, academic institutions should endeavour to initiate and develop strategies to establish public-private networking platforms, which embrace mutual benefits, and fully engage them to participate in training activities. Overall, the participation of actors along the fish value chain will culminate in increased fish production from aquaculture systems,

and reduced fishing pressure on capture fisheries. Increased fish production will contribute to food and nutritional security and increased income, as enshrined in Aspiration 1. A prosperous Africa based on inclusive growth and sustainable development of the AU Agenda 2063 and the UN's Sustainable Development Goals 1: End poverty in all its forms everywhere; 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture; and 3: Ensure healthy lives and promote well-being for all at all ages.

5.1.3 Why fish farming in Ethiopia?

by Silke-Silvia Drexler

Introduction

In Ethiopia, fish is among the most popular and important dishes eaten during the lent period when meat and poultry are forbidden by the Orthodox Christians, which account for 69.27% of the total population. However, an estimated average of 0.5kg of fish is consumed per person per year due to limited access to fish linked to dwindling stocks of capture fisheries and a negligible contribution from aquaculture. Indeed, aquaculture production has stagnated at 25 MT per year, mainly of Tilapia since 2000 compared to approximately 29,000 MT from capture fisheries. Although Ethiopia has over 8,065 km² of long lentic and 13,637 km² of lotic water systems with potential to develop sustainable aquaculture, fish farming has remained under-developed with extensive, pond-based production systems ranging from 100-300 m² in size. Most farmers operate a pond system with very little or no technical input or management resulting in very low levels of productivity. Despite governmental efforts to promote the development and expansion of fish farming in the country, the practice has not been adopted across the country and remains in its infancy stage and makes an insignificant contribution to national GDP. The low level of adoption of aquaculture has been attributed to limited fish seed and feed supply, high initial investment cost and limited extension services capacity to cover and effectively promote the practice.

As part of regional initiatives to promote the adoption of fish farming in Eastern Africa, the STRECAFISH project was conceived to establish model aquaculture villages (MAVs) in Ethiopia and build community and extension staff capacity through hands-on participatory training. The consortium consisted of a research team from the National Fishery and Other Aquatic Life Research Centre of the Ethiopian Institute of Agricultural Research; the Department of Zoology, Entomology and Fisheries Sciences, Makerere University, Uganda; the Institute of Hydrobiology and Aquatic Ecosystem Management, University of Natural Resources and Life Sciences, Austria and the Department of Fisheries and Aquatic Sciences, University of Eldoret, Kenya. From 2015 to 2018, the consortium worked with communities in three villages: IrgeWashemo, Jatodarki and SedenIllu in the Oromia region to foster aquaculture development. The consortium activities were financially supported by the Austrian Development Agency through the Austrian Partnership Programme in Education and Research for Development (APPEAR) of the Austrian Agency for International Cooperation in Education and Research (OeAD). It was anticipated that upon successful fish harvest from the mode ponds and realisation of profits from the venture, potential farmers will adopt the practice and thereby expand aquaculture in Ethiopia.

Participatory project implementation

During the initial stages, the STRECAFISH team organised a series of consultative meetings with stakeholders from the West and Southwest Showa administrative zones and the Oromia region, and identified the major challenges of fish farming in the area. The research team observed that water conflict, a lack of farm input especially feed and poor seed quality as the major factors undermining the success of the previous attempt at fish farming. Based on feedback from the participants, the research team selected model farmers based on a) previous involvement in fish farming but which was not successful, b) the willingness of farmers to engage in fish farming, c) the availability of land for pond construction, d) the availability of sufficient water sources and e) the absence of potential water resources. In addition, the selection of model farmers was based on whether a farmer was already practicing and had basic production infrastructure such as access to water and the availability of abandoned or operational ponds. Based on the above criteria, three farmers with abandoned pond systems due to a weak extension service were selected to serve as model farmers, these included: Mr Bekere from Irge Washemo kabele ($9^{\circ}2.445'N$, $37^{\circ}19.142'E$), Mr Aguma from Jatoderki kabele ($8^{\circ}59.183'N$, $37^{\circ}21.307'E$) and Mr Degefa from Seden Illu ($8^{\circ}58'22.6"N$ $37^{\circ}20'29.0"E$).

Using a community participatory approach, hands-on training sessions were organised for the entire kabele communities along the production and consumption chain. The training commenced with pond repair and construction of new ponds during which the community actively participated in pond siting and designing, and provided labour for excavation and construction of the dykes. Upon the successful repair and construction of ponds, the community was trained and participated in pond management, especially stocking, on-farm feed production and feed management including the feeding regime. In December 2016, the three model farms were stocked with fingerlings of Mirror carp (*Cyprinus carpio*), African catfish (*Clarias gariepinus*) and Tilapia (*Oreochromis niloticus*) with a total weight ranging from 15 to 25g. The farmers were given different feeding and water management regimes to assess the effect of farm management on fish production. Within a period of four months,

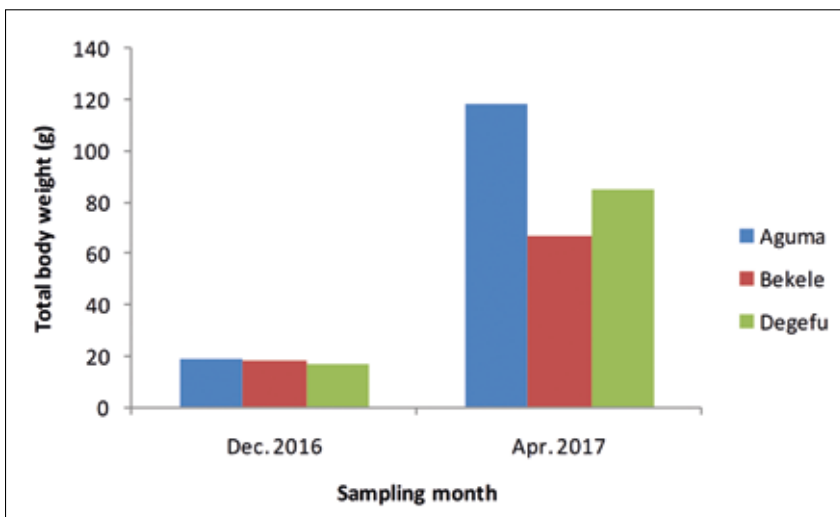


Figure 1: Performance of fish at the three model farmers

fish had on average quadrupled in weight to a total weight ranging from 67 to 118.7g respectively. The differences in fish growth was evident (see Fig. 1) owing to poor pond management, especially the frequency of flashing and cleaning of the ponds as well as an improper feeding regime.

Timeliness of the project: testimonies

Previously, a low amount of fish had been eaten in the Ijaji community. This was coupled with a national per capita fish consumption of approximately 0.5 kg per year due to low and irregular supply. Therefore, most members of the community were not able to prepare dishes and fish. In preparing the community to utilise the fish, the team also organised practical training sessions in fish processing and consumption. During the training, 24 trainees composed of 90% women, from each of the three kabeles subsequently prepared different fish recipes on site. After the training, an interview with one woman present at training noted, “I am happy, I can now prepare fish for my family, boiled or deep fried. Now my family will be eating fish frequently”.

The project contributed to increasing the amount of fish consumed at household level and within the community. During the joint annual meeting, all three model farmers in unison noted that they are able to get fish for their families from their farms. In particular, Mr Aguma said, “I can now eat fish from my farm with my families and already, I have been selling to cover my son’s school fees who is attending a private school, my family is now happy”. Furthermore, Mr Aguma informed the team that, “One trader who sometimes buys fish from my farm has started selling fried fish at Ejaji and the demand is high. Imagine he can sell over 100 whole Tilapia per day. Demand for catfish and common carp is even higher, fetching a good price because of their size”.

Women had also been marginalised in participating in fish farming. The project encouraged and supported women to participate in fish farming and subsequently stimulate ownership. At Mr Bekele’s farm, two additional ponds were constructed using project support and one was allocated to his wife. She was happy and expressed her enthusiasm, “I am happy to do all the activities after fish stocking, I will care for the fish so that they grow big, sell and get money to buy personal requirements and for the family”. At Mr Degefa’s farm, his wife (Ms Tadelu Gudesu) was encouraged to regularly undertake management activities including feeding and flashing the pond. During the harvest, she expressed happiness upon succeeding in growing fish in a pond, “With my family we had tried in previous years, but fish did not grow to this size, now I can see fish and it has grown in very short time. We have been eating some and selling some to the neighbours. We are going to restock and I will look after the ponds. Fish do not require a lot of time like cattle or goats, just a few minutes and they give food and you come back to do your housework”. In order to ensure sustainable management, special practical training sessions were organised for women and young people, which covered fish feed types and fish feed preparation (from locally available feeds), fish pond management (fish feeding, flashing ponds and keeping fish ponds clean), fishing net making and fish harvesting (how to make fishing nets and how to fish from ponds), fish handling and processing (preparing different fish dishes).

The farmers lacked fish feed, seeds and other accessories such as fishing gear or received very limited support from the Woreda Livestock and Fishery Development Office. Mr Bekele recollected during the first year project monitoring visit that “Fingerlings required for stocking new ponds and reservoirs have traditionally been obtained from the natural

lakes”. However, the growth rates have been very poor, pushing most farmers to abandon the practice. Therefore, the project with the Sebeta Fish Culture Station of the National Fish and Other Aquatic Life Research Centre provided 25g of fingerlings for stocking at a density of 2 fish/m² for each farmer, supplied feeds but later worked with farmers to make their own feeds on-farm and also provided fishing nets.

Water conflict was highlighted as the main hindrance to adopting and spreading aquaculture in the region. Mr Bekere decried water conflict with neighbours as the main factor preventing the expansion of his farm, “My neighbour and I have been quarrelling since I started fish farming, complaining that I am blocking water in my ponds, yet water keeps flowing throughout the year (*showing us to the outlet where was evidently flowing*). They frequently open the outlet letting my fish escape”. This issue was brought before the Livestock and Fishery Development Office of the West Showa Zone of Oromia region during one meeting with farmers and received the following response, “We would like to thank STRE-CAFISH for involving us in the fish farming project. Through our participation, we now have evidence that fish pods do not block water but actually act as water reservoirs. We are now more committed to supporting fish farmers to co-exist with crop farmers. Therefore, the project anticipates that fish-crop conflicts will reduce due to the strong participation of higher zonal administrative offices meaning that more fish farmers will emerge”.

Conclusion

By the end of the project, the model villages had attracted and trained over 100 potential farmers, zonal and Woreda heads as well as experts about fish farming since 2018. The model farms are now used as demonstration sites by the Livestock and Fishery Development Office of the West Showa Zone of Oromia region. By the end of 2018, farmers, livestock and fishery experts, development agents and officials from 22 other Woredas had visited and shared experiences. In addition, 10 farmers had purchased fish fingerlings from the model farmers to start fish farming. These demonstration farms, farmed and managed by the community will foster the adoption of practices and technologies. Within five years after the project, fish farmers will have increased by three fold.

5.1.4 Enumeration of results

<i>Result areas</i>	<i>Deliverable</i>
Institutional and stakeholders' networking in aquaculture & fisheries research, training and extension were established	1. 19 partnership agreements and/or MoUs were developed and signed to establish mutual public-private-partnerships (PPPs) to enhance research and training in fisheries and aquaculture
	2. New and expanded partnerships created during the project: MAK UoE, EAIR, Rhodes, Mzuzu, Bahir Dar, Bukavu, Abomey-Calavi together won funding to organise and implement student and staff mobility
	3. An inventory consisting of the expertise and infrastructure of the participating institutions and a platform for sharing of resources (expertise, facilities and equipment) were established
	4. A research framework was developed highlighting four broad national and transboundary challenges: Fish feeds and feeding; Breeding and quality seed; Fish diseases; Socio-economic issues including marketing, which were prioritised for research to boost fisheries and aquaculture productivity and sustainability
	5. An active website is maintained at Makerere University to share information and to raise awareness in recent developments in fisheries & aquaculture
Demand-driven training programmes and curricula adapted to the rapidly changing fisheries and aquaculture sectors were established	6. The project facilitated the revision of the MSc Fisheries and Aquatic Sciences (UoE) and MSc Fisheries and Aquaculture (MAK). This helped the team to work with stakeholders during the MSIP meeting to align the curriculum with stakeholder needs and expectations were identified. The curricula are awaiting approval from the university senates
	7. A colour chart of fish of Lake Victoria, Ugandan waters, was developed to improve and expediate the identification of fish
	8. Audio-visual material was developed on fish reproduction to help students follow and apply practical aspects
	9. For the first time, M and UoE students were introduced to intensive hands-on field-oriented modular training. The students were trained entirely in the field at stakeholders facilities.
	10. For the first time, farmers and other research institutions have been directly involved in the training of future employees during field-oriented modular training. The staff at the stakeholders firms/institutions were involved in giving lectures and facilitating practical-hands-on activities
	11. Three training sessions: one in Uganda and two in Kenya were organised for modular field-oriented training at stakeholder facilities and have provided the basis for further improvement and will subsequently provide financial incentives for adoption by the universities

<i>Result areas</i>	<i>Deliverable</i>
More adaptive and grounded fit-for-purpose students/staff were trained	<p>12. A gender study was conducted on women and their role in small-scale aquaculture in East Africa with about 200 farmers</p> <p>13. A new course, „Introduction to Gender studies“, was developed and incorporated into the MSc Fisheries and Aquaculture curriculum at MAK</p> <p>14. Eleven MSc students were supported to undertake research activities under the priority areas derived from MSIP</p> <p>15. One MSc thesis produced „Microsatellite Cross-Species Amplification and Utility in Selected African Cichlids: A Valuable Tool for Tilapiine Fishery Management and Conservation“ and 10 are under preparation</p> <p>16. Five fit-for-purpose PhD students were recommended to APPEAR and supported to undertake advanced training and research activities on priority areas derived from the multi-stakeholder innovation platform. Four PhD students directly linked to STRECAFISH finished their PhD studies by May 2019 and one individual APPEAR PhD fellowship recipient will finish her studies by April 2020</p> <p>17. Six scientific articles were published in peer-reviewed journals, six have been submitted and are under review at various journals and nine manuscripts are being prepared for submission to various journal to meet the PhD graduation requirements</p> <p>18. The project team and students have presented thirteen articles at various conferences</p>
Efficient use of regional training and research resources and increased teaching and networking among South-South Institutions with technical backstopping from a Northern collaborator	<p>19. Student mobility among participating institutions was initiated and six MSc students have been supported to undertake research with a regional perspective, thereby contributing to the pool of fit-for purpose graduates with a strong knowledge of transboundary issues</p> <p>20. A staff exchange platform was developed and maintained, under which, twelve exchange opportunities for staff to deliver lectures and/or undertake joint research activities have been supported and two researcher officers from NFALRC have undertaken aquaculture experiential learning at Ugandan and Kenyan aquaculture research institutions and fish farmers.</p> <p>21. The team expanded the network and together with Rhodes University, Mzuzu University and the Official University of Bukavu developed and won funding under the Intra-Africa Mobility Scheme to mount joint graduate training through the mobility of students and staff among partner institutions</p> <p>22. STRECAFISH was also linked to LARIMA and EDULINK creating synergy in implementing mobility activities</p> <p>23. Two graduate training sessions held for ten students at UoE and another one for 4 students of Mak using the aligned curricula to achieve fit-for-purpose graduates</p> <p>24. Eight fisheries officers were trained as trainers at stakeholder aquaculture facilities in areas of YY sex reversal; re-circulating systems in aquaculture, aquaponics and fish nutrition and feeding</p>

<i>Result areas</i>	<i>Deliverable</i>
Practical oriented fisheries officers and development agents trained and model aquaculture village were developed	<p>25. For the first time, Ethiopia has developed a “Fish Farming Manual” outlining the practical aspects of fish feeds, feed preparation and feeding, fish harvesting, handling and preparing fish recipes. This has been translated into Amharic, printed and 250 copies have been distributed</p> <p>26. Simple training guides for aquaponics; pond construction, fish diseases and disease control; ornamental fisheries, routine fish farm management were developed for farmers and extension staff in Kenya</p> <p>27. 66 fish farmers, 20 fisheries extension officers and eight fisheries officers were trained in Kenya along with seven fisheries officers and 124 fish farmers in Uganda, as well as one regional expert, eleven Zonal, 26 Worada experts and 108 farmers in Ethiopia have also been trained and equipped with skills in aquaculture</p>
	<p>28. Three model aquaculture villages were operationalised in Irigo Washemo, Jatoderki & Seden Illu; Ijjaji zone, Oromia region, Ethiopia</p> <p>29. One TV broadcast aired in Ethiopia on fish farming. This can be accessed at https://youtu.be/BwIK_ey4AP8</p>
	<p>30. Overall, three on-farm and nine participatory training sessions and demonstrations were conducted during the project duration. Practical training and demonstrations focused on pond site selection, designing and construction, fertilisation, stocking, fish feeds and feeding, fish harvesting, handling and preparing fish recipes</p>
	<p>31. The project organised and implemented field-based and skill-oriented training modules for 14 students from Eastern Africa</p> <p>32. The team prepared a popular scientific report entitled “Fische ernten auf Hochschulelevel” (Harvesting fish at university level) for the Austrian journal “Weltnachrichten”, which was published in June 2018 to raise awareness of the contribution of universities in developing aquaculture</p> <p>33. Two radio broadcasts were made in Austria on ORF Ö1 Campus radio to highlight the importance of North-South partnerships</p>



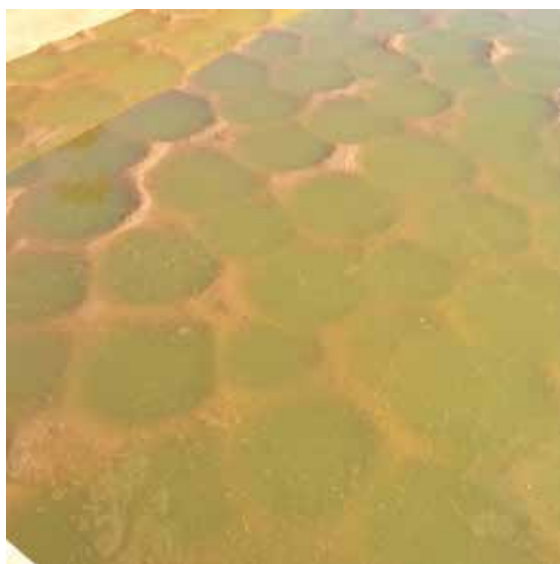
Cultivating participatory approach through brainstorming sessions



The demand for fish is high – one of the regular customers



Dissemination was crucial – media interviewing institutional support leader



Nile Tilapia nests in the breeding pond



*Reasonable harvest – pond owners displacing *Clarias gariepinus* polyculture with *Tilapia**



Women were critical in pond management and feeding

5.2 Sustainable Highland Rivers Management in Ethiopia

Project Coordinator: Wolfram Graf

Coordinating Institution: University of Natural Resources and Life Sciences, Vienna, Department of Water, Atmosphere and Environment, Institute of Hydrobiology and Aquatic Ecosystem Management

Partner Institutions: Ambo University, Department of Biology, Ethiopian Institute of Agricultural Research (EIAR) – National Fishery and Other Aquatic Life Research

Partner Country: Ethiopia

Project Duration: 1 August 2015 – 31 July 2019

5.2.1 The project – LARIMA

LARIMA was a project funded by the Austrian Development Cooperation, including both – water and biodiversity. Water resources are important for livelihoods but in the Ethiopian highlands, the progressive deterioration of aquatic systems due to various influencing factors is ongoing. The aim of the project was to develop awareness of the essential nexus “land-water-people” for promoting river health and to initialize monitoring systems that inform decision-makers.

The consortium consisted of the University of Natural Resources and Life Sciences (BOKU) – Institute of Hydrobiology and Aquatic Ecosystem Management (IHG), the Ethiopian Institute of Agricultural Research (EIAR) – National Fishery and Aquatic Life Research Centre (NFALRC) and Ambo University (AU). Moreover, the project involved collaborators from Austria including the Center for Development Research (BOKU – CDR) and the Natural History Museum (NHM), Vienna, for professional input in the project work packages and activities. From Ethiopia, the Holota technical and vocational college, district agricultural- environmental and water resources bureau, ministries (agriculture, water, industry, health and environment) were also included.

The LARIMA project aimed at building human capacity in the field of assessing the health of surface water resources, generated knowledge for understanding the socio-economic development and aquatic ecosystem services provided to humans, and strengthen participatory management practices for aquatic resources in Ethiopia. In addition, this project established and strengthened links and collaborations in research and education among national partners and between local and European institutions.

To achieve these objectives, the project focused on 1) establishing a metadatabase on available data on hydrology, land use, meteorology, physico-chemistry, morphology, biology data and gap analysis; validating and adapting biomonitoring tools using benthic invertebrates to assess the status of Ethiopian highland streams and rivers, 2) establishing two watershed based case-study sites for research and training on sustainable highland streams and rivers management, 3) developing baseline socio-economic and gender disaggregated information on aquatic ecosystem services in Ethiopian highlands, 4) developing human and institutional capacity for the newly established Ambo University and EIAR-NFALRC regarding education, research and extension on sustainable water resources management and 5) developing strategies to disseminate the project outputs to the scientific community, policy makers, relevant authorities and the wider public. In addition, the project aimed

at providing a first basis of national hydrobiological information and biodiversity data for future uses beyond the project period in Ethiopia.

5.2.2 Awareness raising and capacity building as a key role for further development

by Aschalew Lakew and Silke-Silvia Drexler

Research and education play a central role in improving the livelihood of people and economic development of countries worldwide. Research and education capacity is the ability to produce and use scientific knowledge such as new technologies and information to satisfy the needs of the country. Capacity building for research and education is a long-term complex process that requires the interplay of individuals, institutions, national and international research and education institutions. Scientific information and technologies are generated through the integration and synergistic contribution of higher learning and research institutions primarily involved in innovative research and education. There is a strong synergy and cooperation between researchers and university scholars while developing research questions and project ideas. The quality of research and education can be improved through networking across national and international institutions and sustaining these links through various ways including project implementation and scholarships. This short story focuses on the contribution of the LARIMA project to capacity building of partner institutions and to creation of awareness by scientific and local communities residing around the project sites and others.

Inception

I – Aschalew Lakew – was in the final year of my PhD studies granted by the APPEAR program when the LARIMA project idea and concept note were developed. I received the opportunity to initiate the project for sustaining and strengthening the relationship with my host institution (BOKU– University of Natural Resources and Life Sciences, Vienna) after completing my studies. This was my first experience in designing and preparing proposals in a multidisciplinary approach and applying the knowledge acquired for the benefit of my institution and the country at large. This type of project development requires discussions with different experts and scientists where new ideas, approaches and dimensions are analysed and organised. The project focused on highland rivers flowing through rural, sub-urban and urban areas of the country that are used for various activities by local communities, small and medium scale development companies and industries. The idea was to maintain the health of the river water and keeping the balance of different life forms like bacteria, macro-invertebrates and fish living in the aquatic system.

Human capacity building

As a component of the capacity building program, young lecturers from Ambo University (AU) and researchers from EIAR-NFALRC (Ethiopian Institute of Agricultural Research – National Fisheries and Aquatic Life Research Center) were awarded long term training opportunity to obtain their MSc and PhD (three from AU and one from EIAR-NFALRC) at BOKU specialising in aquatic ecology, biomonitoring of rivers and socio-economics. It is an

advantage that the teaching and research capability of the trainees and their home institutions will provide a benefit in improving the quality of education and research output upon completion of their studies.

In addition, more than 12 graduate students of AU were financially and technically supported to cover their field, laboratory work as well as the write-up of their MSc research studies focusing on topics related to the project activities. The students were selected following rigorous screening based mainly on their academic merit. Female students were encouraged and given priority as per the project document. The research supervisors were members of LARIMA project from EIAR-NFALRC and AU based on specialisation. Today, most of the project sponsored graduate students have been recruited and have joined the newly established universities as lecturers and research institutions. This is one of the success stories of the project in producing qualified teachers and researchers for higher learning and research institutes in the country. Moreover, the research output of the graduate students was summarised and compiled as deliverables and communicated to the local community and development agents in the workshops regularly held during the project period in order to create awareness.

Modules and manuals

The quality and contents of courses provided to graduate students of aquaculture and fisheries and environmental sciences at AU were upgraded by introducing course chapters and practical sessions to the curriculum. Previously, AU offered aquatic ecology graduate courses led by expatriates who had less knowledge on the major water bodies of the country. The courses given on aquatic ecology were predominantly based on theoretical lectures lacking in most cases practical sessions. A dearth of practical knowledge was the main shortcoming of the graduate programs in the department of biology. It was exciting for students and lecturers of AU to take part in the practical sessions in the field and the laboratory. AU officials, in particular the president and vice president, were extremely cooperative and actively supported the successful implementation of the project.

The training provided for local experts and development agents, using short course manuals developed during the project period, created immense awareness in the area of river utilisation and management. The experts are capable of explaining the causes, effects, pressures and drivers of river pollution and the consequences to development sectors that they are leading including agriculture, water supply and environmental protection.

Community awareness creation

One of the aims of LARIMA project was to introduce and create awareness of the scientific and local communities in the partner and collaborating institutions and within the communities living at the project sites on basic knowledge of aquatic ecosystem management. A series of training workshops were conducted in the Ambo, Sebeta and Ginchi area where the project site is located. The workshops held at AU were targeted at university teachers and graduate students dealing with the monitoring of river health using aquatic organisms. In addition, at Ambo University, a training workshop was organised for lecturers and PhD students of Addis Ababa, Bahirdar and Gonder universities on biomonitoring and on challenges of aquatic ecosystems of the country. The trainers were scientists from BOKU university and researchers from EIAR-NFALRC. One of the theoretical training and field sampling sessions coincided with the social unrest and heavy gun shots in February 2018 while the

lecture was taking place in the university hall, which is unforgettable. The Austrian scholars were so dedicated that they even carried out the field sampling as scheduled.

Several workshops were held in the towns of Chilimo and Ginchi to create awareness on sources and drivers of river pollution and its consequences to family health and other development activities. The local communities who participated in the training were aware of the sources of river pollution, its consequences to family health and its impact on agricultural production and environmental protection. Gender based interest was reflected in workshops held at the project demonstration site where female participants strongly raised the problem of water pollution on family health and gave prior attention to technologies adapted to improve water quality for drinking and domestic use, whereas male participants were interested on the volume of the water for farmland irrigation. Moreover, the communication of project results to the national and international scientific community was successfully accomplished at the project final workshop. The workshop created an opportunity to share experience and establish links within national institutions, between countries and among continents (Africa, Asia and Europe).

Life experience

The scientific commitment and ethical dedication of professors and senior scientists from BOKU demonstrated during field sampling provided life experience to scientists and experts from national partners. Night sampling of aquatic insects by using light traps is one of the most interesting techniques we learnt, practically from Austrian scientists. In one of the lower Awash River sampling sites, we obtained incredible samples and all of us were impressed by the collection. As we took a longer time, some of the team members decided to stay longer and others decided to make a slow walk back to the vehicle through bushy and plain field where there is no walking road available. In about 15 minutes the remaining team left the site with the local guide and on our arrival to the vehicle the other team members were not there. In that very rural area at night it would be difficult to get them back without the help of the local guides who are trained to shout loudly and who know each direction of the locality. From this, the Ethiopian team learnt the commitment and the extent of sacrifices for generating knowledge in science. In addition to the natural challenges we overcame during sampling – such as instant flooding while we were sampling, several crocodiles and hippos in the river, the way we handled and managed the local cultural taboo such as being unable to stay near a river after sunset and local security issues -all of the experiences gained were remarkable and were just rewards for our long-standing work in science.

In addition to the human capacity building, the LARIMA project built on the capacity of Ethiopian partners through receiving scientific equipment which is not available on the local market. Both AU and EIAR-NFALRC have sufficient scientific equipment for providing practical education and conducting quality research in river systems. I would like to thank the project managers from BOKU, for their tireless efforts to procure this scientific equipment on the international market.

Generally, Ethiopian partner institutes, namely AU and EIAR-NFALRC, have benefited in terms of human and institutional capacity building to provide quality education and conduct innovative research to generate scientific information in riverine ecosystems for the benefit of the country. The European counterpart gained enormous experience and knowledge on the aquatic ecology and bio-monitoring of highland rivers in Ethiopia and the tropics at large. Nevertheless, the most impressive was the tireless commitment of Ethiopian

partners to the project idea though their daily life was limited several times during the whole project life span due to tribal clashes and political unrest.

5.2.3 A contribution to re-establish freshwater health and biodiversity?

by Wolfgang Graf, Silke-Silvia Drexler and Anne Hartmann

Humans are vitally dependent on nature, and everything we need on a daily basis is gained from natural processes. We might not be aware of this fact as goods are sold in fancy packaging, but the raw material is simply nature. And although we undoubtedly live in the Anthropocene, where humans change the world's appearance decisively, a tiny virus – the SARS-CoV-2 – is suddenly able to abdicate us from our throne, forces us to stop all activities and reveals our vulnerability and dependence on nature.

Large numbers of complex and constantly occurring natural processes ensure that the ecosystem functions and provide us with vital ecosystem services, which we take for granted. Humans have influenced their environment since time immemorial, but with growing population density, the decoupling of processes has reached critical thresholds and is leading to an unbalanced system resulting in risks to basic requirements for humans.

The United Nations implemented the Sustainable Development Goals (SDGs) in 2016 to ensure sustainable development in the future. Water security, capacity building, biodiversity and conservation are among the topics addressed in these 17 SDGs. The LARIMA project broached these important subjects by raising awareness of water resources in a healthy environment of locals, but also amongst academics and stakeholders by linking socioeconomic with hydrobiological aspects.

Biodiversity is seen as a major pillar to ensure sustainability in ecosystem functioning, but especially in East Africa little is known regarding for example aquatic organisms. In aquatic ecology, nutrient cycling starts with primary producers like algae, mosses, ferns and macrophytes which serve as a resource for macroinvertebrates, which mineralise organic particles and purify the water. Macroinvertebrates have developed a multitude of functional feeding techniques to utilise various resources of different particle sizes. Species diversity is extremely high within this group and each species has a specific job or function within the food web, thus ensuring resistance and resilience of aquatic ecosystems against potential disturbances. Together with microbial organisms, macroinvertebrates may be considered to be natural sewage plants maintaining aquatic systems sustainably and providing a vital ecosystem service, namely pure drinking water for society.

Recently, experts have been discussing the potential of moving towards a sixth mass extinction of species. Our planet already experienced five big mass extinctions caused by volcanism, tectonic phenomena and meteorite impacts – all naturally occurring. However, this current crisis is man-made. Recently, we have learned that biodiversity is declining at a shockingly fast rate in all of our ecosystems. According to a WWF study (2018), about 60% of our animals have been eradicated since the 1970s. Regarding freshwater ecosystems only it is even worse at 83%. The tropic regions seem to be most vulnerable and have recorded substantial losses due to the high density of species (WWF, 2018).

Today, developing countries face the same problems in freshwater ecosystems as industrialised countries faced in the 1970s. The enhanced input of nutrients and eutrophication

in agricultural areas caused by fertilisers, toxic industrial sewage input, domestic wastes in urban zones, deforestation and input of fine sediments as well as missing buffer zones, deterioration of morphology and hydrology due to hydro power-plants as well as water withdrawal by irrigation and usage of waterways as important traffic arteries put immense pressure on aquatic ecosystems, thereby endangering their functionality. The extensive lack of implementation of a legal basis to protect water bodies intensifies conflicts arising from daily needs of humans, such as cooking, washing dishes, laundry and cars, watering the cattle, the fields or even bathing. On the other hand, ecology is heavily disrupted due to these human impacts.

The African population is set to grow to 2.4 billion people in 2050, which means a doubling of numbers from 2014 (UNICEF, 2014). This massive population growth evokes increased pressure on the water sources due to increasing power production to meet energy demand. Hydropower is still considered as sustainable as it produces no pollutants and emissions. Nevertheless, the negative effects on the aquatic ecology are scientifically proven. The Grand Ethiopian Renaissance Dam – the biggest power project in Africa – on the Blue Nile River in Ethiopia is supposed to produce 6.000 MW power per year (IHA, 2017) and is thus in a position to cover the entire electricity consumption of Ethiopia. The dammed-up water will cover a surface of 1,874 km². The ecological effects have not been studied yet but are known to have a major influence on biotic and abiotic components.

European countries have their lessons learnt from physico-chemical, hydro-morphological as well as biological devastation and established the EU Water Framework Directive in 2000. It contributes to enhancing the status of aquatic ecosystems and even to protecting them from further deterioration by striving for a good ecological status of surface water systems. The crucial question will be if such a European scaling and protection system like the WFD can be adapted to African conditions.

LARIMA laid a specific focus on the documentation of aquatic biodiversity as this issue is inextricably linked to 1) awareness building on the sensitivity of aquatic ecosystems and 2) to the management of aquatic resources and conservation aspects. We only can preserve what we know to exist, and information on distribution of African fauna is scarce. In times of high anthropogenically induced extinction rates, documentation of faunal elements is crucial.

Four peer-reviewed SCI-publications in the framework of LARIMA as one important outcome of the project have therefore been briefly touched upon.

- Terefe, Y.; Vitecek, S.; Graf, W. (2018). Description of the larva of *Oecetis mizrain* Malicky & Graf, 2012 (Trichoptera, Leptoceridae) and *Lepidostoma scotti* (Ulmer, 1930) (Trichoptera, Lepidostomatidae) from Chilimo Forest, Central Ethiopia. ZOOKEYS. (766): 63-77. Macroinvertebrates are important biological quality elements within current and globally implemented assessment methods. The taxonomic resolution is decisive for the precise identification of the ecological status and the larval stages of invertebrates are in overwhelming cases not described in tropical Africa. Terefe et al (2018) have started an initiative to increase the level of knowledge of these indicators and described two species restricted to natural forested streams in the highlands of Ethiopia. Furthermore, a complete list of Ethiopian Trichoptera is also provided.

- Yanai, Z., Graf, W., Terefe, Y., Sartori, M. & J.-L. Gattolliat (2020). Re-description and range extension of the Afrotropical mayfly *Cloeon perkinsi* (Ephemeroptera, Baetidae). *European Journal of Taxonomy*. <https://doi.org/10.5852/ejt.2020.617>.

The distribution of macroinvertebrates in Africa is widely not clear. Identification on species level is therefore hampered, yet crucial for biodiversity and management issues. The paper describes a mayfly species – *Cloeon perkinsi* – in detail and illustrates its global distribution raising phylogenetic and zoogeographic questions.

- Englmaier, G., Hayes, D.S., Meulenbroek, P., Terefe, Y., Lakew, A., Tesfaye, G., Waidbacher, H., Malicky, H., Wubie, A., Leitner, P. & W. Graf (2020). Longitudinal river zonation in the tropics: Examples of fishes and caddisflies from the endorheic Awash River, Ethiopia (submitted). *Aquatic Conservation*.

The paper describes zonation patterns of aquatic organisms (fish and caddisflies) and links them to abiotic features along the course of a major River in Ethiopia. This is the first time that an Ethiopian river has had over 1200 kilometres analysed in terms of its biota. Biodiversity and distribution, in regard to physico-chemical and physiographic parameters, are analysed and potential historical and anthropogenic factors responsible for species occurrence are discussed.

- Kebede, G.; Mushi, D.; Linke, R.B.; Dereje, O.; Lakew, A.; Hayes, D.S.; Farnleitner, A.H.; Graf, W. (2020). Macroinvertebrate indices versus microbial fecal pollution characteristics for water quality monitoring reveals contrasting results for an Ethiopian river. *ECOL INDIC*. 2020; 108, UNSP 105733.

The enhancement of bioindication, riverine health and management is another big topic within LARIMA, which is closely linked with socioeconomic processes. Kebede et al. analysed the assessment of the results based on macroinvertebrates and microbes and found very contrasting results along a tributary of the Awash river around the village of Ginchi. While macroinvertebrates indicated a good ecological status in upstream sections and moderate to bad status downstream, the density of microbes at all sampling stations exceeded all existing guidelines. These findings underline the urgent need for management action on a large scale to reduce the high risk of water-borne diseases for the local villagers. The paper stresses the fact that different indicators tell their own story and cannot be replaced by one another. This is a crucial finding for managers and decision-makers as relatively cheap macroinvertebrate surveys are frequently used for status assessments, but do not cover important hygienic aspects, which might seriously affect humans.

In conclusion, LARIMA tried to contribute to various aspects linked with freshwater systems in the highlands of Ethiopia and in the tropics in general. The findings made in the framework of LARIMA might be used as a way forward towards a sustainable use of freshwater in Ethiopia as a tipping point with societal needs.

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5.2.4 Enumeration of results

Biomonitoring tools to assess the status of Ethiopian highland rivers:

- A meta-database based on a comprehensive literature search enabled the development of a biomonitoring framework. It allowed for the acquisition of comprehensive knowledge of what data is available in the region and supported data analysis in terms of availability, format and quality of the data sets. Based on the database, existing taxalists for fish and benthic invertebrates were extracted from the collected literature, thus supporting the creation of a LARIMA taxa catalogue.
- Extension of the listed species for Ethiopia and their compilation in a taxa catalogue (macro invertebrates and fish) by own collections. First detailed investigation of a river in Ethiopia represents the first detailed investigation along this length of its longitudinal gradient regarding benthic invertebrates and fish. Gained knowledge about the biodiversity of aquatic organisms and the influence of certain land use scenarios.
- Creation of a stream classification system: typology based on ecosystem, altitude class and catchment class.
- Adaption and testing of an existing benthic macroinvertebrate river biomonitoring concept (ETHbios) for Ethiopian highland rivers; confirmation that also microbiological data is essential for assessing water quality in Africa.

Watershed based case-study sites for education and research on aquatic ecosystem management:

- Selection of three study sites reflecting the variety and overall ecological status of aquatic ecosystem in the highlands of Ethiopia from near-natural to heavy degradation. Sites were used for demonstration, practical training and research during and after the project period.
- Compilation of data on anthropogenically caused water pollution; potential suggestions for mitigation measures to restore the health of the aquatic ecosystem could be addressed to stakeholders and politicians including education, training and workshops to minimise the increasing levels of pollution.

Socio-economics and aquatic ecosystem services in Ethiopian highlands:

- Analyses of beneficiaries of aquatic ecosystem services along the river Awash over time by surveying their tasks and uses of the stream.
- The survey and analysis of a large number of representative households along the Awash river provided valuable insights into the socio-economic impact of aquatic ecosystem management measures on the livelihood of the community (e.g. hygiene aspects).

Human and institutional capacity building in partner institutions to support the sustainable use of aquatic resources:

- Inclusion of two course chapters in two MSc programs at Ambo University. Development and provision of course materials.
- Production of three manuals as teaching materials for instruction in field sampling and sample processing for benthic macroinvertebrates (manual on multi-habitat sampling of benthic invertebrates from wadeable rivers in Ethiopia, a manual for the sorting of benthic invertebrates from rivers in Ethiopia and a training manual on the ecological health of rivers and streams). These manuals standardise sampling and sample processing at all levels in research institutions, universities and relevant ministries and colleges.
- Intensive exchange of experience between experts on benthic invertebrates and fish (North-South and South-North exchange). Successful South-South cooperation in lectures, supervision and evaluation of dissertations.
- LARIMA awarded short-term research grants to a total of 14 students and all of them successfully completed their studies. To date, four graduates have gone on to teach at universities and three have become environmental specialists in the Ministry of Environment. One went to university as a teacher, which shows that the project has made a major contribution to capacity building and the training of competent graduates.

Mechanism of result dissemination and adaptive management techniques:

- An active website is maintained at BOKU to share information and to publish recent project results: <http://www.larima-appear.info>.
- Three leaflets (in different languages) and one poster were published to share experiences and promote future mitigation activities.
- Eight workshops were held on site to train local communities and experts, which were organised at the demonstration site. Teaching media for the local community were partly made available in Amharic and Oromiffa to allow a better understanding and conversation with the community. Local farmers were also introduced to a simple prototype of a home-made water purification system to be adapted/trained by rural women fetching water for domestic use from the river. Under LARIMA, farmland was successfully preserved for bank management practice and used for educational and demonstration purposes, including future use by university institutions.
- The project organised the final conference in Addis Ababa and invited international and national scientists in the field of aquatic resources and river management to evaluate the project output and share their experience in the field of sustainable utilisation of aquatic ecosystems. 23 papers were presented and discussed in detail and group work sessions were arranged to discuss the way forward and future projects.



Analysis of benthic invertebrates in the lab during joint workshop on river ecology at Ambo University in February 2016



Sampling at Awash River during joint workshop on river ecology at Ambo University in February 2016



Dr. Aschalew Lakew leading the excursion to Chilimo Forest (a sampling site in LARIMA project) during a visit of project lead partner in September 2018



*Yonas Tereffe Atlabachew
(PhD student within
LARIMA project) at
Awash River explaining
riverine processes*



*Typical highland scenery:
children at the bank of
Awash River with watering
cattle*



Fish sampling at Awash River during longitudinal river sampling within LARIMA project



Children at fish market at Lake Koka



Fish sampling at Awash River during first longitudinal river sampling within LARIMA project

Ethiopia



*A mayfly of the family
Heptageniidae from the
upper Awash*



Awash River (Ethiopia)

5.3 Implementation of Academic Land Administration Education in Ethiopia for Supporting Sustainable Development

Project Coordinator: Reinfried Mansberger

Coordinating Institution: University of Natural Resources and Life Sciences, Vienna, Surveying, Remote Sensing and Land Information

*Partner Institutions: Debre Markos University, Natural Resources Management
Vienna University of Technology, Department of Geodesy and Geoinformation*

Bahir Dar University, Institute of Land Administration

Partner Country: Ethiopia

Project Duration: 1 March 2016 – 29 August 2020

5.3.1 The project – EduLAND2

In Ethiopia, land is the primary means of production, offering diversified livelihood opportunities. Land is the basic asset used by farmers to accumulate wealth and to transfer it to future generations. Besides this, land has also cultural dimensions. People often have an emotional attachment to the land that they claim, resulting in small land disputes that lead to hostility and even deadly conflicts even between neighbouring farmers. Accordingly, proper assurance of land rights supports proper management of land, livelihood improvement of people, and hence, leads to economic growth. Thus, land rights are imperative in order to bring sustainable development to the country.

An effective land administration system supports sustainability and is an essential source for decision-making. Land administration comprises land tenure, land use, land value and land development functions. A proper land administration system is a pre-requisite for good governance. It supports a sound and transparent land policy, resilient land use, adequate spatial planning and sustainable land development.

In 2015, UNDP estimated a demand for 50,000 land professionals within the next ten years for Ethiopia (USAID, 2014). The project “Implementation of Academic Land Administration Education in Ethiopia for Supporting Sustainable Development (EduLAND2)” contributed to mitigating the lack of land administration experts and triggering research on land administration topics.

The establishment of a proper land administration system provides many socio-economic benefits for society, such as the assurance of land tenure security, enhancement of social stability, societal development, provision of security for credits, labour mobility, increased productivity, improved urban planning and infrastructural development, fair taxation and support for resources management.

The general objective of the academic project EduLAND2 was to improve the livelihood of Ethiopian society by increasing knowledge, competences and skills of experts working in the field of land administration and to provide enhanced geodata sets for land-related decision-making, whereas the specific objectives of EduLAND2 were:

- To establish a Land Administration Competence Centre at Debre Markos University (DMU);

- To increase the number and enhance the competence of land administration professionals in Ethiopia;
- To deliver demand-driven community services in the area of land administration;
- To launch long-term cooperation between all partner institutions and to strengthen the professional network at a national, regional and international level;
- To promote gender mainstreaming on land rights and to increase the number of female academics in land administration.

The project “Implementation of Academic Land Administration Education in Ethiopia for Supporting Sustainable Development (EduLAND2)” is a bilateral four-year project between Northern and Southern Universities and was launched in March 2016.

The following institutions were project partners in EduLAND2:

- Institute of Geomatics (until November 2019: Institute of Surveying, Remote Sensing and Land Information) and Institute of Spatial Planning, Environmental Planning and Land Rearrangement, both from the University of Natural Resources and Life Sciences Vienna (BOKU, Austria). The Institute of Geomatics is the coordinator of the project;
- Institute of Land Administration (established in August 2016) of the Debre Markos University (DMU, Ethiopia), which was the main beneficiary in the project;
- Research Group Geoinformation of the Technische Universität Wien (TUW, Austria); and
- Institute of Land Administration of Bahir Dar University (BDU, Ethiopia), which mainly contributed its experience in establishing a Land Administration Institute and running a curriculum in “Surveying and Land Administration”.

The project strengthened the capacities of all the partner institutions in education, research and management in the scientific field of surveying and land administration. EduLAND2 provided a significant contribution to sustainable development in Ethiopia in general and the Amhara National Regional State in particular, by building academic staff capacities designing a research-driven bachelor curriculum, applying joint research and preparing demand-driven community services. With these activities, EduLAND2 contributed to improving the living conditions of the local population, guaranteeing land tenure security and providing an objective basis for decision-making in order to support good governance.

In August 2016, DMU established a Land Administration Institute (ILA/DMU) and in the same year, a four-year Bachelor program “Surveying and Land Administration” was launched, which was based on the curriculum of ILA/BDU and adapted as part of the project. Due to change in the higher education strategy in Ethiopia, i.e., to teach first year students freshman general courses and place them in different programs in the second year, it is impossible to enumerate first year regular land administration students. However, there are 135 regular students in three batches (4th, 3rd and 2nd year students). The first batch was intended to graduate in July 2020 but this was postponed due to the Covid-19 pandemic.

A community-service delivery program and training for local land administration experts was developed and delivered starting in the second project year. Lifelong learning (LLL) programs were provided (evening and summer training programs). There are 203 students, who are completing their Bachelor’s studies in this continuing program. In addition, short-term training sessions were provided to the farming community on Amhara National Regional State (ANRS) revised land administration and land use legislation. Consultancy services within the areas of land administration were offered.

EduLAND provided DMU with surveying equipment (GNSS instruments, total stations), financed a computer lab with 25 working places and delivered learning and teaching materials.

Joint research activities were carried out between project partners, which resulted in two feasibility studies, two presentations at the World Bank Conference in 2019, three articles in proceedings and by July 2020 four publications in international peer-reviewed journals. In addition, three articles have been submitted to journals.

Gender mainstreaming was a focal point of EduLAND2. Priority was given to females in staff recruitment, staff training and student enrolment. Additionally, gender-related topics are integrated in the developed BSc curriculum “Land Administration and Surveying”. The success story after four project years: in the first year about 70 percent of the enrolled students were female, in the second, third and fourth project year the percentage of female students was about 35 percent. Unfortunately, the recruitment of female staff members and PhD students was not so successful, as the number of potential candidates was very limited due to the male-dominated higher education system in previous times.

Another central issue in the design of the EduLAND2 project was the principle of equal partnership between all project partners. EduLAND2 included a bundle of activities to implement and run an equal partnership in the project. After four project years, all project members are in close contact on an institutional and national level.

At the end of the project in February 2020, all of the objectives of the EduLAND2 project were achieved. All project partners intend to continue to cooperate in the future and they submitted two project proposals for joint research activities on the topics of surveying and land administration.

5.3.2 Equal partnership

by Reinfried Mansberger, Sayeh Kassaw Agegnehu, Gerhard Navratil, Belachew Yirsaw Alema

In EduLAND2, equal partnership was based on the principle of co-operation, mutual learning and mutual understanding in the field of profession. Equal partnership was applied using knowledge exchange, joint research activities and staff mobility between all project partners. Mutual learning and understanding of each other's culture was an essential ingredient for implementing the partnership. In addition, the concept for establishing an equal partnership in EduLAND2 included components to maintain the partnership beyond the duration of the project.

Implementation of an equal partnership

The idea of equal partnerships between all project partners (University of Natural Resources and Life Sciences Vienna / BOKU, Debre Markos University / DMU, Bahir Dar University / BDU, and Technische Universität Wien / TUW) was taken into account and implemented in the EduLAND2 project as early as the design phase. The development of the project proposal was a joint activity. In two workshops, the proposed project coordinators framed the project idea, the objectives of the project, discussed and agreed on content, work packages, time schedules and budgets. High-level managers from all partner universities as well as stakeholders in the field of land administration in both countries were informed and partly involved during this stage.

Besides the core activities in EduLAND2, the implementation of the Institute of Land Administration and a Bachelor's degree program on "Land Administration and Surveying" at the Debre Markos University, various activities were outlined in the project to strengthen cooperation and partnership in the project:

Elaboration of two feasibility studies and preparation of joint publications, which were focused on the current challenges in the Ethiopian land administration.

Joint preparation of lectures and applied team teaching to deliver short-term training for students and land administration experts. Staff exchanges strengthened the cooperation between project members. Bidirectional study visits by staff members were carried out to obtain knowledge on each other's teaching and learning environment and the strengths and weaknesses of the systems in both of countries, Austria and Ethiopia.

All decisions in project management were discussed and agreed with the partners involved. Decisions were communicated to all other project partners. Proposals for follow-up research activities were prepared to facilitate a long-term cooperation. Cultural study tours were organized to enhance knowledge about history and the way of life in the partner countries and to achieve a better mutual understanding.

Success stories

All project members are in close contact on an institutional and national level. The partnership between all of the partner institutions of EduLAND2 was enhanced. In addition, the cooperation between the national partners increased, e.g. teachers at ILA/BDU support teaching activities at ILA/DMU and DMU enabled some members of their teaching staff with a Bachelor's degree to attend Master's programs at BDU.

All Austrian staff members cooperated closely with their colleagues at Debre Markos University during the provision of specific courses for regular students and land administration experts. Austrian and Ethiopian experts discussed the content of the courses together. In some cases, lectures were delivered in a team-teaching approach. High representatives of the institutions of the project partners took note of the project, as all four coordinators made sure to organise meetings with the rectors of DMU, BOKU and BDU, as well as with a high-ranking representatives of TUW. Stakeholders were regularly informed about the project and some representatives of local stakeholder associations contributed actively to the project as members of the advisory board.

The sharing of responsibilities and the continuous exchange of information enhanced the commitment of all project partners to cooperate in the project. The main communication tool between the partners was e-mail, which worked properly. The national coordinators communicated periodically by internet calls. Face-to-face meetings were held once a year with venues alternating between Debre Markos, Vienna and Bahir Dar. All communication tools served to increase the level of partnership.

Since the preparation of the project, the partnership between all coordinators at the institutions has increased. All the partnership-building measures in EduLAND2 resulted in friendships between project partners. These friendships are sustainable sources for ongoing cooperation. Common cultural activities enhanced the knowledge of history and the way of life in the partner countries, and contributed to a better mutual understanding.

Challenges

The equal partnership was an important factor for the success of EduLAND2. All project partners worked on this partnership. Nevertheless, there were some challenges in the process of establishing close, equal and long-term partnerships, as outlined below.

Personal relationships are an important factor for partnership building between institutions. If staff members move to other institutions, new contacts have to be established. Newer universities in Ethiopia suffer in particular from a high level of staff turnover, as some of the teaching staff have to be trained in long-term programs (e.g., Master's programs or PhD programs). In addition, well-educated experts were recruited for high-level jobs at governmental level.

Equal partnership requires continuous communication between all project coordinators and in a top-down process to all project staff members at each university. Hindering factors for carrying out these requirements are a shortage of time due to other duties (teaching, research, administration) as well as some problems with the internet in Ethiopia due to power fluctuation.

As mentioned above, the preparation of new projects aims to maintain the cooperation between all project partners even after the end of EduLAND2. Due to a shortage of research funds, most projects calls are competitive. This fact includes the risk that the submitted project proposals will not be considered for funding.

Lessons learnt and recommendations

EduLAND2 was characterised by a broad spectrum of activities, ranging from organisational tasks, educational tasks and community services down to research activities. The cooperation of all project members from the very beginning until the very end of the project was necessary to manage the workload and successfully complete the project.

Staff rotation at universities was very commonplace due to short-term contracts or professional changes for high-end researchers. Staff changes always pose a risk to keeping partnerships intact – especially in cases where a limited number of staff members at partner institutions are involved. The integration of new project members is easier, if university managers and/or stakeholders are involved in the project.

Austrian project members were very satisfied with their national land administration system. Therefore, the initial intention was to transfer practices from Austria to Ethiopia, thereby foregoing an equal partnership. During the project implementation, the Austrian project members realised in discussions with the Ethiopian colleagues that the proposed solutions are not applicable for Ethiopia. Knowledge exchange between partners resulted in better solutions than those implemented in the “developed country” Austria. In EduLAND2, Austrian partners recognised the importance of shifting the academic approach from knowledge transfer to knowledge exchange.

Culture and way of life are very different in Ethiopia and Austria. Project partners have had to learn about both the culture and the ways of life of the other nation in order to understand personality and behaviours of their counterparts.

Key staff members of all institutions have known each other for many years, as the project coordinators of DMU and BDU successfully completed their PhD at Austrian universities. The idea of a common project was born shortly after the return of the Ethiopian colleagues to their home country and resulted in the successful application of EduLAND2. In

recent years, the relationship between the project coordinators has developed from an equal partnership to friendship, which has increased the resilience of the partnership.

A Memorandum of Understanding (MoU) between universities can help to form a good partnership, but it is not a guarantee. MoU only provides evidence of an intended partnership between universities on a strategic level and not of a partnership between researchers at a personal level in a project.

The author of the article will summarise the experiences gained in the last three years of EduLAND2 and formulate the following recommendations for a successful implementation and running of equal partnership in capacity building projects:

- Interest for cooperation in research, teaching and community involvement are the basic requirements to successfully run a project;
- At the very beginning of the project, the focus has to be on brainstorming, discussions between concerned professionals at the universities and outlining joint research topics;
- Try to get some preparatory funding for the preparation of the project and for elaborating the project proposal as well as for launching the partnership;
- Recognition of equal partnership between all project partners is essential for continued engagement by the project partners;
- Include staff and student mobility in your project;
- Involve university managers and stakeholders in the project (e.g., as advisory board members);
- Promote and communicate project content and results to the national and international community;
- Launch partnerships in different disciplines at the same universities;
- Continue capacity building and staff exchange upon the finalisation of the project by applying other funds for the successful continuation of joint research and teaching activities.

Summary and outlook

The project EduLAND2 is implemented successfully. An important factor for the success was the equal partnership in the project. EduLAND2 increased the number of land administration professionals in Ethiopia and extended knowledge, skills and competences in problem solving on the topic of land administration in Ethiopia and in Austria. EduLAND2 delivered demand-driven community services in the area of land administration. EduLAND2 promoted gender mainstreaming on land rights in Ethiopia and in Austria and the project increased the number of female experts / academics in the Ethiopian land administration.

However, EduLAND2 has more impacts than outlined above. An equal partnership was developed and fostered in the project. EduLAND2 was a driver for long-term cooperation between the partner institutions DMU, BOKU, BDU and TUW. Many components of the project contributed to the strengthening of the partnership. EduLAND2 was a success story. All of the formulated objectives were achieved in the proposed time schedule and the evidence of equal partnership is still apparent to this day. To keep the cooperation alive, further project proposals are being elaborated.

5.3.3 Gender aspects

by Ayelech Kidie Mengesha, Sayeh Kassaw Agegnehu, Reinfried Mansberger

Gender land rights

Land is the key socioeconomic asset of the rural livelihoods of the Ethiopian society. Thus, access to and right of landholding determines the livelihood of a family in particular and of the society in general. It is a fact that women's access to land is essential to the empowerment of women, to reduce poverty as well as to reduce externalities of gender inequality. However, the different land right systems in the previous ruling periods of Ethiopia had a significant influence on women's access to land and landholding rights. Accordingly, Ethiopian women in the past, both in the imperial regimes and the Derg regime, were denied landholding rights and excluded in the decision making processes of agricultural activities. Thus, in the previous patriarchal system of landholding, women were disadvantaged and a marginalised group in society.

Cognisant of the timely gender inequality in different aspects, the current Ethiopian government has tried to recognise women's landholding rights as well as gender equality. Consequently, women's land rights issues have been noted as one component in the modern land administration system: land registration and certification program, which was established in 1998 to be implemented in different regions of the country. There are two levels of land registration and certification. The first level of land registration provides a landholding certificate to landholders without any geo-referencing of the parcel whereas the second level of registration includes parcel boundary determination in a countrywide reference and projection system. The first level was implemented in different regions of the country and the second level of land registration and certification currently is being conducted in all regions of the country. The certificate is issued in the name of the husband and the wife (joint titling) in order to indicate their equal access rights to land and to make it legally binding. In addition to joint titling, the certificate is also issued to female headed households. Thus, the new land legal framework, is making a significant contribution to women's landholding rights. According to the current land legal framework, rural woman can hold and inherit land the same way as males without any gender differences. However, it is imperative to properly execute women's land rights as the legal framework alone is not a miracle that brings change by itself. Strong technical and administrative support is necessary to enable women to become beneficiaries of the system.

Gender mainstreaming in EduLAND2

Sustainable Development Goal 5 is about the achievement of gender equality and empowering all women and girls. Women's land rights are essential to achieve the sustainable development of the country since land is a key socio-economic asset of development. The majority of the poor in the globe are women since they are denied rights to land and access to the basic resources. EduLAND2 has played a significant role in strengthening women's land rights and it is an example for other development projects trying to empower rural women, especially in developing countries.

EduLAND2 project has tried to empower the unprivileged sectors of society by incorporating gender mainstreaming as one main work package. All the work packages designed in the project are triggered to empower the rural poor by strengthening the launched modern land administration system in the country. When the capacity of human power is enhanced

and the number of professionals in the discipline increased, the program of securing land rights can be properly implemented and long-term land-related investment encouraged. This can allow both female and male rural subsistence farmers to obtain benefits from the fruits of the project, both in short and long-term scenarios.

Delivering short-term training sessions for women and other underprivileged groups

Capacity building is the main work package in the EduLAND2 project. Accordingly, tailor-made training programs were designed. Organised by the Institute of Land Administration of Debre Markos University (ILA/DMU), the training sessions were delivered to experts from federal to lower administrative level and extended to the farming community by training land administration committees in different kebeles (Ethiopian administrative unit according to municipality level). Training of land administration committees especially on the rural land administration legislation is essential for the proper implementation of the legislation. In total, 236 farmers were trained in three different sessions. The call put out to the trainees was for both female and male committees. Nevertheless, only male persons attended the first two training sessions. Therefore, a specific training only for female land administration committees was organised and delivered within the EduLAND2 project. The training was for two consecutive days. 50 female rural land administration committees and 10 participants from two concerned institutions (zonal land administration and land use department and Debre Markos University) participated in the training. The themes of the training were 'Female land rights and the newly revised Amhara National Regional State (ANRS) rural land administration legislation'. In the training, the issues raised by the participants were really impressive. While practicing the legislation at the grass root level as well as their land right issues, the following challenges were faced:

- While renting their parcels, the lessee sometimes denies the agreement and women are forced into litigation;
- Communal land encroachment is threatening their animal husbandry practices;
- While they strive to manage the land according to the legislation, the kebele (municipality) administration is not supportive;
- Lack of capacity building training on female land rights and on the legislation,

The institute's academic staff and concerned experts of the zonal land administration and land use delivered the trainings. They addressed the problems of unprivileged groups, gave responses to the raised challenges and justified the issues raised by both male and female farmers.

Organised by EduLAND2 project, two days of training for about 90 students completing their Bachelor's studies in different programs of DMU was conducted on gender and land rights. The students were from different regions of Ethiopia. Students actively attended the training and discussion on gender land rights issues in Ethiopia from previous times up to now. They discussed hot topics raising issues from different regional scenarios perspectives and it was essential in the exchanging and sharing of experiences.

Female academic staff long-term training

In the PhD scholarship application process, preference was given to women. Despite the fact that Land Administration (also worldwide) is a male dominant area, it was possible to recruit one female candidate for an APPEAR PhD scholarship application. Due to the

admission requirements, she had to complete a Master's program before she could begin her doctorate. She finished the Master's program in 2018 and currently she is working on her PhD. Another female assistant lecturer was recruited by ILA/DMU and she joined Bahir Dar University Institute of Land Administration for her Master's studies. Currently, she is on duty completing her Master's degree in land valuation.

Conducting scientific research related to gender issues was also the concern of the project. As a result, one Master's research degree under the scholarship of EduLAND2 project was nominated for the BOKU Sustainability Award in 2019 and awarded the Inge Dirmhirn Award (for gender-specific scientific thesis) 2019 by BOKU.

Considering gender in curriculum design

Within EduLAND2, a curriculum of Land Administration and Surveying program was implemented at ILA/DMU. All project partners took special endeavour to integrate gender perspectives into the curriculum resulting in a separated course 'Gender and Land Rights (Course Code LaAd2065)', which included in the curriculum of the Bachelor's program 'Land Administration and Surveying'. Additionally, concerns of unprivileged groups and awareness raising for mitigating women land right challenges are mainstreamed in different courses in the curriculum.

Increasing number of female students in the program

In the project documentation, it was stipulated that from each year admitted at least 30% of students should be females. The ILA/DMU carried out constructive measures to motivate and attract more female applicants. Accordingly, the announcement for the BSc study program 'Land Administration and Surveying' motivated female students to apply. Finally, a lot of female students applied for the course and in total 37 female students (out of 50) were admitted and enrolled to the study program in the first year of the project. This was a great achievement since above 70% of the admitted students are females. In the subsequent cycles of the BSc study program (2017 to 2019), the number of admitted students is above 35%, which is still a promising figure.

Considering gender in staff fulfillment

ILA/DMU recruited staff members from other colleges of the university as well as from the market. During staff recruitment, affirmative action was given to attract female instructors to the institute. Unfortunately, the market of female land professionals (especially with academic degrees) was very limited and therefore currently out of 15 recruited staff members only two are females. In addition, two female experts are employed at the institute: one is employed in technical assistance, which is also academic staff, and another one is a lab attendant, which is member of the support staff.

Gender in advisory board member

The mainstreaming of gender was also considered during the advisory board member selection. Representatives of unprivileged groups became members of the advisory board of the project. These persons (head of the Women's Association, and head of the Youth's Association of Debre Markos city as well as representative of the Farmers Association in the vicinity rural kebele) provided valuable input for the curriculum development and for the final set-up of the project. Two of these local advisory board members are females.

5.3.4 Enumeration of results

- Status of Staff Members at ILA/DMU (February 2020): two instructors with PhD degree; 5 instructors with MSc degree (upgraded during the project duration); one surveying technical assistant; 1 computer attendant; 7 administrative workers; lectures from partner universities.
- Upgrade of DMU Staff Members: two staff members attending PhD program at BOKU; 6 assistant instructors attending MSc programs at Addis Ababa University and Bahir Dar University.
- Trainings for Staff and Students in the form of a Study Tour of Ethiopian Colleagues to the Austrian Institutions Federal Office of Metrology and Surveying, Cadastral Office Vienna and Land Consolidation Authority and training for surveying instruments.
- Curriculum Development with a Need Assessment Report and Curriculum Document: including profile of graduates, course descriptions and contents, learning outcomes.
- Enrolment of students in BA programme in land administration at DMU (Status February 2020):
 - - Regular Students: 4th year – 38 (25 female/13 male); 3rd year – 48 (16/32); 2nd year – 49 (18/31); 1st year – DMU bachelor basic module (60 students visiting land administration courses)
 - - Summer Students: 3rd year – 46 (19 female/27 male); 2nd year – 52 (11/41); 1st year – 31 (10/21)
 - - Extension Students: 2nd year – 27 (9 female/18 male); 2nd year – 47 (14/33)
- Courses Delivered by Project Partners in the topics: Land Law, Remote Sensing, Photogrammetry, Gender and Land Rights, Land Valuation, Cartography, Land Consolidation, Practical Aspects of Land Administration.
- Computer Lab was equipped with 25 desks; 25 chairs, 25 desktop computers, one LCD projector, one notebook.
- Surveying and Photogrammetric Instruments purchased: GNSS-instruments, 1 High-end Total Station (Leica TC02 plus); 4 Total stations for Students Training (Leica TS07 plus), and photogrammetric equipment in the form of 3 3D Mirror Screens with Accessories.
- Teaching and Learning Materials (Developed and Handed over to Ethiopian Colleagues and Students) for training / courses of students, for staff and experts training as well as Reference Books: printed textbooks and e-books covering the topics mathematics, statistics surveying, land administration, remote sensing , cartography, GIS, CAD, and geodesy were purchased and provided.
- Feasibility Studies.
- Conference Presentations (with regards to EduLAND2).
- 8 Scientific Papers published (peer-reviewed).
- 2 Proposals for Follow-up research activities prepared.
- Short term training courses for land administration experts provided in the topics: Geographical Information Systems (GIS), land rights, land consolidation, Cartography and Computer Aided Design (CAD), remote sensing.
- Training for Local Communities (Farmers and Land Administration Officers) in the field of Land Rights and Land Administration (part 1 and 2) and Gender Aspects of Land Rights and of Land Administration.



*Project meeting – kick-off
Debre Markos*



*Meeting of project mem-
bers with farmers, Choke
Mountains*



*Campus of Debre Markos
University*



Teaching students at DMU



Students of 4th and 3rd years



Meeting of project members with land administration experts, Debre Markos



*Training on land rights
for female farmers, Debre
Markos*



*Cultural program in Ethio-
pia, Blue Nile Falls*



*Cultural program in Aus-
tria, Rax Mountains*

5.4 Advanced Academic Partnership for Legal and Human Rights Education in Ethiopia

Project Coordinator: Wolfgang Benedek

Coordinating Institution: University of Graz

Partner Institutions: Ethiopian Civil Service University, Addis Ababa University

Project Duration: 1 February 2016 – 30 November 2020

5.4.1 The project – AAPLHRE

The idea of the Advanced Academic Partnership for Legal and Human Rights Education 2016-2019 (AAPLHRE) was conceived, nurtured and put forward on the basis of demands and needs of the Southern academic institutions. It builds on previous experiences of the Academic Partnership on Legal and Human Rights Education (APLHRE), which the three partnering institutions successfully implemented.

The wider objective of APPEAR Project 131 AAPLHRE was to further improve the capacities of the Southern Institutions in higher education, research and management through empirical and problem-oriented research and publications. The project covered five core academic/research activities: the pursuit of short-term exchange visits (teaching and research); assistance and collaboration in PhD and MA curricula development; undertaking joint problem-oriented research and publication; organizing and carrying out the Legal and Human Rights Academy; and the admission of teaching staff of Southern institutions to the PhD Program at the University of Graz.

The first objective, short-term teaching and research exchange visits, worked on strengthening the capacities of Southern institutions through two-tracked action lines. The first component of the project intervention involved facilitating short-term teaching visits by professors to co-deliver (in blocks) modules in the graduate programs of Southern institutions.

The second objective of the project, focusing on collaboration in PhD and MA curricula development at the AAU-CHR, intended to work on a complete overhaul of the dysfunctional PhD program co-hosted at the CHR, and to establish new PhD and MA curricula tailored to the contemporary context and institutional needs in Ethiopia. The new PhD program would not only facilitate the institutionalized transfer of educational, research and supervisory skills and experience of the IILIR to the CHR, it also enables the admission of PhD students from various stakeholder institutions, whom, on graduation, will assume responsibility in the effective, organized and timely delivery of master's programs in their respective institutions. This helps in lessening the dependence of many academic programs and institutions in Ethiopia on visiting professors.

The project's intervention logic for joint problem-oriented research and publication is founded on the need to address key national problems in the field of human rights through further strengthening the research capacity and skills of Southern partner institutions and their academic staff. In particular, the research carried out under this pillar would address gaps between Ethiopia's human rights commitments and practice through collaborative studies. This way, the project aims to improve the implementation and monitoring of human rights in Ethiopia, linking specific local problems to regional and universal standards.

The project's fourth objective, pertaining to the organization of a Legal and Human Rights Academy, engaged in capacity development initiatives by holding annual policy-level academies. The academy focused on various themes of national significance including issues of rule of law (in the context of police and executive mandates), human rights (targeting African best practices in the implementation of human rights, roles of the judiciary), democratization and governance. The pool of the academy participants eligible for the capacity development trainings were drawn from key sectors of the government and civil society who, on account of the positions they hold, play significant roles in the implementation of human rights and good governance; this particularly involved judges, lawmakers, police officers, executive functionaries, human rights practitioners, and young academics from the country's public universities.

The last pillar of the project, on capacity development through enrolment in the PhD Study Program in Graz, involved further intensification of the admission of academic staff of the Southern institutions in the PhD study program at IILIR. This key intervention helps to upgrade the academic and research capabilities of junior academic staff at the AAU-CHR and ESCU-IFLS – many of whom hold only a master's level educational rank; this has led to a significant dearth in teaching and research skills usually required in graduate level education. This sub-component was designed as a short-term intervention, the long-term solution to Southern institutions' challenges lying in the design and implementation of a home-grown PhD program – a scheme that has been proposed above.

5.4.2 Human rights education during states of emergency, political reforms and a pandemic

by Wolfgang Benedek and Bernadette Knauder

Why has it been important to start the project?

AAPLHRE was an advanced academic partnership, meaning that it built upon a first project phase that was successfully completed in 2014. The initiative to apply for a second phase of the project on legal and human rights education came from the Ethiopian partners, who were very satisfied with the outcomes of the first phase, but insisted that, for more sustainable results, more time and activities were needed. One of the driving forces was a former PhD student in Graz, an APPEAR scholarship recipient who, after his return, had become the director of the Human Rights Centre of the Addis Ababa University (AAU). The experiences of the first project, together with its positive evaluation, were crucial for a needs-oriented design of the new application.

In this respect, the shortages and gaps at the Southern partner institutions were to be addressed – these included the lack of qualified teachers and international cooperation, but also pertinent curricula offering students to do a PhD in human rights in their own country or follow master's studies in specific fields of human rights. This also meant strengthening the literature base, as the universities lacked funds to buy relevant books. Both input into the teaching process at Ethiopian universities by Austrian lecturers, and research visits to the University of Graz to benefit from the resources available there for scientific work and to receive feedback were considered most welcome. There was also a strong interest regarding the three available PhD opportunities, which were filled in a competitive process with a

preference for female candidates. To achieve female participation and gender balance in all project activities was one of the overarching goals of the partnership. While this could be mostly achieved in the activities that took place in Ethiopia, it proved difficult to convince female students and staff who usually have family obligations to travel and enhance their skills and knowledge during short-term research visits to the University of Graz, or to even pursue a PhD here.

In addition, in an increasingly repressive political context, where human rights NGOs faced increasing restrictions, it had become even more important to continue the discussion of human rights topics and the relevant legal situation at the universities that still enjoyed larger freedom.

The trust and know-how developed in the first phase facilitated the cooperation. The Southern partners appreciated the triangular approach of involving the two Addis universities and thus also stimulating better cooperation and exchange between them. They were also open to the idea of strengthening regional outreach by involving other Ethiopian universities as partners and beneficiaries of activities. Furthermore, the importance of developing a better gender balance in the university staff and activities remained a priority. There were good prospects, as the number of women among the staff and students was increasing.

On the side of the University of Graz, the first project had left a positive impression on the coordinating Institute of International Law and International Relations, but also on the faculty management and faculty colleagues, which accordingly supported a second phase. It also was possible to find qualified and committed project officers to take on the many demanding tasks of the daily administration of the project, as well as interested colleagues ready to teach in Addis Ababa.

At the end all of us we will have learnt What?

The lessons learned from the project can be identified on several levels: on the professional level, students benefitted for their academic work and teaching staff for doing much needed research, which is very important for their qualification and professional advancement. Moreover, the project created important outcomes beyond academic exchange and capacity building.

During inception and implementation of the AAPLHRE project, legislation in Ethiopia put severe limits on the work of NGOs with foreign funding, particularly in the human rights and governance fields. In a sense, the higher education institutions filled a void and stepped up where the work of human rights NGOs had become increasingly difficult. Project activities were designed to provide a platform for dialogue and exchange between government, civil society and academia, and a training opportunity for key actors of society and potential drivers of reforms. There was also the hope that this would prepare the ground for necessary reforms in the future, once those would become possible.

The three academies organized were designed also as a policy dialogue to debate alternative policy options. They created an opportunity to discuss sensitive human rights issues, but also necessary legal reforms to ensure respect for human rights and their better implementation. They also allowed for an exchange between academics and practitioners coming from the parliament, the judiciary, and the administration or the private sector, such as NGOs, which usually are not brought together in academic exchanges. The Northern partner was able to make much-appreciated inputs, but also benefitted from the highly educational experiences of following the Ethiopian debates.

The last academy in particular, which was organized after the democratic turn in the country and focused on legal reforms in several fields, such as elections, civil society, media regulation or terrorism laws, has been able to make a direct contribution into ongoing reform processes towards democracy and respect for human rights. More generally, the debates on certain legal and human rights issues during the project were quite relevant for the political reform process in which the participants actively took part. The flexibility of the APPEAR management allowed us to reallocate funds to the documentation of the policy academies. Two books now stand testimony to academic discussions around a unique political reform process.

The human rights workshops at the Ethiopian Civil Service University allowed participants to address a number of important and sometimes sensitive topics and stimulated innovative research of a publishable quality. The book published with a renowned international publishing house, after a meticulous process of presentation of papers and several rounds of review, was a particular experience of cooperation between the three main partners and also authors from other universities. It also responded to the lack of opportunities for Ethiopian academics to participate in international publications.

In general, the communication went very smoothly and professionally, but there were also difficult times, as when, because of a state of emergency or simply because of a lack of electricity, the internet was down, or when, because of changes in academic positions, experienced partners were replaced by new counterparts.

The project also contributed to a better understanding of each partner's culture and working environment, which can only be fully appreciated when experienced on the ground. It created many nice memories from encounters and visits to remarkable places. Accordingly, both sides learned to better understand the other, including the respective working environments, the possibilities, and limitations of cooperation.

We have learnt that if opportunities are seized, a project can have an impact that goes beyond the objectives of the project proposal, contribute to societal discourse at large, and support a reform process. We have learnt that multiple states of emergency may slow down project implementation, but that this can also open windows of opportunity to reshape the activities to become even more timely and relevant, if the partners are willing to walk the extra mile. AAPLHRE's secret success ingredient was the solid, sustainable relationships on the personal as well as on the institutional level that were rooted already in the predecessor project. Personal dedication and the trust in the partnership kept people engaged and willing to reshape activities, reallocate funds, rearrange meetings, etc. over several states of emergency and several project extensions, and long after the available budget for staff costs had been exhausted.

5.4.3 Working together to fulfill our objective

by Tesfaye Abate Abebe

The first group of people who participated in the project included researchers. Researchers for the contributions to the book, *Implementation of International Human Rights Commitments and the Impact on Ongoing Legal Reforms in Ethiopia* (Brill 2020), came from various universities of Ethiopia, including the Addis Ababa University Centre for Human Rights, the

Ethiopian Civil Service University School of Law and Federalism, Gondar University School of Law, Dilla University School of Law, and Mekele University School of Law. Among the contributors to the book were two female researchers. The research experience in general helped all the researchers to upgrade their skills.

The research conference and the editorial process provided feedback on the abstracts, as well as the development of research. This was fundamental to exchange the experience of the staff from the three partners of the project. In addition, researchers have benefited from the discussions, since scholars have forwarded their ideas to improve, as well as to upgrade, the quality of research.

Beneficiaries of the project are many in number. The first beneficiaries were staff of the Southern partners. Some staff members have visited the University of Graz and passed time there doing research and presenting to the Graz Community. This gave the opportunity to have access to relevant materials for their research. In addition, their stay at the university gave them the opportunity to discuss ideas with Graz colleagues, which enabled them to exchange experiences. Furthermore, the places they visited, such as a chocolate factory or villages of wine farmers, helped them to appreciate that it is possible to send the products of the farmers directly to the consumers.

Students are also beneficiaries of the project. Students in the PhD programme at CHR-AAU could visit the University of Graz, which helped them to have exposure to international academia. Visiting professors also visited AAU and ECSU to give courses, from which our students have benefited. This allowed students from Southern partners to have experience with international professors.

Many students have attended the lectures given by visiting professors from Graz. This enabled the students to interact with foreign professors, share their experience and upgrade their efforts towards an international student standard.

During the project, the legal and human rights academies conducted benefited a number of participants as well as trainers. Participants came from justice offices including the participants from the attorney general's office.

In addition, administrative employees of both the Southern partners were also indirect beneficiaries from the project, since they participated in the management of the project as per their administrative rank.

The stakeholders for the project include those who are working on human rights issues and laws, and related fields. Thus, a variety of stakeholders from the executive organ of the Ethiopian government, such as police officers, attorneys, and lawyers were among the stakeholders to the project.

Recipients of the project were mainly the communities of the two schools of the Southern partners, i.e., the CHR-AAU, and SLF, ECSU. However, the project also had various secondary recipients, such as those in the academy who benefited as participants in the respective workshops. In addition, students of the two partners could also be considered recipients of the project, since they directly benefited from lectures, visits and books purchased.

What is more, the staff of the two partners are the fundamental recipients of the project activities, because visits and all activities have been done to promote their capacity. Thus, the academic staff, students and the administrative staff have benefitted. What is more, visiting guests from Graz have participated in the project particularly in providing lectures at CHR-AAU for PhD class, and SLF, ECSU master's class. Individuals from regional universities of Ethiopia were also participants in different areas, such as the academy, research, and trainings.

In addition, three students from AAU-CHR, and SLF, ESCU participated in the PhD programme at the University of Graz. This no doubt enhanced the capacity of the partners. One individual from SLF has completed his PhD study and re-joined the SLF. This enhanced the scholarly capacity of the individuals as well as the institutions.

Females participated in almost all activities, such as the publication, to which two women have contributed, and in other project activities. The gender participation was given due and special attention, as in the academies whereby at least half of the participants were female. In addition, females were encouraged to join the PhD programme, and of the three doctoral students at the University of Graz, one participant from AAU was female (at the time of the recruitment of the project, SLF had not any female staff to participate in the Graz PhD programme).

Generally, the project has involved people from various parts of the administration as well as relevant sectors of justice. They have contributed directly to its proper implementation. Participants who were judges could share their practical experience in the country. Altogether, numerous individuals participated, particularly in the workshops and trainings. This enabled participants to share experiences and skills on related areas of law.

5.4.4 Enumeration of results

- Three edited volumes were published:
 - Benedek, W., Woldetsadik, T. K., & Abebe, T. A. (Eds.). (2020): *Implementation of International Human Rights Commitments and the Impact on Ongoing Legal Reforms in Ethiopia*. Leiden, Niederlande: Brill | Nijhoff.
 - Zelege, M. & Geset, M. (Eds.). (2020): *Gender, Development and Women's Rights. Ethiopian Perspective*. Addis Abeba: Centre for Human Rights.
 - Van der Beken, Ch. & Tadesse Gashu, W. (Eds.). (2020): *Constitutionalism, Constitutional Adjudication and Human Rights in Ethiopia*. Addis Abeba: Centre for Human Rights.
- Greater exposure and developed research capacities of the Southern institutions, regional universities, and their staff in the fields of human rights education, training and research, emanating from engagements in three problem-oriented, joint studies, publication and dissemination of the research outputs, and improved international academic standing of the Southern institutions
- Selected relevant chapters on minority rights, the right to seek asylum, and the right to freedom of expression in *Understanding Human Rights: Manual on Human Rights Education*, Benedek, W. (Ed.). The manual was translated into Afar Oromo and Amharic. Manuals are widely distributed and have been used in training settings for a wide target audience.
- Over 90 recent scientific books on human rights purchased and transported to Addis Abeba where they are made available to staff and students of the Southern institutions in their respective libraries
- One national research workshop undertaken, giving about 23 book chapter contributing regional university professors the opportunity to present on their proposed chapters and receive feedback from colleagues and senior professors
- Three rounds of legal and human rights policy academies have been conducted in cooperation with universities in the regions. They brought together more than 60 academics,

- politicians, members of the judiciary, media representatives and other members of civil society, and provided unique exposure to highly-tailored policy dialogue and trainings on select themes of pressing national interest in human rights and democratization, resulting in the enhanced capacity of Southern academic institutions and multiplicity of stakeholders, and improved implementation capacity of the stake-holding institutions.
- Teaching and research visits of eight professors of the University of Graz and its network strengthened educational, training and research skills of academic staff of Southern partner institutions resulting from collaborative teaching of modules offered by Southern institutions and University of Graz staff
 - Three PhD Students admitted at University of Graz
 - Six PhD students admitted at AAU-CHR
 - Nine academic staff undertook short-term research visits from AAU and ECSU, and benefitted from the acquisition and diffusion of knowledge and experience resulting from teaching and research exchanges facilitated for academic staff and PhD students of all three institutions.
 - The capacity of the educational, training and research skills of Southern partner institutions was strengthened by collaborative design of in-house PhD program and the admission of junior academic staff of Southern institutions at the PhD program in Graz.



Sign of the Human Rights Centre at AAU



Group picture during research workshop



Group picture with visiting PhD students from AAU during PhD workshop in Venice



Participants during the Human Rights Academy in Adama



Project team visiting Tigray during the Human Rights Academy in Mekelle



AAPLHRE publications

5.5 Technology Enabled Maternal and Child Healthcare in Ethiopia

Project Coordinator: Gustav Pomberger

Coordinating Institution: University of Linz (JKU), Department of Business Informatics –Software Engineering

Partner Institution: Addis Ababa University (AAU), School of Information Science

Partner Country: Ethiopia

Project Duration: 1 January 2017 – 31 March 2020

5.5.1 The project – TEMACC

The aim of the TEMACC research project was to explore the potential of information and communication technologies (ICT) for rural development, particularly to improve access to and quality of healthcare for mothers and children in rural communities. This was in response to two of the UN sustainable development goals – SDG 3: Ensure healthy lives and promote well-being for all at all ages; and SDG 5: Achieve gender equality and empower all women and girls. TEMACC was an interdisciplinary effort by professionals from the field of ICT and specialists from public health and medicine. TEMACC was a joint research project between the Addis Ababa University (AAU) in Ethiopia and the Johannes Kepler University (JKU) in Linz, Austria. The Ethiopian partners conducted the main project work, including field trips to collect requirements, prototyping with different user groups, software design and development. The Austrian partners provided guidance for this development work and were responsible for project coordination.

The main stakeholders of TEMACC were mothers (assumed to be mostly illiterate), health extension workers (HEWs) working at health posts (tenth grade education), and health professionals assigned to health centres (e.g. nurses, health officers), as well as local and regional health bureaus. The focus was on facilitating the work and education of HEWs, health education of mothers, and communication between mothers and HEWs.

To facilitate information exchange, we have provided IT support for a cooperation platform for HEWs, health professionals, health bureaus and local hospitals. An Android app for mothers was developed that offers basic information about pregnancy, birth, postnatal care, and new-borns, for example on nutrition or hygiene. Illiterate women can use the app that enables navigation of the content by using icons and reads information to them in their local language. In addition, the mothers' app reminds women of important antenatal and postnatal care dates, such as preventive medical check-ups or the expected date of delivery. HEWs can use web-based systems on tablets or on mobile phones to access health-related information for the education of mothers, as well as information to continue their own education. The web-based system also contains basic patient data, which are also accessible to health centres so that HEWs and health centres can exchange information about mothers as needed. The web-based system thus provides a means of communication. It also helps less-educated medical personnel to get in touch with specialists to discuss medical problems.

In 2017, the first TEMACC project year, we collected user requirements, based on several field trips to rural areas around the city of Butajira. We identified the usage context for a potential IT system and learned about the availability of and access to information on mater-

nal and child healthcare. We prioritised our observations and used them as the basis for design solutions, including health content, based on paper mock-ups and mobile application prototypes. We then used the paper mock-ups, prototypes, and initial content as additional instruments to gather more user requirements. We selected and compiled relevant content, based on healthcare materials made available by the Ethiopian Ministry of Health (MoH). This allowed us to develop an initial version of the health content with reference to national maternal- and child health-related guidelines. The major topics covered were antenatal care, postnatal care, vaccination, nutrition, hygiene and infant disease. We also attempted to align content with user stories that we had collected in the preliminary investigation. In total, over 100 digitised content slides were prepared for use in the mobile prototype applications. The content was prepared in both text and audio formats.

In 2018, we started developing software prototypes and validating them through workshops with mothers and HEWs in rural areas. Evaluation has shown that proper design increased the chance that mothers would be interested in using these applications. According to the observations we made, most were eager to actively try the prototypes and provide feedback, despite their indifference and relatively limited participation during earlier preliminary investigation. We assume that the fact that they were able to have a hands-on experience contributed to their active participation.

The development of the TEMACC software systems was largely finished by the end of 2018. The year 2019 was devoted to testing and evaluating these software systems. In order to assess the potential community impact of the TEMACC system and to promote the educational aspect of the research, we conducted a community-based intervention study. The results of this study have clearly demonstrated that the platforms for online knowledge sharing based on multimedia learning materials have great potential to enhance the level of education in rural settings, with a special emphasis on skills and knowledge of pregnant women, mothers and HEWs.

5.5.2 Why the project was necessary

by Rahel Bekele

Sustainable development is highly dependent on providing reasonable and equitable healthcare to every citizen. With this in mind, many developing countries have taken encouraging steps in terms of expanding healthcare facilities in the last two decades. In the case of Ethiopia, the country has been grappling with seemingly insurmountable healthcare problems particularly in rural areas.

According to the Ethiopian Demographic and Health Survey of 2016, maternal deaths represent 25% of all deaths among women aged 15-49. The infant mortality rate is 48 deaths per 1,000 live births. The child mortality rate is 20 deaths per 1,000 children surviving to the age of 12 months. Health services in Ethiopia, like in many low-income countries, are also constrained by a shortage of qualified health personnel.

Primary healthcare is the first level of contact of individuals bringing healthcare as close as possible to where people live and work. Currently, the Federal Ministry of Health bases the Ethiopian health system on a three-tier structure. The secondary and tertiary levels are comprised of general and specialised hospitals, and the coverage of each extends to larger

portions of the population. The primary care level at the district level (or 'Woreda' level in Amharic) includes a primary hospital, local health centres and rural health posts. Health centres provide comprehensive primary health care, which includes curative and rehabilitative services. Under the current arrangement, each health centre coordinates 5-7 health posts.

Health posts serve communities within the lowest government administrative unit ('Kebele' in Amharic), typically comprising one thousand households or five thousand people. Two female health extension workers staff each health post. Health extension workers provide care services covering mainly reproductive health, maternal and new-born care, child health, as well as disease prevention and control. Health extension workers can monitor health and disease on a local level, educate their fellow Ethiopians about sanitation, how to avoid spreading communicable disease, childcare and nutrition, and family planning, as well as providing basic primary care services such as contraceptives, immunisations and treatment for common childhood illnesses. Rural health posts throughout the country staff over 30,000 health extension workers. In rural settings, ideally health posts provide the first point of care for patients and may refer patients to health centres, which may in turn refer patients to primary hospitals when more specialised care is required.

Even with the deployment of such primary healthcare infrastructure, access to health services is more difficult in rural areas where 76% of the women in Ethiopia reportedly live. There is still a huge vacuum particularly when it comes to caring for mothers and children. Women in rural areas have very limited or no awareness of safe maternal care practices, child health, family planning and hygiene. They also have limited information on important issues such as preventing deaths attributable to common illnesses caused by poor nutrition. Timely provision of healthcare before, during, and after delivery is a critical factor in preventing the majority of maternal and neonatal deaths. Hence, we need more efforts to improve the effectiveness and efficiency of care service delivery in rural areas.

Managing the provision of healthcare at various levels relies on the provision of correct, consistent and comprehensive information. Accordingly, the Federal Ministry of Health designed a simplified and standardised health management information system contextualised to the Ethiopian setting and based for the most part on manual processing and tools. The existing system, however, suffers from the limitations of manual systems and/or poorly designed/adapted technologies. By and large, basic information exchange between health extension workers at health posts and health officers at health centres is still carried out via paper-based manual means.

What is more, researchers in the area of public health attribute the problems related to maternal and child health to the absence of relevant intervention to promote preparedness for birth and readiness for complications, utilisation of healthcare services and information given during antenatal care visits. Being aware of this fact, the Ethiopian health sector has undergone a huge structural and functional reform. One major development worth noting in this connection is the government's initiation of the Health Extension Program at local health posts in rural areas as well as the provision of 16 essential health interventions packages for use by health extension workers and health professionals.

Despite these major strides forward and similar attempts to improve the healthcare situation in rural areas, there is still a huge vacuum, particularly when it comes to caring for mothers and children. As one may observe from various findings, the services introduced are extremely basic and have a limited reach. What is more, due to economic reasons and limited infrastructural facilities, mothers in rural areas find it neither practical nor cost-ef-

fective to travel long hours to get healthcare services or to see a specialist. Experiences also indicate that most newspaper, radio and TV programs and advertisements provide information that caters to a wider segment of the population, thus leaving out the details for specific areas needed in the rural community.

The government has given significant emphasis on information and communication technologies (ICT) as the main agent in achieving public healthcare strategies of the country, considering the remoteness of rural communities from healthcare facilities. Many stakeholders believe that the innovative use of ICT for health intervention programs would make a significant contribution to supporting community health workers and appropriate healthcare delivery practices.

It was against the background outlined above that we initiated the Technology Enabled Maternal and Child Health Care (TEMACC) project. TEMACC is a research project that aims to explore the potential of ICT for rural development particularly to improve healthcare access and quality for mothers and children in rural communities.

TEMACC addresses maternal and child healthcare provision by primary healthcare units by: (i) enabling (mostly illiterate) mothers to receive public health related information and healthcare notification without the need to travel long distances, (ii) helping health extension workers to receive health education online or on their mobile devices by interacting with a specialist elsewhere without leaving their hometown or locality, (iii) allowing collaboration and consultation among healthcare professionals, and (iv) creating virtual professional communities for improving maternal and child healthcare.

TEMACC is also an attempt to contribute to aspects of two of the UN Sustainable Development Goals, namely SDG 3 and SDG 5, which many countries endorsed and adopted in 2015. SDG 3 relates to ensuring healthy lives and promoting well-being for all at all ages. Facts and figures under this goal indicate that although more women are receiving antenatal care, only half of the women in developing regions receive the recommended amount of healthcare. There is an increasing proportion of child deaths in Sub-Saharan Africa and Southern Asia, particularly from mothers with no education. The project also contributes towards achieving SDG 5, which is dedicated to achieving gender equality and empowerment of all women and girls. SDG 5 particularly has the goal of enhancing the use of enabling technology, in particular information and communications technology, to promote the empowerment of women.

5.5.3 TEMACC successfully completed – and now?

by Johannes Sametingir

Enthusiastic feedback and very positive results of the intervention study testify to the success of the TEMACC project, short for Technology Enabled Maternal and Child HealthCare. What does it take to turn the pilot project into a sustainable system to improve healthcare in Africa?

“I have benefited greatly from TEMACC,” says Tigist. The 25-year-old always carries her mobile phone with the TEMACC app installed, safely stored in a linen bag around her neck. She has five children; the oldest is nine years old, the youngest a few months. “I received the TEMACC mobile phone during my pregnancy and it helped me a lot.”

From the TEMACC app on her smart phone, she gained knowledge about symptoms that can be signs of serious complications and therefore need professional clarification. This knowledge has increased considerably during the nine-month intervention study carried out as part of the project. So has the general access of mothers to important health topics such as family planning, prenatal and postnatal care, the treatment of diseases such as diarrhoea or pneumonia, but also about necessary vaccinations, infant and child nutrition and hygiene.

“My husband and I listen and learn from the app. Often, other mothers from the village come, and then we listen to the information together,” says Zahara, who became part of the TEMACC pilot group during her second pregnancy. In the meantime, her son is eight months old and she has started complementary feeding him. The TEMACC app tells her to what she has to pay attention, e.g., nutritional balance.

One of the unexpected positive results was that the mothers who participated in the TEMACC project shared their knowledge with many other mothers. The mothers have taken the information from the app more seriously than advice and information material from their health extension workers. Two big advantages of the app: Firstly, the knowledge is always available and the mothers can specifically and repeatedly retrieve and remember the information they need. Secondly: There are no taboos. The mothers are better informed and have more self-confidence. In addition, they are later more likely to ask specific questions to their health extension workers.

Ensure healthy lives and achieve gender equality

TEMACC has set itself the goal of implementing aspects of two of the 17 UN Sustainable Development Goals: SDG 3 – Ensure healthy lives, promote well-being for all at all ages, and SDG 5 – Achieve gender equality, and empower all women and girls.

The goal of TEMACC was to improve healthcare for pregnant women, young mothers, and their children in the pilot region with the help of an ICT-based service platform. On the one hand, this was achieved by creating a very low-threshold access for pregnant women and mothers to health information and care with a visual-audio-based smartphone app. The fact that almost 50% of the mothers were illiterate had posed a major challenge and resulted in a solution where mothers could navigate the content with audio guidance, and had the content read out aloud in Amharic, their local language. On the other hand, this platform also supports healthcare providers – especially health extension workers on the frontline – with tools to facilitate their work and to improve the quality of healthcare. For example, the coordinated central management of patient data enables better communication and coordination between healthcare institutions. The service platform provides health extension workers with easy access to up-to-date specialist information – thus ensuring a coordinated state-of-the-art approach.

Data from the intervention study has shown that perceived access to readymade health information on various topics such as family planning or hygiene increased on the average from 23% to 70%. The perceived usefulness of received health information increased from 29% to 98%. Various preparations for delivery during the last months of pregnancy, e.g., saving money, checking for transport, on average increased from 27% to 69%. The awareness of serious health problems while pregnant that could endanger women's life, e.g., bleeding, severe headache, fever, on average increased from 20% to 67%. Knowledge on child feeding, e.g., breastfeeding, complementary feeding, on average increased from 21% to 83%. Hygiene awareness including washing hands increased from 36% to 83%.

Origin and place of implementation are essential

The initial idea for the TEMACC project originated in Ethiopia. Our later project partners had the desire to improve the living conditions for mothers in rural Ethiopian areas and had already started TEMACC on a small scale. Results of this early work have contributed to a convincing project application that ensured APPEAR financing for the TEMACC project. Besides the origin of a project idea, its place of implementation plays an important role for later sustainability. Ethiopian people have carried out the project work in Ethiopia, including the requirements analysis, IT development and the intervention study. The Austrian role was mainly of a supportive nature, including financial administration, discussions on project goals, requirements, early prototypes, as well as management, development and medical issues.

Focusing on users from the very beginning ensures commitment

The starting points for the implementation were the special characteristics of health conditions and processes in the pilot region Butajira, which also differed greatly from those known to the project staff from Addis Ababa. In the implementation, we therefore followed a consistent user-centric approach. From the very beginning, we tried to involve affected mothers, health service providers and other stakeholders, and the Ethiopian Ministry of Health and we only used content approved by official bodies. The Ethiopian team developed the software on site according to the principle of user-centric design and ethnographic action research. Their focus was on working WITH the end-users, not FOR them. For this purpose, our Ethiopian partners carried out numerous field visits for observations, conversations, interviews and questionnaire surveys with mothers, health extension workers and staff in the health centre. They carried out several prototype tests, the results of which they then incorporated into their development.

In addition to the desired and hoped-for positive effects on the health of mothers and children, the feedback from mothers and health extension workers in the pilot region showed further encouraging improvements. A single TEMACC smartphone often reached all the women in an entire village and gave them access to information that significantly improved their personal responsibility and self-confidence. In addition to the improvements mentioned above and that were aimed for, health extension workers also emphasised the fact that they had the information material for their patients digitally available to them and saved themselves the trouble of carrying heavy folders on foot over long distances.

Great potential

The great potential of TEMACC is that any group in any developing region can use it. The only prerequisite is that somebody adequately prepares the content and considers regional and cultural aspects. In this context, the importance of an interdisciplinary approach is particularly noteworthy. Experts from IT, medicine, public health, and nutritional sciences worked together on the TEMACC project. Other medical content requires the integration of further expertise from other fields.

The TEMACC team itself has shown the versatility of TEMACC by the fact that during the coronavirus crisis the Ethiopian partners developed a mobile app based on the existing TEMACC infrastructure within a short period to make rules regarding conduct available to the Ethiopian people during the COVID-19 pandemic.

Currently, our Ethiopian partners have already established initial contact with the Ethiopian government in order to push a rollout of the project forward. In addition, a gynaeco-

logical development aid project in Nigeria has already expressed interest and has examined preliminary test versions of TEMACC.

We can extend TEMACC with functionalities that also benefit the health system as such. We can expand TEMACC's focus from mothers and pregnant women to the whole population and from health posts and local health centres to local hospitals up to the university clinic. In addition, TEMACC can collect statistics that are important for the healthcare system and that are currently not feasible in Ethiopia due to a lack of data.

TEMACC is a beginning

After development and the nine-month pilot phase, our first priority has to be ensuring further use in the pilot region. An essential basis for this is the IT infrastructure: Who is responsible for the equipment? Who ensures maintenance? Who procures and pays for new equipment so that more mothers can participate in the project? Who is responsible for software maintenance and further development? Who will update and extend the content? Who will educate end-users?

With TEMACC, we have succeeded in setting up a project that has great potential to improve healthcare in Africa on a sustainable basis. For a successful future, this requires clear responsibilities, for the coordination of the project, for the maintenance of hardware and software, for updates and expansions of the content. Most importantly, it also requires financial funding for all the necessary human and software/hardware resources.

We have planted the seeds for health improvements in rural developing areas. We will only see this bear fruit if health officials take the responsibility and ensure that its results will not end up stored away in a cupboard, as is the case with too many developing projects. The preconditions are promising. We can build upon an existing phone infrastructure in rural areas. There is only a low financial demand for the IT infrastructure. Mothers, health extension workers and other stakeholders need only little education to make them familiar with the system. There is local expertise to keep the system up and running. There is local IT expertise to maintain and further develop the system.

The system and its content that exists right now are only a start. Gradual extensions and expansions are conceivable in many directions, e.g., the support of additional local languages, the support of additional health material and even non-medical content, as well as data analysis and automatic statistics for health officials.

All it takes as a first step is commitment from local or federal health officials to keep TEMACC running. Further steps include its continuous rollout and extensions in whatever direction is required.

5.5.4 Enumeration of results

- Mothers system Software
 - Information source for (illiterate) mothers
 - Educational and promotional material on basic healthcare in textual, audio and pictures, with very user-friendly interfaces
 - Educational content on antenatal care (ANC), post-natal care (PNC), hygiene, nutrition, vaccination, care for sick babies
 - Alerts and reminders (ANC and PNC)

- Information on how to get support from healthcare workers in the area
- HEW system
 - Registration of mothers/pregnancies/infants/deliveries/follow-up visits
 - Administration of visits (lists of scheduled visits to allow for tracing unattended visits)
 - Online reference
 - Essential data on women for screening and follow-up purposes
 - Calculations such as expected date of delivery with basic information such as last menstrual period
 - Alerts and reminders (ANC and PNC)
 - ANC follow-up starting from registering a pregnant woman up-to labour and delivery
 - Access to medical history, standardised form for capturing situation assessment results and delivery details including date of delivery, place of delivery, delivery status, etc.
 - Time management to organise activities, specifying the purpose and location of each entry and to maintain schedules on various activities/topics
 - Planning training programs for women on various topics at home or in neighbourhood
 - Readily accessible digitised versions of centrally prepared content on primary level healthcare
 - Flexible navigation and searching mechanisms to access digitised content
- Professionals system
 - Web-based clinical application system
 - Health material storage & retrieval system
- Family planning app
 - Administration of family planning methods
 - Appointment/medication reminders
- Library of contents
- Educational content for mothers and HEWs
 - English and Amharic
 - Text, images and audio (videos adopted from Ministry of Health and other International NGOs)
 - ANC, PNC, hygiene, nutrition, vaccination, baby care, family planning
- Publications
 - 2 papers at International IT conferences
 - 2 papers at International medical congresses
- Data on intervention study
 - Base line data (250 mothers)
 - End line data (249 mothers)
- Safe Delivery for mother and child in Butajira
- Plan to build a new delivery facility at Butajira health centre outside the scope of TEMACC, but sparked by the TEMACC project



Tesfaye Biru, Robel Yirgu, Peter Oppelt, Johannes Sametingier with health extension worker (center) in front of health post



TEMACC team members at a workshop at the Addis Ababa University



Mother with children at the health center in Butajira



*Christiane Floyd with
health officials in Butajira*



*Mothers receiving their
TEMACC mobile phones
at health center in Butajira*



*Mothers receiving their
TEMACC mobile phones
at health center in Butajira*



Final workshop with mothers and health extension workers in Butajira



Tigist Demissie with child and TEMACC app



Zahara Kedir with her child and solar charger

5.6 Partnership for Strengthening Institutional Capacity in Peacebuilding and Conflict Transformation in Ethiopia

Project Coordinator: Gutema Imana Keno

Coordinating Institution: Haramaya University

Partner Institution: Unit for Peace and Conflict Studies, University of Innsbruck

Partner Country: Ethiopia

Project Duration: 1 December 2017 – 30 November 2020

5.6.1 Description

The project “Partnership for Strengthening Institutional Capacity in Peacebuilding and Conflict Transformation” was developed and implemented jointly by partners from Haramaya University, Ethiopia, and the University of Innsbruck, Austria. The project was undertaken between December 2017 and November 2020 focusing on a variety of dimensions of academic cooperation between the two universities. In this context, the revision of two existing curricula for Peace and Development Studies at MA and PhD levels constituted central dimensions of the joint efforts of the project partners. Moreover, institutional capacity building and international staff and student mobility between the two universities were important components of the project. In this project, Haramaya University was the partner holding the overall project lead.

While Ethiopia is developing faster than most other African states in terms of economic growth (Cheru et al. 2019; The World Bank 2019), it is simultaneously facing the effects of climate change, growing inequality, poverty, and displacement which are causing protracted conflicts and growing disenchantment (Adugna 2019; Hirt 2019; Maru 2017). In this context, the potential erasure of indigenous cultures and languages constitutes an imminent threat to local communities. Therefore, the project partners identified a need to develop innovative and culture-specific approaches to peace and development at Haramaya University, taking into consideration the fact that this might also generate fruitful insights for other Ethiopian universities. In turn, this might also strengthen the capacity of Ethiopian society and its local communities to respond to these challenges based on research and education that are sensitive to and in line with local contexts.

Located in the Horn of Africa, Eastern Ethiopia, close to the border between the Oromia and Somali National Regional States, Haramaya University and its surrounding communities are home to rich cultural heritage and knowledge, both of the utmost interest for developing an understanding of regional conflict dynamics as well as the potential for their transformation. Against this background, Haramaya University, in partnership with the University of Innsbruck, decided to strengthen its capacity to be a pioneer in indigenous and community-based approaches to peace and development studies. In this process, the project partners from the University of Innsbruck contributed their experience in developing internationally compatible courses and academic programs in Peace and Development Studies, while the project partners from Haramaya University provided the necessary expertise regarding the contextual particularities of Haramaya University as well as its surrounding communities.

The methodology applied for curricular development and capacity building followed an elicitive approach to developing Peace and Conflict Studies curricula. As opposed to more

normative, prescriptive approaches, this approach to curricular development works in a more process-oriented manner, which places the knowledge and demands of local communities at the heart of the process, while also considering opportunities for compatibility with the international field of Peace and Conflict Studies (Echavarría, Hamed and Taylor 2019). This approach also recognises that a focus on relationships between project partners is a key factor for successful capacity building processes. Thus, the partnership aimed at jointly developing tools that would allow Haramaya's community to engage with, and contribute to, peace and conflict transformation approaches in the academy and on the ground in Ethiopia. The process of institutionalisation of Peace and Development Studies as a nascent program at Haramaya University as the overall objective was accompanied by biannual staff exchanges, guest lectures, skills-based facilitation, and workshops ranging from elicitive curricular development to conflict transformation for interdisciplinary staff and students.

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5.6.2 Ownership and belonging in international academic curriculum development

by Juliana Krohn, Adham Hamed, and Gutema Imana

The academic community that has been built over the course of three years in the APPEAR project "Partnership for Strengthening Institutional Capacity in Peacebuilding and Conflict Transformation" transcends the immediate contexts of the two partner universities and reaches deep into the surrounding communities. Particularly in the context of Haramaya University, the involvement of community elders as well as nongovernmental organisations active in the peace and development field in the overall process of capacity building has been a central element. This approach is rooted in a central epistemological assumption, which has served as a seedbed for this project from the very beginning: the insight that any definition of peace as a singular noun has the potential for considerable epistemological violence. In order to avoid this, a joint acknowledgement of the manifold interpretations of peace that are rooted in diverse cultural and social experiences, has been guiding the project team.

Consequently, understanding peace as a plural noun, as *many peaces* (Dietrich and Sützel 1997; Dietrich 2012), means that inquiring into the different epistemological meanings and interpretations of peace that are present in a given context, is vital for curricular development in Peace Studies (Echavarría, Hamed and Taylor 2019).

Our approach to academic capacity building and curriculum development has been centrally inspired by Ivan Illich, who proposes that “War tends to make cultures alike, whereas peace is that condition under which each culture flowers in its own incomparable way” (Illich 2006, 175). Drawing on Illich, as well as on guiding principles of development cooperation work, we have considered questions of local ownership as being central throughout the process of capacity building. This also concerns the question of how to integrate local partners, the university community (students and staff), as well as the communities living on and around the Haramaya University campus and a careful recognition of their respective interpretations of peace.

Recognising that *ownership* also constitutes a much-debated category of contemporary development cooperation work (Keijzer et al. 2018; Hasselskog and Schierenbeck 2017), the project team has reflected on it extensively throughout all of the phases of the project. In this chapter, we will, therefore, firstly conceptually and critically reflect on the notion of ownership and secondly outline why and how we have aimed at strengthening the latter and discuss ‘belonging’ as an alternative term. Moreover, we will reflect on the challenges we have encountered along the way and lessons learnt about how to include key stakeholders representing local communities as well as non-governmental organisations into the development and implementation of curricula.

Choices made at each stage of a project cycle can either strengthen or weaken the degrees of involvement of local communities, which in turn may directly affect sustainability perspectives beyond the formal timespan of a project period. As mentioned above, in this regard ownership deserves particular attention and reflection. This not only pertains to the level of project administration, but also to the epistemological background on which the process of institutionalisation in general and the development of the curriculum, in particular, is being carried out. This implies carefully inquiring into contextually rooted meanings of key concepts such as peace and conflict – and a readiness to be challenged in one’s own assumptions about them.

When researching the terms’ deeper cultural meanings in the Ethiopian Oromia region, in which Haramaya University is located, one can find that understandings of the term that are remarkably different from definitions that can be found in the conventional frameworks of international politics, which centrally are derived from liberal concepts of peace (Richmond 2011). Within the vernacular *Gadaa* system, peace is not owned by individuals or parts of communities or society but rather it constitutes itself through the experience of encounter and relationships, both with fellow human beings, with nature and with spiritual powers (Etefa 2012, 62). There had been an academic discussion about these epistemological differences amongst the project team members. This became particularly clear to the Austrian part of the project team when they visited the surroundings of the city of Harar, bordering Oromia, some 20 kilometres from Haramaya University.

Following a well-established tradition, a local man calls hyenas at dusk, and feeds them carrion from his hands. The visitors were invited to join this man in this practice. By doing so, the visitors not only had a highly interesting joint experience on the outskirts of this historic Ethiopian city – by engaging with the practices of local communities they also under-

stood something about the deeper cultural meanings of peace in this region. While in many other contexts, hyenas are considered as hostile to people, inhabitants of the city and its surroundings live in a harmonious relationship with them. As long as the hyenas do not attack the inhabitants, they would simply lead them back into the countryside. In other words, in this case peace is experienced through a balanced human-animal relationship. Such an insight in turn has been of substantial relevance for our curriculum development process as we realised that while it is important to carefully consider the possibility of a framework to teach, in a curriculum, the international dimensions of a concept such as human rights, to name just one example, it is through the recognition and integration of local forms of knowledge and with the people as preservers of that knowledge that an academic program and curriculum can, in the spirit of Ivan Illich, “flower in its own incomparable way” (Illich 2006, 175).

Within Oromo communities, conflicts are addressed by the intervention of community elders who carefully consider ways of re-establishing relational peace, often through rituals. In most cases, the interrupted social systems rebalance themselves in this process, without the need for further intervention. However, in some rare cases of severe crimes, there is also the option to cast out a person or apply corporal punishment, which is considered the ultimate step towards rebalancing relationships in a societal context that historically has no knowledge of the modern prison system.

Just as it is important to consider possibilities for integrating knowledge of local peace epistemologies, as illustrated in the example above, it has been crucial for the project team to continuously inquire about the possibility of integrating the study of contextual mechanisms of conflict transformation, through the study of the *Gadaa* system and in dialogue with local communities. To develop curricular content, it was important to apply a methodology that allows for curricular content to emerge from within local communities, in the spirit of what John Paul Lederach describes as an elicitive approach to peace work. While prescriptive approaches to peace work and conflict transformation focus on applying prefabricated solutions, elicitive approaches focus on the potential and knowledge that are already there and provide a space in which the conflicting parties can find their own approaches to and ways of conflict transformation (Lederach 1995).

It is against the background of such epistemological considerations that one needs to revisit the notion of *ownership*, especially in a project that primarily revolves around the concept of peace. While in some contexts, peace might be considered an asset to be made, owned, and even transferred to a certain context by individuals, groups, organisations or nation-states, the context of our project calls us to revisit the very central category of – ownership – that we are working with in many contexts of development cooperation, which usually – although not undisputed – is a concept that is associated with a positive connotation.

The notion of ownership is rooted in a liberal understanding of peace (Richmond 2011), one that builds upon rationality and individualism as central categories. Yet in the context of our project, we found that this notion has certain epistemological limitations as it would not necessarily do justice to the more collectivist and relational approaches to peace and conflict transformation outlined above. Therefore, we propose ‘belonging’ as a relational alternative to ownership. Belonging, rather than drawing on the notion of individual possession, allows us to ask whether the people concerned or affected by approaches and programmatic choices can relate to and resonate with them. *Identification*, *irritation* and *alienation* are therefore central dimensions which serve as indicators as to whether a certain approach or

a programmatic intervention are suitable and serve the projects' partners, community and context.

Identification describes the perception of congruence between the programmatic content of a development cooperation project and the own embodied experience of categories such as peace ascribed to community members through their socialisation. *Irritation*, by contrast describes a feeling of dissonance about a systemic change. Irritation, just like conflict, does not necessarily have a positive or negative quality, yet it is an indicator for dissonance in a project, for example regarding a certain measure or change, that requires particular attention. *Alignment* describes that programmatic interventions have been integrated into the process as the people concerned or affected by approaches and programmatic choices can relate to and resonate with them. *Alienation*, by contrast, describes how programmatic interventions have failed to do so by preventing identification and causing irritation.

In dialogue with key stakeholders, all three dimensions serve as a basis for discussion about adjustment within a given project work package, or if need be also in regard to the overall aims of the project – which in turn usually requires dialogue with further actors, such as the implementing program and the donor agency. Through such adjustments, the degrees of congruence between project activities and the, sometimes mutually contradictory, needs of different partners might be raised or lowered. In this context, higher degrees of congruence increase the feeling of belonging and the participation of central stakeholders, local communities on the one hand but also international project partners on the other hand, which in turn may raise the chances of the project succeeding over a sustained period.

Following the approaches and considerations outlined above, a central aim of this partnership was to strengthen a sense of belonging between the larger academic community of Haramaya University and the content of the MA and PhD programs in Peace and Development Studies, that is to revise and innovate the curricula in a way that makes them fit in with the particularities and needs of the context of Haramaya University in particular and the larger Ethiopian context in general. Consequently, the people and their lived experiences had to be at the heart of all curricular considerations – students, staff, people living on and off campus and in the surrounding villages, communities and their elders alike. At this juncture of our work, as we look back upon a fruitful cooperation, it also helps us to think about the potential for sustainability through an adopted lens. As a result, we have developed an initial outline for our concept of belonging as an approach that critically revisits ownership as a guiding principle for peace and development cooperation work. This concept is certainly worthy of further research, empirical application and debate in the broader community.

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5.6.3 Curricular innovation in peace and development studies beyond linear thinking

by Juliana Krohn, Adham Hamed, and Gutema Imana

Revising curricula may be perceived as a primarily technical issue. However, its practice also confronts us with deeper epistemological questions about central concepts used in the development of curricula in general and in the descriptions of specific modules or courses, in particular. This calls for a re-vision of both historic entanglements and recent practices of universities in broader societal and historical contexts. This has become particularly evident in the framework of the APPEAR project “Partnership for Strengthening Institutional Capacity in Peacebuilding and Conflict Transformation”. On the one hand, the project team has been repeatedly confronted with the question of how vernacular, that is non-standardised, forms of knowledge can be integrated into the larger frameworks of teaching and research at a university. In the context of HU, this particularly concerns the *Gadaa* system in which *Abbaa Gadaa* and *Haadha Siinqee*, both male and female community elders, take up key roles in peace and conflict transformation efforts in the communities surrounding the university. On the other hand, this raises the question of which forms of knowledge are considered valid, and therefore worth mentioning, within the framework of Peace and Development Studies curricula. In this chapter, we wish to engage in a reflection on both aspects as they point towards problematic colonial notions of the university, paired with a linear form of development thinking. Through such a reflection, we can see a tension between universalised institutions of knowledge production, such as modern universities, and local epistemologies – such as the *Gadaa* system which calls for a decolonising approach to curriculum development (Kessie, Marks, Ramugondo 2020).

Yehuda Elkana (2009) argues that most universities do not find adequate answers to the complex demands of the challenges we are facing in the twenty-first century – be it global warming, poverty, or the complex consequences of epidemics. The latter is a subject that is more topical than ever in view of the global COVID-19 pandemic, which is posing manifold challenges for science and its role in society. These challenges are interdisciplinary in nature and call for transdisciplinary responses. However, curricular practice frequently does not reflect this need for inter- and trans-disciplinarity. Elkana further argues that in order to revise university curricula so that students are being educated in a way that enables them to deal with these complex problems, the following three challenges need to be addressed: “genuine interdisciplinarity, education of concerned citizens and fostering non-linear thought” (Elkana 2009, 937). For curricular development in the area of Peace and Development Studies, these concepts were considered to be useful, however they can be adjusted and expanded.

In the context of a university, “concerned citizens” are defined as students who are educated “to understand the main problems of the world you find on the pages of any good daily newspaper” (Elkana 2009, 939). While Elkana remains rather vague about his definition of a ‘good’ newspaper, which leaves room to draw rather dualistic distinctions between ‘good’ and ‘bad’ journalism, he makes a crucial point when he proposes that contemporary problems of global dimension are multifaceted and interconnected, and therefore require comprehensive approaches that draw on the expertise of more than just a single discipline. Genuine interdisciplinarity therefore calls for interdisciplinary education, not only the establishment of research groups that merely gather experts from different disciplines.

Indeed, drawing on Elkana, we propose to add precisely that in the context of Peace and Development Studies, transdisciplinarity constitutes an even more helpful concept as it opens up the possibility of moving beyond disciplinary boundaries, particularly in regard to methodological questions. This also corresponds to Elkana’s call for nonlinear thought which enables us to make connections between seemingly unrelated concepts, potentially leading to creative and innovative approaches to addressing a problem. Moreover, nonlinear thinking becomes particularly important not only when teaching peace and development theory, but also at all stages of innovation in curriculum development, which provides the larger framework for teaching in the context of a university as it opens up the possibility to draw on the resources inherent to the networks of the social systems that hold a project like a web. This ultimately leads towards a process-oriented approach to education, which does not follow any standard that is assumed to be universal, but which always examines the knowledge inherent to the places and people to whom a project belongs.

Rethinking curricular practice in such a way raises the question of the modern university’s socio-historical genesis and addresses its epistemological implications. What is perceived as constituting knowledge is rooted in Enlightenment thinking. The principles of a universal, rational, and therefore context-independent science are still influential for many university curricula in the Global North. This also holds true for other parts of the world, since the concept of the modern university with its basic structure has served as an example for universities internationally (Elkana 2017). While international academia follows a set of transnational standards, such as accreditation systems, which allow for easier mobility of students and recognition of courses taken and degrees obtained at partner institutions, it is important to avoid falling into universalist thinking of having to apply uniform standards of education when thinking about curriculum development in a given context.

It is often not only the structure of the university which is being adopted, but also the curricular practice with its epistemological background, thus neglecting the opportunities that engaging with local epistemologies provides. This becomes particularly apparent when revising curricula in the transdisciplinary context of Peace Studies, in which the subject of study cannot simply be derived from a seemingly remote textbook example, detached from the realities of the students, faculties and communities concerned, at least not without falling into the trap of epistemological violence. On the contrary, we could argue that the subject itself – peace – constitutes itself through the concrete relationships of the related subjects. Students, faculties and community members therefore determine the perspective towards the subject at hand, which derives meaning from their specific educational encounters. Consequently, for knowledge to emerge there needs to be a space that is not already taken by the content of a ready-made curriculum and which, therefore, can be used for and adjusted to the needs that arise out of the specific context and lived realities of the human beings involved.

When the project team first reviewed the already existing MA curriculum at Haramaya University, it soon became apparent that in many of its aspects it followed the example of a British university. This orientation led, at least implicitly, to an assumption of an idealised standard which ought to be followed in order to have a 'good' Peace Studies program. However, the curriculum did not mirror the particularities and unique characteristics inherent to Haramaya University. With Elkana (2009, 2017), we may indeed argue that this was a missed opportunity as it reproduced standardised ideas of what a modern university ought to be like. The attempt to implement the content and structure that were designed for the context of a British university, also reflects on the potentially violent aspects of linear development thinking, in which concepts developed in the global North are transferred to the global South without adequate consideration of and adaptation to the local context. Such epistemological violence has been criticised by a number of scholars, including the development researcher Wolfgang Sachs who coined the sentence "on earth as in the West" (Sachs 1993). In reference to Sachs, an early guiding question for intensive debate amongst the project team was how to find a proper response from within the contexts of Haramaya, Ethiopia and the broader Horn of Africa region that would respond to such a critique of universalist thinking and practice.

By way of elicitive curricular development, a space was created in which the curriculum could be revised in a manner that suits the context of Haramaya University and allowed for the development of its unique approach to Peace and Development Studies that makes Haramaya University an important centre for Peace and Development Studies and conflict transformation in the Horn of Africa. The full revision of both a Master's and a PhD curriculum in Peace and Development Studies constituted a central dimension of the joint project work between Haramaya University and the University of Innsbruck. As such, we put a central focus on a) an assessment of the status quo, b) a comparative perspective with different national and international examples of existing Peace and Development Studies Curricula and c) an assessment of existing resources and unique qualities for Peace and Development Studies inherent to HU, its surrounding communities and the broader Horn of Africa context.

While a local perspective and profile are key for the development of successful Peace and Development Studies programs, there is nevertheless a necessity for international compatibility. In the context of the cooperation between Haramaya University and the University of Innsbruck, the decision was taken to develop a formal framework that is in line firstly with the local requirements of Haramaya University's legislation, secondly with the broader legal frameworks of the Ethiopian Higher Education system and thirdly with the European Credit Transfer System (ECTS).

To sum up, in this chapter, we have discussed and problematised curricular practices of universities in the 21st century in the context of the experiences within the project "*HU-UIBK Partnership for Strengthening Institutional Capacity in Peacebuilding and Conflict Transformation*". In the course of our engagement, we have, on the one hand, recognised the problems and potential violence inherent to universalised forms of knowledge-production. Most obviously, we had found this in curricula that had previously been written, which assumed one idealised form of how Peace and Development Studies should be, following the example of a British University. This can be described as a classical example of the development of underdevelopment (Frank 1978).

In other words, the aim of implementing a curriculum that makes sense in the context of a European university to an Eastern Ethiopian context in the Horn of Africa creates linear

thinking of wanting to strive for an ideal that ought to be reached while leaving any alleged shortcomings behind. Such a perspective, however, would completely disregard the myriad of qualities that make a given place and context – in this case Haramaya University – unique. Drawing on a nonlinear approach to curriculum development enabled us to bring on board many stakeholders. This has led to the integration of presumably non-academic knowledge bearers such as community elders and local organisations, thereby creating a curriculum that meets both the requirements of Haramaya's broader academic community as well as of international standards.

In the curricula innovation effort, the project team attempted to go beyond the conventional approach of curriculum design and implementation in terms of content and didactics by considering all key stakeholders during the curriculum development, implementation, and evaluation processes. The curricula were designed in such a way that students do not only gain theoretical but also practical knowledge, skills, and perspectives. The learning-teaching process therefore brings together students, teachers, and stakeholders from the surrounding communities. The learning-teaching activities benefit from a dynamic approach of integrating indigenous and modern ways of learning-teaching. These innovative curricula were designed and implemented by people of different backgrounds, i.e., students, instructors, community elders/leaders, government organisations, nongovernmental organisations and community-based organisations. All of the key stakeholders participated in the curricula design and implementation is expected not only to boost the quality of the programs, but also to ensure their sustainability as they anchor the program in the communities both in- and outside of the university, thus ensuring that they belong to all of the people involved.

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5.6.4 Enumeration of results

The central results of the project are outlined in the following section:

- Four rounds of programmatic capacity building training sessions for 20 faculty members at Haramaya University were conducted by University of Innsbruck academic staff members. Each of these training sessions strengthened the capacities of the faculty to innovate the MA and PhD curricula in Peace and Development Studies and effectively engage in the learning, teaching and research activities of the programs;
- One MA student conducted one semester of coursework as an international exchange student at the University of Innsbruck. Two PhD students conducted six months of coursework and research at the University of Innsbruck. During this time, the students were exposed to new insights and experiences in the field of Peace Studies. This international experience has benefited not only the students directly but also the larger student body and the faculty at HU as they have returned to Haramaya University after their semester abroad;
- Two PhD proposals were successfully defended in the framework of Haramaya University's PhD Curriculum in Peace and Development Studies;
- Two curricula revisions were conducted, integrating substantial innovation at the levels of didactics and community engagement: one MA curriculum and one PhD curriculum in Peace and Development Studies;
- The revised MA curriculum in Peace and Development has already successfully been implemented during the second year of the project;
- 80 Haramaya University Staff members were well-trained in the area of conflict analysis and peace-work (4 training sessions, 20 participants per training session);
- Four university seminars for a total number of 60 MA and PhD students at Haramaya University were successfully conducted;
- A successful and inspiring small group (25 participants) gathered for an international project culmination workshop, in careful consideration of COVID-19 protocols; and
- A well-developed and reviewed proposal for the establishment of the Institute of Peace and Development Studies at HU has been developed.

Ethiopia



*A rural village between
Dire Dawa and Harar*



*An endangered Lake
Haramaya in the vicinity
of HU*



*Dr. Gutema Imana intro-
ducing the project at the
HU kick-off meeting*



M.A. and PhD students who attended a seminar on theories of peace and development, conducted by UIBK staff



Visit to Ambras Castle during the last HU team visit to UIBK

5.7 Inclusion in Education for Persons with Disabilities

Project Coordinator: Alemayehu Teklemariam Haye

Coordinating Institution: Addis Ababa University

Partner Institutions: University of Vienna, Dilla University, Gondar University

Partner Country: Ethiopia

Project Duration: 1 March 2017 – 30 June 2020

5.7.1 The project – INEDIS

The overall objective of INEDIS was to strengthen capacity building at higher education institutions (HEI) and to facilitate inclusive education for students with disabilities at university level. Additionally, the project aimed at strengthening the ability of HEI to contribute to inclusive community and school development with a special focus on the intersection of gender and disability.

INEDIS thereby addressed necessities for capacity building in three areas:

- Strengthening the capacities of HEIs and employing institutions by empowering students with disabilities at universities and by further developing research and teaching capacities on disability and inclusion at high levels of scientific excellence. Addis Ababa University led the development of an evidence-based training session for HEI staff that enables universities to better support students with disabilities in higher education.
- Fostering knowledge development and competencies to facilitate research and teaching with respect to gender and disability and developing direct measures to empower female students with disabilities in education and the labour market. The University of Gondar conducted participatory research on challenges for women with disabilities in higher education and secondary schools. The findings have been included in training workshops and the guideline developed by Addis Ababa University.
- Enhancing knowledge, skills and competencies of academic staff to research and teach issues of community and school development and strengthen university community services to support inclusive development. A participatory research study implemented by Dilla University focussed on views, practices and prospects at community and school level and formed the basis for the development of a postgraduate program on inclusive community development for community workers. Additionally, a resource centre for persons with disabilities, families, community workers, teachers and other stakeholders has been set up at Dilla University.

A special emphasis was given to capacity building of research, teaching and management skills as well as the exchange of research findings and knowledge within the consortium. The University of Vienna contributed to and supported the design and implementation of participatory research studies, the development of the guideline and training materials, the publication and international dissemination of research results, and the management of the project.

Research

Initially, the project planned to conduct three main research studies in order to facilitate research based and demand driven capacity building, awareness raising and institutional

development activities. In the course of the project, activities and preliminary findings have led to follow-up research questions that have been addressed in additional research studies during the project duration. AAU carried out two major research studies: (i) on the experiences of students with disabilities at HEI to develop guidelines and training materials for universities; and (ii) on the mental health status of students at Addis Ababa University and four other Universities. The findings were informative in respect of the existing practise of inclusion in the university. To narrow the gap and to reduce barriers, a guideline on the implementation of inclusion of students with disabilities in higher education was developed. Additionally, a study on sign language has been conducted as a baseline for an MA program for sign language training at AAU.

The University of Gondar first conducted research on Gender-Based Violence (GBV) against female students with a disability in HEIs in Ethiopia. A second study focussed on educational, social and environmental challenges of students with disabilities in the higher education and preparatory schools of the Amhara Region. The goal was to better understand experiences of female students with disabilities and to get a comprehensive picture about the extent of the problem. In addition to women at HEIs, various stakeholders participated in the study. Findings served as a basis for training session and capacity building and have been included in the production of the guideline on inclusive education at HEIs.

With regard to Community Based Inclusive Development (CBID), Dilla University has conducted two research studies in order to better understand the current situation and needs with respect to inclusive community development. The first research looked at practices, challenges and future prospects of community based rehabilitation services in the Gedio zone. It served as the scientific basis for the post-graduate program on CBID. The second research adopted a more specific focus on the implementation of inclusive education in selected primary schools in Gedio zone in order to support teachers and schools to provide inclusive education in local community schools.

Capacity building and institutional development

The main focus of the project was to increase training and institutional capacities of HEIs in order to facilitate inclusive teaching and learning environments for students with disabilities. With regard to organisational development, a key project outcome has been the Guideline on Inclusion of Students with Disabilities at Higher Education Institutions. It gives a general introduction to inclusive education at a university level and most importantly provides good practice examples and tools for university administration as well as lecturers to facilitate inclusive teaching and learning and support services. Findings from research on gender and inclusion at HEIs have been integrated into the guideline. Due to the advocacy and networking efforts by the project team, the guideline is now disseminated by the Ministry of Education to all Ethiopian universities both in the English and Amharic version.

Throughout the entire project duration, capacity building activities have been a central component of the project. Workshops on a wide range of topics have been conducted, ranging from inclusive services and teaching methods, employability of persons with disabilities, gender mainstreaming and the prevention of gender-based violence, strategies of inclusive community development, to general awareness raising activities on inclusive education. Participants from different backgrounds have attended the workshops, such as university lecturers and administrative staff, students with disabilities, government officers, business owners, community workers, community members and families. Training workshops have

contributed to a significant increase in awareness and capacities to support students with disabilities in their studies at the university as well as increase their opportunities after graduation.

With respect to inclusive community development, the project has had a major impact in reducing the lack of inclusive community workers in Ethiopia. Based on research on inclusive community development, DU has started the first post-graduate program on Community Based Inclusive Development (CBID) in Ethiopia. Graduates have the knowledge and skills to facilitate and coordinate inclusive community development at a local level. The program was taken over by DU after the project duration.

Additionally, the project initiated an MA program at AAU to train lecturers from different departments in sign language in order to enable students using sign language to pursue various study programs. The curriculum will start after the project duration.

Dissemination

Findings and outcomes of the project have been disseminated to various stakeholders in order to increase the impact of the project and raise awareness on inclusive education in HEI. The project team has continuously engaged with various stakeholders, including university administration and government officials in order to advocate for the implementation of support structures for inclusive education at HEI. As a result, the Guideline has been distributed to universities through the Ministry of Education. At the same time, research findings have been published in 3 joint research papers and 13 joint presentations at international conferences. At national levels, project findings and activities have been promoted via dissemination workshops and using mass media and press releases.

5.7.2 Gender equality and empowerment across four universities in Ethiopia and Austria

by Yirgashewa Bekele Abdi, Meseret Hassen Ayele, Ababu Teshome Ayalew, Michelle Proyer, Simon Reisenbauer

At the nexus of disability and gender...

In a broad understanding of inclusion, not only disability but different layers of diversity and their intersections play a vital role in understanding societal dynamics of discrimination and exclusion (Biewer, Proyer & Kremsner 2019). International studies indicate that women with disabilities are subject to increased discrimination due to prejudices on the basis of gender and disability (Froschl, Rubin, & Sprung, 1999). The communities perceive women with disabilities as dependent and incapable of assuming respected positions within society. Often they will be hidden by their families fearing social discrimination. Women with disabilities are very likely to be victims of gender-based violence at one point in their life. They have less access to education than men with a disability or women without a disability. The few who get access experience discrimination that affects their educational success (Rousso, 2003). This holds even truer at the higher education level in Ethiopia and in Austria. Female students with a disability are often invisible and unnoticed by the (higher) education system in most low income countries, such as in Ethiopia. Access and gender equality in higher education institutions is perceived as luxury rather than a right (Leathwood & Read, 2009).

Those who promote either gender or disability equality often don't pay attention to the education of women with disabilities (Rousso, 2003).

Despite many years of research at the nexus of disability and gender, many of the complex overlapping facets remain underexposed. This holds especially true in contexts beyond the Global North and issues beyond mainstream topics such as livelihood, motherhood of women with disabilities, and binary readings of gender in the context of disability. This is particularly worrisome as studies point to the fact that gender-based violence, in the context of disability referred to as 'Gendered-Disability Violence' (Dessie et al. 2019, Bekele et al. 2020), has been shown to pose a serious problem among certain communities.

INEDIS: more than mainstreaming gender

In accordance with APPEAR's gender mainstreaming approach, the project Inclusion in Education for Persons with Disabilities (INEDIS) picks up the main idea of producing findings that enable decision-making by women, especially in the context of higher education. Gender runs through all project phases like a guiding principle, in planning, implementation and monitoring. Additionally, the specific objective two directly targets this dimension of diversity. It aims at fostering the knowledge and competencies of Ethiopian universities to facilitate research and teaching with respect to gender and disability related issues at high levels of scientific excellence and to empower female students with disabilities in education and the labour market.

The project builds on prior knowledge from earlier collaboration efforts between Addis Ababa University and the University of Vienna in the APPEAR project RESPOND-HER, where gender has been one of the main concerns. Consequently, an enlarged consortium has made it its goal to pick up where it left off and investigate one of the main findings further. It stated that the intersection of gender and disability has been identified as an under-researched topic, despite creating specific barriers and challenges for female students with disabilities in higher education. While touching upon the relevant matter of female empowerment in the higher education context, at the same time the project takes the idea of empowerment further and aims to benefit females with disabilities who might otherwise be deprived of opportunities in other contexts, such as secondary schools and on the labour market. The mainstreaming of women is taken to an extent that also females with disabilities can achieve high levels of academic training, find safe study environments and gain non-discriminatory passages to enter the job market.

Perspectives on gender: team, research efforts, and capacity building

The project has paramount significance to gender equality and the empowerment of females' participation in all aspects, including leadership. Based on the objective of the project, gender balance was a serious consideration in all activities, such as workshop participation, presentations and dissemination, data collection, and obtaining access to capacity building and training. Gender as one dimension of diversity played a major role in general and can be considered as significant throughout the activities of all four involved universities. Women with different profession have been encouraged to participate in the project activities. The team leaders of the project activities at Addis Ababa University and University of Gondar were female staff. In the core team, women researchers and contributors were an integral part of the project. The University of Vienna INEDIS team thereby specifically supported female researchers within the consortium to ensure equal participation of women in the

core teams and project activities, such as leadership roles, international conference presentations and authorship of publications. A special focus was placed on engaging in research activities, publications, international conference presentations and reporting on gender perspectives, including gender-based violence. Additionally, a research visit to the University of Vienna was organised for female researchers, including an exchange on strategies of gender mainstreaming and diversity management at HEIs. With regard to the project implementation, one of the major focus areas of INEDIS was to include women in project activities in order to make gender balanced contributions to the project outcome.

Following the specific objective two, activities at the University of Gondar were specifically geared towards assessing the needs of female university students, with a focus on their experiences of sexualized abuse and violence in university contexts. The University of Gondar team conducted extensive research with female students with disabilities at different universities and secondary schools in Ethiopia. Additionally, an APPEAR scholarship was granted to research the experiences of female students with disabilities in higher education. Findings show that gender-based violence occurs in every stage of life and at every educational level, such as primary education, secondary education and higher education levels. The most common forms of gender-based violence reported and witnessed by different offices and students with disabilities are verbal harassment, sexual abuse and rape, attempted rape, and unwanted physical contact. The team identified the main risk factors for gender-based violence: A lack of special support from schools and higher education institutions, misconceptions about sexuality and the life of disabled people by women with disabilities and abusers. Based on the findings, recommendations were compiled and incorporated in various reports, as well as into the 'Guideline on Inclusion for Students with Disabilities in Higher Education' (Addis Ababa University, 2019).

The findings and recommendations were used to develop capacity building activities for various stakeholders throughout the project. Workshops and trainings on gender have thus focussed on female participants, e.g. in the first project year 33 out of 40 participants in the gender-based violence seminar at the University of Gondar were female participants. Moreover, in conducting the research the majority of data collectors were women, who collected materials at different universities in Ethiopia. In addition to specific activities on gender, the project team specifically invited women to join the project activities. The Dilla University project team specifically invited women with disabilities to apply for the CBID post-graduate program. As a result, 8 out of 31 trainees are women. Among the 31 trainees, four of them have a hearing impairment, two have a visual impairment and two are physically challenged. In the second project year, 21 female students with a disability participated in the Disability Talent Week at the University of Gondar and 8 of them were actively involved in sport competitions. 36 female students with disabilities took part in the workshop related to challenges for people with a disability on the job market. In the third project year, the Directorates Focal Persons of Gender & HIV/AIDS and the Disability Study and Support Centre comprising women from the University of Gondar, Bahirdar University, Wollo University, Woldiya, Debreabor and Debreworkos were also involved in the Disability Talent Week.

Lessons learnt and outlook

A main objective of the project was to strengthen the participation and position of women in higher education and research. Activities related to gender were an integral part of the project planning and implementation. On the one hand, a specific component focused on gen-

der related challenges that students with disabilities have to overcome during their studies at university level and in secondary schools. Research, capacity building and dissemination activities were planned accordingly. On the other hand, gender was a mainstreaming topic in all project components. Findings and expertise stemming from research and training on aspects related to gender were integrated into all research and capacity building activities throughout the project duration.

The participation of female students, and academic and administrative staff was a priority during the project implementation. Although there are only few initiatives by the university to involve women in various activities, the dedication of INEDIS to promote the role of women served as a leading good example. The fact that the team leaders of INEDIS were female academics helped to attract women to participate in the project activities. Female academic staff played a vital role in project coordination, research, paper presentations and publications, conference participations, and group discussions. The trends in the university often neglect the increasing participation of female students and staff. The absence of the proportional participations of women at conferences and workshops organised by the University as a precondition leads to low rates of participation in overall university activities. However, INEDIS set this precondition of having at least gender proportional participation at conferences, workshops, training participation, presentation and group leadership and this was enforced by the project leadership. As a result, an interesting new practice emerged and led to an increased number of women from collaborating universities and stakeholders being able to actively participate in the project. Students with disabilities in general and female students with disabilities in particular were actively involved as data collectors, data sources and conference and workshop participants. The female leadership within the project also attracted further collaboration for publication with female staff members from the University of Vienna to publish findings in internationally reputable journals.

Gaining knowledge on the everyday challenges female students with disabilities face enables the development of user-oriented support structures. The project added to the body of knowledge both in academic and general terms. Researchers, university administration, ministries and potential employers were informed of the findings. Information enables understanding which can lead to supportive environments for women with disabilities that in turn enable their empowerment.

The positive lesson from working on the INEDIS project is that projects must be transparent and explicitly target the participation of and ownership by women. This has been accomplished within the implementation of INEDIS, which can serve as a good example for future project collaborations. Attention to women and marginalised community members makes the project equitable, fair and with justice that other funding organisations need to look into. What makes INEDIS special is the commitment to empower and give responsibilities and leadership to female researchers. As a result, leadership at a project level, workshop coordination moderating, research coordination, presentations, and the participation of women in general has been an interesting experience and opportunity that resulted from the project.

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5.7.3 Institutional change and impact in higher education institutions in Ethiopia and Austria

by Yirgashewa Bekele Abdi, Ababu Teshome Alayew, Meseret Hassen Ayele, Alemayehu Teklemariam Haye, Simon Reisenbauer, Michelle Proyer

Disability inclusion in higher education

In light of the publication of the UN Convention on the Rights of Persons with Disabilities (UNCRPD), calls for inclusive education have gained momentum in countries around the world. Despite increased political pressure in higher education, the conditions at universities are still challenging for persons with disabilities. Existing university policies and guidelines have not been effectively implemented.

In the higher education sector in Ethiopia a number of policies, strategies and guidelines refer to inclusive education, especially the Higher Education Proclamation (2009) and individual strategies and guidelines at each university. At an institutional level, disability centres based at the universities are supporting students with disabilities. Even though there are measures in place, policies and guidelines are not well distributed and in many cases even neglected. Disability centres are often confronted with a lack of capacity, resources and negative attitudes of staff in research, teaching and management that hinders students with disabilities to realise their right to and success in higher education (Munemo & Yirgashewa, 2020) and beyond in terms of entering the job market.

Negative attitudes and a lack of support count among the persistent barriers to higher education for students with disabilities (e.g., Moriña, Sandoval & Carnerero 2020). However, at the same time the number of students with disabilities at university level is increasing every year, with little or no improvement in providing adequate and supportive environments at the 32 universities in Ethiopia. Capacity building and training of university staff is one of the key issues to initiate change in the attitudes of academic and management staff and provide skills to support students with disabilities. Additionally, academic staff in the field of special needs education in Ethiopia are confronted with a lack of resources and support to further explore the situation of persons with disabilities in higher education. This is especially true for the intersection of gender and disability. Women with disabilities face additional discrimination and are even more marginalised within higher education.

Female students with disabilities are highly underrepresented in the Ethiopian universities with only 25% of students with disability being women (Tirussew et al., 2014, p. 12).

NEDIS: impact on universities in Ethiopia and Austria

Through INEDIS, three Ethiopian universities and one Austrian university have joined efforts to target institutional change at university level that is required to address the challenges for students with disabilities in higher education. The main objective of the project was to strengthen capacity building at higher education institutions to facilitate inclusive education for students with disabilities at a university level. Additionally, the project aimed at strengthening the ability of higher education institutions to contribute to inclusive community and school development with a special focus on the intersection of gender and disability. Thus, apart from the university, the INEDIS team engaged with stakeholders from government offices, schools and communities.

During the three-year implementation period, the project contributed to capacity building and knowledge development, through applied research, evidence-based training, the production of teaching modules and materials, advocacy and empowerment. In addition, the university staff (administrative, research and leadership) had access to awareness raising training, which led to attitudinal change towards persons with disabilities and inclusion. Much progress has been achieved on the part of the university community, leaders, academic staff and the surrounding school community in adopting a positive concept of inclusive education and disability. They have demonstrated commitment to incorporate disability and inclusion as part of societal, institutional and professional development processes. As a result of the project activities and advocacy efforts, the leadership of the Ethiopian partner institutions has allocated budget and resources to support students with disabilities and strengthen the support centres for students with a disability with both human and non-human resources. In addition, administrative staff at the university are also aware of challenges that students with disabilities face in accessing university services, such as course registration and library services.

A major contribution to the development of inclusive higher education is the publication of the 'Guideline on Inclusion for Students with Disabilities in Higher Education' (Addis Ababa University, 2019). After extensive research, consideration of critical reviews among the involved university teams and editing, the INEDIS team developed the guideline to provide background information on inclusion and disability, and most importantly give recommendations for universities to facilitate the inclusion of students with disabilities at the levels of teaching, research and administration. The Guideline is available in English and Amharic (with a contribution by the Swedish International Development Cooperation) and has been disseminated for future implementation. The Ministry of Education is adopting and distributing the guideline on inclusive education at HEIs to universities in Ethiopia.

Additionally, government organisations such as civil service offices, the Ministry of Education, and education bureaus have participated in training sessions and awareness raising activities, which helped them to rethink their approach to the inclusion of persons with disabilities in higher education. As an example, the Special Needs Support Center at Addis Ababa University managed to promote the development of an inclusion policy that will be part of the university regulations in the future. Knowledge transfer within the consortium has allowed the University of Vienna to gain a valuable insight into experiences and services

at Ethiopian universities. These may also serve as good practice examples to improve services at the University of Vienna.

Besides university staff, the main beneficiaries of the project have been students with disabilities. There is an increased demand for support services and inclusive teaching provision due to awareness raising and training activities. Students have also increased their skills and knowledge in a series of workshops on computer skills, sign language, employability, as well as general study skills. Additionally, INEDIS has established prosocial public activities at the University of Gondar, in particular the Disability Talent Week, as an opportunity for students to present their talents in arts, music and sports. Measures to raise awareness of barriers for students with disabilities are considered essential.

In terms of curriculum development, INEDIS has opened the first post-graduate program on Community Based Inclusive Development (CBID) in Ethiopia. The successful implementation of the first two courses at Dilla University has contributed to the provision of qualified community workers for inclusive community development. The program will be continued by Dilla University due to high demand and commitment by the university administration that is to support the sustainable establishment of the program. In the course of the curriculum development, Dilla University established links to CBR organisations in the Southern part of Ethiopia to ensure that the program continues to be demand-driven and graduates have access to job opportunities. The CBID program is enabling trainees to fill their theoretical and practical gaps and acquire skills for project design that help trainees to develop to improve the lives of disadvantaged groups of the population. Additionally, graduates have basic skills, such as sign language training that enable communication with persons with disabilities and community stakeholders, and thereby support outreach and improvement for communities (Ayelew et al, 2020). An additional MA curriculum on sign language for lecturers at AAU has been initiated through INEDIS. The program will train lecturers at different departments to be able to provide sign language instructions to deaf students in order to gain access to study programs that are currently not available due to a lack of adequate teaching provision.

Initiating sustainable institutional change

The main focus of INEDIS was to initiate sustainable change at university level to support inclusive education for students with disabilities and facilitate appropriate support structures. The project was closely aligned with institutional developments and policy frameworks with regard to inclusion and disability in higher education institutions. Findings from research and needs assessments have further guided the implementation and adoption of project activities. This has led to a high project impact and the integration of project activities into institutional policies and organisational development processes. The Ministry of Education is adopting and distributing the guideline on inclusive education to all universities in Ethiopia. Additionally, awareness raising, and advocacy activities have accompanied the project in order to ensure that project outcomes, newly developed support systems and curricula will be adopted by the respective institutions. In this regard, it was crucial to closely work with university leadership and administration. As an example, the Dean of the Institute of Education and Behavioural Science at Dilla University highlighted the commitment and contributions of the INEDIS project to the adoption of inclusive policies and structures at Dilla University. He urged all stakeholders to work together with the university to continue addressing the issue of disability and inclusive education in future institutional

development processes. The project has been recognised as a highly effective contribution to inclusive institutional development in the long term.

With respect to supporting (female) students with disabilities in higher education, a major success of INEDIS has been the adoption of the guideline by the Ministry of Education. The Ministry is using the Guideline as a framework for universities in Ethiopia to make their study programs and administration more inclusive. The project teams have been frequently requested by various universities to provide further capacity building and training. Consequently, the project has contributed to creating awareness at an institutional and structural level and at the same time providing expertise, knowledge and training materials for university staff all over Ethiopia.

At the level of curriculum development, the project has successfully developed and implemented the first Ethiopian CBID post-graduate program at Dilla University. Dilla University management decided to adopt the curriculum in their regular summer program. The curriculum and its implementation serve as a blueprint for other universities to initiate similar programs. Similarly, Addis Ababa University has adopted responsibilities to implement the MA program on sign language for lecturers.

Lessons learnt and outlook

The project has been highly successful in achieving its targets, including additional project activities and outcomes. However, at the beginning some challenges were observed in implementing the project activities. Within the consortium, taking on responsibilities in international research collaboration has been challenging, especially for new consortium members. Be that as it may, with strong interventions from the project leadership, support from experienced team members and discussions during project meetings, those challenges were overcome. At an institutional level, there was some resistance to adopting changes at the beginning. Focusing on awareness raising and inviting key university stakeholders into the project was helpful to overcome such institutional barriers and even generate additional support for the project. At the end, the project formed a strong consortium of experienced researchers that has great potential to further strengthen inclusive education at higher education institutions in the future.

The consortium structure has been a particular strength of the project. Within the Ethiopian education sector, the three universities are at a different level of institutional development, ranging from universities with a long institutional history to rather newly established institutions. They also represent different regions and therefore have access to different stakeholders to promote inclusive education as an important issue. In order to maximise the impact of the project, additional collaborations with different partners and stakeholders, such as civil society organisations, the Ministry of Education, local government offices, schools and community leaders, were emphasised as part of the project methodology.

INEDIS also had a big impact on the participating core team members. The cooperation was formed to create mutually beneficial outcomes for the Ethiopian and Austrian partner in terms of knowledge, practice and cultural exchange. Annual INEDIS workshops have been key events for the exchange of knowledge and experiences, coordinating, monitoring and planning project activities. The project participation in research, capacity building and advocacy activities has strengthened the position of core team members and team leaders at their respective institutions as well as in the academic community in Ethiopia. Teaching exchange, international publications and conference presentations have increased their aca-

demic profile significantly. Early-stage researchers in particular have benefited from participating in the project and will play important roles in the field of inclusive education in Ethiopia in the future.

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5.7.4 Enumeration of results

Capacity Building

- 1,031 university staff (researchers, lecturers and administrative staff) have directly benefitted from capacity building activities.
- 212 university staff participated in capacity building activities related to gender and inclusive education at HEIs.
- 5,612 students with disabilities (2,991f, 2,621m) benefited from project activities, and capacity building by receiving training and support for their education through the project.
- 2,991 female students benefitted from capacity building, awareness raising and prosocial activities. Active invitation of women to project activities has the improved participation of women. Female students with disabilities equally participated in pro-social activities, training and the disability talent week.
- 46 graduate students working at CBR programs acquired the knowledge and skills to facilitate inclusive community development.
- 150 students with disabilities and 138 business leaders participated in capacity building on-the-job opportunities for graduates with disabilities
- 46 students attended the first CBID post-graduate program at DU.

HEI institutional development

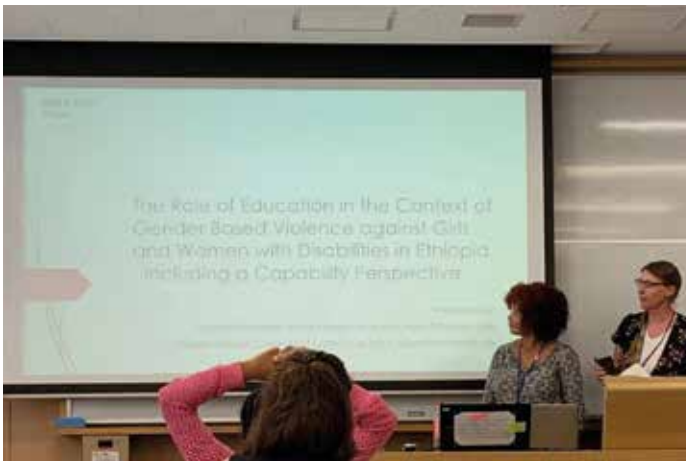
- The Guideline on Inclusion of Students with Disabilities at Higher Education Institutions guideline is available in Amharic and English, including research findings on gender-based violence. The Ministry of Education is adopting and distributing the guideline on inclusive education at HEI to universities in Ethiopia. 1,000 copies have been distributed to universities in Ethiopia. INEDIS team members are working with the university administration at AAU, UoG and DU to implement recommendations on inclusive education building on the guideline.
- The capacities of the centres for students with disabilities have increased at AAU, UoG, and DU. Knowledge and experiences were exchanged with the support centre at UoV
- The counselling centre has been equipped with the necessary material and personal. Physical barriers have been reduced at the UoG and DU campuses.

Study program implementation

- The post-graduate program on CBID has been implemented at DU. DU will continue the post-graduate program on CBID.
- MA-program on sign language has been initiated at AAU. The curriculum will allow students to access lectures in sign language in different study programs at AAU.

Research & dissemination of findings

- 3 joint research papers on research findings in international journals have been published
- 13 joint presentations at international research conferences
- Various workshops, public events and media coverage to disseminate project activities and findings to the wider public



Yirgashewa Bekele (team leader AAU) and Margarita Bilgeri (UNIVIE) presenting research findings on gender perspectives at the WERA 2019 conference in Tokyo



From left to right: Hawa Alemu (UoG), Meseret Hassen (team leader UoG), Margarita Bilgeri (UNI-VIE), Wondwosen Mitiku (UoG), and Yitayal Alemu (UoG) at the INEDIS conference in Vienna in 2019



Student with visual impairment taking an exam at the DU CBID post-graduate program supported by an assistant to write down answers



Graduates receive their certificate at the graduation ceremony for sign language trainees at Addis Ababa University

6 KENYA – UGANDA

6.1 Strengthening Capacities for Agricultural Education, Research and Adoption in Kenya

Project Coordinator: Benedict Mwavu Mutua

Coordinating Institution: Egerton University

Partner Institution: University of Natural Resources and Life Sciences, Vienna

Partner Country: Kenya

Project Duration: 1 May 2016 – 30 November 2020

6.1.1 The Project – SCARA, the Kenyan experience

by Raphael M. Gacheiya

Egerton University was founded as a farm school in 1939 by Lord Maurice Egerton of Tatton, a British national who settled in Kenya in the 1920s. In 1950, the school was upgraded to an agricultural college offering diploma programs. The Egerton Agricultural College Ordinance was enacted in 1955. In 1979, the Government of Kenya and the United States Agency for International Development (USAID) funded a major expansion of the institution. In 1986, Egerton Agricultural College was gazetted as a constituent college of the University of Nairobi. The following year, 1987, marked the establishment of Egerton University through an Act of Parliament. With such a history, Egerton University was the best home for the SCARA Project.

SCARA – Strengthening Capacities for Agricultural Education, Research and Adoption in Kenya – was an ambitious project funded by the Austrian Development Cooperation and implemented by Egerton University in Kenya and BOKU University in Austria. The project aimed at developing effective mechanisms for youth in agriculture to address the future challenges of providing water for food and nutrition security, as well as access to information and learning about these challenges. It was hoped that at the end there would be functional communication and networking channels through partnerships between key actors (universities, farmer groups, extension services, development actors, infomediaries, media and the private sector). With such an ambitious plan, the project found that external factors such as elections (which at times were contested, especially in the African context) were never factored. This was a huge blow, for it delayed some of the inception activities.

The project focus on agriculture was in tandem with today's world, where agriculture is the backbone of most African economies. With this in mind, SCARA advocated and implemented the idea that learning institutions must keep track with the latest information and communication technologies. The project's approach was such that the institutions and all actors must align themselves to the reality of the fluid nature of today's technological advancement in a fast-changing environment. This was in line with the project's realization that ensuring satisfaction of all stakeholders' needs and expectations, and developing, improving and enhancing the quality of the agricultural services provided, will make Information Communication and Technology for agriculture (ICT4Agric) a reality and thus lead to food security.

The SCARA project realized that universities, as the epitome of knowledge generation, will have to technologically adapt and disseminate the agricultural services they provide and their content. In the project's implementation journey, it was realised that universities can't afford to ignore the agricultural trends related to agricultural information and communication technologies. This was an all-informing experience. Most universities will have to move from only knowledge generation to knowledge generation and dissemination. In this context, SCARA propagated the belief that ICT and e-learning play and continue to play a major role in the development and economic growth of African countries now and in the future. As the project made its first strides, it was noted that success of Information, Communication and Technology for Agriculture (ICT4 Agric) heavily depended on the capacity and ability of the young generation. This was an interesting experience. The young generation are believed to be techno-savvy and this has to be harnessed for the betterment of agriculture. In Kenya, the young generation comprise more than 60% of the total population. If this populace is included in the ICT4Agric web through education and lifelong learning through ICT in respective areas, Kenya will make bold steps towards reaching its development goals and reducing rural poverty and food and nutrition insecurity. Being privy to this reality and experience, the project made a deliberate attempt to have a bottom-up approach and a participatory approach to the realities and the laid down objectives.

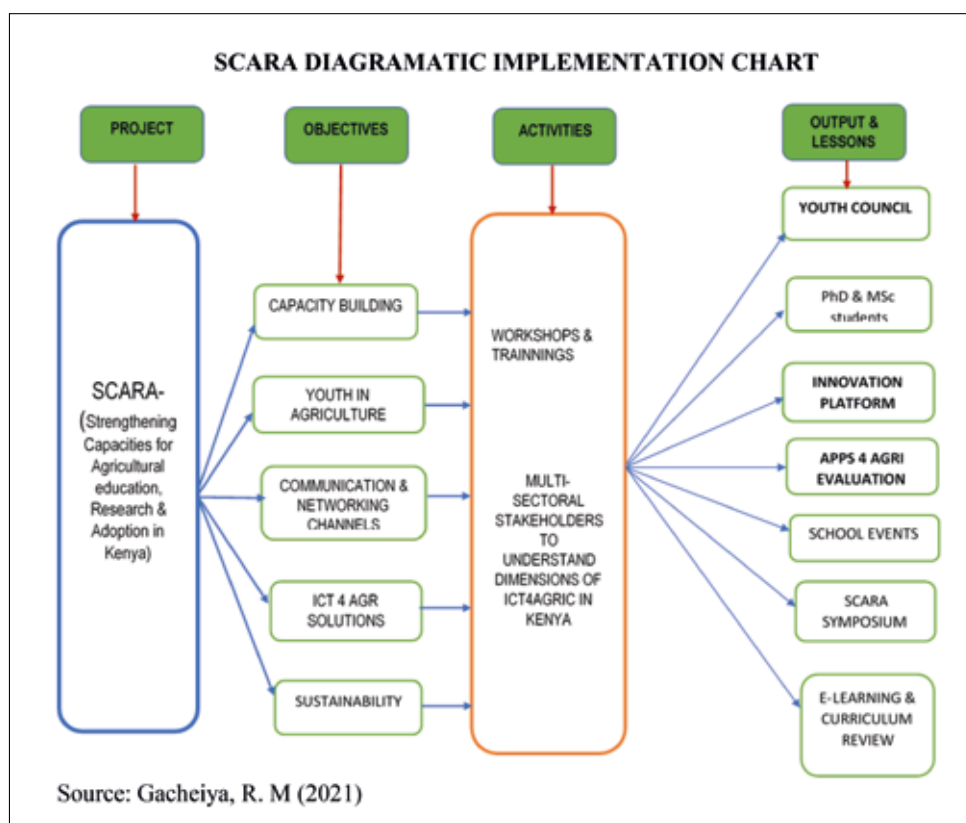
A major focus during implementation of activities was on involvement of stakeholders at all levels according to participatory approaches. The workshops were organized in a way that all stakeholders were at the centre of discussions and were provided with a platform to air their opinions. Training workshops created a platform for all participating farmers to address their needs, and collect burning issues, such as how farmers take up new technologies, adopt new technologies, what technologies are available to and for them and why they are not applied. The youth council and innovation platform workshop provided a forum for the youth and the selection of young farmers. ICT experts, high school and university students provided a very good mixture of young people involved in different aspects of the agricultural sector. The youth council gave an opportunity for young people with a strong interest in agriculture to promote the voice of the youth and get access to information and learning and to improve their capacity and shape the future of agriculture in Kenya. The involvement of young female scientists and students in research activities and research competition provided an opportunity for female scientist and students to put gender topics in the focus of their work and produce research promoting the voice of women in science, socio-economic and policy matters to a wider national and international audience. The formation of an innovation platform, a partnership between relevant stakeholders of different sectors (extension services, development actors, infomediaries, media and the private sector) was an innovative method that led to sustainable partnerships of key actors of relevant sectors with the goal to develop new technologies for ICT4Agric, which meets the demands of different parties involved. ICT4Agric, as was envisaged in the SCARA project, was and still is a tool that helps to boost development of technologies that are tailor-made for small scale farmers and meet their quest for agricultural information and services. Also, ICT4Agric plays a vital role in dissemination of knowledge and exchange of information, which in turn can be used to develop demand-driven research and technologies, hence increase technology adaption.

The project realized that the Kenyan universities' context is one of rapid growth scientifically and technologically. This includes information communications technology (ICT)

which is coupled with its own fair share of challenges. Such include the growing unevenness in technological advancement in terms of capacity both human and technical, cost of internet connectivity, availability and affordability of smart phones that would be necessary for accessible roll out of ICT4Agric, traditional knowledge and beliefs versus modern knowledge and attitudes towards agriculture. The SCARA Project, faced with such realities, realized that universities' role to develop innovative technologies in the field of water for food often did not match the rate of farm level adoption. Most farmers had no information about the existence of some agricultural apps and those who knew had no means to access the information.

The COVID-19 crisis in Kenya brought to the fore the critical role of information and communication technologies (ICTs) for continued functioning of the different sectors at large. Further, it was a clear indicator of the startling digital inequalities between and within Kenyan communities in terms of access and availability. Since the first COVID-19 case was reported in Kenya back in March 2020 (13/03/2020), the number of cases rose rapidly. Consequently, the Government of Kenya, through a presidential address to the nation on 25/03/2020, continuously undertook, reviewed and implemented various measures to curb the spread of the virus. For the SCARA Project, the impact was deep and largely negative. The last few activities that required face-to-face interactions were delayed.

However, this being a project that had a leaning on ICT, it was an opportunity that stimulated innovation within the project. The project has seen innovative approaches in support of its activities and training continuity: from social media, such as Facebook, WhatsApp, and Signal, to the Google Meet and Zoom platforms, in addition to e-mail. SCARA simply had only one option: being technologically innovative by adopting the existing technological platforms. This ensured that whichever activity that had been planned took off despite the delay. On August 26th 2020, a SCARA high-level meeting was held via the Zoom platform. This was the epitome of the realization that technology can be a source of good for every project towards realization of the project's objectives. The final high-level leaders' delegation meeting with participants from county government, the ministry of agriculture and ICT, service providers (internet and data), CBO and agricultural institutions, highlighted the need for a continues dialog on ICT4Agriculture and partnerships between all involved stakeholders, which the SCARA project helped to establish.



Scara diagramatic implementation chart. Source: Gacheiya, R. M (2021)

6.1.2 ICT (Information and Communication Technology) and agriculture in Kenya: experiences from the APPEAR project SCARA

by Dominik Ruffeis

Introduction

ICT will play a major role in the development and economic growth of African countries in the future, with the agricultural sector being the backbone. This development heavily depends on the capacity and ability of the young generation. On the other hand, rural poverty is still a burning issue of many poor and underprivileged rural farmers, especially of young female farmers.

Education and lifelong learning through means of ICT in respective areas will be key in reducing rural poverty and food and nutrition insecurity. ICT4Agriculture plays a vital role in dissemination of knowledge and exchange of information, which in turn can be used to develop demand-driven research and technologies, hence increase technology adoption.

New ICT technologies will have a significant impact on developments in agriculture, such as ways farmers access information and use this knowledge to improve crop produc-

tion or access markets. Mainly, young male and female farmers with a sound understanding of new communication technologies play a key role in this development. In many ways, youth is the key to development and growth.

The use of ICT in agriculture and extension has gained increasing attention from the international development community. The use of mobile phones and expansion of internet infrastructure has enabled people to access information and services.

Information flow and knowledge generation

Agriculture is knowledge- and data-intensive, and generation of data and its distribution to various stakeholder groups needs to be closely integrated. Agricultural knowledge and information generated from universities and public or private research institutes needs to be streamlined with indigenous knowledge and information from farmers to create innovations and farming practices that are adoptable by users.

An important activity of the SCARA project was to analyse stakeholder interactions and communication pathways along the value chain. This clearly showed that, especially, linkages between farmer and research organizations needs further improvement through advancement in participatory research. This topic was specifically addressed during a training on participation of beneficiaries in research activities.

Figure 1 was developed as a result of the IP (Innovation Platform) meetings. This figure shows knowledge generation (data) and information pathways (communication) along which knowledge is transferred and exchanged between involved stakeholders.

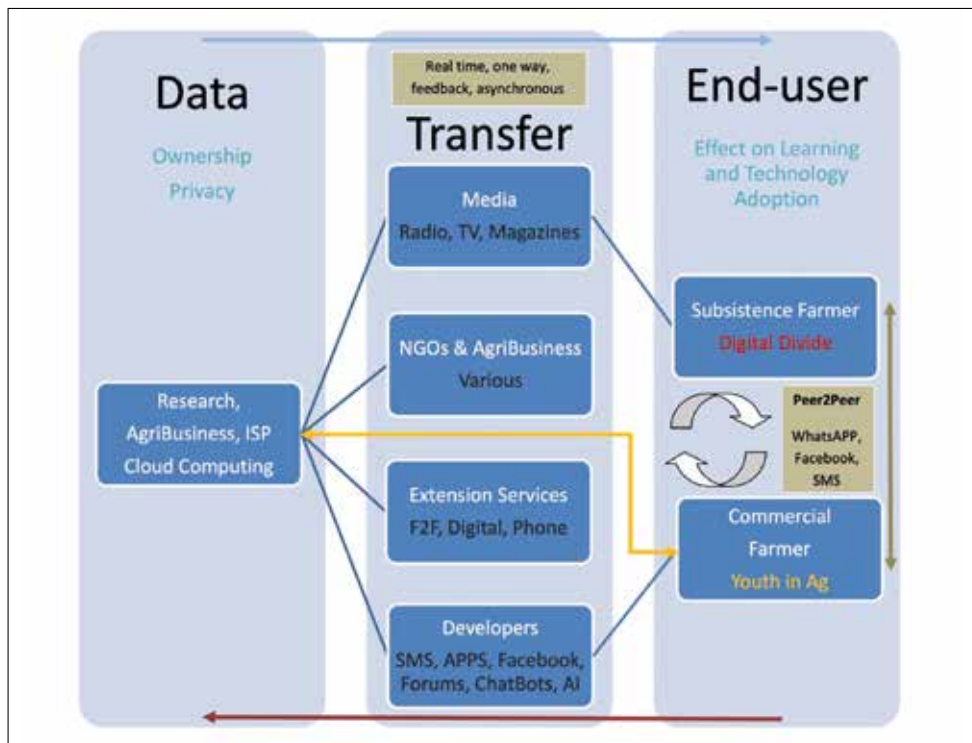


Fig. 1: Information and communication pathways in ICT4Agriculture

ICTs have the potentials of bridging the existing communication gap among agriculture researchers, extension workers, farmers and other stakeholders by providing a network among key stakeholders.

Effective knowledge and information management in the agricultural sector is achieved when farmers can access relevant information at the right time in a user-friendly manner. Therefore, farmers need to be involved in the knowledge generation process. Mobile communication offers the opportunity to facilitate peer-to-peer interaction and socialized learning processes among all stakeholders. The horizontal and vertical flow of information becomes a two-way communication process that benefits all stakeholders.

Adoption of ICT-based solutions for agriculture

As part of the SCARA project, a research activity was conducted to analyse the perception and use of ICT among farmers in Nakuru County. For this purpose, small-holder farmers were interviewed in five sub-counties (Subukia, Rongai, Molo, Njoro, Gilgil). Among the farmers interviewed, general and ICT literacy is low among individuals and their children. The preliminary results show that most farmers presume that ICTs are complex apps or web-based platforms involving the use of expensive gadgets for information dissemination. They suppose that an internet connection is a prerequisite to access. Most farmers are only conversant with TV and Radio as the dominant methods of delivery of extension information. Use of mobile apps, websites and other mobile or computer-based platforms requiring an internet connection is perceived to be expensive and unnecessary. Basic skills required to operate such platforms are missing and even those with their own or who have access to smartphones only use them to call, text and transact mobile money. A few are on social media platforms but not for the purpose of seeking agricultural information. For some of the interviewed farmers, feature phones and SMS are a good solution to access required information. For many rural farmers, radio and TV are still major sources of information on weather, market, laws and emerging trends.

In Kenya, a tech-savvy young generation of agri-preneurs develop multiple apps and databases aimed at improving farm level productivity and enhancing profitability among farmers.

Farmers and computer science students from Egerton University jointly evaluated existing smartphone applications in the “App Evaluation Workshop”. The main objective of this activity was to sensitize farmers on the opportunities to include ICT tools in their farming activities. The students, who are actively involved in software engineering, vice versa received valuable insights into the needs of farmers and the basic requirements of development of smartphone applications.

During the development process, it is highly relevant to reach out to the product end user in order to fully understand the users’ needs rather than make an app based on what developers think they need. Exclusion of the beneficiaries during the design phase was identified as the main factor of discontinuation of an application. Inaccurate and rather generalized information not addressing individual needs and location-specific information were mentioned by most farmers as reasons not to use an application. In case individualized solutions for farming problems are not possible to access, mitigation procedures offered for different crises are favoured. Hence, the involvement of experts and reliable data sources is relevant. This also emphasizes the important role universities as research organizations play in this context. From an interface design perspective, developers have to make sure that

apps are user-friendly, including more pictures than text. User friendly also refers to the use of local languages and easy language, with commonly known terminologies for less literate end users.

Key findings:

- General and ICT literacy among farmers is low, which makes ICT trainings as part of extension services and primary education a necessity.
- Feature phones and SMS are solutions that can be easily accessed by farmers.
- Radio and TV are major sources of information on weather, market, laws and trends.
- ICT-based solutions for agriculture are not adopted by farmers and other stakeholders, because most ICTs were developed without using participatory approaches.
- Exclusion of the beneficiaries during the design phase is a main factor of discontinuation of an application.
- Women often do not have smart phones or access to them. The main reasons are lack of financial resources, socio-cultural reasons and higher levels of illiteracy among women.
- Information must be accurate, needs- and location-specific.
- The involvement of experts and reliable data sources is highly relevant. This also emphasizes the important role universities and research organizations play in this context.
- In case individualized solutions for farming problems are not possible to access, mitigation measures offered for different crises are favoured by farmers.
- From an interface design perspective, developers must make sure that apps are user-friendly, including more pictures than text.
- User friendly also refers to the use of local languages and easy language, with commonly known terminologies for less literate end users.

Socio-cultural norms, socio-economic constraints and the use of ICT

Gender, marital and family status, education level and land ownership are all factors that influence use of ICT tools and applications. Young persons with access or rights to land, often men, use ICT skills in farm planning, production and marketing. They use ICT to obtain more reliable market and modern production information for their existing crops and gain better access to markets.

Preliminary results from the SCARA research activity show that, even though not actively being precluded from owning a smartphone by societal norms, often women whose husbands have smart phones do not have access to them. The main reasons are lack of financial resources and higher levels of illiteracy among women.

Conclusion

ICTs have the capacity to enable farmers to access information on product pricing and local markets, and are sources for inputs and weather conditions. However, discussion cannot be solely about the use of ICT in agriculture that should enable farmers to access relevant information. Information must be accessible and in a format that makes it usable. This is also a matter of trust. Farmers are questioning whether the information they receive is legitimate. Hence, farmers prefer to use different sources and cross-check information with people they know and trust. In designing ICT interventions, it is crucial to recognize local information and communication pathways. The use of conventional information and communication tools to address the needs of those who cannot access ICT due to limitations related to liter-

acy, isolation, and social norms is often required. Access to technologies, and thus the resulting advantage, is highly dependent on income, education and socio-cultural background. Rural women in particular face limitations in access to communication opportunities and information.

In order to keep agricultural knowledge freely available to farmers, independent of agro-industrial corporations and input supply firms who offer face-to-face or SMS-based advisory services to farmers, educational institutions such as universities and schools play a central role. The goal of free access to information in the agricultural sector, regardless of socio-cultural and economic status, can be achieved through flexible and supportive policies and regulations. Local and regional ICT education and infrastructure programs can make a significant contribution to eliminating these inequalities. The availability of agricultural technologies in the public domain and the democratization of information plays an essential role in this context.

Agriculture in Kenya is no longer just about crop production or livestock farming activities. Young learners must be prepared to deploy ICT in countering the challenges brought forth by ecological factors affecting the environment. Hence, the role universities play in this area is important not only with a strong focus on research on ICT and agriculture and to produce specific sets of data, but also to integrate ICT, digital data management and the role of innovations in agriculture in their curriculum.

6.1.3 Enumeration of results

- An inception workshop and 1st Action Coordination Committee (ACC) meeting were held. The workshop was convened for the participating project team members from both project partners to discuss project contract details, such as communication and reporting, among other activities.
- Three national stakeholders' workshops, one farmers' workshop and a field day at a model farm of a female farmer were held. These workshops created a platform for all participants to address their needs, and targeted extension officers and a mix of farmers, both young and old, and largely food-producing. The workshops adopted the use of participatory approaches to integrating socio-economic, ethical and gender issues to identify innovative adoption pathways.
- An apps evaluation event to create a learning opportunity for students and farmers and allow for valuable insight into the development and use of ICT4Ag smartphone applications was held. The event brought together students from the youth council, computer science students as developers, and farmers as users.
- Scientific writing and publishing training was held. Dr Andreas Zitek (from BOKU University) facilitated the training. The training focused on effective writing of scientific papers and proposal writing. The team that attended the training included SCARA project members, Egerton University staff members, and PhD and master's students.
- A research competition was held where four female applicants and one male student were awarded partial support to facilitate their research work after they were selected from the advertised SCARA Research Competition and reviewed by the SCARA Research Competition Jury. As part of an international student collaboration initiative, one female BOKU master's student (Monika Stradner) jointly conducted her field data collection with a stu-

dent from the research competition. As a direct output, the training platform Moodle was hosted by BOKU for the students.

- Participatory research training was held for faculty members to improve skills in participatory and demand-driven research and ICT, as well as to undertake research leading to increased adoption rate of development interventions.
- ICT4Agric training was held. The training intended to embrace the use of ICT for agriculture in Kenya with a focus on improving agricultural yields in the Njoro area. The training was facilitated by two trainers from Yelder Kenya.
- An innovative platform workshop using the Open Space Technology (OST) method was held, which provided a platform for the youth. The selection of young farmers, ICT experts, high school and university students provided a very good mixture of young people involved in different aspects of the agricultural sector. It led to the formation of the youth council, thereby establishing mechanisms for youth in agriculture to address future challenges of providing water for food and nutrition security. The youth council primarily provided a space for learning and discussion among undergraduate students and high school students about topics such as climate change, communication and agriculture. As a direct output, a secondary schools' event bringing together over 80 school-going students and their agriculture teachers came to the university for learning and knowledge sharing.
- The SCARA symposium on ICT and innovations in agriculture, "Creating the Future Together" was hosted. More than 90 participants discussed and deliberated on the topics of ICT, digital agriculture, socio-cultural issues and agricultural sustainability.
- A policy brief was also prepared and distributed.
- A high-level leaders' delegation meeting was also held. In this meeting, the participants, who were drawn from county government, the ministry of agriculture and ICT, service providers (internet and data), CBO and agricultural institutions, shared the effects of COVID on their ventures, where most remarked that, while it caused them to do much readjusting, it worked in their favour.



SCARA group picture, workshop three, 12.07.2017



SCARA group picture, symposium, 28.09.2019, head of APPEAR programme Mr. Andreas Obrecht, second from left, Dominik Puffeis, fifth from left, project coordinator Benedict Mutua, second row, seventh from left



*Farmers field day,
14.10.2016*



*Farmers field day,
14.10.2016*



*SCARA student awardees,
09.02.2018*



*SCARA participa-
tory research training,
09.02.2018*

6.2. Strengthening Higher Education, Research and Community Outreach in Agroecology in the Rwenzori Region in Western Uganda

Project Coordinator: Bernhard Freyer

Coordinating Institution: University of Natural Resources and Life Sciences, Vienna

Partner Institution: Mountains of the Moon University (MMU), Fort Portal

Partner Country: Uganda

Project Duration: 1 May 2016 – 30 November 2020

6.2.1 The project – AER

Despite the rich natural endowments comprised of rich volcanic soils, reliable rainfall and an overall richness in biodiversity, the Rwenzori Region in Western Uganda faces enormous challenges: over exploitation of its natural resources, high population growth rates and poverty among the majority of rural households, mostly practicing traditional agricultural techniques in small-scaled farming systems to earn their livelihood. Governmental and private sector programmes in the last 20 years have mostly failed to specifically target these challenges as there was a lack of understanding of the needs and demands of the affected stakeholders. A shift towards sustainable food systems requires a comprehensive understanding of complex interrelationships and the social reality of the stakeholders involved, calling for a reorientation of educational content at schools and especially at universities. Therefore, there is a high demand for research and education to elaborate solutions collaboratively with local stakeholders enabling sound agro-ecological and socio-cultural development based on a sustainable and economic use of regional resources to address these challenges.

The APPEAR project Strengthening Higher Education, Research and Community Outreach in Agroecology in the Rwenzori Region in Western Uganda (AER) therefore was designed to build capacities at the Mountains of the Moon University (MMU) – a relatively young, however dynamic and innovative, community-embedded¹ institution located in the city of Fort Portal – in higher education, research and community outreach in the field of agroecology (AE) in the Rwenzori region. In expanding the disciplinary borders and in the inclusion of stakeholders into the processes of both, defining the actual challenges in the field and the continuous learning/teaching and research, the AER project used a transdisciplinary approach intended to generate a systemic understanding of the challenges in the Rwenzori region and to enable pathways to target them.

The initial phase of the project was dedicated to the exchange of knowledge and staff training at MMU to create a common understanding of the main concepts, approaches and theoretical foundations the project is built on. Workshops covered topics such as AE principles (including a socio-cultural dimension), systems theory, transdisciplinarity, but also lessons learnt in AE curriculum development in Austria and Uganda. This phase also

1 MMU is a community-owned and community-governed institution with a representation of all stakeholders at the board of governance making it accountable to the community. It was established in 2005 to contribute scientific findings to the regional challenges and so to serve the rural communities of the Rwenzori region.

included a two week stay of four MMU staff members at BOKU to participate in courses and to explore the Austrian organic sector in excursions.

The core of the AER project was the establishment of a participatory action research framework, the actual development of the curriculum of the MSc in AE and the design and establishment of an AE demonstration farm at MMU's campus in Saaka. For the participatory action research framework MMU selected stakeholders from governmental organisations (national, regional and local administration), non-governmental organisations, community-based organisations and – with the main focus – the smallholder communities (Farmer Family Learning Groups – FFLG) in the Rwenzori region have been included in the project to enable a continuous knowledge exchange process between the university and the stakeholder communities. The framework in the beginning served to conduct a needs and demand assessment (NADA) with the non-academic stakeholders to integrate their perspectives and experiences in the development of the MSc in AE curriculum and later to train lead farmers for model AE farms within the FFLGs (facilitating mutual learning among farmers) and hosting case study learning with students and researchers, as the focal identifier of research needs and as the implementers of research outputs. Feedback-loops with the results of the scientific endeavours are brought back to practitioners in the villages by the researchers, teachers and students, and are transmitted in an understandable manner in order to have a positive impact enabling socio-economic and agro-ecological innovations.

The development of the curriculum of the MSc in AE was based on the results of the NADA, which was implemented with the stakeholder communities. In workshops, future teachers iteratively included these outcomes in drafting the teaching modules and their content. This participatory and stakeholder-driven approach ascertained a regionally embedded MSc at MMU to form alumni who are capable of decisively contributing to the prevalent challenges in the Rwenzori Region. The development of the curriculum encompassed the general structure of the curriculum, the elaboration of the individual teaching modules (including detailed teaching materials) about AE in theory & practice, methods and attached subjects as well as the conceptualisation and integration of a pedagogy for sustainable food systems education. A traditional top-down approach in teaching is replaced by a transdisciplinary mode of learning where the teacher becomes a facilitator guiding the students through a real-life case study in order to learn to recognise, understand and handle complex, systemic challenges. This requires knowledge and practices – which are developed interactively between students, teachers and practiced in a case study- learning approach.

The design and establishment of an agroecological demonstration farm at MMU's campus in Saaka was guided by the main objective of being a model for feasibility of a small-scaled AE system entailing the characteristics of an average smallholder farm based on resources available for farming to sustain optimal yields and meet the social and economic needs of an average household in the Rwenzori region without compromising ecosystem health and facilitating sound socio-cultural development. It is an attraction pool to demonstrate and test permanently AE practices, providing hands-on training for MMU members with practical and innovative agro-ecological solutions proposed to the local farmer communities and also a research area and practical testing site at MMU before vulgarization to vulnerable smallholder farmers may occur.

The APPEAR programme enabled the AER project to select two PhD students from Fort Portal, Mary Ekyaligonza (Organic Matter Management and Cropping Systems for Soil Fertility Improvement in Rwenzori Region, Uganda) and Thaddeo Tibasima (Developing

a Systems Model for Sustainable Soil Erosion Control in the Rwenzori Region, Uganda) to study at BOKU.

6.2.2 Participatory curriculum development of a Master of Science in Agroecology – a case study from Western Uganda

by Phillipp Dietrich and Violet Kisakye

Why participatory curriculum development in the Rwenzori region?

Current global food systems intensely contribute to the loss of biodiversity, land degradation, climate change and environmental pollution. These tendencies go hand-in-hand with under and malnutrition and overweight/obesity at the same time. Similar tendencies can be observed in the Rwenzori region, found in the Western part of Uganda. However, the region has experienced a period of relative stability since the 1980's and has partly benefited from massive national macro-economic growth accompanied with declining poverty rates, the significantly reduced prevalence of HIV/AIDS and the cessation of conflicts. The most notable security concern was the clashes between the Obusinga bwa Rwenzururu royal guards and the government armed forces in fall 2016 and most recently, the flare-up of election-related violence and censorship. Despite the aforementioned achievements, the region is still grappling with persistent income inequality, high population growth (with over 50% of the population under the age of 18) while most of the rural population is dependent on small-scale farming systems and is thus vulnerable to poverty and food insecurity. Unequal access to land and other resources, prevalent poverty among farmers and concentration of power are systemically interwoven with this kind of food system. Due to the high population growth, pressure on land and natural resources has increased, leading to landslides on the steep slopes of the Rwenzori range (caused by repeated soil leaching and erosion), deforestation, a loss of biodiversity, siltation and pollution of water resources, overfishing in lakes and rivers and wetland degradation. Over the years, agricultural productivity has declined steadily. With climate change the situation is bound to deteriorate threatening the livelihoods of the majority of the people in the region.

These pressures result in the pressing need to re-model the food system in a sustainable way and to re-integrate food into its socio-cultural and physical territorial context, which most contemporary development programmes have failed to do, because of their lack of understanding of the real needs and demands of the people in the Rwenzori region. Traditional higher education programmes have also not enabled the formation of alumni groups capable of specifically comprehending these needs and demands in order to target impact at household level, promote grassroots linkages or provide regional or local development perspectives.

From our perspective, it is the result of traditional curriculum development in higher education in Uganda, which is implemented typically in a top-down process or a procedure in which only a few experts are consulted and involved, frequently ignoring the real life challenges and needs and demands of the majority of the mostly rural population who are the major users of the education and research products such as agricultural innovations. These curricula then often entail either a social science, or a natural science approach, remain disciplinary in their mode of teaching and emphasise student's ability to study, remember

and learn factual knowledge and reproduce it, but often ignoring stakeholders outside of academia. The Agroecology in Rwenzori (AER) project between the University of Natural Resources and Life Sciences (BOKU) and Mountains of the Moon University (MMU) was designed as an integrative, iterative and holistic process to approach these actual challenges encountered by the population of the Rwenzori region by inverting the process, commencing a new pedagogical philosophy and approaches in food systems education (*case study learning*) at MMU and initiating curriculum development with an assessment of regional needs and demands for higher education and research: the people of the region were invited to create the curriculum based on their own needs and demands specifically aiming to overcome the distance between academia and real world problems of stakeholders. The contextualisation of teaching, learning and research removes the aforementioned limitations to contribute to the provision of local development perspectives and to target regional challenges. Through the formulation of such a stakeholder-driven curriculum for an MSc in agroecology, MMU will be able to produce competent agroecologists capable of decisively and adequately addressing the needs and demands of the community.

MMU as a community-owned university

From the initial idea to conduct a participatory curriculum development, we took advantage of the fact that MMU is a community-owned and community-governed² institution with representation of all stakeholders on the board of governance, making it accountable to the community. MMU was established (in 2005) to contribute scientific findings to the regional challenges and so to serve the rural communities of the Rwenzori region. This idea is reflected in the main objectives of the university, which are the provision of quality education, action-oriented research and offering community services. This makes MMU a leading agency of the Rwenzori Regional Development Framework³ and the Rwenzori Think Tank⁴, two bodies coordinating a common vision on sustainable development for the Rwenzori region.

The stakeholders and the consultative process

We used the fact that MMU is embedded in the community to establish a network of stakeholders for the consultative process assessing the perceptions and complex realities of the daily life of the involved stakeholders, and so directly address rural development, poverty eradication and gender mainstreaming in a bottom-up process. Two major prerequisites guided the consultative process of systematically gathering the needs and demands of the

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- 2 MMU's success as a university led the Government of Uganda to the decision to set up MMU as a public university in Rwenzori Region. The decision was made during the implementation of the AER project in March 2018. At the moment the transition of MMU from a private to public institution is still underway.
 - 3 The Rwenzori Regional Development Framework was established in a series of consultations and discussions among a different regional actors led by the Kabarole Research and Resource Centre (krcuganda.org), MMU, several NGOs/CSO and the local government.
 - 4 The Rwenzori Think Tank is a consortium composed of the local political and technical leadership in the Rwenzori region, MMU and participating NGOs and the private sector. It offers a platform for individuals and institutions to generate and prioritise ideas that are pivotal to the region's development agenda. Researchers mainly in the Rwenzori region are given an opportunity to publish their research and also share knowledge and experience with an aim of addressing pertinent issues affecting the region. Through this consortium developmental regional research has been disseminated to the scientific community within the region.

stakeholders: 1.) The AER project is not providing *a solution* for the stakeholders (like a set of specific technologies, measures or practices to target a certain problem), but is offering *a partnership for learning* to elaborate contextualised pathways based on ecological principles, indigenous knowledge, action research and innovation to target the actual challenges using agroecology and 2.) The consultative process assessing the needs and demands of the stakeholders was the starting point for a *continuous learning and exchange process* in which scientists, teachers and students became aware of the practical challenges of the stakeholders and then were able to define and influence this reflexive process from its initiation and retain ownership of it. A systemic understanding of the smallholder farming systems facilitates innovative solutions in research and also teaching in higher education towards the current challenges, which then are disseminated in feedback sessions among the stakeholders, who have been empowered by the process. The AER project initiated the process and in the longer run MMU will sustain this framework of exchange and mutual learning.

Objectives and key stakeholders involved in the process of the needs and demand assessment

The overall objective of the needs and demands assessment (NADA) was to gather inputs of various stakeholders in the Rwenzori region for the Master of Science in Agro-ecology curriculum to produce suitable graduates to address the concerns of the Rwenzori region. The specific objectives of the NADA process were: 1.) To sensitise the Rwenzori farming actors on the AER project; 2.) To identify thematic areas that should be included in the MSc in AE curriculum and 3.) To ascertain the preferred mode of delivery of the MSc in AE course for both the benefit of the stakeholders, the students and the teachers.

To capture the opinions of the key players in the food system in the Rwenzori region, three main categories of respondents were targeted: 1.) *Farmers and members of value chain players* (Small-holder farmers predominantly subsistence-oriented; business-oriented farmers; traders of agricultural produce (plant & animal products); cross border vendors and value-addition players (e.g., processors, tourism sector). The farming communities represented the main secondary stakeholders of the AER project as they also represent the vast majority of the people in the Rwenzori region. The development of the MSc in AE curriculum is mainly based on the demand of farmer communities; 2) *Technical agricultural persons working with local government and civil society organisations*. These included: District agricultural officers (D.A.O), District veterinary officers (D.V.O), District commercial officers (D.C.O), District production officers (D.P.O), agricultural extension workers, fisheries officers, environmental officers, agribusiness and market linkages officers and natural resources officers and civil society agricultural officers. The district local government officials act as intermediaries, facilitators and in the best case as the multipliers of the AE strategies of AER by incorporating this into district development plans. This category of stakeholders also included representatives from: The National Agricultural Research Organisation (NARO), Uganda Organic Certification Limited (UGOCERT), Sustainable Agriculture Trainers Network (SATNET), Ministry of water and environment and Ministry of agriculture animal industry and fisheries; 3.) *Representatives from the regional cultural institutions* which include; the Obusinga Bwa Rwenzururu, the Bu Dingiya Bwa Bwamba and the Obukama Bwa Tooro. In a multicultural setting the inclusion of regional cultural institutions representing the values of the main stakeholders and taking the cultural beliefs and indigenous knowledge into custody, is of the utmost importance for the successful implementation of project activities.

Methods

The following methods were used for data collection: 1.) *Survey & focus group discussions*: nine farmers representing each district of the Rwenzori region (there are 9 districts) were interviewed using an in-depth questionnaire. We used the snowball sampling method to determine respondents in the categorical/stratified groups. This ensured that women were deliberately included in the interviews and that no repetitions of responses were made by ensuring that varied respondents within a category are interviewed. Additionally, we worked with a total of ten farmer groups (about 30 farmers per Farmer Family Learning Group) to gather their views in focus group discussions on their challenges and required support; 2.) *Observation*: This majorly focused on the crop fields, livestock and their structures on both the farms of respondents and their neighbours; 3.) *Focus group discussion*: Technical meetings of at least 20 technical experts in agricultural related positions in each district and representatives from the public and private sector as stated above were conducted. The major aim was to validate the issues that had been raised by the farmers and other players. The focus group discussions started with three key issues being brainstormed by each individual, followed by group discussions and a world café analysis of the issues raised by both the farmers during the interviews and those raised in the brainstorming sessions of the technical focus group discussion. A value chain approach was followed to ensure that the constraints along the chain (*from seed to seed/egg to egg*) were thoroughly considered.

The data from the interviews was coded and entered into SPSS for further analysis while data from observation and focus group discussions was arranged into themes and qualitatively analysed.

Results and stakeholder feedback

During the farmer interviews, the research team ensured that respondents were deliberately selected and consequently the majority of respondents were female (69%). Equally in the district technical meetings and meetings with representatives from government bodies and NGOs, female representatives were encouraged to participate (at least 45%) despite most technical agricultural positions being occupied by males. Upon analysis of the results, all stakeholders insisted that the new curriculum should incorporate the following key themes: Livestock management, crop and disease management, post-harvest handling and marketing, value addition, land management issues, soil management, appropriate technology, climate change, agro-entrepreneurship and cross cutting issues e.g., gender, ethics etc. Other key demands from the stakeholders were: Making the course practical, ensuring an intensive experiential learning and research process (e.g., supervised internship at the district agriculture department), making the course either a weekend or distance program to enable working persons to enrol, making sure that each module exposes students to a case study in order to learn. Farmers were interested to such an extent that they volunteered to act as host farmers for action research studies.

The results of the NADA exercise were communicated to stakeholders through a series of workshops conducted in all the districts of the Rwenzori region. The representatives from the public and private sector as well as farmers were invited to feedback workshops in Kabarole, Kasese, Bundibugyo and Kamwenge districts where the results were presented and additional input offered. After finalising the NADA report, the findings were passed on to the module developers at MMU who were tasked with incorporating the results in the curriculum. Most of the needs and demands of the stakeholders were incorporated into the final curriculum

which includes 14 modules all centred around the key themes identified by the stakeholders and elaborated in the NADA report. Stakeholders' demands of making the programme very practical were met by the establishment of the agroecology demonstration farm at MMU and 10 other community demonstration farms that will be essential for action-oriented research between farmers, students and MMU-staff in a participatory manner. A deliberate effort was made to ensure the inclusion of *case study learning* in all the 14 modules as requested by the stakeholders. Due to the coronavirus pandemic, the final feedback on the accredited curriculum was given to the stakeholder via radio, website, video documentary and smaller stakeholder meetings as permitted by the Ugandan COVID-19 guidelines.

Conclusion

The consultative process followed in the development of this curriculum ensured that all stakeholders provided valuable input into this curriculum. This ensured that the gap between academia and the stakeholders is narrowed, and future alumni of the programme will be able to target regional challenges and enable innovations for local communities. This has generally created a sense of ownership of the academic programme by all stakeholders in the region confirming the support of our future students especially when they will be engaged in case study learning and action research, where there is a need for close cooperation with the stakeholders (e.g., research for MSc thesis elaborated with farmers with experiments taking place at their plots), which is a key component of this programme. The outlook to have such motivated stakeholders keeps the transdisciplinary element of the MSc in AE in teaching, learning and research vital and offers – in combination with the new pedagogical philosophy – MMU a unique selling proposition in marketing of the MSc in AE in Uganda and Africa at large. Due to the unique participatory manner in which this programme was developed, the National Council for Higher Education in Uganda commented that it was one of the best developed programmes at MMU and urged future programmes to follow this process. The content and methodologies outlined in this programme are also replicable in other areas of Africa where similar conditions characteristic of the Rwenzori region prevail. Indeed, if Africa is to generate solutions for the prevailing challenges on the continent, through quality education and research, we have to overhaul the old colonial system of a top-down curriculum development process and adopt a participatory bottom up curriculum development process as a way forward.

6.2.3 From teaching towards learning – lessons learnt from AER

by Bernhard Freyer, Mary Ekyaligonza, Phillipp Dietrich

The challenge of “traditional” learning and teaching methods

Most academic programmes in higher education in Uganda and also other African countries have been criticised for providing inadequate teaching and learning approaches, expressed in what are known as top-down teaching and the pedagogic concept follows the old teacher-learner centred system in classrooms.

Characteristics of such approaches are far reaching (Parr, Trexler, Khanna, & Battisti, 2007) and others), (Table 1).

Table 1. Critical elements of learning and teaching

<i>Content</i>	<i>Methodologies</i>
Lack of practical knowledge	Lack of soft skills
Aged learning material	Lack of skills to solve real-life localised problems (in the communities)
Transmitting canons of formal knowledge	Methodological/theoretical deficits specifically in qualitative social science methods
Overhang of theoretical elements	Hierarchical teaching methods/passive students
Exclusion of local knowledge	Discipline driven
Lack of systems theory	Classroom lecture and drills
	Lack of inter- and transdisciplinarity
	Partly an overabundance of PowerPoint presentations
	Minimal exposure of students to the field

Source: AER project design

The students' role is mostly defined as a passive recipient of knowledge and consequently they do not feel invited to exchange experiences and knowledge with their fellow students, and students' views are not often solicited by teachers. Other weaknesses of the educational system include limited access to books and journals in libraries, outdated books, libraries with a limited offering of work spaces, and slow or limited access to the internet and international journals. These factors combined lead to low learning outcomes.

This type of learning is complemented by research with low level of interaction and participation with society, specifically in the region where universities are situated. This leads to a certain self-understanding of students, as actors, with a weak relationship to society, separated from real world problems or with Niklas Luhmann "Fish may die or people may die, bathing in lakes or rivers may produce disease, oil may stop coming out of pumps, and average temperatures may fall or rise: as long as there is no communication about this, it has no social impact" (Luhmann, 1986, 64). Limited communication with society also weakens the value and relevance of universities for up-to-date global challenges, and the awareness of scientific contributions by society, policy and the business world.

Resetting the learning and teaching system

In order to bring about a change to the learning and teaching format, a manual was developed entitled "Pedagogical Philosophy and Approaches in Agrofood Systems Education" (Klimek et al. 2020). This document offers pedagogical teaching methods and approaches in order to revise and enrich sustainable agricultural curricula in higher education, particularly with a systemic perspective.

This manual is merely one step in a larger curriculum development process, one that specifically looks towards a common philosophy and the methods and approaches that might best accompany a program that may be designed (Klimek et al., 2020). The methods and approaches introduced in this document are suggestions and can be used to instigate a discussion towards student-centred pedagogy combining theory and practice.

The most relevant elements for revising the current learning and teaching practice are: Systems thinking; key pedagogical (or learning) approaches and methods. Below we provide a brief overview on these elements, as we applied them in the process of the curricula development at the Mountains of the Moon University (MMU).

The importance of systems thinking

Many problems that we encounter in the real world are very complex and ignoring this complexity (i.e., by focusing our analyses and management strategies on single elements of a system) can have dramatic consequences. Teaching is often disciplinary-oriented, often narrowed down to one target variable (e.g., yield, productivity, etc.), which is to be optimised. Thus, the focus is on the individual elements of the system (reductionist perspective) and not on the relationships between the elements.

Systems thinking can be very helpful for engaging all kinds of problems from simple to complex, but it is an absolute necessity if complex problems are to be understood and pathways to solve them elaborated. Systems thinking is a systematic (i.e., a structured step by step) approach to create a systemic (i.e., holistic) understanding of a complex situation. The output of system development is an evaluated model of the system of interest. System development is often combined with other practical-orientated research and learning methods, such as case study learning and research. Systems theory distinguishes between an ontological more engineering-orientated approach (i.e., hard systems claim to model reality with the aim to improve it), while soft systems (SST) approaches take an epistemological standpoint (i.e., here the system models do not claim to model reality but are seen as a learning device to create a common understanding among involved stakeholders) (Slattery & Carlson, 2005, p. 159). Critical systems thinking (CST) as a third perspective, reflects the power relation in a system (Bawden, 2012). While SST emphasises the ethical foundations of the actors as part of their worldview and value patterns, the analytical approach of the CST explicitly emphasises the associated power constellations. These diverse entry points of systems thinking provide many applications in case study and similar learning frameworks.

Key pedagogical (or learning) approaches

Complex real-world situations must be addressed in the applied pedagogical approaches, otherwise students will not be prepared for the present complexity and lack the skill of critical thinking. Systemic learning approaches are characterised through their own specific focus and some similarities (Table 2).⁵ It is up to the teachers and program developers to find the right mix of approaches for their specific program, needs of their students and stakeholders and logistic and administrative boundaries.

5 These pedagogical approaches share also some similarities with the approaches from the Transdisciplinarity lab from ETH Zürich, see: <https://www.usys.ethz.ch/en/research/TdLab.html> and from Lüneburg University, see: <https://www.leuphana.de/en/professorships/transdisciplinary-sustainability-research.html>.

Table 2. Systemic learning – a comparison of different approaches

<i>Approach</i>	<i>Brief description</i>	<i>Main approach</i>
Service learning/ Community En- gaged teaching	A form of experiential learning that combines actively involving students in learning goals and community service in ways that can enhance both student growth and the common good.	It is often incorporated into a course or series of courses by way of a project that has both learning and community action goals. The project is designed collaboratively between the faculty and community partners, such as non-governmental organisations or government agencies. The project asks students to apply course content to community-based activities, giving students experiential opportunities to learn in real world contexts and develop skills of community engagement, while affording community partners' opportunities to address significant needs.
Case-study learning (CSL)	CSL enables mutual learning opportunities for students, stakeholders and the facilitators themselves in defining/reflecting and working on transition pathways of real-world challenges of a case embedded in a complex context applying different methods.	CSL might be used as the general design of a course (within a program) or as a part within a thematic module dealing with sustainability/transition learning depending on the topic. The transdisciplinary features CSL entails strengthen individual and collective capacities to deal with the multifaceted perspectives reflected in the case and its environment. The learning process aims to detect and elaborate transformative potentials of the case.
Action learning	Learning approach oriented to solve real-world problems. It involves choosing a problem, analysing it, taking action to solve it and reflecting upon the results. During this reflection process experience and theory are transformed into knowledge. There are no teachers but "coaches".	Action learning theory is often used as a method to support organisational and business development initiatives to improve problem-solving efforts. As a teaching approach supports "learning by doing" and "unlearning as a prerequisite for learning". The focus is on everyday situations (real-world problems) and aims to foster learning by asking questions, identifying possible solutions, taking action and reflect, both individually and in the group, in the outcomes of the action.

<i>Approach</i>	<i>Brief description</i>	<i>Main approach</i>
Experiential and reflective learning	Hands-on learning, where experience is the source of learning. Through particular experiences the students question previous meanings and frame new knowledge. Emphasis is paid on the learning as a process rather than at the outcomes. It is very centred in the individual learning process, the context, the emotions and the feelings. There are no teachers but facilitators	Experiential learning can be used as a theory to understand the learning process or as an approach for the design of a course or a module, etc. As a teaching approach in higher education, it has been widely used through student-farms, where students are provided with hands-on options to get involved in agricultural activities in the broader sense.
Phenomenon-based education	Holistic real-world phenomena provide the starting point for learning. Phenomena are studied in their real context, and the information and skills related to them are studied by crossing the boundaries between subjects. Phenomena are holistic topics like human, European Union, media and technology, water or energy. The starting point differs from the traditional school culture divided into subjects, where the things studied are often split into relatively small, separate parts (decontextualisation).	Real life phenomena are established as the starting point for the learning process; The goal is to immerse students in practical phenomena at the farming and food system levels, and let these phenomena determine what theory is necessary and relevant; focuses on thematical and topical learning. The phenomena-based approach supports learning through inquiry, and uses project and portfolio creation. It is problem-based and focuses on practical implementation.

Source: Klimek et al., 2020

Methods

Each of the above introduced systemic learning approaches might use specific methods, but some might be open to new or additional methods. There are many methods that can support educational approaches. Social science related methods take on a key role in order to enter into a critical discourse with society on all kind of challenges. These include all kinds of qualitative interview types, focus groups, group discussions, workshops, reflective photo booth, participatory observation and visual research methods (photographs and videos). All of these methods and others provide a rich spectrum for interacting with stakeholders. They are to be kept in mind when resetting the learning approach during the process of curriculum development.

Practical implementation of a new learning approach in curricula development

Using Mountains of the Moon University (MMU) as a case of reframing learning and teaching methods, a general structure (template) for lectures was developed in order to secure a broad implementation of modernised learning and teaching within a university context. The developed curriculum at MMU had 14 modules categorised into five transdisciplinary themes (Table 3):

- Knowledge and understanding of AE, which acquaints the students with the sciences of AE
- Tools, which enable the students to appropriately apply AE
- The contextual issues and institutional frameworks, which enable students to understand the underlying issues that influence the will to adopt AE
- Business aspects, which acquaint the students with the knowledge and skills required to establish effective enterprises in the AE set-up
- The real-life AE project that links the students with real-life problems facing the communities.

For each module, the structure for lectures is an outcome of critical discussions between MMU and BOKU teachers. The idea was to integrate and to combine theories, the content of a topic, a practical case study and the communication of the case study results to society and the research community. From the abovementioned methods that have been introduced, the case study approach offers a broad range of options to cope with a real-world issue.

Table 3: Categorisation of the courses under the five transdisciplinary themes

<i>Code</i>	<i>Course title</i>	<i>Credits</i>
<i>Knowledge and understanding agroecology</i>		
MAE6101	Foundations of Agroecology	3
MAE6102	Agroecology: Science and Practices	4
MAE6103	Research methods	4
MAE6107	Natural resources management in agroecology	4
<i>Tool and their application in agroecology</i>		
MAE7201	Adapted technologies for agroecology	4
MAE6106	GIS and remote sensing	4
MAE7207	Participatory extension and innovation for agroecology	4
MAE6104	Agricultural engineering and renewable energy	3
<i>Context and institutional framework of agroecology</i>		
MAE6105	Institutional frameworks for agroecology	3
MAE7202	Climate change risk management	3
MAE7204	Gender mainstreaming in Agroecology	3
MAE7203	Agroecological food systems and nutrition	3
MAE7208	Integrated water resources management	4

Code	Course title	Credits
<i>Business aspects in agroecology</i>		
MAE7205	Entrepreneurship and Marketing in Agroecology	4
<i>Real-life AE project</i>		
MAE 2101	MSc. Research proposal	30
MAE 2201	MSc. Dissertation report	30

Outlook

Master's students, stakeholders as well as teachers of this Master's curriculum will make their experiences with the revised learning approach. A continuous evaluation process will lead to adjustments and fine tuning of the learning methods, which is in line with systems thinking.

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6.2.4 Enumeration of results

- Trained and equipped MMU staff in Agroecology (incl. water resources), transdisciplinarity, systems theory, curriculum development, teaching unit design (including didactical approach and case study learning).
- Established participatory network between MMU and various external stakeholders: Conducted needs and demand assessment as a basis for the curriculum development, conducted feedback workshops and for action research resp. case study learning for the teachers and students of the MSc in AE at MMU.
- Developed, approved (internally at MMU and at the National Council for Higher Education) and implemented stakeholder-driven, regionally embedded and transdisciplinary MSc in AE at MMU, including the development of and approval by MMU's Senate of 14 teaching modules.

- Designed and established (and set the responsibilities for the maintenance at MMU) Agroecology demonstration farm at MMU (Saaka Outreach Centre), where AE principles are implemented and training and practical experience with students, staff and external stakeholders are implemented.
- Ten partnership agreements established between the communities and MMU in participatory action research and case study learning. Within each of these Farmer Family Learning Groups (FFLGs), the project supported one lead farmer (with training and inputs) to demonstrate agroecological practices to be used for action research with MMU staff, students and the FFLG. All ten lead farmers have been trained in agroecological principles at the AE demonstration farm at MMU.
- Developed and ready to use deliverables/outcomes such as the *Manual Pedagogical Philosophy and Approaches in Agrofood Systems Education* (established by BOKU in cooperation with colleagues in other APPEAR projects); a *Gender mainstreaming manual* at MMU; a *Conceptual framework* to create an understanding among all team members, a *Manual for stakeholder participation*; a compiled *Collection of action research tools*, a *Training manual in Agroecology* and a *Business plan* for the agroecology demonstration farm at MMU and the FFLG lead farmers, a *Catalogue of measures for upgrading traditional farms to agroecological farms* a *Restoration plan for river Mpanga catchment*, and a *Report on smallholder farmers' implementation of agroecological practices* and other publications.
- Disseminated (preliminary) results in consultative live radio shows, feedback workshops to stakeholders, established a show reel for MSc in AE at MMU and created homepages for both the AER project and the MSc in AE at MMU.



AER team members and farmers



AER team members during the excursion to Austrian organic farms



AER team members taking samples of Mpanga river



Artemisia annua grown and used against malaria in Fort Portal



Students exploring agroecological practices in the field



Farms and plots scattered on the slopes of the Rwenzori range

6.3 Capacity Building on the Water-Energy-Food Security Nexus through Research and Training in Kenya and Uganda

Project Coordinator: Jakob Lederer

Coordinating institution: Vienna University of Technology

Partner institutions: Makerere University, Technical University of Kenya, University of Natural Resources and Life Sciences, Vienna

Partner Countries: Uganda, Kenya

Project duration: 15 December 2016 – 31 August 2020

6.3.1 The project – CapNex

Background

Population and economic growth in many parts of Sub-Saharan Africa (SSA) has led to increasing demand for water, energy, and food (WEF). This is also true in the East-African countries of Kenya and Uganda. According to the development strategies of the governments of both countries, this demand should be met by an increase in domestic production rather than imports. An increase in domestic production will also increase the need for domestic resources like rivers and lakes for water provision, biomass for energy supply, and soils, water, and nutrients for food production. As a consequence, pressure on these resources is forecast to increase. Furthermore, the multiple use of resources to provide WEF results in multiple pressures, with severe consequences for domestic resources in terms of both quality and quantity. The domestic supply of sufficient food of high quality for a growing population is a good example to describe these multiple pressures on resources and consequences for their quantity and quality. Higher food production can only be achieved if either crop yields are increased, or the crop and pastureland is expanded, both of which having adverse effects on water and energy supply:

- Increasing yields can be achieved by higher inputs of nutrients and irrigation water. With respect to nutrients, the most important underused domestic sources available in Kenya and Uganda are livestock manure and human excrement. However, livestock manure also became a source of energy through its use in biogas plants. If the nutrient-rich slurry from the plants is not used for fertilizing, there is competition for this resource between food production and energy supply. For human excrement, this competition is not that severe as it is hardly used at all, and one reason for that is that using this may affect the water quality for drinking water supply. With respect to irrigation water, a quantitative competition with drinking water supply may appear if too much irrigation water is extracted.
- An expansion of crop and pastureland means that less land can remain temporarily untouched as fallow. This, however, is one important soil and water conservation technique that helps to reduce soil erosion. As a consequence, higher erosion rates of nutrient-rich topsoil can be expected, which not only reduces the productivity of crop production systems in the long run, but also impairs the water quality in rivers and lakes through sediments ending up in these freshwater bodies. This again affects the supply of both, drinking water as well as freshwater fish products.

There are a number of other examples of the multiple pressures on resources through the domestic provision of WEF in Kenya and Uganda. In order to overcome these, an integrated approach that considers the interlinkages between the WEF sectors is required. Such an approach was developed around the year 2010 by research groups, international organisations, and national development agencies by the WEF nexus. Defined by the Food and Agriculture Organisation (FAO) as “concept to describe and address the complex and inter-related nature of our global resource systems, on which we depend to achieve different social economic and environmental goals”¹, the research and policy practice of the WEF nexus leaves a lot of space for further clarification and thus improvement, some of which should be mentioned. Firstly, even though SSA is mentioned as one of the WEF-nexus hotspot regions, comparatively little studies are available². Secondly, the local scale and the stakeholders there are very often not appropriately addressed when it comes to capacity building by research and training³. Thirdly, relevant WEF nexus aspects may differ between various regions and situations, resulting in different sectoral focuses (e.g., water-energy, water-food, energy-food) and there is a call for a situation-specific investigation of relevant WEF nexus aspects rather than holistic modelling of all WEF-nexus aspects.⁴ To overcome these challenges, the CapNex project aimed to address relevant aspects of the WEF nexus in SSA at local scale, using the border region of Kenya and Uganda as a case study area.

Project objectives and activities

- Establishing the foundations for capacity building on the WEF nexus in Kenya and Uganda by reviewing literature and research projects in the case study area, thereby establishing a data and knowledge base for integrated WEF nexus investigation and capacity building.
- Capacity building on the WEF nexus at university level by involving students in the case study research projects and developing course materials on the WEF nexus for lectures.
- Capacity building on the WEF nexus at the non-university level by involving non-university stakeholders (water users and providers, farmers and farmer groups, national and local authorities and NGOs, agricultural extension services) in the collection, processing and interpretation of data by interviews, focus-group discussions, and stakeholder workshops.

Project outline

The project was carried out by researchers of different scientific disciplines (agriculture, environmental science, hydrology, limnology) from four universities (BOKU, Makerere University, TU Kenya, TU Wien). The core of the project was case study research projects carried out in the border region of Kenya and Uganda between Lake Victoria and Mount

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- 1 FAO (2014): The Water-Energy-Food Nexus A new approach in support of food security and sustainable agriculture. United Nations Food and Agriculture Organization (FAO), Rome.
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Elgon. This area, which is dominated by the transboundary Sio-Malaba-Malakisi river basin (SMMRB), was seen to be suitable as first it is shared by both countries, second it is the rural area with the highest population density and thus presumed pressure on resources in both countries, and third the researchers had sufficient research experience in the area to construct the locally relevant aspects of the WEF nexus. Based on that, four case studies were defined, focusing on A) Water Quantity and Supply, B) Erosion and Water Quality, C) Soil and Water Conservation, and D) Manure Management and Recycling. The results of these case studies were subsequently to be integrated for a common framework for WEF nexus research and training, using the case study area as an example. After preparing the literature review, 2 Bachelor's, 6 Master's, and 5 PhD students worked in the different case studies. The results of their work were integrated by the researchers and another PhD student into a common WEF nexus framework. Based on the results, course materials were developed, and stakeholder workshops were conducted at the end of the project.

6.3.2 A personal reflection

by Jakob Lederer

Prologue

In June 2015, Mathew Herrnegger and I were sitting on the bank of the Nile in Jinja, Uganda, just north of its outlet from Lake Victoria. From here, this mighty river makes its way northwards for about 5,500 km, flowing first through the spread-eagled-fingers-like Lake Kyoga, then passing a series of recently-built hydropower plants, and forcing its 300 cubic-metres per second through the seven metre narrow gorge of Murchison falls, after which it widens and heads westwards towards Lake Albert. With a glimpse of the Democratic Republic of the Congo, the river turns northwards, forced in this direction by the Blue Mountains range that marks the eastern boundary of the Congo river basin. From here, it continues its journey, leaving Uganda and entering nowadays South-Sudan, flowing through the up to the 19th century impassable swamps of the *Sudd*, the largest wetland in Sub-Saharan Africa. The name *Sudd* is of Arabic origin and means the barrier. To bypass this for centuries impassable barrier, the government of the Sudan aimed to dig the Jonglei-channel in the 1980's. The excavator is still there, the channel is not, and the river makes its way to the north on its original course, as it did for thousands of years. In Egypt, man was more successful in subduing the river using the *Assuan* dam. Subduing means regulating the flows of the water, in order to produce the electricity and food required for the, according to Herodotus, "*Gift of the Nile*" Egypt. Most of this food is produced in the *Nile Delta*, a vast area of irrigation between Cairo, the most populous city in Africa, and the final destination of the river of rivers: the Mediterranean Sea.

Our reason for being there could have been told in an epic a manner as the journey of the river, as this journey speaks volumes about our intentions: to discuss and investigate how water, energy, and food security can be achieved in the upper part of the Nile River Basin. However, in fact, what we did was less epic and of more of a profound nature. Having decided with our colleagues, Jeninah Karungi from Makerere University and Luke Olang from TU Kenya, that we want to submit a proposal on water-, energy-, and food-security, known as the WEF-nexus, in Kenya and Uganda to the APPEAR programme, the question

was who was going to take the lead as the principal investigator. Neither Jeninah, nor Luke, were keen to do that, so it was between Mathew and I to decide. We were discussing for hours, and even though we had a few beers, we did not come to a conclusion. Thus, we let the gods decide, through the popular kids' game *rock-paper-scissors*. Obviously, I lost, and for this reason, I am able to write a very personal and subjective story of the CapNex-project.

The history of our partnerships

The CapNex project has its roots in the professional and personal relations between the project partners. Mathew and Luke were both PhD students at the Institute of Hydrology at the University of Natural Resources and Life Sciences Vienna (BOKU). Prior to the CapNex project, both carried out the KEF (Commission for Development Research) funded project *MaMa-Hydro* (2011-2013) on water management in the Mara river basin in Kenya. Jeninah and I were collaborating in the KEF-funded project *UGoS* (2010-2013)⁵, in which I focused on organic municipal solid waste management, including composting and the material flows of nutrients impacted by this, and Jeninah carried out a participatory evaluation of the use of compost produced by farmers from this. Both teams, Mathew and Luke, and Jeninah and I, had good experience in our partnership and thus were keen to continue the scientific collaboration. The relationship between Mathew and I prior to CapNex was a bit different. We have been friends for a long time, meeting once or twice a week for a drink, ending up in endless discussions on various topics concerning our research. In these discussions, we also discussed methodological issues on nutrient transport processes in agricultural systems in Sub-Saharan Africa, i.e., the unsolved question on where eroded soils and the nutrients contained therein are stored or end up. The logical consequence of the desire to carry out more projects together as well as our scientific interests, was to formulate a research proposal and submit it to the APPEAR programme. However, due to our different scientific background in hydrology (Mathew and Luke), crop science (Jeninah), and waste and resource management (me), the question was on which topic could our research intentions be channelled into a meaningful project? Here, the APPEAR programme helped us out by defining in its calls that “proposals considering a nexus approach of water-, energy-, and food security, the so-called WEF-nexus”, were welcome.

The WEF-nexus, or how can such different disciplines develop a project

Even though poorly defined in literature, the WEF-nexus can be described as an approach to natural resource management that aims to balance between the resource demand to provide water, energy, and food. The resource in demand can be, for instance, water that can be used for irrigation, energy production, and drinking. Obviously, an approach like the WEF-nexus requires the competences of different scientific disciplines. Thus, it was inevitable that this would be used as a trigger for our project idea. Before contacting the partners, however, I wanted to get familiar with the WEF-nexus as discussed in literature, in order to present a well-framed concept, in which each partner can embed her and his research interests. For this reason, I performed together with Mathew a literature review, with, in my eyes, quite disappointing results. Even though the number of scientific publications that claimed to use

5 KEF stands for the Commission for Development Studies, a back-then existing organization at the OeAD funding small research projects.

the WEF-nexus as their research object, has increased exponentially since the emergence of the concept (around 2010), we found that about 80% of the scientific articles neither had a clear method, nor a theory for their investigations. Much better were the other 20% of articles. However, in these articles, we found a strong trend towards integrated modelling of the WEF-nexus. The underlying assumption of these models was that WEF-nexus challenges can be investigated by applying the same methods in different situations, whether these are different world regions, or different geographical scales. Imagining how different situations might look like, I was quite reluctant to take-up such holistic approaches, and in my opinion, WEF-nexus challenges have to be investigated on a site- and situation-specific basis using methods which were to be defined only after defining the WEF-nexus challenges in a region. My reluctance towards integrated modelling of the WEF-nexus along pre-defined parameters, together with the basic principle of the APPEAR programme of a demand-driven approach, yielded a procedure in setting-up our project idea and the underlying partnership.

First, Mathew and I sketched on eleven A8-size pages a general framework on what the WEF-nexus in countries such as Kenya and Uganda might consist of, including some examples. Then, I formulated an email to Jeninah, Luke, and Mathew, in which I proposed to use the WEF-nexus as a trigger and framework in which each partner can freely formulate her and his research ideas. The only restriction was that the ideas and the associated research should be applicable in both Kenya and Uganda. A topic relevant to only one of these countries would thus not meet this criterion. The formulated ideas can then be embedded in a framework. What I received were research ideas on topics of hydrological (Mathew) and erosion (Luke) modelling, the socio-economics of soil and water conservation as well animal manure management to increase food production (Jeninah). For the preparation of the proposal on erosion modelling, Luke spent three months in 2015 at the Institute of Hydrology, funded by an Ernst-Mach-scholarship. Jeninah formulated her ideas together with two senior researchers who have recently completed their PhD at Makerere University and the Swedish University of Agricultural Sciences (SLU), namely Alice Turinawe, an economist who did extensive work on the uptake of soil and water conservation practices in Western Uganda, and Allan Komakech, an environmental engineer who investigated organic solid waste management practices and technologies in Kampala. These four ideas were then termed as case studies. In order to fulfil the relevance-to-both-countries criterion, it was inevitable that the border region of Kenya and Uganda would be selected as a case study area. Both Jeninah and Luke had already worked in this area, which is dominated by the transnational Sio-Malaba-Malakisi-River-Basin (SMMRB) system. It was then my duty to link the case studies with each other and formulate a conceptual framework so that they were not being dealt with in isolation, but in context to both, each other, as well as the WEF-nexus.

The result was a proposal that was submitted first as an application for preparatory funding to the 5th call for proposals under the APPEAR programme in 2015. This proposal for preparatory funding was not accepted, probably as the name of the proposal contained the term “modelling”, which raised the concern by the decision committee that this work might be too scientific and theoretical to comply with the APPEAR claim of applied research. Nevertheless, Mathew and I travelled to Uganda in June 2015 to discuss the proposal with Jeninah, and then to Nairobi to present ourselves at TU Kenya, even without preparatory funding available. On the way from Kampala to Nairobi, we stopped at the Nile in Jinja to decide on the project lead – the scene described in the epilogue.

Based on the discussions between Jeninah, Luke, Mathew, and myself in 2016, we developed the project idea into a full academic partnership project proposal that replaced “modelling” with “capacity building” and “training” in the title. The proposal itself was structured along two axes, a vertical one that represented the process of knowledge generation on the WEF-nexus and the topics embedded therein, and a horizontal one that represented the process of capacity building and training among university and non-university stakeholders. The vertical axis was divided into three parts. The first part was a literature review that aimed to unveil the existing knowledge and knowledge gaps on the WEF-nexus in Sub-Saharan Africa, Uganda, and Kenya in general, and the case study area of the SMMRB in particular. In the second part, the four case studies on hydrology (Case study A – lead by Mathew), erosion (Case study B – lead by Luke), soil and water conservation (Case study C – lead by Alice), and manure management (Case study D – lead by Allan), were investigated. In the third and final part, the knowledge generated in the case studies was synthesised, merged, and publicly disseminated and discussed (by Jeninah, myself and all project partners). The horizontal axis was divided into two parts. The first part dealt with capacity building at university level, which was achieved on the one hand by training a total of 14 students in the project, and on the other hand by producing course materials and giving courses for about 100 students of all academic levels, as well as practitioners from authorities, NGOs, and the private sector. The second part focused on capacity building among non-university stakeholders, which was achieved by workshops carried out at the end of the project.

This second attempt, which was submitted in response to the 6th call for proposals by APPEAR, was suggested for funding by the selection committee, so that at the end of 2016, the project was able to start.

Contracts and people: The foundations for a good project

In the first half year of the project, the project management foundations were built-up. That meant firstly formulating the grant contract between TU Wien as coordinating institution and APPEAR. While the contract itself was a standard document, the appendices usually differ from project to project. In our case, one appendix had to include a strategy on stakeholder participation and consideration of gender issues, as both topics were seen to be underdeveloped in our proposal. In addition, partnership agreements had to be drafted and signed between TU Wien and the other project partners.

After the kick-off meeting, which was organised by Jeninah and colleagues at Makerere in the end of January 2017, each partner had to find the students to be trained and to carry out the research. At Makerere, four Master’s and one Bachelor’s student were to be recruited, which took some time as Jeninah and her colleagues wanted to ensure the gender balance desired by APPEAR. As a result, Hyacinthe Nyirahabimana and Ronnie Ahumuza who were supervised by Alice in their work on soil and water conservation adoption in Case study C, and Joseph Jjagwe and Keneth Chelimo who were supervised by Allan in their work on manure management in Case study D, joined the team. In addition, Agnes Nalunga, a Bachelor’s student supplemented the team with her work on valorising products from manure management. At TU Kenya, two PhD students working on the project in Nairobi, and two PhD scholarship holders located at BOKU, were to be found. Stanley Chasia and Nathan Muli were recruited as PhD students located in Nairobi working on erosion in Case study B, while Hope Mwanake (erosion, Case study B) and Paul Omonge (hydrology, Case study A) successfully applied for an APPEAR scholarship for their PhDs at BOKU with Mathew. The

latter two were also not completely unknown, as Hope was doing her Master's in 2013 at TU Wien, and Paul did his Master's in the KEF-project *MaMa-Hydro*. At TU Wien and BOKU, the recruitment process was smoother, not only due to the lower number of students, but also as most of these were already working at BOKU and TU Wien. Arabel Amann from TU Wien joined the project as she already worked as PhD student on nutrient management in Austria. Also, Christoph Schürtz was already PhD student at BOKU who, in addition to his modelling skills, had already gained experience in erosion measurement in Ethiopia. For both of them, it was very important to Mathew and I that firstly, their PhD-work in Austria was related to their project work in CapNex, and secondly, that they got along with each other as well as Mathew and I do. Both criteria were fulfilled perfectly. Doris Wimmer, a Master's student from BOKU, had already completed her Bachelor's thesis in *MaMa-Hydro*, while Gabriel Stecher, Bachelor's student at BOKU, joined the project in the first months of 2017, mainly to support Doris in data collection. However, his tasks in the project became ever greater and are still required today. In June 2017, the project team was almost complete, and the research work started. Later, in 2018, Lea Schneider joined the team, doing her Master's on the recycling of nutrients from human excrement in Kenya, supported in the project by Arabel in particular.

Some research highlights of the project

The first part of the establishment of the knowledge for WEF-nexus capacity building, namely the literature review, was an ongoing process, but in June 2017, we had already collected a lot of literature and secondary data, not only for first analysis, but also to identify data gaps. One of these was definitely in the land-use data, which is quite typical for small-structured agricultural systems such as that in the SMMRB. Mathew therefore had the idea of celebrating the kick-off into the second part of knowledge generation, i.e., the case studies, by carrying out a joint survey in the case study area with the participation of Bachelor's, Master's, and PhD students from BOKU, Makerere University, and TU Kenya. The aim was to record the land-cover (e.g., plantations of different crops, forests, wetlands) and land-management practices (i.e., soil and water conservation measures) at randomly selected points in the case study area. The result was a land-cover map of the SMMRB based on 6,000 points, produced by Doris, Gabriel, and Stanley. However, each member of the survey team had her or his special tasks. Doris dealt with the concept developed together with Mathew and was supported by Gabriel. Stanley, in addition to his geographical skills, also contributed by his inquisitiveness of a fully-fledged social scientist, interviewing every person that came his way to acquire more additional information.

The results of this joint survey, which was a dignified start to the research work in the project, as well as the future plans for research and capacity building, were presented and discussed in the second project meeting, organised by Lewis Sitoki and Jacinta Kimuyu from TU Kenya in Naivasha in February 2018. The first large activity to be carried out in the aftermath of this meeting, was to collect primary data from farmers. Therefore, two questionnaire surveys were carried out in the case study area. For this questionnaire, Alice designed a detailed questionnaire covering a large number of relevant physical (land size, crops grown, livestock, ...) and socio-economic (income, gender, education) farm characteristics. For her model, Hope required only physical characteristics, which were also planned to be collected using a survey. As both surveys were interviewing farmers in the SMMRB, I initially suggested that both, Alice and Hope should cooperate by using the same questionnaire and

share the workload for data collection, but this was then rejected for a very practical reason. In addition to only requiring the physical characteristics, Hope also envisaged a lower sample number of 200 for her model. Thus, she had less budget available for the survey than Alice who not only retrieved more parameters, but also required a larger sample number of 500 for the models her students were using. To me, this was a lesson that cooperation can have different intensities, and not every synergy effect by cooperating that seems to be logical in the beginning, turns out to be unfeasible in reality. In the end, the cooperation between the partners in the survey was meaningful, miscellaneous, and multifaceted: Alice kindly provided Hope with her questionnaire, and Hope was able to tailor these questions to be relevant for her purposes. Hope supplied Alice with contacts to authorities on the Kenyan side. Stanley, who aimed to carry out a survey on the history of land-use and land-management, joined Hope meaning that they sampled and interviewed the farmers together. Mathew and his colleagues provided the visualisation of the results of both surveys. The surveys themselves were both spiked with sometimes unbearable challenges for the students and their data collectors. Heavy thunderstorms, unmentionably bad road conditions, the burden of disease, and even inaccessible areas due to armed conflicts in some areas, were not able to stop Hyacinthe and Ronnie, Hope and Stanley in their endeavours. They paid their dues and were rewarded with their Master's and PhD-degrees, which they will really deserve.

I wrote a lot about cooperation in the last two paragraphs, and indeed, this was a crucial point throughout the project. Most of the time, it went well, and if it did not, the partners managed to make it work. However, in one situation, this was not the case, namely in the collection of water quality data in the rivers of the case study area. Both Hope and Nathan needed these to run their models. However, even after a large number of discussions and phone calls, it was not possible to produce and use the same dataset. In the approach Hope used, which was developed together with Mathew and Christoph, it was key to collect the samples within one year so that the water quality data can be linked to hydrological data. This was done in an intensive sampling survey carried out in 2019 by Hope and her supporting staff, creating one of the close-meshed water quality sampling networks in a river system in Kenya and Uganda, at comparatively low costs, but with high levels of high personal effort and devotion. Contrary to that, Nathan collected his samples in a lower and irregular frequency, but over a longer time period. Both datasets are still subject of analysis. Only if this analysis is completed, can the potential added value of having both sets be determined.

Hope, Nathan, and Stanley are all working in some way on erosion and thus water quality, leaving the huge topic of hydrology to Paul. His main tasks in the first years of the project were to test different satellite precipitation prediction products for their use in substituting a lack of ground data, i.e., from hydrological stations. This is very important for a large number of stakeholders, from authorities, water works operators, to the different water users. Thus, Paul's fieldwork differed a bit from that of the aforementioned PhD students, as his focus was more on the stakeholders involved in quantitative water management. For a project that was from the very beginning suspected to not sufficiently consider the demand of local stakeholders, Paul's work and the way how he has carried it out up to present, was very important. Nowadays, there is hardly anybody who has such an overview of the stakeholders and their concerns on water management in the SMMRB, and some say that Paul needed an extra hard drive to store all the phone numbers he collected during his visits.

While the joint survey, the questionnaire survey, the water quality sampling and the water quantity stakeholder analysis, are all linked to each other, the work of Allan and his

students on manure management looks, at first glance, as more or less a stand-alone project. However, now, at the end of the project, I have more and more come to realise how closely this work is interrelated to the other case studies, through some more and some less obvious links. During the work, Allan and his students required little cooperation with BOKU and TU Kenya, but more with Makerere and TU Wien. Keneth carried out a questionnaire survey on manure management in the SMMRB. Like Hope, he was able to benefit from the Alice's questionnaire design. Then, both Keneth and Joseph carried out experiments on manure management and using the produced products from this for fertilising tests. While Keneth focused on biogas and manure storage, Joseph worked on vermicomposting. In addition, Agnes, a Bachelor's student supervised by Allan, Joseph, and colleagues, carried out experiments using the worms produced in vermicomposting as poultry feed. When in a meeting in February 2018, Allan declared that each Master's student of his should publish at least two scientific articles, I had to smile benignly, as in Austria, this is usually the criteria for PhD students. Now, after two articles published by Joseph and one under review by Agnes, I still smile, but not benignly, and for different reasons. Co-supervising Joseph and reading his texts was more than a pleasure. I only must be careful that his work does not set the standard for Master's students in Austria, as this is hardly achievable.

Having had all these research activities, the question is how to synthesise and merge them? This is a challenging task, and Arabel, Christoph, and Mathew were the unlucky ones who had to carry this out. Christoph, who recently completed his PhD, carried out an in-depth analysis of the processes of erosion and its uncertainties, not only in the case study area, but in the whole of Kenya and Uganda. Mathew is about to link land management to sediment loads in rivers, caused by erosion and affecting water supply. In doing so, he will use soil and water conservation techniques derived from the work of Alice, the erosion rates modelled by Christoph, and the land-use and land-management data and sediment samples provided by Hope. Arabel is modelling the material flows of nutrients and the potential to increase crop production using improved management practices. These refer to vermicomposting of manure as investigated by Allan and Joseph, reducing the soil erosion as investigated by Christoph and Mathew, and using human excrement as investigated by Lea. These three works will finally link the case studies into an integrated framework, using different methods, depending on the WEF-nexus challenge to be tackled. In this way, they also link both, WEF-nexus studies claiming holistic modelling, as well as those using no model or theory at all.

For the people? By the people!

On aspect of the project that was seen critical by APPEAR from the very beginning was the dialogue with stakeholders in the project. As difficult as it was to write a concept for stakeholder dialogue in the beginning of the project, it was just as easy to ultimately put this into practice, as the principle that good research results are worth nothing if they remain on the researchers' shelves was well understood. Two aspects of stakeholder dialogue and involvement are described subsequently below:

Firstly, surveys including the joint survey, the surveys with farmers, and the survey by Lea, were carried out with local stakeholders. These were local authorities, the NGO Youth Environment Service (YES), with which I was familiar from earlier projects (Andrew and Amosiah Ongatai), and Moses Wakala, an expert on sanitation systems. They acted not only as important local cultural brokers and skilled research assistants, but also ensured that the

results of the project can be taken up at local level. Furthermore, they made the project teams feel at home during their stays.

Secondly, a number of capacity building and dissemination events were organised. Courses on statistics in water management as well as material flow analysis were held at Makerere and TU Kenya in 2019. In February 2020, stakeholder workshops were organised with local stakeholders in Busia, organised by Alice, Paul, and Stanley. In these workshops, Nathan showed, using his straight-forward presentation style, how research results of universities can be made accessible to non-university stakeholders. In Kampala, Jeninah organised a well-received workshop at national level. Government authorities dominated the auditorium, and the discussions were lively, particularly after Mathew presented his results that indicated a low hydro-meteorological data availability in Uganda. These data are now available, but the project is over, and it's now up to our successors to make good use of it.

Epilogue

In July 2020, five years after the memorable moment at Jinja, all of us grew, either in personality, number, size, or grey hairs. The results of our work were impressive, but the WEF-nexus is still not solved, neither from a physical or societal perspective, nor in terms of its scientific problems. This should encourage us and other researchers to continue the work, even if that means we have to play *rock-paper-scissors* again.

6.3.3 Gender perspectives

by Alice Turinawe and Jeninah Karungi-Tumutegyeze

In this narrative, gender is mainly taken as participation and involvement of women in the research project and process.

In the project team

Gender was a criterion in selecting the project team and students at the country level of Uganda (Makerere University). In the research team, the ratio of women to men was 2:1; the country coordinator (Dr. Jeninah Karungi) and Case study C leader (Dr. Alice Turinawe) were administrative roles taken by women; who were later joined by Dr. Rosemary Isoto as an academic supervisor for one of the MSc students of Case study C. Mind you, these ladies were chosen on their merit and not just to balance numbers. This laid the foundation for further the institutionalisation of gender in CapNex.

At Makerere University, the project allocated four MSc students, two for case study C and two for case study D. The advert for students enrolled strongly encouraged women to apply. The team used merit criteria in interviewing prospective candidates. Unfortunately, we received fewer applications from female candidates compared to the male counterparts. In the end, Case study C enrolled at a ratio of 1:1 (women: men) whereas case study D was 0:2. Not giving up easily, case study D sought alternative ways of including female students in the project and the solution came in the form of enrolling an undergraduate student to carry out her dissertation research under the set objectives of case study D. That is how Agnes Nalunga joined the project and she proved to be a highly proactive and creative stu-

dent, and her dissertation produced a very high quality manuscript that is in line to be published in a highly reputable peer reviewed journal.

Makerere University is a formidable advocate of gender in research and development and will always champion the inclusion/involvement of women without sacrificing quality.

In the research process

With regard to research activities, the bulk of the gender aspects were planned for Case study C due to the fact that it would have the biggest interaction with the communities in the study area of the Sio-Malaba-Malakasi river basin that traverses Uganda and Kenya. In one study of Case study C on the impact of adoption lag of soil and water conservation practices on crop productivity in the Kenya-Uganda border region; gender was one of the factors put under scrutiny. The study was implemented through household surveys. The ratio of participation of women to men was 100:407, i.e., nearly 20% of surveyed households were female-headed. Results showed that there were significant differences in some socio-economic characteristics between male and female-headed households in the study areas. Female-headed households showed more years of farming experience, were older and had a higher dependency ratio than their male-headed counterparts. On the other hand, male-headed households were significantly more educated, accessed more markets, and had bigger household sizes. There were also significant differences between male and female-headed households with regard to adoption lags (years taken to adopt technology after knowing/learning about it) of soil and water conservation practices (SWCPs); in male-headed households, a mean-lag of about 9 years was observed while in female-headed households a mean-lag of about 12 years was observed. This indicated that male-headed households adopted SWCPs earlier than female headed-households, which may be attributed to the fact that in most cases men own more resources than women and can afford quick investment in technology adoption. Also, men had higher education levels and studies have indicated that higher exposure to education increases farmers' better understanding of the benefits and constraints of soil conservation which enhances adoption (Asfaw & Neka, 2017; Sidibé, 2005). Moreover, male-headed households accessed significantly more markets than female-headed households; which could be due to less flexibility in women's schedules to allow time for marketing and other economic activities outside the home as they dedicate more time to home management and child care than men (Gimenez-Nadal and Molina, 2016). It was also evident that the effect of gender of the household head on adoption lag of SWCPs varied with conservation practices studied, which further supports reports that the implementation of different SWCPs requires different efforts and resources which vary between males and females. Indeed, technologies that reduce time/effort requirement such as minimum tillage were the exception to the rule with women being quicker to adopt such practices.

Since it is not always feasible to develop agricultural/conservation technologies that require less resources and time investment; other avenues for uplifting uptake by women, whether in female- or male-headed households, are essential. One key finding to promote the adoption of such technologies/innovations among women is participation in social groups. Strengthening women farmers' social networks is crucial as an intervention to promote the early adoption of agricultural/conservation technologies. Through such networks they can share not only information, but load too; and also get a stronger voice to access credit, extension and other services.

In training, workshops and policy dialogue

The project always placed a special emphasis on encouraging females in adverts to attend the different training sessions hosted in Uganda. In the training workshops on material flow analysis (MFA) given by TU Wien and R in hydrology (R) given by BOKU, the gender balance in participation was quite good (MFA: 9F:15M – 40%; R: 8F:15M – 36%). For the demonstration training on vermicomposting in Tororo Uganda under Case study D, the participation was 6F:17M (26%). Participation in the dissemination/stakeholder workshop in Busia was 12F:58M (17%), and 14F:48M (23%) in the policy workshop in Kampala, which were less than optimum figures. The low representation of women in some of the stakeholder workshops shows an inherent under-representation of women in local governments and agricultural/environmental institutions, the stakeholders that participated in these workshops. For the women farmers invited, most were not able to attend due to commitments in the home but also for married women, meetings that involve long distances of travel are discouraged by their spouses.

Synthesis

The journey this project has taken shows that there are complex factors that limit women participation in research and development despite there being opportunities available for them. Systematic targeting through career guidance, mentorship, and social networking will lead to gradual balancing of the scales.

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6.3.4 Enumeration of results

- 14 students of all levels completed their final thesis in the project. Of these, a total of 8 have already completed their studies. The students were supervised by 13 Professors and senior staff.
- The 8 completed final theses have been published, including 2 Bachelor's theses, 5 Master's theses, and one PhD thesis.
- 6 drafts of final theses are available, including 1 Master's thesis draft and 5 PhD thesis drafts.
- 3 scientific publications were published in high-ranking SCI indexed journals.
- 2 scientific publications were submitted for publishing in high-ranking SCI indexed journals.
- 5 drafts of scientific publications were prepared for publishing in high-ranking SCI indexed journals. These should be submitted by the end of the year.
- 57 participants followed courses carried out at TU Kenya and Makerere University.

- 729 students visited lectures in which results of the project were presented.
- 165 stakeholders participated in stakeholder workshops carried out in Busia, Bungoma, Chwele, and Kampala.
- 40 stakeholders participated in focus group discussions on soil and water conservation (Case study C)
- 800 farmers participated in questionnaire surveys (Case study B and C)



*February 2018: A worm of the species *Eudrilus eugeniae* – one of the little helpers in the vermicomposting experiments carried out by Makerere University in the CapNex project*



February 2018: The water intake for the Lirima water supply scheme at the foot of Mount Elgon in Uganda is a good example of an undisturbed water catchment.



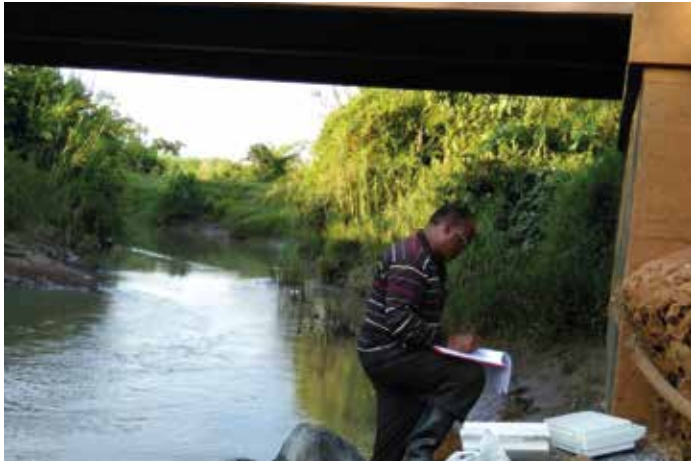
June 2017: A team of researchers from BOKU and TU Kenya, together with local stakeholders, carried out a reconnaissance survey in the case study area in Kenya. From left to right: Andrew Ogwal from the local NGO Youth Environment Service, Stanley Chasia from TU Kenya, Gabriel Stecher from BOKU, Dr. Jacinta Kimuyu from TU Kenya, Doris Wimmer from BOKU, and Nathan Muli from TU Kenya



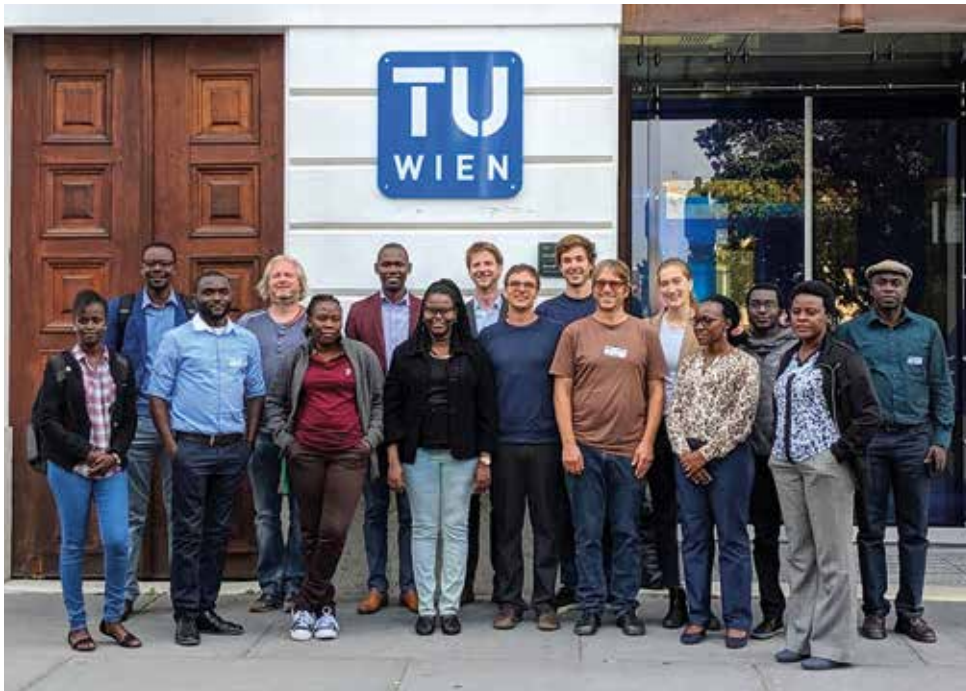
June 2017: The steep hills towards Mount Elgon require farmers to adopt soil and water conservation measures. An example can be seen in the brown field in the middle, which contains Napier grass rows to reduce soil erosion.



February 2020: An evaluation meeting at TU Kenya at the end of the project. From left to right: Dr. Lewis Sitoki from TU Kenya, Ms. Julia Lichtkoppler from APPEAR, Dr. Luke Olang from TU Kenya, and Prof. Paul Mwanza Shiundu, Deputy Chancellor of TU Kenya



June 2019: Nathan Muli, PhD student from TU Kenya, is taking notes while collecting water quality samples from River Lwakhakha.



September 2019: A group picture after the mini-symposium on the CapNex project at TU Wien. From the CapNex team (including scholarship holders), Dr. Luke Olang (TU Kenya, 2nd from the left), Stanley Chasia (TU Kenya, 3rd from the left), Ass. Prof. Mathias Zessner (TU Wien, 4th from the left), Paul Omenge (BOKU / TU Kenya, 6th from the left), Hope Mwanake (BOKU / TU Kenya, 7th from the left), Dr. Mathew Herrnegger (BOKU, 8th from the left), Dr. Christoph Schürz (BOKU, 9th from the left), Gabriel Stecher (BOKU, 10th from the left), Dr. Jakob Lederer (TU Wien, 11th from the left), Doris Wimmer (BOKU, 12th from the left), Dr. Alice Turinawe (Makerere, 13th from the left), Ass. Prof. Jeninah Karungi (Makerere, 15th from the left), and Dr. Allan Komakech (Makerere, 16th from the left) can be seen.

6.4 Professional Social Work in East Africa – Towards Sustainable Impact

Project Coordinator: Helmut Spitzer

Coordinating Institution: Carinthia University of Applied Sciences

Partner Institutions: Makerere University, University of Nairobi, Hope Africa University, University of Rwanda, Institute of Social Work

Partner Country: Uganda, Kenya, Tanzania, Rwanda, Burundi

Project Duration: 1 January 2016 – 31 March 2019

6.4.1 The project – PROSOWO II

PROSOWO II was an Advanced Academic Partnership project implemented between 2016 and 2019. It was *advanced* because it represented a continuation and an expansion of activities, which were successfully implemented under the first PROSOWO project (2011-2014) in order to promote professional social work in the East African Community (EAC). The previous project had set into motion a number of initiatives to strengthen social work through research, curriculum development, capacity building, partnerships and networks, and advocacy; it had no doubt awakened a lot of interest in social work in East Africa. PROSOWO II aimed to concretise these achievements and contribute towards building sustainable mechanisms, through which professional social work can strengthen its position as a key player in social development in East Africa – a region grappling with poverty and deprivation, conflict, and an increasing burden of refugees and migrant populations, as well as human rights violations, inequality, and social injustices. All these require a strong social work profession to contribute towards positive social change.

The partnership involved six academic institutions from East Africa and Austria: Makerere University (Uganda), University of Nairobi (Kenya), Institute of Social Work (Tanzania), University of Rwanda, Hope Africa University (Burundi), and Carinthia University of Applied Sciences (Austria). The overall objective of the project was to strengthen the formation of mechanisms for social work education and practice in order to contribute more effectively towards social development and poverty reduction. The project had six major components:

- Empirical research on indigenous and innovative models of social work practice.
- Establishment of a regional centre for social work and social development research.
- Capacity building of tertiary schools of social work through research, training, joint publications, and networking at national, regional, and international levels.
- Efforts towards the legislation of social work in the countries of the East African Community.
- Increased engagement of social work professionals in social policy and advocacy for human rights.
- Multidirectional knowledge transfer and sharing of lessons learnt within Africa, with stakeholders in Austria, and with the international scientific community.

All project activities were geared towards having a tangible impact on the lives of poor and marginalised people using highly qualified social workers and improved social services.

The project addressed a major gap identified under PROSOWO I, i.e., lack of research, documentation, and adoption of indigenous, locally relevant and innovative models of problem solving within the training and practice domains. Thus, a key milestone of the project was the execution of a study on indigenous and innovative models of social work, which was conducted in all five countries in East Africa, and which culminated in six book publications. This in itself resulted in multiple benefits, including enhanced research and scientific writing capacity among social work scholars; increased availability of locally generated and relevant literature that strengthens the indigenisation discourse; as well as increased visibility of African knowledge and practice systems within the broader scientific body of knowledge.

As part of ensuring sustainable outcomes, the project facilitated the establishment of a regional centre for social work and social development (East Africa Centre for Research and Innovation in Social Work – CRISOWO) which now serves as a coordination mechanism for social work related research, capacity building, networking, and advocacy within the EAC.

Another critical component was increased engagement with national governments in order to contribute towards efforts to establish legal mechanisms for the regulation of social work education and practice. Whilst recognising that this is a long-term goal, the PROSOWO team members actively engaged with government authorities to advocate for legal regulation of social work to not only increase visibility but also strengthen mechanisms, through which a competent social service workforce can be developed and supported to deliver effective services to the population in an ethical manner.

A lot of progress was made in this regard, especially in Tanzania where a draft bill has been developed. Other countries have realised successes in sustaining government interest in social work legislation, and there is evidently more recognition of the need for a strong and regulated social work profession in all the partner countries. In Uganda, minimum standards and a national competency framework for social work education and practice have been adopted by the government.

The PROSOWO II project also aimed to build the capacity of social work professionals to engage in social policy and advocacy for human rights in the region. This is an ongoing process that will continue to be realised by working with national and regional social work associations to increase social work's voice on critical social justice and human rights issues. Two position papers have so far been written and shared with relevant government authorities in East Africa and the Democratic Republic of Congo. All partner institutions also enrolled and/or renewed their membership and participation in national, regional and international professional networks, including the Association of Schools of Social Work in Africa (ASSWA), the International Association of Schools of Social Work (IASSW), and the International Federation of Social Workers (IFSW).

The project had a very strong focus on dissemination. This was achieved through the organisation of dissemination workshops in all participating countries, conferences and seminars, publications in open access journals and books, as well as presentations of research findings in national, regional and international scientific and non-scientific forums. The results should not only benefit the scientific community, but also ordinary social development practitioners, policy makers, and service users as much as possible.

A major highlight of the project was the launch of an international social work conference in Kigali, Rwanda, in March 2018, which attracted close to 500 participants from all over the world.

Finally, PROSOWO II aimed to facilitate a multinational knowledge transfer between East Africa, Africa, Austria, and the international scientific community. It was believed that efforts to strengthen social work in African contexts could offer lessons to the wider social work community at a global level.

6.4.2 Social work in East Africa: reclaiming the profession's glory, unlocking the future

by Janestic Twikirize, Consolee Uwihangana, Susan Muchiri, Serges Claver Nzisabira, Alexandre Hakizamungu

Introduction

This article presents the transformations that have been taking place with regard to professional social work in East Africa as a result of implementing the PROSOWO project. The first APPEAR-funded academic partnership, launched in 2011, had already laid a strong foundation for the revival of the social work profession in East Africa. This was done through generating research evidence, creating awareness on the role of social work, building partnerships and linkages, and engaging in a series of activities to profile social work and improve public recognition of its significant role in national development in the respective partner countries of Uganda, Kenya, Tanzania, and Rwanda.

After a couple of decades of lying in the valley of isolation and uncertainty, professional social work began to regain its visibility. For partner countries in East Africa, the advanced academic partnership (PROSOWO II) was an opportunity to concretise the gains from the first phase and move the agenda of reviving and repositioning social work as a major contributor to social development forward. And indeed, within the period of three years, many significant milestones have been achieved. Below, we provide a few highlights from Uganda, Rwanda and Burundi. Each country has its own story on how and when social work was introduced and how it has developed, and a unique experience of implementing the three-year academic partnership to further strengthen professional social work.

Uganda: Recovering the profession's glory, unlocking the future

Introduced as part of the colonial administration, social work in Uganda formed part of the civil service, with staff employed in state-owned enterprises, welfare services, and community development projects (Twikirize 2017). However, with the weakening of public services and the emphasis on market-driven economies in the 1980s and 1990s, the recognition of professional social work by government and the public began to weaken, and by the early 2000s, social work occupied a dismal place in the public arena. Ironically, this was during a period when the role of social workers in addressing a myriad of social problems was most relevant, with worsening situations for refugees and internally displaced populations owing to armed conflict in Uganda and the Great Lakes region. Other challenges included a widening gap between the rich and the poor, increased cases of child abuse and neglect, domestic violence, and the HIV/AIDS pandemic. Despite the low level of acknowledgement of professional social work, social workers continued to provide critical social welfare services through the NGO sector while they were squeezed out of government institutional services.

Conversely, during the same period, the government liberalised higher education, and this led to the launch of numerous privately sponsored social work programmes in the new universities and other higher education institutions beginning in the early 1990s. This created a situation where the number of social work graduates was increasing without any serious formal recognition and subsequently less recognition of their contribution to national development. Simultaneously, the quality of social work education was weakening due to a lack of capacity to design and deliver training and education in the many mushrooming universities.

By the time the PROSOWO project was launched, first in 2011, even the social work faculty had doubts about the merits of the once celebrated profession in the country. By the end of the project in 2014, a lot of interest in professional social work had been stirred up among different stakeholders, and numerous achievements registered. The advanced academic partnership provided an opportunity to move the agenda forward and work towards developing sustainable mechanisms for a stronger profession. And indeed, in the period of slightly more than three years (2016 to March 2019), many significant milestones have been achieved. Below, we provide a few highlights:

The completion of an empirical study on indigenous and innovative problem-solving approaches was a major achievement given the age-old challenge of undocumented histories and practices in Uganda. The study unravelled an array of rich, relevant and practical approaches present within different communities. Analysing, documenting and publishing these local systems of knowledge and practices has given a voice to the ordinary person in Uganda's communities and has brought this knowledge not just into the classroom but also into the global body of social work knowledge. Anyone researching on culturally relevant social work – be they from the Global North or South, will now be enriched with knowledge from landlocked Uganda. The project provided an opportunity for these stories to be researched and written from the ground up, by local researchers. Social work practitioners, academics and ordinary people in the communities participated in the research on indigenous and innovative problem solving approaches, a process that was greatly empowering. A concrete outcome has been the publishing of a couple of textbooks on social work in Africa, thus increasing access to locally relevant social work literature in the region (Twikirize and Spitzer, 2019; Twikirize, Luwangula and Twesigye, 2019).

Through the PROSOWO project, doors were once again opened for social workers to fully engage with the government in Uganda. In 2011 when we first made contact with the government ministry responsible for social development, they openly confessed that they had lost contact with professional social workers and did not know that the ministry was the home of social work practitioners in the country as had been the situation historically and logically. By 2014, this relationship with the government had been reinstated. In the second phase, between 2016 and 2019, the strength of this relationship was demonstrated in the many official meetings and policy discussions where the government ministry invited the participation of or directly collaborated with social workers and their professional association.

Two examples demonstrate this: In 2018, the Ministry of Gender, Labour and Social Development in collaboration with the National Association of Social Workers and the Global Social Service Workforce Alliance hosted the first ever international symposium on social work in Uganda, themed 'Social work, the pillar for social development in Uganda'. In October 2019, the same government ministry hosted an international conference on social work in Uganda, in collaboration with the International Federation of Social Workers.

With regard to policy development, several achievements were made between 2016 and 2019. We have directly contributed to the development of the national child policy and spearheaded the development of the first ever national minimum standards and competency framework for the education and training of social workers, which have been adopted by the National Council for Higher Education. In addition, our university department, in partnership with the National Association of Social Workers supported, supported the development of a competency framework and national guidelines for para-social workers, thus contributing to social service workforce strengthening in the country. Whilst these were not listed as specific activities in the PROSOWO II project, we count them as significant successes and offshoots because one of our objectives was to increase the engagement of professional social workers in policy and advocacy. The PROSOWO II project opened doors for engagement with different government and non-governmental stakeholders and we are witnessing not just the blooming but the first fruits of these efforts to strengthen and reposition social work within the social development arena.

Another highlight of the project on Uganda's side has been the building of capacities of social work students and faculty through hands-on participation. For the over 20 students who participated in the International Social Work Conference in Kigali 2018, it was life changing. They were mentored to prepare and present papers, and this revolutionised their ways of learning and their future outlook. There has been evidence of strengths-based and more learner-centred pedagogical approaches at the departmental level, including more peer-to-peer learning as a result. Furthermore, there has been a revamping of the social work curricula based on evidence generated through the PROSOWO II project. To strengthen the focus on field work and social research, a new 4-year Bachelor of Social Work programme has been approved and launched in 2020, with the final year dedicated to field work and research. This was in response to the gaps highlighted through the PROSOWO-led research on social work in Uganda. The new curriculum is deliberately designed to strongly respond to the local development needs and to be more culturally responsive. The new Master's in Social Work (MSW) has also been heavily informed by the results of the studies conducted during the two project phases. The MSW offers specialised training focusing on community development, social enterprise and livelihoods development, social work with children and families, and community health and clinical social work.

There are several positive outcomes from this project which, in different ways, have lifted the veil that covered professional social work in Uganda (and in East Africa) for a couple of decades, thus allowing the profession to rise and shine again. For Makerere University, we use the words of a colleague in the aftermath of the launch of the book publication on social work in Africa in March 2019: "Undoubtedly, PROSOWO has been the most viable academic partnership that our department has engaged in so far." (Prof Julius Omona, Department of Social Work, Makerere University)

One of the greatest lessons from this project is the extent to which partnerships can be instruments for unlocking local potential within academic institutions in Africa.

Social work in Rwanda: Stronger together

The PROSOWO project has been the first of its kind to raise the visibility of social work in the East African Community (EAC) in general and in Rwanda in particular. Through its collaborative approach and team spirit, PROSOWO resulted in a strong and sustainable partnership among social work institutions in the EAC.

The first research on social work in Rwanda, which was carried out and published to be widely read (Kalinganire and Rutikanga, 2015), was due to the PROSOWO project. Capacity building through doctoral scholarship, research and publication benefited social work staff at the University of Rwanda. Career development is an ongoing process but the project has laid the foundations. It has been nurtured via attending workshops, meetings and conferences, which serve as networking opportunities for academic staff, students, practitioners and policy makers.

The International Social Work Conference held in Rwanda from 19-22 March 2018 has been one of the greatest milestones in the history of social work in Rwanda. Not only did many delegates from around the world attend but also it was an opportunity for different stakeholders to work hand-in-hand to make the profession known to the Rwandan community and most importantly those in positions of authority and decision-making. Since the 2018 conference, university authorities, especially the Vice Chancellor, have become active advocates for professional social work nationally and internationally. Colleagues from other departments are now in close consultation with us (*“Social workers, what are you up to, now?”*) because they identify with our leading role in promoting excellence in education and practice for better development outcomes in the country. It is a sign that social work is now visible in the country. Key stakeholders are in constant contact in order to find out what is next on the agenda for social work in Rwanda, which attests to the appreciation of the profession's contribution to socio-economic development.

Our students, especially those who attended the conference, are very much interested in learning, serving the community during field placements or any other activity organised by the department, and are also keen to network and participate in workshops and conferences to a greater extent than had been exhibited before since the introduction of the profession in the post-genocide period in the mid-1990's.

The success of the project and specifically the visibility gained through the hosting of the international conference on social work in Rwanda strengthened the already existing collaboration between the University of Rwanda and universities from Canada and Sweden. The Canadian partner universities (York University, University of Manitoba and Saint Thomas University) are looking into securing further funding for a new project with social work in Rwanda. With Swedish cooperation, a proposal for future staff development (PhD training, short courses, joint research, and publications) has been successful. Lecturers from Gothenburg University who attended the International Social Work Conference in Kigali were amazed and decided to reinforce the current cooperation of teacher and student exchange.

At the national level, the University of Rwanda has since developed local working relationships with two other higher learning institutions teaching social work in the country based on the achievements of the PROSOWO project and the extent of participation of other institutions during project implementation. Other partnerships with development partners including UNICEF, Hope and Homes for Children as well as other NGOs have been strengthened and new proposals for future collaboration are being jointly pursued. In addition, the project supported the strengthening of regional and international professional links and networks. Currently, the University of Rwanda has full membership in the Association of Schools of Social Work in Africa as well as the International Association of Schools of Social work. Finally, the publication on empirically generated practice models in Rwanda (Uwihangana et al., 2020) is another milestone of the project, which will inspire future generations of students and social workers alike.

Social work in Burundi – On becoming a social work nation

Social work in Burundi has been in its infancy since its inception in the country in 2004 (Spitzer, Murekasenge and Muchire, 2014). To date, the Hope Africa University (HAU) is the only higher learning institution offering a degree in Social Work and Community Development with more than 780 graduates. As a result of its participation in the academic partnership, the Burundi National Association of Social Work (NASW-Burundi) was founded in 2015 during the Burundi International Social Work conference in partnership with PROSOWO. This partnership has provided exposure to social work in Burundi at both the international and local level, leading Burundi to become a social work nation.

From its inception in PROSOWO II, HAU has participated in all key activities, which has contributed immensely to capacity development for both academic staff, students, and social work practitioners. The Department of Social Work and Community Development at HAU has been exposed to research under the theme 'Innovative and indigenous models of social work practice', which resulted in a series of joint publications (Muchiri, Murekasenge and Nzisabira 2019a and 2019b; Muchiri and Nzisabira, 2020; Muchiri, Nzisabira and Murekasenge, 2020). The publication of books and journal articles at our department paved the way for the development of research interest in the university as a whole. One amazing development has been the adoption of a university-wide regulation that all academic staff must demonstrate engagement in research and scientific writing as a basis for promotion.

The faculty in the department was exposed to academic networks with universities locally and internationally. The students' capacities have also been built by attending and presenting at the PROSOWO-related conferences, which has resulted in the formation of the first Social Work Students' Association since the university began. The students are networking with other social work students' associations within the region. This is what Burundi needs: students learning from each other and using the knowledge to develop sustainable communities as envisioned in the UN Sustainable Development Goals. Through PROSOWO II, HAU has also become integrated in the Association of Schools of Social Work in Africa (ASSWA), thus enhancing collaboration with other higher learning institutions within the region; while NASW-Burundi has been integrated into the International Federation of Social Workers, which is an important step in building a nation where social work can be recognised.

Social work in Burundi still faces challenges as with many African countries where social work is based on Western theories, which do not correspond to local realities. Through the PROSOWO II research on indigenous and innovative models, recommendations were made to adapt the current social work curriculum to correspond to the local realities within the African context. The university authorities have welcomed the idea and a curriculum review is being planned.

The future of social work in Burundi looks bright with increased academic networking, enhanced student participation in conferences, more social work publications, more faculty capacity building, and increased political participation and lobbying by social workers for a sustainable Burundi.

Concluding note

Partnership and collaboration in education and research have proven to be important tools for the visibility of the social work profession in East Africa. Through the PROSOWO project, much has been achieved in terms of capacity building, locally relevant social work

research and publications, networking, and curriculum review and development. Through the project, partner universities strengthened their capacities for culturally relevant social work education and practice. On account of the increasing recognition and strength of the profession in East Africa, social work's contribution towards socio-economic development is likely to be more visible in the short- and medium-term. The new challenge for the partner institutions in East Africa is to consider how to sustain the momentum that has been generated through the PROSOWO project in order to expand the opportunities for the profession to grow and influence all spheres of society, especially through policy formulation and implementation.

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6.4.3 Celebrating World Social Work Day amidst difficult circumstances: impressions from East Africa

by Helmut Spitzer

Introduction

I had the privilege to collaborate with a group of East African scholars on an international project for a period of ten years. In 2010, we came together for a week-long retreat in Nairobi, Kenya, in order to brainstorm on a joint venture to set in motion the professionalisation and indigenisation of social work in the countries of the East African Community. This objective was largely based on the notion that imported theories and models from the West still heavily influence social work education and practice in many African contexts. In addition, there was a lack of research and a notorious absence of legislative and regulatory frameworks for the social work profession (Spitzer and Twikirize, 2014b).

From 2011 to 2014, the project ‘Promotion of Professional Social Work in East Africa’ (PROSOWO) ran in its first phase, with interrelated key components of basic research, curriculum review, joint publications, and policy advocacy. The latter refers to meetings and workshops with government officials on the role of social work in social welfare and poverty reduction programmes, position papers towards the enactment of laws regulating the social work profession, and social action on issues pertaining to social justice and human rights.

In 2016, we were awarded a grant for a follow-up project (hereinafter referred to as PROSOWO II), which ran until March 2019. It had a strong focus on practice research (Twikirize and Spitzer, 2019), and at the same time, it was directed towards an increased engagement of social work professionals in social policy and human rights advocacy. This endeavour was based on a conceptual understanding that social work is a human rights profession (Healy, 2008) and a social change agent with a mandate to engage in political action towards transforming societies for the better (Spitzer and Twikirize, 2014a).

In this article, I focus on one particular feature of this project, namely, social action on World Social Work Day (WSWD). This day is celebrated every third Tuesday in March, and it is regarded as the key event in the year where social workers worldwide stand together to advance the profession’s message (International Federation of Social Workers, 2021). From 2014 onwards, it was our intention to set an example in that respect in the East African region, where, to our knowledge, WSWD had never been recognised and celebrated before. We aimed at giving a voice to both social work itself and the people the profession is supposed to serve, i.e. marginalised, impoverished, vulnerable, and disadvantaged people. In the subsequent sections, I provide some impressions from events revolving around WSWD, starting with the year 2014.

Kampala, Uganda, 2014: marching on the streets for social justice

From the outset of the project, the PROSOWO team had planned a big social work conference in the capital city of Uganda. While we acknowledged the importance of such academic events in terms of knowledge exchange and networking, we also wanted to raise awareness for social work issues by reaching out to policy makers and the public. Therefore, we came up with the idea of organising a march on the streets of Kampala.

On World Social Work Day, more than 400 African and international participants gathered at a certain point right in the city centre, and when the delegation started marching and

cheering, they shared a spirit of enthusiasm and unity. Apart from social work practitioners, educators and students, there were also some social service users who joined the march, including a group of street children. Even a representative from the Ministry of Gender, Labour and Social Development mingled with the participants. In subsequent years, the ministry played an active role in organising similar events, and it worked in close collaboration with the Department of Social Work and Social Administration at Makerere University and the National Association of Social Work Uganda (NASWU) on various policies pertaining to social work, child welfare, and related issues (see Twikirize et al. in this volume).

Retrospectively, this event was a turning point for social work not only in Uganda but also in the entire region. It was a moment when the participants realised that their profession is part of an international community with a strong common background and a joint vision for more just societies (Spitzer and Twikirize, 2014b). The Kampala conference also contributed to a sense of professional identity amongst faculty members of the participating university departments, as well as to enhanced efforts in neighbouring countries to start a dialogue with key decision makers.

Apart from the big success of the conference, there were also challenges involved. A major foreseeable obstacle was highly political. In March 2014, shortly before the PROSOWO conference, an Anti-Homosexuality Bill prohibiting same-sex relations in Uganda and proposing life-imprisonment for “offenders” came into force. The enforcement of this discriminatory law was accompanied by a widespread culture of homophobia in the country. The question was how we should handle this situation. Would the government suspend our conference and the planned public action if we openly advocate the rights of sexual minorities, which is in line with international social work ethics? And how should we deal with a conference abstract on this issue, which was submitted by the former President of NASWU? In 2010, this person, who was also a government official, had openly supported the Anti-Homosexuality Bill in a statement, which was regarded as a scandal by the international social work community. Several international social work organisations had sharply criticized this statement (Healy and Kamya, 2014). When we announced our conference, we received some critical comments from international colleagues who blamed us for launching such an event in the context of draconian laws against sexual minorities. Yet, the conference organising committee remained dedicated to implementing the event as planned.

During the march on the streets, some activists raised banners in favour of sexual minority rights, and in the course of a conference session where the former NASWU President delivered a hate speech against homosexual people, both African and international delegates stood up and opposed his discriminatory attacks. Contrary to our worries, there was no interference from the police, and the conference went smoothly. It was only later that I learned of harassment against the national social workers’ organisation by the government. However, I also learned that the advocacy role of courageous social workers during this event, hand-in-hand with pressure from international bodies and administrations, had contributed to the process of overturning the controversial law (Spitzer, 2019).

The 2014 Kampala conference and its concomitant social and political activism was widely regarded as a landmark social work event in East Africa, and it was not the last one of its kind.

Bujumbura, Burundi, 2015: social work in post-conflict societies

In 2015, in between PROSOWO I and II, the East African team was still very active. Due to the commitment of colleagues from Hope Africa University in Bujumbura who had participated in the Kampala conference, the next WSWD event was envisaged to take place in Burundi. With a small grant from the federal government of Carinthia, Austria, both a conference and a march on the streets of Bujumbura were organised – albeit amidst difficult political circumstances. During that time, controversial presidential elections were underway, and the government acted violently against political opposition and civil society and restricted the rights to freedom of expression, association, and peaceful assembly (Amnesty International, 2016). Ironically, the theme of our conference was ‘Social Work and Community Development in Post-Conflict Societies’, and Burundi is a case in point for a context where social work has to deal with the effects of civil war and political violence, coupled with chronic poverty and a profound lack of basic infrastructure and services (Spitzer, Murekasinge and Muchiri, 2014).

When a group of 250 social workers and students started their march on the streets of Bujumbura in order to celebrate World Social Work Day, they were accompanied by heavily armed security forces and the police. To me, this was an encouraging and a threatening situation at the same time. The *Ministère de la Communication* delivered a passionate speech and promised to support social work at governmental level – a few weeks later he was no longer in office and Burundi was in political turmoil, with hundreds of thousands fleeing the country and many people killed. Yet, the conference turned out to be a success, particularly because of the foundation of a national association of social workers in the course of the event. Subsequently, this organisation became a platform for social work education and practice and the promotion of social policy issues in the country.

Arusha, Tanzania, 2016: social workers as “angry reminders”

When PROSOWO II started, one of the first project activities was the launch of another social work event in the region, this time in Arusha, Tanzania. The conference entitled ‘Social Work and Social Welfare: Implications of Global Transformation for Local Realities’ was organised by the Tanzanian Association of Social Workers (TASWO) in close collaboration with the PROSOWO team. Both the location and date for this event were chosen deliberately: Arusha is the headquarters of the East African Community (EAC) where key decisions are made, and World Social Work Day seemed to be the right time to bring social work on EAC’s agenda.

The event commenced with a well-organised march on the busy streets of Arusha, with thousands of people curiously attracted by a vivid group of social work stakeholders coming from Burundi, the Democratic Republic of the Congo, Ethiopia, Kenya, Rwanda, Tanzania (including Zanzibar), Uganda, and Austria. At the conference, the Tanzanian colleagues managed to bring a range of policy makers on board: apart from representatives from the Ministry for Health, Community Development, Gender, Elderly and Children, and the Arusha Regional Commissioner, the Tanzanian Minister of Foreign Affairs, who oversees matters pertaining to the EAC, also honoured the conference. In his closing speech, he emphasised the need for people-centric social development and governance based on human rights. He called upon social workers, who are frequently referred to as a friendly, philanthropic helping profession, to act as “angry reminders” when it comes to bad governance and failed development. In fact, social workers should play a more pro-active role as

watchdogs of democratic principles, political accountability, and the thorough implementation of policies.

The Minister officially received a well-elaborated resolution, which had been jointly formulated by the conference delegates. This resolution called ‘Arusha Call for Action’ demands for accelerated processes of statutory regulations of social work in the region and calls for a permanent representative of social workers in the administrative structures of the EAC (Spitzer, 2019).

The Arusha event gained extensive media coverage with several reports on television and in newspapers. It can be regarded as an important milestone in social work policy in East Africa.

Kampala, Uganda, 2017: launch of a new Centre for Research and Innovation in Social Work

In 2017, no joint WSWD event took place under the umbrella of PROSOWO. Instead, the team members opted for country-specific activities in their respective contexts. Nonetheless, the group met once again in Kampala, shortly before World Social Work Day, in order to participate in the launch of the new ‘East Africa Centre for Research and Innovation in Social Work’ (CRISOWO). This centre was established at Makerere University with the aim of having a permanent regional hub for applied research, innovative practice, and knowledge production in social work (see www.crisowo.org).

The official launch of the centre was embedded into a regional consultative forum on ‘Social Work, Social Policy and Human Rights in East Africa’ that brought together social work scholars, educators, practitioners and representatives of national associations from Burundi, Kenya, Rwanda, Tanzania, Uganda, the Democratic Republic of the Congo, Austria, and the USA. At this forum, the next step towards another major event in the region was set down: the first international social work conference in the context of post-genocide Rwanda.

Kigali, Rwanda, 2018: social work under surveillance

In March 2018, close to 500 delegates from 25 countries from inside and outside Africa came together in the capital city of Rwanda in order to attend this four-day conference with the theme ‘Professional Social Work and Sustainable Development in Africa’. As usual, the event culminated in public action on World Social Work Day. Conference attendees participated in a powerful march on the streets of Kigali, orchestrated by the police during rush hour. The final destination of the march was Kigali Genocide Memorial, where the delegates laid a wreath on behalf of the international social work community to commemorate the victims of the 1994 genocide in Rwanda.

In this small and beautiful country, close to one million people were killed during the genocide. As a response to collective trauma and complex social problems, a social work programme was formally initiated at the National University in Rwanda in 1998. Since then, social workers have played important roles in the reconstruction of the country (Kalinganire and Rutikanga, 2014). The new government initiated a series of political, economic and social projects to deal with the unique circumstances of total destruction, yet it has also developed authoritarian policies and restrictions on opposition parties, civil society, and the media (Straus and Waldorf, 2011).

In this regard, social work is also affected, which could be observed in the context of organising and implementing this conference. In my view, the Rwandan team did an out-

standing job to make this event a reality, even though their efforts were jeopardised by so many bureaucratic, hierarchical, and political obstacles. To me as an outsider, it was remarkable to see that certain authorities seemed to be omnipresent in the course of the conference, monitoring every single aspect of the event.

Such observations, seen from a comparative lens, make me feel humble. I have been working in social work practice, education and research for more than 30 years, and I can truly say that I have learned a lot from committed colleagues in East Africa – educators, practitioners and students alike. They work under very difficult and sometimes dangerous political conditions, face strict and intolerant authorities, have limited resources, and deal with a myriad of social problems, which significantly differ from the context of industrialised countries. Yet, as has been seen in this article, they manage to liaise with policy makers and get them on board with their agenda. In Austria, social work professionals would need more such efforts to comply with the profession's political mandate.

Despite the above-mentioned restrictions, the general impression of the delegates was that the Rwanda event was one of the most successful and inspirational social work conferences ever (for a visual summary of the event, see the video on YouTube: <https://www.youtube.com/watch?v=a5WbFGPF960> 8 – YouTube).

Conclusion and perspectives

In conclusion, the PROSOWO project turned out to be a success story, at least in my view. In virtually all partner countries, social work has gained much broader public and political recognition. What I heard from my colleagues is that – inspired by the aforementioned events – many higher education institutions, professional associations and practice organisations have begun to launch annual activities on World Social Work Day. Most importantly, responsible ministries have become aware of the crucial role of social workers in social development and social welfare in their respective contexts.

In addition, the WSWD events in East Africa have also stimulated the social work community in Austria. There were several occasions throughout the project span, where the African colleagues shared their experiences with their European counterparts. It was amusing to watch the reactions of some Austrian colleagues when they learned that a country like Tanzania has made far more progress towards the legislation of social work than Austria, where a law regulating social work is still not in place.

On WSWD 2017, we initiated a similar approach at my home university in Feldkirchen, Austria, combining a social work symposium with social action by marching on the streets of this sleepy little town. Social workers, university teachers, students, and even some service users walked side-by-side and enjoyed themselves in a spirit of togetherness and solidarity. Although they might not have been aware of it, their action was heavily influenced by happenings thousands kilometres away in the South.

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6.4.4 Enumeration of results

Empirical research:

Practice research on indigenous and innovative models of problem solving and their relevance for social work in Burundi, Kenya, Rwanda, Tanzania, and Uganda. A total of 155 qualitative interviews and 55 focus group discussions with key social work stakeholders, community members, local leaders and policy makers were conducted.

Publications:

The PROSOWO team published 6 project-related books, 5 journal articles, and 17 book chapters. Some of these publications are freely available at www.crisowo.org.

Conference papers:

From 2016 to 2019, the PROSOWO team made 46 project-related presentations at confer-

ences and symposia in Austria, Ireland, Kenya, Rwanda, South Africa, Uganda, the USA, and Zambia.

Position papers:

- Arusha Call for Action: Social Work and Social Development in East Africa, launched in March 2016 (available at www.crisowo.org).
- Position Paper on Social Work in the Democratic Republic of the Congo (available in English and French), published in 2018 (available at www.crisowo.org).

Curriculum development:

- A new Master's of Social Work (MSW) programme was approved by the Makerere University Council in 2018, and the first cohort of students enrolled in 2020.
- The Bachelor's of Social Work and Social Administration at Makerere University has been restructured and a renamed Bachelor's of Social Work (BSW) has been approved, beginning in 2019.

Organisation and implementation of project-related events:

- In partnership with the Tanzanian Association of Social Workers (TASWO), the PROSOWO II team co-hosted a conference on 'Social Work and Social Welfare: Implications of Global Transformation for Local Realities,' in Arusha, Tanzania, 15-17 March 2016.
- From 22-23 February 2017, a 2-day regional consultative forum was held in Kampala, Uganda. The theme of the consultative meeting was 'Repositioning Social Work as a Key Player in Social Policy and Human Rights Advocacy in East Africa'.
- From 19-22 March 2018, the PROSOWO team launched a big conference in Kigali, Rwanda. The event with the theme 'Professional Social Work and Sustainable Development in Africa' drew the participation of 460 delegates from more than 25 countries across five continents. A video on the conference can be seen here: <https://www.youtube.com/watch?v=a5WbFGPF960>
- On 29 June 2018, a joint symposium under the theme 'Global Challenges and International Social Work' was held at Carinthia University of Applied Sciences, Austria.

Establishment of a regional centre of excellence in social work research and innovation:

On 24 February 2017, the East Africa Centre for Research and Innovation in Social Work (CRISOWO) was launched in Kampala, Uganda (see www.crisowo.org).

Efforts in social policy issues and towards the regulation of social work:

More than 20 country-specific stakeholder meetings with government authorities, national associations of social workers and schools of social work were conducted in the five East African countries.

PhD scholarships:

Three candidates from Burundi, Rwanda and Tanzania (two female, one male) were granted APPEAR scholarships for doctoral studies at the University of Vienna, Austria.

Additional grants and awards:

- In 2018, the PROSOWO project was successfully extended to the Democratic Republic of the Congo by a grant from the federal government of Carinthia, Austria.
- In 2019, the *International Social Work Journal* Prize for the best article published went to Helmut Spitzer for his article 'Social Work in East Africa. A *Mzungu* Perspective'.
- In 2021, members of CRISOWO received a grant from the Norwegian Programme for Capacity Development in Higher Education and Research for Development (NORHED II) to implement a six-year project, which builds on the achievements of the PROSOWO project.
- In March 2021, the Department of Social Work at Makerere University has been awarded a Regional Resource Centre (RRC) status by the International Association of Schools of Social Work to continue the agenda for strengthening social work education. It is the first RRC in the Africa region.



Janestic Twikirize and Helmut Spitzer at the launch of the East Africa Centre for Research and Innovation in Social Work



Consolee Uwihangana, PROSOWO coordinator in Rwanda, at the international conference in Kigali



Celebrating World Social Work Day in March 2018, Kigali, Rwanda



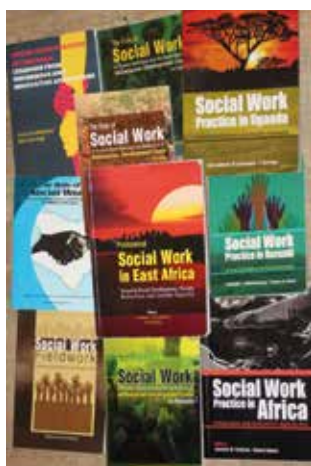
Commemoration of the victims of the genocide, Kigali Genocide Memorial, APPEAR representative Ms. Elke Stinnig, second from right



Target group of improved social services: vulnerable community in Gitega, Burundi



Performance of traditional dance and music at Kigali conference



A range of books were published to disseminate the PROSOWO research findings

7 MOZAMBIQUE

7.1 Strengthening Remote Sensing Data Processing and Interpretation Capacities for Operational Use in Agricultural System Monitoring

Project coordinator: Francesco Vuolo

Coordinating institution: University of Natural Resources and Life Sciences, Vienna

Partner institution: Universidade Eduardo Mondlane, ESUDER Escola Superior de Desenvolvimento Rural

Project Duration: 15 June 2017 – November 2020

7.1.1 The project – EO4Africa

Food security, agricultural risk assessment and sustainable crop production are top priorities and challenging societal issues in Mozambique (FAO, Country Programming Framework 2016-2020). Agriculture is the principal source of income in rural areas, accommodating roughly 70% of the nation's population. As with other countries in East Africa, Mozambique is highly vulnerable to extreme weather events (droughts and floods) and erratic and unpredictable precipitation patterns. This negatively contributes to uncertainties in crop production and often limits access to food, causing malnutrition in children. In this context, analytical tools to timely monitor crop production, risk and vulnerability are strongly needed by governmental agencies (national to regional), as well as various actors in the food management and supply chain. Timely and accurate knowledge of land and water resources and their use are essential in understanding how climate variability affects regional crop production and for supporting the allocation of resources for medium and long-term planning.

Agricultural monitoring systems rely on timely, objective and cost-efficient information to support the assessment of agricultural production at a relatively fine scale over large areas. A well-implemented information stream can produce essential datasets, such as crop acreage, crop types, crop conditions and crop production. Considerable efforts have been made in the past years to obtain this information in a cost-effective, precise and reliable way. The use of Earth Observation (EO) satellite imagery has been essential thanks to its wide and frequent coverage of global land surfaces. An increased up-take of EO data can be expected for the coming years, as more open-source, high-spatial resolution satellite data becomes available, such as Sentinel-2 satellite data from the European Copernicus programme.

Objectives

The overall objective of EO4Africa was to strengthen the institutional capacities for mapping and monitoring agricultural areas in Mozambique. EO4Africa aimed at developing local skills and strengthening research, management and networking capacities to:

1. routinely and operationally map crop growing conditions;
2. detect vegetation growing anomalies;
3. provide timely land use statistics on a permanent basis;

4. develop capacities for better implementation of existing and forthcoming national policies to support the implementation of the Sustainable Development Goals;
5. collaborate with international humanitarian organisations (e.g., W.F.P.).

Implementation

Supported by the APPEAR programme, EO4Africa was jointly implemented by the Institute of Geomatics at the University of Natural Resources and Life Sciences, Vienna (BOKU) and by the Escola Superior de Desenvolvimento Rural (ESUDER) based in Vilankulos (Inhambane province, Mozambique).

To ensure success, positive experiences from similar countries were leveraged. First implementations were set up in the Inhambane province starting in June 2017. Crop monitoring capacities were expected to be consolidated, demonstrated and extended to a neighbouring region (Sofala or Manica province).

Outcomes and impact

The project provides research tools, (big) data sets, skills and analytical capacities to better cope with natural resource (water and land) monitoring, assessment and control.

- It jointly develops analytical tools to increase transparency and efficiency in the decision-making processes for food production monitoring (with a focus on field crops).
- To increase regional impact, the project involved local stakeholders, such as the provincial agency for food aid (local staff will be trained), the agricultural extension services and one, large-scale food producer (Join Aid Management – J.A.M.).
- To maximize international visibility and to contribute to climate change studies, the project also supports the integration of data and local capacities into global CO₂ networks, such as FLUXNET, CarboAfrica and the Trans-African HydroMeteorological Observatory (TAHMO).
- Furthermore, country staff of the World Food Programme (WFP) will participate in the training.
- Finally, the project paves the way for the local partners to get involved in larger-scale initiatives, such as Copernicus (GMES & Africa initiative), Word Bank and ESA for development.

5.1.2 Reaching the youngest – investing in educational tools

by Laura Essl, Sosdito Mananze and Francesco Vuolo

Introduction

Food security, agricultural risk assessment and sustainable crop production are top priorities and challenging societal issues in Mozambique (FAO, Country Programming Framework 2016-2020). Agriculture is the principal source of income in rural areas, accommodating roughly 70% of the nation's population. As with other countries in East Africa, Mozambique is highly vulnerable to extreme weather events (droughts and floods) and erratic and unpredictable precipitation patterns. This negatively contributes to uncertainties in crop production and often limits access to food, causing malnutrition in children and adults. Malnutrition can contribute to physical, intellectual or mental health disability (Groce et al. 2014). In

Mozambique, more than 40 per cent of children under age of five suffer from stunting as a result of chronic malnutrition (Unicef, Sitan report 2014).

In this context, analytical tools to timely map and monitor crop production, risk and vulnerability are strongly needed by governmental agencies (national to regional), as well as various actors in the food management and supply chain. They allow a timely and accurate knowledge of land and water resources and their use, and they are essential for understanding how climate variability affects regional crop production, as well as supporting the allocation of resources in the short- and medium-term. For example, with these tools, remote rural communities can be better and more often targeted by the Agricultural Extension Services. Hot spots can be timely identified and targeted.

In the APPEAR project Earth Observation for Africa (EO4Africa), our main aim was to develop a local expertise to obtain land use and crop production statistics, and to monitor crop status conditions. The overall objective was to improve the capacities to provide information and to support the local communities and governmental agencies with the necessary knowledge. The objective was achieved with several actions, including revision and improvement of teaching and training material, practical field research, interaction with users, and publication of research papers and proposals for future research to fill gaps.

Beyond the technical and academic part of the project, in this paper, we will describe our educational and dissemination activities that involved the younger public. Efforts are needed in the acquisition of skills through formal school and academic education. These skills are the real key drivers of social and economic development, and education will provide the tools for better coping with climate change and natural risks.

Our effort was in the direction of developing educational tools that can bring knowledge about natural resources both to students and younger kids. Not everything was planned beforehand, and the deviations were – not surprisingly – mainly related to: A) some of the expected risks of the project (i.e., the existing gap between the high technological level of satellite tools and the actual problems present at the ground in the agricultural context), and to B) the COVID-19 pandemic that just broke out the week before we planned to conduct our second summer school in March 2020 in Mozambique.

Our mitigation strategy for the first issue was the implementation and construction of an Augmented Reality Sandbox, an educational tool that helps to illustrate digital maps and basic hydrological concepts. To the COVID-19 pandemic, we responded with the development of more teaching material, case studies and exercises for performing distance learning.

In all the development process, our focus was to stress the inclusiveness of science: we started from high-tech cloud computing systems to derive crop maps, and we ended up playing in the sand to bring knowledge about maps and water resource management, first to adults (ourselves), and then to younger people, including kids. In this paper, we would like to illustrate both the educational tools for students and for the kids that were developed during the project. We will close with conclusions and further perspectives on digital learning and visual communication tools.

The opportunities and challenges of digital learning tools

In response to the COVID-19 crises, we were required to revise our teaching material and teaching strategy both for the APPEAR Summer School and for our regular academic teaching. This gave us the opportunity to also rethink the ways of teaching in general and to explore the possibilities of online teaching for Mozambique.

In February 2020, one of the most advanced classes at BOKU on Earth observation data processing (remote sensing and image processing) had already received from the EO4Africa project major upgrades (in terms of content and case studies, software use and data). Most of the teaching material was, however, not designed for distance learning use. This class is usually opened for up to 25 students, as this is the number of available working stations in our computer room, where specialized commercial software is available for executing the work. During March and April 2020, we devoted a huge effort to timely adapt the class for distance learning, making it possible for everyone to attend using a laptop computer from home. The class started successfully in May 2020 and, by the end of the course, it received from the students one of the best evaluations ever achieved. Thanks to the conversion to distance learning, it could be visited by all interested students who otherwise needed to wait for available places in future dates. This was our first, fully online distance learning class and the experience was very positive. To make it also easy to attend for working students or students with kids, it was organised in 3-hour sessions, with first a theoretical part, followed by practical training, and homework to be prepared for the following session. All sessions were recorded and provided on Moodle – an open-source learning platform – and remained available for the entire duration of the semester. For the final exam, students had to complete all homework and choose one of the provided case studies for elaboration.

The case studies were an integral part of the work achieved in EO4Africa. The use of case studies deepened the knowledge of and interest in selected areas by providing an overview of the topic (e.g., fire monitoring, deforestation, climate change or conservation agriculture), and led students through several exercises and to a final project they had to complete. We used data from real situations, and scientific papers, but also actual news from media and videos (e.g., TEDtalks) to prepare students for short quiz sessions or the writing of a short narrative text. The final assignment was technical and it was related to satellite image data processing with a specific task to be fulfilled. This interactive format based on the use of different input material, as well as different formats for verifying the learning outcomes of the students, turned out to be successful, as 31 students (out of 33 initially registered) successfully completed the course with very good scores, personal satisfaction and interest in the topic. This was measured via feedback questionnaires at the end of the course.

Despite the known limitations of and scepticism towards distance learning, several advantages could be identified: students were independent in their working rhythms, which allowed them to integrate the classes better into daily routines that may have also covered childcare or professional employment. Attending the classes “live” offered the opportunity to pose questions, but also the recorded sessions were well accepted and used by the students. We could observe more questions raised in the chat space of the online teaching platform than during the live teaching format. The questions were not only answered by the lecturer, but also by other students, which made the sessions more interactive and social even though they were held online only. We found that there was more solidarity in the group and more positive support was provided from each other.

ESUDER, our partner from Mozambique, located in Vilankulos, uses the same learning platform Moodle, and the interactive teaching concept was transferred supporting working or child/parent-caring students. However, we identified several problems that made it difficult to directly adopt the teaching material and presentation flow. Internet connections are available, but the livestreams of the lectures require a large amount of continuous data to be transferred with a stable internet connection. Alternatives could be downloadable videos

(optimized for low internet bandwidth), presentations with recorded audio files and additional Q&A sessions to immediately respond to open questions.

Internet connectivity around the world is also constantly improving. Public and private investors have launched several initiatives to bring more people online with faster and more reliable internet connectivity. For example, the Facebook Connectivity initiative recognizes that the internet not only gives people a voice, but also creates opportunities to share knowledge. The evolution of internet access will surely support academic activities in accessing big data, networks and distance learning.

Unfortunately, the situation in Mozambique is not yet ideal and we could perceive these limitations during our visits there. The Inclusive Internet Index 2020 (commissioned by Facebook and conducted by the “Intelligence Unit” of *The Economist*) ranks Mozambique 94th globally and 20th in Africa. It registers uniformly low scores across all four pillars (Availability, Affordability, Relevance and Readiness). Like many other African countries, low literacy levels are a severe constraint, along with inadequate electric power and network infrastructure. For comparison, Austria ranks 16th, with affordability being the weakest pillar (28th globally).

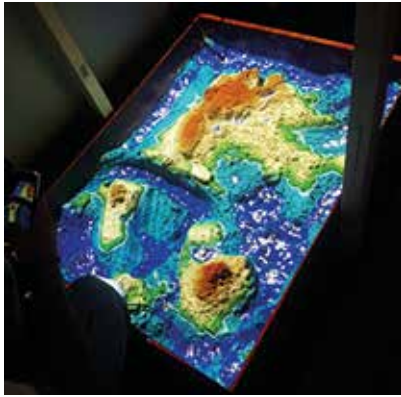
Another obstacle is the availability of hardware for students. For training in the use of software applications and work with large volumes of data, a personal computer or laptop, preferably with a second screen, is desirable. Much content can be transferred on a mobile phone, but for the practical sessions, students would need to get access to computer hardware, which is usually possible in the computer rooms at the university.

The augmented reality sandbox as visual communication tool in Austria and Mozambique

The second unexpected teaching tool that was developed during the project was the augmented reality (AR) sandbox. In the course of the project, a summer school took place in September 2018 at BOKU with incoming lecturers from Mozambique and students from BOKU. It was organized into: A) a theoretical part (during the mornings) with presentations and discussions on topics related to remote sensing, land use and land rights in Mozambique, and B) a hands-on-session in the afternoon with a focus on maps and visual communication.

The reasons why visual communication (of relevant spatial-temporal information) is important are that pictures require no reading and no formal language skills, and reach all individuals regardless of age, sex and origin. It supports visual learning types that need to “see” concepts and ideas to understand them. As researchers in remote sensing, our passion is about interpreting the colours, the patterns and structure in the “photographs” that we remotely receive from satellites. Our initial idea was to bring this to the public and share our passion for image data and derived maps and information. Initially, we thought to elaborate contributions to the film4Climate contest but we realised that this was beyond our possibilities (considering time, effort and movement limitations due to COVID). Instead, we selected the Augmented Reality (AR) Sandbox as a tool to communicate the basis of the science that we are teaching.

We know of augmented reality as systems in which virtual content is projected onto the real world, thereby “augmenting” it with additional content and information. The most popular application is the mobile game, “Pokémon Go”, in which players have to capture and battle virtual creatures that are projected onto the real world requiring a smartphone with GPS and an active internet connection.



The Augmented Reality Sandbox in operation. The colours show the land topography and water. They adapt dynamically with changes in the position of the sand. Water level and water flow also adjust in real time with rain events.

The AR Sandbox is a wooden box filled with normal white sand, and, mounted above it, there is a video projector and a motion-sensing device (in our case, the Microsoft Kinect camera, originally developed for home gaming).

The initial concept was developed by the University of California that also provides a tutorial on construction and use¹. Once in operation and active, if the sand is shaped and moved, the motion-sensing device detects the height of the sand and it reconstructs a 3D model using photogrammetric techniques. In real time, the video would project on the structured sandy surface colours that resemble the contours of topographic maps as we know them from atlases used at school. The most appealing component of the AR Sandbox is the immediate change of colour if the sand is being moved.

On this augmented reality surface, rainfall and water flow can be simulated by holding the open hand above the sandbox to make it rain. A picture of the sandbox created during the summer school in Vienna can be seen in figure 1. From the very intuitive playing experience with the sand and its changing colours when moved, to the discussion of contour lines, water shed, dams, water flows and flooding scenarios, the AR Sandbox allows for a wide spectrum of applications and demonstrations. This tool helped us communicate technical and research aspects in an understandable way to all audiences. For example, the BOKU project team used the AR sandbox for the annual children's university (Kinderuni) where the Institute of Geomatics was represented for the first time. To ensure the further use of the sandbox, we developed a guide with a list of possible experiments and a lesson plan for some of the experiments.

It was planned to build the second sandbox in Mozambique during the summer school scheduled for March 2020. COVID-19 thwarted our plans and we could only remotely support the team in Vilankulos in building their own sandbox.

The sandbox in Mozambique will be used in a similar way as in Austria: to teach even the youngest of the importance of water resources, to show them how maps work, to make it rain and to watch water flows. Sessions with kindergarten kids and primary school students

¹ <https://arsandbox.ucdavis.edu/> and Reed, S., O. Kreylos, S. Hsi, L. Kellogg, G. Schladow, M. B. Yikilmaz, H. Segale, J. Silverman, S. Yalowitz, & E. Sato (2014): Shaping Watersheds Exhibit: An interactive, augmented reality sandbox for advancing Earth science education, Abstract ED34A-01 presented at Fall Meeting, AGU, San Francisco, Calif., 15–19 Dec.

will be organised to make children aware of the possibilities they have, make advertisement for the university and inspire kids to become the researchers of tomorrow.

Concluding remarks

Our cooperation was unfortunately slowed down by the COVID pandemic. However, we continued to work together remotely and shared many personal feelings and life expectations, much beyond the work commitment. Especially during the Austrian lockdown in March and April 2020, we appreciated even more how fortunate we are with childcare facilities at our workplace at the university in Vienna. Especially for young scientists, students and working parents involved in education such as us, having this facility and support is of immense help and we should not take it for granted.

Although family structure and organisation of life is different in Mozambique, our colleagues and friends there also acknowledge this aspect. Childcare attendance has been recognized to be important to pupils' success in elementary school as well as their achievement in later years.

After learning that in Mozambique only 5% of children between age three and five years benefit from early childhood education, our friends in Mozambique decided to contribute to the local community by constructing the so-called "JARDIM INFANTIL LITSAKO". It is a childcare facility located in the semi-urban village of Vilankulos, near the school where I worked. LITSAKO started operating in March 2018. By the end of September 2019, only 25 children were enrolled against LITSAKO's overall capacity of 75 children. The main reason for this low enrolment is that many families, due to their very low income, cannot afford to pay the symbolic fees needed for operational expenses.

As such, they established an Early Education Scholarship Programme in order to help more and more children to benefit from this important educational step. Now we wish to help them to get more financial support for this initiative, and we will start a fundraising campaign for supporting kids aged 2-5.

We believe that it is also of strategic importance for long-term social and economic development to engage the young generation and inspire them in the use of digital tools and, more generally, in the use of digital information. We consider that these are basic skills to acquire to positively face the challenges of present and future times.

7.1.3 Remote sensing, a new and reliable data source for agricultural monitoring in low-income countries – applications and potential use cases and users in Mozambique

by Sosdito Mananze, Laura Essl, Francesco Vuolo

Introduction

Remote Sensing (RS) is the science and, to some extent, the art of obtaining information about an object, area, or phenomenon through the analysis of image data acquired by a sensor that is not in contact with the object [1,2].

The lack of reliable and objective data in developing countries hinders the formulation of appropriate strategies for key areas of social and economic development. Traditional forms of data collection such as surveys and census fail to provide timely, relevant, and cost-effective

tive information about the socio-economic and environmental aspects. As such, there is a growing interest in using satellite remote sensing data and techniques in support of sustainable development related applications worldwide. There are several targeted examples of fit-for-purpose datasets, tools and methodologies evidencing the integration of satellite data to address challenges in agriculture, food security, sanitation, energy, disease, fresh water, disasters, air quality, biodiversity, deforestation, hygiene, public health, urbanization, and environmental challenges.

The use of RS data in agriculture is underpinned by the fact that it copes with important specificities such as the strong seasonal patterns related to the biological lifecycle of crops, the dependence on the physical landscape (e.g., soil type), as well as climatic driving variables and agricultural management practices. Moreover, as crop attributes can change within short time periods due to biophysically changing conditions, the agricultural systems monitoring needs to be timely, synoptic, cost efficient and repetitive to provide worthwhile information. RS is suitable to fill this requirement, as it can gather information over large areas with high temporal resolution.

The image data recorded by satellites can be used to assess several components of agricultural and agronomic processes, including crops yield, acreage, crop phenological information, stress conditions, trends and disturbances, soil moisture and drought indicators, and biochemical and biophysical parameters.

Amongst other things, the retrieved information can support the decision-making process at field level to promptly react and alleviate effects of pests, diseases, water stress, and/or nutrient insufficiency. Furthermore, it can support the policy decision process to better anticipate and cope with the effects of disturbance events (e.g., climate-related hazards) to get an objective and unbiased spatial picture over large areas for risk assessment, and to define suitable strategies to ensure food security and natural resources management.

Despite the well-known potential of RS in both agronomic process inference and agricultural monitoring, its application in sub-Saharan Africa (SSA), particularly in Mozambique, has been challenging and extremely limited so far. This is mostly because, in a recent past, RS data and their processing were mostly associated with high costs and complex computer software and processing algorithms, creating a constraining factor in low-income countries. In addition, Mozambican agriculture is mostly smallholder farming systems, characterized by very small sized fields, with mixed crops and multipurpose trees. This agricultural system suggests high temporal and spatial change dynamics; such conditions are very challenging to monitor using most of the freely available satellite imagery. In the recognition of the RS potentialities for agricultural monitoring, the main objective of the APPEAR project EO4Africa was to strengthen the institutional capacities for mapping and monitoring agricultural areas in Mozambique using Earth Observation data. In this paper, we briefly present the main objectives and results of the main applications implemented in Mozambique under the scope of the project.

Applications in Mozambique

In the scope of the project, four case studies were implemented aiming at testing and validating different types of RS data and methods for the monitoring of: (i) Maize Leaf Area Index (LAI) [3]; (ii) Soil Moisture (SM) and Agricultural Drought [4]; (iii) Cropland's extent and dynamics [5], and (iv) Mapping and Monitoring of Burned Areas [6]. In addition, the online Drought/Vegetation Monitoring Platform was implemented.

Leaf Area Index (LAI)

The LAI is a quantitative measure of the amount of green leaf material present in the canopy per unit of ground surface. The LAI describes a fundamental property of the plant canopy in its interaction with the atmosphere, especially concerning radiation, energy, and gas exchange. Hence, it is a crucial variable for crop growth evaluation and yield forecasting.

For the Leaf Area Index case study, the main objective was to compare the performance of different types of RS data – multispectral (European Copernicus Sentinel – 2) and hyperspectral (handheld spectroradiometer) – and methods – statistical (empirical and machine learning algorithms) and radiative transfer models (PROSAIL model) – to estimate maize LAI. All tested datasets and methods accurately estimated LAI; however, the statistical approach involving vegetation indices outperformed the machine learning and the radiative transfer models [3].

Soil Moisture and Agricultural Drought Monitoring

For the Soil Moisture (SM) and Agricultural Drought monitoring, the study aimed to investigate the applicability of the Optical Trapezoidal Model (OPTRAM) for the monitoring of soil moisture and agricultural drought monitoring using Copernicus Sentinel – 2 data. Results showed that OPTRAM is a useful tool to improve water use efficiency in croplands under specific conditions of Mozambique agricultural systems [4].

The SM is recognized as a key variable in controlling the water and energy fluxes exchanged between the earth surface and the atmosphere through evaporation and transpiration processes [7,8], and has a crucial role in the biosphere as it guarantees the vegetation growth [9]. The information about SM in the radicular zone has great application in studies related to crop growth modelling [10,11]. Moreover, SM is a suitable variable to monitor agricultural drought events, which is defined as a shortage of water to such a point that it adversely affects crop growth [12,13].

Land Use Classification

Regarding the Mapping of Cropland's extent and dynamics, the objective was to develop and test an automated land cover classification and mapping using Google Earth Engine cloudy computing. A combination of USGS Landsat-8 and -7 spectral bands, vegetation indices and textural features performed well in mapping different land cover classes within the study area, with emphasis to agricultural fields and their spatial and temporal change dynamics [5].

Agricultural land use dynamics is the major cause of ecosystems degradation at the global scale [14], so land use monitoring related to farming is important for land management [15]. The estimation of a crop's area extent and mapping of crop types and of crops dynamics provides crucial information for agricultural monitoring and management [16], and also supports agricultural investment policy and early warning systems related to food security [17]. Wildfire is one of the most important threats to biodiversity and natural resources in Mozambique, particularly inside protected areas.

Fire Management

The Kernel density map developed from Landsat satellite, and burned points extracted from the Fire Information for Resources Management System (FIRMS) showed very few areas

with a critical level of fires. The Mopane forest and pasture areas are the most affected vegetation types, but, in general, at low severity [6].

Outlook, potential users, and challenges

The results of the four case studies demonstrate that RS data have great potential for operational application in agriculture by both farmers and policy makers. For farmers, the results may assist in the early identification of growth anomalies caused by pests and diseases, nutrient or water deficit and thus enable them to decide and implement corrective actions on time and in specific areas. For policy makers, the results may be useful in accurately estimating crop yields and as such decide about food security, food aid and importation or exportation of food.

An important remark regarding the four case studies is that, mostly, freely available data sources (Sentinel – 2, Landsat 8, Landsat 7 and MODIS) were used as well as freely available software packages (QGIS, ARTMO, R and Google Earth Engine).

Nevertheless, considering the main agricultural systems in Mozambique, there are a number of potential challenges and barriers that farmers face, including, but not limited to: (i) lack of resources to guarantee immediate reaction as soon as an anomaly is detected; (ii) lack of scientific understanding and experience; (iii) difficulties associated with extending scientific understanding or technological capability to operational utility; and (iv) lack of human resources to interpret and operationalize the RS data. Therefore, in-farm operational applications are more likely to be currently implemented by large to medium size commercial farming companies, which use relatively sophisticated agricultural practices.

Yet, the results can also be operationally applied by agricultural governmental institutions, entities related to natural hazards management and non-governmental organizations for early detection of crop loss and food security risks. The crop growth and agricultural drought monitoring and cropland mapping are crucial for planning food security at several scales, ranging from individual farmers up to districts or even the whole country [18,19]. Because agriculture is the prime source of food and income for the major part of the Mozambican population, the possibilities of obtaining yield estimates or crop performance with reasonable accuracy and prior to harvest is very important, since timely interventions can be made in case of poor yields. Government and/or aid agencies can adequately plan the import and export of food products based on such information. In fact, we think that this information can feed very efficiently the food security early warning systems enabling prompt interventions to lessen its effects and avoid fatalities.

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7.1.4 Enumeration of results

- Five staff members received training on data processing, validation activities and field work.
- Two course materials were revised and improved – Online-teaching classes were developed; Case studies were integrated into the Remote Sensing and Image Processing course at BOKU.
- Two training sessions were held with the provincial agency for food aid and extension services, with ten people participating in each of them.
- Three ESUDER students worked with JAM for their research.
- One BOKU student completed the master's thesis at BOKU.
- One follow-up international research activity has been initiated aiming at using the Eddy Covariance data for the F.A.O. project, Water Productivity through Open access of Remotely sensed derived data (WaPOR).
- Two weather stations were integrated into the international TAHMO network.
- Five research projects for follow up research were submitted. Two were accepted, two were not accepted and one is under evaluation.
- Three research papers were published, and one was submitted to a local, peer-reviewed journal.
- One communication paper was published summarizing the main challenges, opportunities and limitations of educational projects related to remote sensing and GIS. Examples from the EO4Africa project were included.
- One summer school was conducted in Austria with ten participants.
- One upcoming international conference presentation at the AARSE 2020 Conference is expected in March 2021. The title of the paper is “From theory to practice: Strengthening remote sensing data processing and interpretation capacities in higher education for natural resource management in Mozambique”.



*Aerial view of the peri-urban area of Vilanculos. Houses are often constructed with corrugated iron sheets, surrounded by a small living space with some trees. A living hedge of *Euphorbia spinosa* defines and protects the perimeter of the house.*



A maize field and the typical way of cultivating it in Vilankulos with peanut plants and some weeds!



Crop type identification during a field data collection campaign in Vilankulos



Tim Ng (BOKU) giving field training in the use of a GPS device for precise geolocation of field data



Leaf Area Index (LAI) data collection



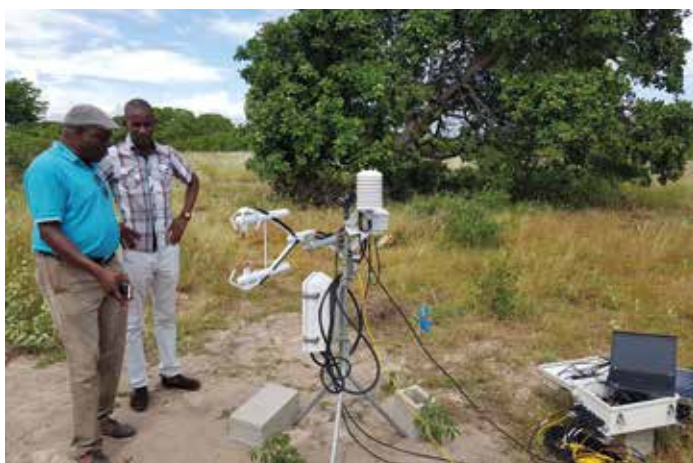
Training in the use of computer software (QGIS) for satellite data processing in Vilankulos



Sunrise from the beach of Vilankulos. The economy of the village is primarily based on fisheries and agriculture.



Hand in hand with a small kid playing in the street around the university campus of ESUDER.



Deployment and testing of the eddy covariance station during field training at ESUDER in Vilankulos

7.2 Innovating Sustainable Agriculture in Mozambique – Learning and Teaching Tools

Project Coordinator: João Paulino

Coordinating Institution: Zambeze University

Partner Institution: University of Natural Resources and Life Sciences, Vienna

Partner Country: Mozambique

Project Duration: 1 January 2018 – 30 November 2020

7.2.1 The project – ISAM

The central coastal region of Mozambique is situated just above the Tropic of Capricorn, characterized by coastal plains that rise gently from east to west. The region is one of the more densely populated areas in the country with high rates of poverty and food insecurity, but is very rich in natural resources. Agriculture is characterized by small subsistence production generating about 97% of total agricultural production. Smallholder farmers are challenged by erratic weather patterns, droughts, floods, a lack of educational and supplementary support leading to increasing land degradation and low productivity.

The region is at the centre of the government's efforts to halt environmental degradation and contribute to the sustainable development of rural areas. Zambeze University (ZU) is the region's higher education institution with a focus on natural resource management. The University aspires to meet the needs and expectations of students and local communities to further improve the situation in the region. Therefore, ZU needs to build capacities in research and teaching. Hence, the Centre for Studies, Innovation and Advanced Training (CEIFA) at ZU and the Department of Sustainable Agricultural Systems (DNAS)/Division of Organic Farming at the University of Natural Resources and Life Sciences (BOKU, Vienna) formed a partnership within the framework of the Austrian Partnership Programme in Higher Education and Development (APPEAR) financed by the Austrian Development Cooperation.

Together, the partners initiated the project “*Innovating Sustainable Agriculture in Mozambique – Learning and Teaching Tools (ISAM)*” with the aim of contributing to the government's intention of developing rural areas through institutional capacity development, thereby directly and indirectly contributing to the sustainable use of natural resources while reducing pollution and improving living conditions, adapting to and mitigating climate change, as well as contributing to food security and employment in rural areas. With its ambition, the project intends to contribute to the achievement of several of the Sustainable Development Goals (SDGs).

As a result, ISAM delivered a collaboratively developed Master's curriculum on “Ecological agricultural production” adhering to the Bologna criteria for higher education and thus supporting the internationalization of teaching and learning at ZU. The curriculum contains innovative learning and teaching approaches, thereby fostering institutional capacity and educational delivery. The training sessions and materials provided advanced detail on capacity building tools for teachers, researchers and students at ZU.

The ISAM partnership project is designed as a continuous mutual exchange process of skills and experiences between BOKU and ZU, thereby building capacity, following a transdisciplinary, bottom-up approach.

In particular, the project aimed to achieve the following specific objectives:

- To develop training tools for newly graduated teachers, researchers, advisors and students at PhD level for modern teaching, learning, extension (smallholders and agro-livestock companies) and scientific methods.
- To train the aforementioned groups in modern teaching, learning, extension and scientific methods.
- To develop a Master's curriculum in the field of sustainable agriculture that can serve as prototype for developing further curricula at the University.
- To train the aforementioned groups in selected thematic fields of the curricula.

All steps were conducted in a participatory manner including all project members, considering other experts where necessary as well as stakeholders in the region, in order to ensure that the content of the project responds to the needs of the region. With this methodology and activity, ISAM expects to increase the capacity of its stakeholders and participants to allow them to contribute to higher education for students and supplementary services for smallholder farmers in the field of agriculture and rural development.

7.2.2 Developing a collaborative Master's curriculum and innovative learning and teaching tools for sustainable agricultural development

by Pierre Ellssel, Anna Porcuna Ferrer, Bernhard Freyer

Background

Why the necessity for sustainable agri-food systems?

The world's agri-food systems contribute to a significant portion of the world's greenhouse gas emissions, land degradation, climate change, biodiversity loss and the general impairment of ecosystem services at the production level (IPCC, 2019), and could prevent the achievement of the 1.5° and 2°C climate change targets if these are not transformed (Clark et al., 2020). Widespread unsustainable practices lead to substantial negative externalities and respective costs for society as a whole in the short-, but especially in the long-term (e.g., Sutton et al., 2011). In addition, we are witnessing high levels of under- and malnutrition as well as instances of people being overweight and obese (WHO, 2020). The concentration of power and capital (Howard, 2016), unequal distribution of resources and access to land (UN, 2013) and poverty among farmers (Rapsomanikis, 2015) are further aspects of the world's agri-food system under dispute.

The agri-food system in Mozambique, in particular, faces a mix of complex and systemic challenges. The most pressing of these is the region's susceptibility to weather variability, climate hazards (droughts, floods and cyclones) and climate change causing annual costs of about USD 790 million (CIAT; World Bank, 2017). Sustainable land management in Mozambique is prevented by a lack of knowledge, population growth and pressure on the resource base, erosion, decreasing soil fertility, deforestation, difficult land rights acquisition processes and a reliance on foreign investment. Livestock rearing and savannah burning constitute the main emitters of greenhouse gas emissions in agriculture in the country (Ibid, 2017).

Socio-economic challenges include high poverty rates, poorly functioning institutions, corruption, a lack of capital (e.g., investment in education and research) and infrastructure (e.g., supplementary services, risk insurance, market access), all of which are crucial aspects for a functioning agri-food system and are especially indispensable when aiming to transform such a system.

Apart from the many challenges, manifold opportunities exist in Mozambique to foster a sustainable agri-food system while increasing food security and reducing poverty. There is significant untapped potential to increase productivity and expand agricultural production as only about 7% of the total potentially viable agricultural land area has been used. The agro-climatic conditions are favourable in various parts of the country, including abundant yearly rainfall and the existence of a multitude of rivers providing water resources. Apart from its natural resource base, Mozambique can draw upon a young workforce and an advantageous geographical location for trade. Besides the myriad of opportunities for Mozambique to achieve a sustainable agri-food system, agricultural development in Africa in general has more broadly focused on a “conventional intensification” of agriculture, following a paradigm that is largely influenced by the approaches of the Green revolution, with (over)reliance on top-down knowledge transfer, modern seed varieties and chemical inputs. However, this paradigm is critically discussed in terms of its shortcomings in relation to environmental sustainability, increasing productivity and reducing poverty among small-holder farmers (e.g., Dawson et al., 2018; Malkan, 2020), who account for 95% of Mozambique’s farming sector (FAO, 2020). Building on principles of organic farming and agroecology, we define “sustainable agri-food systems” as agricultural systems where economic, social and ecological aspects of farming are taken into consideration equally, taking into account all the elements, their interrelationships and effects.

Ecological aspects include safeguarding and maintaining ecosystem services and agrobiodiversity. Social characteristics take into account human wellbeing and broader socio-economic and political aspects of agricultural systems, including the integration of indigenous and local knowledge systems and gender dynamics, to build fairer and more equitable agri-food systems.

The development of a sustainable agri-food system demands innovative learning and teaching in higher education

In order to enable a transformation of the current agri-food system towards a sustainable one, the provision of education and training to the diverse stakeholders is crucial to strengthen their capacities and motivate them. The need for education and training on sustainability issues in general and for agri-food systems in particular is overarching, starting in schools through to vocational training, higher education institutions and adult training, in particular in terms of a need for ecological literacy and complex (real world) problem-solving skills.

We hypothesize that traditional means of top-down curriculum development in agricultural education have failed to sufficiently develop solutions in a collaborative manner with local stakeholders and thus, have failed to enable sound agro-ecological and socio-cultural development based on a sustainable use of (regional) resources. In the past, curricula were often developed in a top-down process (in Mozambique and elsewhere) or through the integration of only a few experts in the development process. Furthermore, curricula were frequently discipline driven, consisting mainly of classroom lectures and the transmission of formal knowledge.

The Bonn Declaration of the UNESCO World Conference on Education for Sustainable Development emphasizes the need for “...creative and critical approaches, long-term thinking, innovation and empowerment for dealing with uncertainty, and for solving complex problems” in education (UNESCO, 2009). For the sustainable development of the agri-food system, this means that the system cannot merely be regarded as commodities or value chains. Consequently, for the transition of the local agri-food system to a sustainable one, a holistic approach based on a systemic perspective and systems thinking – instead of linear thinking and a mere curation of symptoms – is needed. This entails building awareness of the wider context and avoiding a focus on single parts or variables (e.g., yield), but rather taking into consideration the interactions between components, is essential (e.g., Oborn et al., 2017 Leal Filho, 2011). Our aim was to develop a highly participatory and integrative curriculum, based on concepts of experiential and transformative learning, linking the socio-economic and ecological aspects of the agri-food system, emphasizing gender and social equity. The intention was to develop an inter-disciplinary curriculum that can later be adapted to other settings. Therefore, we chose an approach that shifts away from linear learning to a systemic pedagogy in agricultural higher education for sustainability. This approach is theoretically underpinned by systems theory/systems thinking and trans-disciplinarity. In the sections below, we will describe the process of curriculum development and our experiences with its initial implementation.

Concept & implementation within ISAM

Collaborative Master’s curriculum development

The aim of a collaborative Master’s curriculum development in the ISAM project was to integrate (local) stakeholders to create a transdisciplinary process. This has the goal of delivering a curriculum that combines theory and practice, includes systemic characteristics, integrates different perspectives and the needs of the local communities, and innovative teaching and learning tools, thereby optimally preparing students to address complex and real-world challenges.

However, in practice the development of the curriculum was not a smooth and easy process and involved many negotiations of a technical and didactic nature. The BOKU team had previous experience with the development of a Master’s program on ‘Organic Agricultural Systems & Agroecology’, but it was a big challenge to reflect and adapt our knowledge and experience to meet the local reality.

For the ZU team, the development of such an inter- and transdisciplinary curriculum and the participatory teaching format also required adaptation and reflection. The transdisciplinary approach posed challenges for all invited stakeholders, as this implied the prerequisite for everyone to understand more than their own discipline. Nevertheless, a common understanding by all ISAM team members was reached that this approach is much closer to the actual challenges in practice. Consequently, the systems approach for the Master’s program gained momentum. The ISAM curriculum included diverse disciplines instead of following the classical approach of having programs solely focusing on a single discipline such as soil science, crop production, animal husbandry or agricultural economics. One key dimension to achieve this common understanding was trust-building among the different stakeholders of the ISAM team. In this regard, the field trips were

crucial, as they provided opportunities for face-to-face dialogues for rapport building and breaking down barriers.

We divided the development of the curriculum into 3 main phases:

- In a first phase, a questionnaire was drawn up and circulated among ZU staff members (teachers, researchers, technicians) from different faculties and students on their perspective, needs and demands regarding a curriculum on sustainable agricultural development. In a parallel process, local community leaders, value chain actors, agricultural extension service members and local farmers were invited to participate in a consultative process in which their needs, demands and perspectives were captured. In a final workshop, including different stakeholders and the university council, the framework for the content of the Master's curriculum was established.
- The next phase consisted of a further elaboration of courses and contents. This process was aided by disciplinary specific literature reviews, an ongoing process in which teachers from ZU, BOKU and the University of Brazil collaborated and included the latest knowledge.
- In a third phase of the curriculum development process, a series of training materials in the form of handbooks for ZU teachers were drawn up, including various basic skills for science (e.g., literature review and data management, methodology of qualitative interviews etc.) and organic farming practices. Currently, the main task of university staff at ZU is teaching students, while scientific research is minor to non-existent. For the delivery of the training material content, practical training sessions were conducted for teachers. Furthermore, researchers and advisors from other organisations and countries were invited to support knowledge and experience transfer. However, quite a few of the planned training sessions had to be suspended as various challenges were hindering project implementation.

In 2019, the most powerful cyclone (IDAI) on record in the history of Mozambique hit the central coastal areas, significantly damaging infrastructure and leaving parts of the university unusable until today. This also destroyed a few hundred thousand hectares of crops of the country's many smallholder farmers, thus considerably increasing food insecurity. Furthermore, one of ISAM's team members at ZU passed away, leaving a great gap for the working group. Finally, the emergence of the COVID-19 pandemic in early 2020 led to a further cancellation of training sessions. The stability and strength of the internet connection in the country impeded a switch to online training sessions. Nonetheless, the elaborated structure and course content of the curriculum convinced the South African evaluators who were commissioned by the National Council of Quality Assessment, which belongs to the Ministry of Science, Technology and Higher Education of Mozambique. Consequently, an accreditation for the Master's programme was received for the implementation at the Zambeze University.

Innovative teaching and learning tools: a case-study approach

Multiple teaching and learning formats exist, although most of the teachers have been trained in and still follow a classical top-down approach (Deslauriers et al., 2019), usually working with a predefined textbook and PPT presentations or boards in passive lectures with usual time spans of 40 to 60 minutes. Students simply follow a passive reception of

material through listening with the aim of merely remembering and reproducing information. Teachers at ZU confirmed such a reality for their institution, although some already apply innovative teaching methods.

We build on innovative teaching formats based on active learning, which contributes to a systemic pedagogy and systemic learning to address complex issues and to avoid fragmented learning (Ibid). The main teaching and learning format we introduced into each module of the curriculum is case study learning. Case studies are organised as a combination of theory and practice, case analysis and assessment, and final reporting towards practitioners (owners of the case studies) and for a scientific audience as presentations and/or in a poster format, for example, in a poster parkour. Within a case study, students apply various methods from the social sciences (e.g., scenario planning, qualitative interviews, focus group discussions, workshops, participatory observation) and/or from natural sciences (e.g., lab work (soil & chemical analysis), field experiments).

The case studies in the Master's program will, for instance, integrate smallholder farmer communities, where students, teachers and community members together learn to analyse and evaluate constraints on production, profitability, ecology and family/community well-being, and how research and education can, through participatory learning and action, aid in problem solving. The aim is to create a mutual learning environment among teachers, students and participating stakeholders. In contrast to classical top-down approaches, the teacher is not "constantly talking", but providing more of a mentoring/facilitator role, guiding the learning process of students, hence also shifting more responsibility to the learners/students.

However, such learning approaches do pose challenges that often necessitate – first of all – a motivated teacher, who is equipped with the capacities to guide and execute such learning processes. A further challenge is time-availability and commitment, since case study approaches demand more time in preparation, organisation, supervision, and assessment, especially at the beginning, when the new teaching format needs to be implemented from scratch. To tackle these challenges, the ISAM team has been working together to develop examples/"models" of case studies that can be re-adapted to the local context – based on case-studies that had already been successfully implemented as part of a Master's curriculum at BOKU (e.g., Caste Study Competition 1; Systems Course 2) – and thus, facilitating the work of the future teachers.

The transformation of the teaching and learning approach can be challenging. We have observed that students are sometimes very surprised at being assigned a more active role, while the teacher is guiding their learning process more in the background. Nonetheless, active and experiential learning has been shown in many studies and in our own experience to improve student motivation, engagement and learning outcomes (e.g., Diaz & Woolley, 2015). With the implementation of the Master's program, yearly evaluations of the curriculum by all stakeholders will ensure progress and constant improvement of the quality.

Concluding remarks

The ISAM project has been a constant process of development evolving around many challenges and unforeseen events. However, as always in such processes, numerous valuable experiences on a personal and professional level enriched the lives of the involved partners. One of the true benefits of such a project lies in the socio-cultural transaction between the collaborating participants. However, the process of development (personal, professional,

institutional) certainly does not come to an end with the termination of the project, and possibly never will do. Constant reflection on the achievements and on-going consultation with stakeholders will be necessary, and changing realities and evolving experiences will require further adaptations of the curriculum and teaching. Consequently, an intensification of the exchange with practitioners from different parts of the agri-food system is crucial to ensure the quality of the education process and delivery of real-world solutions, serving its citizens and communities. This includes the ongoing development of handbooks which are adapted to the local conditions and serve as additional material for teachers and students to refine their skills. More time will need to be invested in further training and exchange between teachers and researchers to deepen the acquired skills and realities. Education and learning are life-long pursuits. We hope that the efforts of the ISAM project and the resulting curriculum will aid progress towards more sustainable agri-food systems in Mozambique, and that this approach will not only benefit students, scholars, and key stakeholders but also (and especially) smallholder farmers. We also hope that the developed curriculum will be the “seed” of inspiration for many more critical pedagogical tools, which will support a shift towards more sustainable, fair, and equitable agri-food systems. Or as the famous South African leader Nelson Mandela put it: “Education is the world’s most powerful weapon which you can use to change the world”.

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7.2.3 Perspectives, experiences and actions within the scope of the ISAM Project

by Helton Tomo, João Paulino, Iolanda Tachiua

This article makes a brief reference to aspects related to the process of design and project management in a critical analytical perspective of the management and policies adopted during the planned activities as well as the spectrum of results or consequences of these approaches.

Importance of the project

Working for the project (ISAM) was an assertive choice in that the visions orientated within the project conditioned in a positive way an individual's transformation process both on a personal level and in the working environment itself.

Projects such as these, besides the transformation of the individual, allowed for the implementation of constructive actions such as the mobilisation of actors in rural areas and their assistance in terms of scientific knowledge adjusted to the reality on the ground without prejudice to the culture, habit or custom of these actors. Therefore, the project had a remarkable impact on the lives of these social actors, as well as on the institutional level through the capacity building of the staff who are collaborators in the same project.

Great expectations, problems, contradictions, unforeseen events

First of all, the project had objectives that gave rise to much expectation due to the way it was approached and in the consciences of the collaborators. Throughout the process, more institutional value was added to the development of skills and competencies, which in turn was added value to the partnership between both (ZU and BOKU). In fact, the working environment was good, and with the project implementation, it was planned to train 12 teachers from 4 of the 6 faculties at the university. The trained teachers were the same teachers who worked on the development of the Master's curriculum in 'Ecological Production Systems and Agro-processing' (MSPEA), with this being one of the objectives of the project that was achieved with great success. Some producers from Dondo District in the Province of Sofala were also trained, where the training culminated with the assembly of an agroforestry system.

Several training sessions scheduled to take place in 2019 had to be cancelled due to the devastating cyclone IDAI that heavily impacted the central coast of Mozambique, also leaving parts of the university buildings destroyed until today. The training sessions were shifted and rescheduled for the beginning of the year 2020, but due to the situation with COVID-19 pandemic, they ultimately also had to be cancelled. Due to the poor internet connection, the training sessions could not be delivered online either, thus in total half of the training sessions were ultimately delivered. However, it was decided to prepare further training materials instead, providing a comprehensive step-by-step guide to building sustainable farming systems – aiding teachers and students in teaching and learning.

Furthermore, we should mention here that the language (English) unfortunately partly interfered in efficient communication among project partners, although it improved during the project implementation period, aided by modern technology such as translation programs (e.g., DEEPL). Ultimately, the project proved a great learning opportunity to improve language skills. The process of managing funds for projects that have external funding and internal management still poses some challenges such as, the availability of funds to carry out activities on time, the regular payment of subsidies and adjustments that are usually made according to external regulations (of the funder). This was mainly due to the difficulty in understanding the rules as they were in English, which led to some misunderstandings that took a long time to rectify in 2019 for the budget changes, etc. We therefore recommend that the grant contract should also be translated into the national language (in our case Portuguese) in order to ensure inclusivity.

What we learnt

The ISAM project was always guided by a vision of teaching and learning tools allocation, and the most important component for most of the collaborators was the training in Agroforestry Systems (SAF's). The form of instruction provided the expertise to highlight interactivity, a participatory environment, sharing of experiences, and the spirit of leadership typical of good knowledge transfer. This same approach was adopted by the collaborators and used in the training as a practical component that culminated with the assembly of an experimental pilot unit of SAF in the productive unit of the Dondo District Producers' Cooperative.

On the other hand, the development of modules that make up the Master's curriculum, including the production of textbooks for the respective modules, was a great learning experience for all of the teachers, which will benefit the future development of curricula.

It is important that, in the project design process, those seeking funding for project development seek to do so even if it is difficult to predict the broadest spectrum of actions that will be developed in the project, and therefore the things that the planned activities will require in order to be successfully implemented. However, from this we have identified the need for a more participatory diagnostic process in order to accommodate all the perspectives of the project throughout the implementation process.

We have learnt that it is important to look at these aspects so that the results of the project gradually begin to become more noticeable and more significant. Consequently, the beneficiaries of the project and the relationships between the funders and/or recipients of funds may become deeper, always seeking a better approach and the continuity of a satisfactory partnership between both parties, which transforms lives.

Gender perspectives

The issue of gender has been much addressed in recent times, largely because of the predominant role it has been playing and the space it has been gaining in society, both in the main decision-making bodies and at other levels. In accordance with the APPEAR guidelines, the implementation of the gender mainstreaming principles became a cross-sectional task. This means that the gender dimensions are systematically integrated

in the Master's program and on the project level. All measures are examined regarding their implications for gender.

The ISAM project has adopted the same gender mainstreaming approach in all processes from training and implementation of the various activities, but in these processes, it could be seen that there has not been much engagement or even equal interest of women in relation to men. It is believed that this is a cultural issue on which we must keep working over the years to overcome this and find a better balance. However, this situation is also associated with a "gender-specific dominance" which is deeply rooted in social and cultural realities, and especially in patriarchal societies, where they are often considered to be part of the "natural order", a situation that is unfortunately still very common in Mozambique.

As foreseen in the "Five Year Plan" of the Mozambican Government (2015-2019), the period in which the project was being implemented, the principle of gender equality and equity was respected in all project activities. For the selection of professors and researchers who participated in the elaboration of the curricula, the criterion of equality was used with the guarantee of equal opportunities for men and women, and methodologies of evaluation, application, and qualification. However, in this specific case, a gender balance among collaborators, as an objective, was not achieved. This is one of several reasons why there are few women in the areas of agricultural sciences at a university level. The same principle was used for the selection of producers who benefited from the training, in which, unlike for teachers and researchers, the results were different and gender equality targets were achieved.

In the project, women taking the role of protagonists in the sharing of roles and responsibilities is becoming more and more visible; however, our experience in this context is at an encouraging but challenging level as it is necessary for women to take initiative and proactively push and shape change processes. This process involves further empowering and further educating women about their important role in the society, especially in key areas such as research and the mobilisation of different actors.

Knowledge building process

Many of the activities carried out within the project foresaw a need revealed by the “gap” in certain areas of knowledge forcing us to seek trainers to fill these spaces. It should be noted that the approach used for the training stems from the intellectual and technological needs of the ISAM-team and teachers understood to meet a certain purpose. For example, we asked project collaborators to brainstorm regarding which subjects they would like to incorporate in the training, and this communication was carried out in writing (emails and WhatsApp for the most part). Based on their answers, we observed the relevance of the subject for the working group as a whole, which then allowed us to choose the subject of the training proposal. This process is ultimately a kind of an integrated participatory process. We also used this approach to understand the embedded reality of small farmers to cope with climate change, the seasonality of crops and cultivars, quality of life, comfort at work “in situ” and the gradual loss of arable land. Consequently, this has made us look for technologies to mitigate or minimise the suffering of communities by incorporating technologies adapted to the conditions of the environment and to foster the gradual improvement in the quality of life.

Dissemination of the project and its results

The project has a very clear spectrum of action at the site of its implementation and at University Zambeze in general. During the implementation process, the management used all available means of dissemination (banners, information material, manuals, training workshops) to increase the public’s awareness of the project’s existence and prospects, both at the University Zambeze, in its faculties and other institutions. As already described in this article, the project has satisfactorily achieved a large part of its objectives, with the approval of the Master’s curriculum in ‘Ecological Production Systems and Agro-processing’, and the certification of operation by the Ministry being notable highlights. In addition, it also provided a large part of the training it hoped to provide for teachers, researchers and collaborators. The project was also implemented amidst the difficulties imposed by the situation and implemented pilot unit of an agroforestry system with the farmer’s cooperative in the district of Dondo – Sofala Province, which was a challenge for the team who produced a practical guide for the activities carried out in this particular area. The guide contains a detailed description of the operational activities in the implementation of this system. This activity is transforming the form of cultivation performed by small farmers and improving the quality of well-being and life of social actors and their families. However, it is necessary to continue this project if it is possible to secure its continuation so that this activity will have even more significant results in areas such as application of the tools obtained in training and the timely monitoring of projects progress and how this may affect the wider community. These are ultimately issues that require funding, highly competent and motivated employees to continue projects like this in order to obtain complete data on its impact on the lives of the people and on the management of the agricultural and cultivation system.

7.2.4 Enumeration of results

- Master's curriculum "Ecological Production Systems and Agro-processing" accredited by the Ministry of Education of Mozambique.
- Development of the Master's curriculum and the respective modules.
- Various workshops conducted with different stakeholders (local community leaders, value chain actors, agricultural extension service members, local farmers, university staff) before the development of module contents of the Master's program.
- Development of six teaching manuals for the Master's program (Teaching manual; Basic science skills; Qualitative methods; Literature reviews, scientific paper writing & publishing; Mendeley manual; Practitioner's guide on climate adapted and ecological agriculture in Mozambique).
- Extension of the professional network through the collaboration with partners from other universities in Portugal, Austria and Brazil; as well as non-academic partners such as 'Sustainable Agriculture Tanzania' (SAT); membership of Zambeze University to the AfricaUniNet program.
- A total of five training sessions were conducted with teachers (totalling 20 days) on: Gender specific topics; Curriculum development; Soil testing; Design and implementation of agroforestry systems in tropical environments; Set-up and implementation of agricultural extension; Basics in systems thinking and respective teaching approaches.
- The installation of an agroforestry system pilot unit with small farmers (also serving as a case study for future students).
- The implementation of constructive actions such as the mobilisation of actors in rural areas through training in sustainable agricultural practices.



End of first curriculum development workshop in Beira, APPEAR representative Ms. Nikoleta Niko-sianli in the middle, project coordinator Mr. João Paulino, second from left, Mr. Bernhard Freger, last row, second from right



*Team members trying fast
ph-level evaluation of fer-
tile ground*



*Field visit to farmers' com-
munity*



*ISAM project start meeting
with farmers and other
stakeholders*

7.3 Capacity Building for Renewable Energy Technologies in Mozambique

Project coordinator: Luís Cristóvão

Coordinating institution: Zambeze University

Partner institution: FH Joanneum University of Applied Sciences

Partner Country: Mozambique

Project duration: 1st of January 2018 – 30th of June 2020

7.3.1 The project – RETEM

Africa has substantial new and renewable energy resources, most of which are underexploited. The continent is rich in energy resources, but poor in energy supply with over 130 million households still depending on other forms of energy such as: charcoal, kerosene, lantern, candles, fossil fuels, and another 620 million who do not have access to electricity at all. Electricity demand in Africa today is approximately 700 terawatt-hours, with the North African economies and Southern Africa accounting for over 70% of the total.

Most people in Sub-Saharan Africa face severe energy poverty, and low availability of energy services is hampering economic development. This deficit is evidenced in the ranking of the 20 countries in the world with the least access to electricity, of which 13 are from the African continent, namely: Nigeria, Ethiopia, the Democratic Republic of Congo (DRC), Tanzania, Kenya, Uganda, (the former) Sudan, Mozambique, Madagascar, Niger, Malawi, Burkina Faso and Angola. Africa's energy sector can be best understood by breaking it down into three distinct regions. North Africa, which is heavily dependent on oil and gas, Southern Africa, which depends on coal and the rest of Sub-Saharan Africa, which is largely reliant on biomass. Consumption of modern energy in Sub-Saharan Africa (excluding Southern Africa) is very low.

Mozambique is a country located on the east coast of Southern Africa on the Indian Ocean. The country is endowed with abundant and diverse renewable energy resources, ranging from hydropower, photovoltaic, biomass and wind to geothermal. However, the country is already experiencing vulnerabilities to climate change and extreme weather events such as Cyclones and floods. Despite its enormous potential, the contribution from renewable energy has not been fully exploited. The only resources significantly being used on a large scale is hydropower. In addition, forest resources satisfy more than 85% of total domestic energy requirements and more than 95% of the required energy supply in rural areas. Biomass resources are mostly exploited in traditional, but unsustainable ways, though there remains great potential due to the large amounts of organic waste generated from the agricultural sector. It is well known that hydropower and biomass are vulnerable to changes in rainfall, extreme weather events and rising temperatures.

Mozambique is one of the poorest countries of the world with a population of 28.8 million people and almost 70% of the population lives in rural areas, of which only 5.7% use electricity for lighting. The national grid including off grid facilities is claimed to reach 30% of the country today in terms of the number of people having potential access to the grid. Urban electricity access is estimated at 67%. Even so, the country's considerable energy resources enable it to meet its internal demand and still export energy to Southern and East

African countries. Mozambique's targets include the provision of grid-connected access to 50% of all households by 2030. This would require the Mozambique Electricity Company to connect around 180,000 houses per year to the grid. Currently, the Mozambique Electricity Company has budgeted for 100,000 new connections per year. Off-grid solutions are thus an important element in Mozambique's electrification future. Currently, the power sector faces three key challenges, namely: i) to provide reliable and efficient electricity supply to its customers; ii) to cope with the increase in electricity demand from its current (and future) customer base by expanding its generation and transmission capacity; and, iii) to provide access to electricity to the vast majority of the population. Thus, renewable sources of energy, which are environmentally friendly, can be utilized to improve access to sustainable, modern and cleaner energy services. Renewables play a leading role in meeting this demand. To date, the continent with the richest solar resources in the world has installed only 5 gigawatts of solar PV, less than 1% of the global total. The livestock is abundant and forests are becoming scarce. An alternative to fuelwood is desirable and, in this context, biogas, solar, wind and hydropower energy are being highlighted by the Mozambican government.

However, a lack of knowledge concerning renewable energy has been an obstacle to their wider use. Mozambique has limited expertise in undertaking feasibility studies, detailed design and the construction of renewable energy power plants. There is a lack of forest information and sustainable harvesting plans. The banking sector and investors also have limited experience with financing renewable energy projects.

Therefore, forming a well informed group in this area inside the university would also create opportunities for further cooperation with the public and private sectors. The deployment of renewable energy technologies has the potential to contribute to job creation, income generation and the improved livelihoods of marginalised social groups, particularly women and children in rural areas.

Consequently, this project aimed to:

- Create a renewable energy research laboratory to work on different sources of energy and software for optimisation and simulation.
- Create a Bachelor's Program in Engineering of Renewable Energy and Environment to provide an opportunity to develop specialised skills in developing and the sustainability of the world's renewable energies. A BSc. program in renewable energy is among the few courses offered in the country, which not only encompasses renewable energy technologies but also goes hand-in-hand with the indispensable elements related to renewable energy in terms of finance and environmental law.
- Design a short training course in PV Installation and maintenance aimed at addressing the needs of people, organisations or small business that require practical skills on sizing, assessing and installing solar PV systems.
- Offer an English course for training staff at Zambeze University-FEARN in order to improve the capacity to communicate and write up projects and reports.
- Train UniZambeze staff in e-learning platforms in order to reduce the physical presence of students and teachers on campus.

7.3.2 The project and its people

by Luis Cristovao, Julia Silota, Jenita Cangola, Angela Andela

Energy does not just represent physical principles that integrate complex variations of concepts. It plays an important role in the development and future of humanity. Currently, the vast majority of the world's energy consumption is supported by traditional non-renewable sources such as oil, natural gas and mineral coal. These sources generate considerable negative environmental impacts and the scarcity of resources (technological and financial) limits their capacity to explore and respond to the great demand for energy.

As an example, on the African continent, energy is inaccessible, too expensive and unreliable for most people. Of a total of approximately 1.2 billion Africans, only 33% have access to electricity.

In Sub-Saharan Africa, where more than 950 million people live, most countries have electricity access rates of around 20% and two out of three people do not have access to modern energy services. It is the only region in the world where the absolute number of people living without electricity is on the rise. In addition to the lack of access to electricity, four out of five Sub-Saharan Africans depend on traditional biomass to make food.

Specifically, in Mozambique, in a real context of 29 million inhabitants, about 67% live in rural areas and only 26% have access to the national energy grid. This energy crisis affecting the African continent and beyond requires solutions based on understanding the opportunities for exploiting the abundance of resources for renewable energy and investment in technologies, financial resources and human capacity.

According to Avila et al. (2017), in his study on energy challenges in Africa, it is stated that Sub-Saharan Africa has an abundance of renewable and fossil energy resources that have not yet been properly developed to meet the region's demand for electricity. Its potential technical production capacity is estimated at 11,000 gigawatts (GW), largely based on renewable energy. All of the countries in the region have a high potential for solar energy, and the technical potential for photovoltaic solar energy alone is estimated at 6,500 Tera Watts hours (TWh) per year.

Cartwright (2015) also mentions that most of the region's coastal countries have a high potential for wind energy, totalling around 109 GW. The East African Rift Valley offers about 15 GW of geothermal capacity, mainly in Ethiopia and Kenya. As the region is home to the Congo and Nile rivers, which are two of the largest rivers in the world, it also has some of the best hydroelectric resources in the world. Explorable hydroelectricity is estimated at 350 GW, being located mainly in Angola, Cameroon, the Democratic Republic of Congo (DRC), Ethiopia and Gabon. Its fossil energy resources include recent oil and gas discoveries, with around 400 GW of natural gas potential. Coal resources are estimated at 300 GW, mainly in Botswana, Mozambique and South Africa (Castellano et al., 2015). However, some countries with low access rates, such as Angola and Nigeria, have well-developed oil infrastructures that do not translate into a reliable supply of electricity.

The development of renewable sources in electricity generation contributes, not only to increase productivity and lower the costs of agricultural, commercial and industrial processes, but also to the diversification of energy sources. This diversification occurs due to the nature of the source and also the geographic distribution of the generating sources, thereby reinforcing local production parks. In this way, the national electricity network is

guaranteed by energy sources with different seasonal patterns and distributed throughout the national territory.

Poor access to energy has a major impact on agricultural production and productivity, thus contributing to the continuing sad situation of the prevalence of hunger, as production systems are not only the base of the short-handled hoe and without the use of improved inputs, the unavailability of energy has contributed to the low levels of use of mechanised agricultural machinery and irrigation systems, key elements for increasing the size of production area and consequently increasing production and productivity.

Despite the rich resources with potential for renewable energies, most of the population does not have access to energy, which is due in part to financial difficulties and a lack of technical capacity for exploration. The seventh sustainable development goal aims to ensure reliable, sustainable, modern and affordable access to electricity for all. There is a need to ensure the existence of qualified labour for the country in order to maintain energy systems.

According to the Renewable Energy Strategy, in Mozambique the technology for harnessing renewable energy resources is still poorly known. In the technical and consumer sectors, the infrastructure for capturing renewable sources is scarce, the supply of energy services to design, install and maintain renewable systems is insufficient, and the mechanisms and tools for promoting and regulating technologies are non-existent. The strategy establishes an integrated approach for planning and implementing the use of renewable sources in national energy supplies. Institutional training and guaranteeing the training of technicians with knowledge of how to use these renewable forms of energy is one of the major steps to be taken to help achieve this objective, which is the major role to be played by educational institutions, be it technical professionals or higher education. Access to financial resources to guarantee the implementation of the use of these forms of energy remains a major issue, for which it is necessary to integrate different partners, diversify sources and the dimensions of systems.

Mozambique is a vast country, characterised by having regions with very dispersed housing areas, which in a way makes it difficult to supply energy using centralised systems. There is a need to invest not only in large utilisation plants, but also in mini and peak plants and decentralised and isolated systems, mainly in the vast rural and peri-urban areas.

Consequently, the RETEM project which aimed at training teachers, introducing a BSc. program, equipping libraries and setting up laboratories on renewable energy technologies, is opening up space for the existence of many actors to participate in the implementation of projects using renewable energy sources. It has resulted in the training of 20 technicians among professors at the UniZambeze-FEARN and UniPungue, and partners working in the energy sector, such as EDM and FUNAE. Among those trained, the gender aspect was taken into account, whereby 10 of the graduates are women. A BSc. course in Renewable Energy and Environment has been designed and is currently awaiting approval from University Board. Also, 15 young people were being trained in installation of PV systems who, as soon as the COVID-19 restrictions are over, will return to the course. A laboratory was set up and some books were made available in order to guarantee access to information and technical material. Many publications were made on radio stations, television and newspapers about renewable energies, which contributed in a way to drawing attention to renewable energies. Undergraduate and postgraduate students had the opportunity to participate in lectures and practical classes on renewable energies through the implementation of the project. These results show the variety of actors that have been involved and that have received general, technical and/or scientific information.

The existence of knowledge in the field of these technologies for different actors, including teachers, who aim to transfer knowledge to students who have benefited from undergraduate courses and short courses, is of vital importance. This in turn also plays a large role in the implementation of these technologies at various levels. This implementation creates new areas of employment, in industry, commerce and education. Consequently, it also creates new opportunities for income generation.

The establishment of micro, mini and small-scale credit mechanisms for investors in the production, commercialisation or exploration of technologies for the use or conversion of renewable sources, as well as partnerships for continued training and capacity building are important aspects to guarantee the achievement of sustainable development goal number seven. This will also require integration of the aspects related to industries for the manufacturing and maintenance of the necessary equipment.

7.3.3 Between high expectations and daily routine

by Jeannine Schieder and Christof Sumereder

Hearing word of the positive evaluation of our project RETEM – Capacity Building for Renewable Energy Technologies in Mozambique, we were very enthusiastic in starting this cooperation with the University Zambeze. From the beginning, we have been in very close contact with our partner in Mozambique via skype and email. In the first few months we had to fill out a lot of paperwork for the signing of the contract and developing a detailed project plan for the next 2.5 years. After completing the initial project phase, we started work on the first deliverable, developing the Bachelor's degree program.

Now it was necessary to plan the first project meeting and so Mr. Bärnthaler and Mr. Sumereder went to Chimoio in September 2018 for one week. It was a very intensive meeting with a high workload: training sessions for the lecturers on the module on hydropower, commissioning of PCs and lab installations, development of curriculum content for basic education (mathematics, physics, chemistry, economy, ecology, languages, technical content, ...), as well as an excursion to the hydro power station at Chicamba. Both partners were very busy within the project meetings and a long list of tasks was developed. Consequently, there was also a lot of work in the months following the meeting for both partners.

On 15 March cyclone Idai hit Beira with a maximum wind speed of 205 km/h. In addition to the high potential for destruction this entailed, heavy rain showers persisted over several days. The people in the affected areas had to deal with having their homes destroyed on the other hand and fight against a disastrous flood on the other. An acute lack of food and health care, and the danger of epidemics impacted the whole province. Many roads were cut off by mudflows, which made travelling impossible meaning that air bridges were arranged by international aid organisations. Electricity and telecommunications were also interrupted and we were very worried about the situation in Chimoio and how we could help our project partners from Europe. Luckily, the City of Chimoio is about 200 km from the coast and the cyclone diminished in strength thereby easing some of its destructive power. We were so relieved when we received the first message from our partners that they survived the thunderstorm and were safe and sound.

Regrettably, the campus of the Zambeze University in Beira bore the full force of the cyclone. The building was totally destroyed and flooded meaning that it had to be abandoned. Widespread damage with the loss of many electronic documents due to the destruction of IT infrastructure was fairly insignificant compared to the destiny of many other people who lost everything.

Nearly at the same time in Europe due to a very happy event, the birth of her first baby, our project team member Mrs. Horn went on maternity leave. To fill this gap another colleague Ms. Schieder stepped in to support the RETEM project team. As it was one of her first international projects, she was very excited to start working on such an important project, to learn a lot of new things and to assist while establishing a new sustainable Bachelor's degree program in Mozambique. For her, it was also very interesting to hear and see new aspects of a totally different culture. One of her first contributions to the project was to pick up our partner from University Zambeze, Prof. Luis Cristovao, from Vienna Airport. This was in October last year. On the way back to the campus of FH Joanneum in Kapfenberg they had a lot of time to get to know each other and to exchange some very interesting stories from both sites of the project, Mozambique and Austria. There were lots of interesting activities planned for the week of Prof. Cristovao's visit to Austria. Things kicked off with some nice evenings having dinner and drinks in the city of Graz, followed by an exciting film shoot with ORF on the RETEM project and some interesting lectures at the department of Energy, Transport and Environmental Management of FH Joanneum, and finally a nice visit to a PV plant in Styria with Mr. Bärnthaler and Mr. Sumereder. These were just some highlights of this trip to Austria, but there were also a lot of discussions, meetings and paperwork to ensure the progression of the project.

Last February, Ms. Schieder and Mr. Sumereder set out for the return visit to Mozambique and for another project meeting at the University of Zambeze. Besides the usual project work (training of lecturers, reporting, commissioning of lab equipment, ...) we also became aware of the extent of the loss. We were able to inspect the destroyed campus in Beira, on many buildings the roof was destroyed or missing and windows, doors and balustrades were broken or non-existent.

As it was Ms. Schieder's first time in Mozambique and in the South of Africa at all she was very impressed by the green landscape as well as the modern campus of University of Zambeze and she always felt warmly welcomed in this country far away from Europe, despite all the destruction and poverty which came from the cyclone Idai. On several evenings, we were invited to dinner within the city of Chimoio and were therefore able to become familiar with the region and its people. Another fascinating aspect of the visit to Mozambique was the beautiful view of the so-called sleeping giant, which is a mountain that can be seen from the city of Chimoio.

None of us thought in the initial phase of the project that a natural catastrophe could happen and interrupt the project activities. It has to be pointed out that the people in Mozambique did receive help from abroad, but the people also rallied together and showed a great deal of solidarity in helping one another. The essential reconstruction work was completed within a short time. The country came back to a structural sense of normality within the few weeks and we were able to continue working on the next technical modules.

When we came back to Austria after this project meeting in the first few days of March 2020, the whole world was focused on the development of the COVID-19 pandemic, which led to a lockdown in countries in the Far-East. This scenario of a lockdown was unimaginable.

inable for all of us. A lockdown has not been seen in the past two generations. We live in a highly engineered world with one of the best medical care systems around. Only since the first cases were reported in Italy and France did the cocoon of a partial situational lockdown enter our mind. However, the pandemic wave of COVID-19 spread throughout our modern and seemingly so safe world. Finally, some days later the first infections were also reported in Austria and were monitored by all with great attention. By 19 March the Austrian government had ordered a lockdown all over Austria, in Mozambique the lockdown followed exactly one month later.

So, after the first disaster induced by a cyclone, the second debacle caused by a pandemic forced us to overrun our short project period. It should be pointed out that during the lockdown we all were working from home and communication was possible at all times. Consequently, we stayed in close contact to reorganise our project. We had to cancel the scheduled project finish where we had planned to hold the last training sessions and the final event at the campus in Chimoio. We received excellent support from the staff at APPEAR. We were able to choose between different scenarios for the project completion. We chose the option of finishing without reaching the following project objective: approval of the Bachelor's degree program by the university board. We will make up for the final training sessions and final event in 2021 if the pandemic situation once again allows for travel to Mozambique.

Now we are in the post-project phase and we are busy writing all the reports and filling in the tables for financial reporting at the moment. Between the project end in June and today (end of August) 2020, people lost a lot of interest in the pandemic. But now the second wave of COVID19 is becoming ever more present. We are working and planning amidst a totally unpredictable situation in respect of if, and if so which, measures will be imposed by any government. How and when will it be possible to travel, which safety requirements will we have to fulfil, will we need a PCR certificate or will we have to stay in quarantine? Will there be a safe and effective vaccination, will there be enough vaccine for everyone, or only for a risk-group? Who defines this group and will it be necessary to have a vaccination? There are many, many questions and every government makes decisions in a different way and often the regulations have great scope for interpretation and a wide margin of discretion. None of us can remember such an unpredictable time fraught with such uncertainty regarding the development of the pandemic.

In both situations it was necessary to maintain ties between the project partners. The important decisions for the project were made together in close consultation via skype and email. Despite both problematic situations, together we found a way to continue the project without losing sight of its objectives. The time after the cyclone Idai in particular was a great challenge in terms of communication and to keep up with the necessary project work. The reports have to be submitted on time no matter what the situation. The people in Mozambique were great in consideration of the fact that there were permanent power blackouts and interruptions to communications.

In Austria, the routine work was continued in both situations. During the time just after cyclone Idai, we provided support with an aid appeal in our university. At Ö1 campus radio, we were granted an interview where we also made an aid appeal to support international aid agencies. During the COVID-19 lockdown we tried to organise the necessary lab equipment, measurement devices as well as software for PV planning (PVSol) and electrical grid calculation (SinCal). The process for ordering goods took longer than usual due to these critical circumstances. Many companies sent their employees onto short-time working,

reduced the number of employees or made them redundant. Often emails and telephone calls went unanswered. But luckily we were able to order all of the necessary equipment and it was delivered to us in Austria in time before the project was closed. For the installation of the software, we do not have a transport problem, everything can be done via internet. For the measuring devices, we have to wait until it is possible to bring them to Mozambique or we can send them by freight to the campus in Chimoio.

During the project meeting in February 2020, we were able to install the lab equipment for the modules of renewable energy. We ordered four test kits with a focus on PV energy, wind energy, hydro power and biofuel from the company LexSolar. These test kits were packed in carrying cases made from aluminium and weighed more than 30 kg. Transporting these by airmail is a very expensive business and otherwise by ship it would take several weeks. So we decided to take them for the third project visit as hand luggage from Austria to Mozambique. At the check-in desk at the airport we were very lucky that the airline staff allowed us to take all of our equipment free of charge. Luckily, all of the cases arrived in one piece in Beira where we were picked up by the driver from University Zambeze. During the visit we were able to give the first tutorial on how to use these test kits. The lecturers were very interested in this lab equipment and we assembled some of the possible experimental arrangements. The team in Mozambique has also already organised two sets of PV island systems: each experimental test-setup consists of a polycrystalline PV-module, a DC-DC charge controller, a lead-acid battery, a load (light bulb) and cables. With this setup the students can easily assemble an island PV-system with a storage battery. In combination with the PV planning software, the students are also trained in theoretical knowledge about PV technology as well as gaining practical experience in installing the equipment under realistic conditions. Using the test kits from LexSolar, the awareness about renewable energy planning, application, implementation and finally setting it in operation has been deepened to an extent that the graduating students are now able to work as self-employed. Ideally, they will bring the knowledge to other regions of Mozambique and apply renewable technology in practical projects all over the country.

The Austrian RETEM team is very confident that the partners from Uni Zambeze will make the best out of the result of our common project. Prof. Cristovao's team showed great innovative potential and exploratory spirit as well as the enthusiasm necessary to be an excellent teacher and researcher. We wish them all the best for their future.

7.3.4 Enumeration of results

- Laboratory equipment for training

During the period from 2018 to 2020, the project bought several pieces of field equipment and software, namely: 20 Personal computers, 1 printer, 4 laptops, 1 digital camera, 1 power logger fluke, 1 LeXsolar – Biofuel Read-to-go, 1 LeXsolar – Wind Professional 1406, 1 LeXsolar-Hydropower Read-to-go 1905, 1 LeXsolar-PV Professional 1118, PV planning Software, PSS SINICAL Education 16.5 Software, 2 solar photovoltaic solar systems (2 solar panels, 2 converters, 2 charge controller, 2 batteries), 2 thermo cameras.

PV planning software was installed in the informatic Lab and the staff are getting acquainted with this. But assistance with, PSS SINICAL Education 16.5 Software, is still being provided by the manufacturer to UniZambeze technicians.

The equipment was selected taking into account different sources of energy and the potential for renewable energy in Mozambique. Some equipment was bought in Austria, through FH Joanneum, and sent to UniZambeze. The team from the FH Joanneum University trained 20 staff from Zambeze University to use and maintain the equipment. This equipment was being used for short training before schools were closed due to the COVID-19 pandemic and will be useful for the BSc. Program.

- Library and infra-structure for internet

During the project, UniZambeze bought 6 books, out of the 100 books planned in the project. The student to book ratio in the library reduced. An internet connection was made available.

Overall, for all items expected in the project, research literature was not completed due to the COVID-19 pandemic. The acquisition of the remaining books will be possible after the COVID crisis with follow-up funding.

- Capacity Building – Staff Training

Renewable Energy course

During the project, it was expected to offer 4 modules, namely: Hydropower, solar, wind and biomass energy. But, since Mozambique declared a state of emergency in April 2020, wind and biomass module were not carried out as planned.

Overall, during the training, the staff improved their capacity to plan and teach courses in hydropower, photovoltaic solar energy and new teaching tools & methods were made available for energy and environment. During the same period, a short training course was launched. The participants were selected taking into account genders issues and social conditions. Priority was given to participants with limited financial resources.

It is important to mention that, at FH Joanneum University one student finished their dissertation on the project and at UniZambeze, two students are enrolled in the project and are finishing a dissertation on solar energy. The supervision of the work is being undertaken by staff trained in the RETEM project. Also, the students are using the equipment made available by project.

English course

Twenty staff attended an English course at the Language Institute-Chimoio. The participants were selected taking into account gender issues, 7 were female and 13 were male. The classes were divided according to their English levels. All classes were given at the UniZambeze campus, this facilitated the attendance of all staff at the English course, who also continued to teach normally. So far, this training in English and renewable energy that is being taught in English has encouraged all staff to speak English frequently. Unfortunately, since the state of emergency due to COVID-19 started, the institute has been closed. However, the participants are receiving learning materials to read while they stay in home office.

- Short training course in photovoltaic energy

A short training course in PV installation and maintenance was launched with presence of the selected student and academic community. The meeting was held by the representative of the local government, the administrator of Chimoio. The participants were selected taking into account gender issues and young people from low-income backgrounds. The short

training course was provided for free; this helps to reduce social exclusion. The course was intended to finish within 2 months. However, since the state of emergency due to COVID-19 started, the university has been closed. After closing the university, Moodle training for staff was made available during the state of emergency. Specific adaptation mechanisms including social distancing, small meetings and remote interviews were used during the training. This helped the teacher to keep on teaching, although the quality of the training and number of the students that attended reduced. Therefore, for the short training course the faculties have decided to cease teaching as the participants did not have the means to follow the class remotely, in particular young people from low-income families. The Epsilon Solar Company was involved in teaching and the National Energy Fund will be involved in the installation of panels.

- Short training in an E-learning platform

The project trained 20 staff from UniZambeze in Moodle. In addition, during the stay of one member from UniZambeze in Austria, training was held not only from point of view of a user but also as an administrator. Consequently, during the COVID-19 pandemic it was easier to train the remaining staff from UniZambeze. Also, when restrictions are relaxed, short training sessions for all students are planned to resume.

- Curriculum development

Moreover, the research topic of the BSc. program was defined based on the challenges faced in order to exploit different sources of energy in the region. Consequently, to respond to all the competencies, values and abilities required for a renewable energy and environmental engineer, the course defined 51 subjects, 270 Credits and 8,100 hours.

The curricula of BSc. program in Renewable Energy and Environment was submitted in 2019 to the University Board, but since the COVID-19 pandemic began the approval has been delayed due to meeting restrictions. The country is preparing to reopen the school and universities, and specific adaptation mechanisms including social distancing among others are being included in the action plan. The meeting for approval is scheduled for the end of September 2020.

The curricula for the short training in PV installation and maintenance was being used before the start of the COVID-19 pandemic. After the reopening of the university, a small adjustment will be needed in order to reduce contact time without reducing the quality of the course. Also, the class will be divided by groups in order to reduce the possibilities of infection.

The Bachelor's program was not able to be approved by the Board of UniZambeze due to COVID-19 lockdown. The approval will be granted as soon as the COVID-19 restriction are finished, so that the Bachelor's program can start 2021.

All curricula were developed with the involvement of FH Joanneum University, Mozambique Electricity, the National Energy Fund and the Epsilon Solar Company.

- Mobility of staff

During the project, UniZambeze received lectures from FH Joanneum University, and vice-versa. Lecturers from FH Joanneum University were involved in teaching the modules and one staff member from UniZambeze was involved in the seminar at FH Joanneum University. This mobility helped to internationalise both universities and get acquainted with the way each university works.



*TV interview with
Mr. Christof Sumeder at
Campus Chimoio*



*RETEM team at Campus
Chimoio*



Training of teachers



Training module PV



Excursion to fermentation plant in Beira



Hydroelectric power station in Chimoio area that served as example for hydropower generation



Surrounding area of hydroelectric power station and river that is used for hydropower



Use of simple agricultural tools for cultivation and watering of field sites



Visit of hydroelectric power station near Chimoio campus

8 SENEGAL – BURKINA FASO

8.1 Sustainable Energy Access for Sustainable Cities

Project coordinator: Aminata Fall

Coordinating institution: Vienna University of Technology

Partner institution: Ecole Polytechnique de Thies, Austrian Institute of Technology

Partner country: Senegal

Project duration: 1 January 2018 – 30 June 2020

8.1.1 Description of SEA4cities

Sustainability in practice demonstrates a need to scale down the focus from a national to a local level. Subnational entities, whether cities or villages, feature a key component of public intervention efficiency, namely proximity with communities. This proximity supports the efficient intervention in building climate resilient-cities within the framework of a global action to combat climate change and its impacts (SDG-13).

Energy systems are major contributors to pollutants that cause climate variability. In its 2018 report, the United Nations' Intergovernmental Panel on Climate Change (IPCC) estimates that limiting global warming to 1.5°C will require to increase the share of renewables in the electricity supply mix to 97% by 2050. Cities are major centres of energy production and consumption. In developing countries, cities have grown, and continue to expand at a level that requires urgent solutions. Over the last two decades, Africa has recorded the highest urban growth at 3.5% per year, projecting the proportion of urban dwellers to pass from 36% in 2010 to 50% by 2030 on the continent (Transform Africa, 2017). The Global Environment Facility alerted: “No area provides more opportunity to address the world's environmental degradation and work toward sustained global environmental benefits than cities and urbanization”.

Since the 1970's, Senegal has, through a number of initiatives, tried to relieve the rapid expansion of its cities. The capital city Dakar passed from 400,000 in 1970 to 3.1 million inhabitants in the 2013 census. The most recent of these initiatives is the Programme for New Urban Poles adopted in 2013, with Diamniadio being the first of the new poles. The Diamniadio concept echoes the Aspern concept in Vienna, in terms of the rationale related to population growth and the objective of having more sustainable urban living. In Senegal, where universal access to energy is yet to be achieved (71% in 2019 according to IEA), the project undertakes research on the energy behaviour of citizens in order to assess the factors that are relevant to a transition to sustainable energy production and use. SEA4cities proposes, through its Energy-System Planning Model (ESMP), scenarios of access to distributed renewable energy generation (solar and waste to-energy) as potential alternatives to grid extension, which together with better efficiency of energy use, should serve as a model for sustainability of urban energy systems. The SEA4cities project features an innovative paradigm evolution in terms of methodological approaches, by building on experiences of different organisations intervening on energy access and/or urban sustainability, which contributed knowledge in identifying gaps that require research focus and answers to move forward the agenda of access and transition to energy sustainability in Dakar and other emerging cities.

SEA4cities Energy System Planning Model (ESPM) software brings the contribution of information technology to increase the share of renewables in the electricity supply market of Sub-Saharan Africa cities. Apart from mitigating climate variability, this increase should improve living standards in both urban and rural environments, and broadly impact the potential to achieve the other sustainable developments goals in the region, including SDG-8 (economic growth), SDG-11 (sustainable cities) and SDG-12 (sustainable production and consumption).

8.1.2 Bringing together players in access and transition to energy sustainability

by Salif Saw

I am a doctoral researcher and a member of the SEA4cities project team. I mainly worked on the planning of energy systems and the management of the partnership with other institutions and projects. I mainly spent time working in the project on data collection, preparation of survey tools, field surveys, data processing and analysis, supporting correcting ESMP algorithms and drafting articles. Regarding the SEA4cities partnership platform, we initiated contacts with several entities, and reached agreements with some such as CERMI and ProGREEN. We also represented the project in workshops and studies convened by these partners. Additional information on all these activities can be found below.

- Inception workshop: Above all, participation in the SEA4cities inception workshop was one of the most important activities. It was an opportunity to frame the project intervention, and clearly define responsibilities and areas of action. It was also a special moment when I met the other members of the SEA4cities team for the first time.
- Pre-survey for data collection: To guide the project implementation, a certain amount of data was needed. Therefore, we visited several institutions such as the Chamber of Commerce and the ANSD in order to collect information on the number of households, the total population as well as the different types of commercial businesses existing in the two target localities. This data was used to sample the number of households and businesses to survey.
- Field surveys: These represented one of the key interventions of the project, however the survey involved a very long process. In this context, we started out by developing questionnaires. It was a research-intensive activity in order to build a research tool to collect and store comprehensive data for the different needs of the project based on our experience. In addition, we had to coordinate meetings with municipal officials and the various districts' delegates. Finally, during many days we carried out surveys in several households and businesses located in Diamniado and Fann-point E.
- Revision of the ESPM algorithms: The implementation of the planning tool is one of the flagship results of the project. In addition to collecting and processing the data used in the tool, I participated in the review of the ESMP algorithms. The object of this work was to debug the algorithms in order to obtain consistent results during simulations.

ProGREEN study

I represented SEA4Cities in a study initiated by our partner START International through its ProGREEN project. The main objective of this study is to understand the challenges to the development of Renewable energy projects. The study aimed to answer the question: How can small-scale renewable energy systems contribute to a wider energy transition in West Africa?

The work we did consisted of collecting data on existing small-scale renewable energy projects in Senegal, through interviews with implementing agencies or organisations, and through sessions of discussions with key stakeholders and beneficiaries. The analysis of data collected from this process made it possible to understand the challenges that are faced by many renewable energy projects and to identify areas for improvement that could lead to the design and implementation of sustainable renewable energy projects.

CERMI Invitation

The Cabo Verde Renewable Energy Centre was one of the first partners of the project. We had several activities to execute together, but unfortunately, several unforeseen events, including restrictions due to COVID-19, prevented our collaboration from going smoothly. However, CERMI made a trip to Dakar to participate in our ESMP presentation workshop.

BMN workshop

I represented SEA4cities at the workshop convened by BMN within the framework of the “sustainable cities” initiative for Senegal entitled “Promotion of renewable energy, energy efficiency and integrated waste management in the industrial parks of Diamniadio”. The inception workshop was to launch the project and define its scope. The workshop was an opportunity to share information on the work in progress in the project and possible areas of synergy with SEA4cities.

8.1.3 Learning by doing: when design makes sustainability accessible to all

by Xenia Ewert

I joined the project in October 2019 when Dr. Aminata Fall was introduced to me for collaboration within the framework of a Master’s thesis between the project SEA4Cities, the Energy Economic Group and the institute of Visual Computing located in the Human-Centred Technology of the Vienna University of Technology.

Bringing special interest and expertise in the field of human-computer interaction, we collaboratively worked on the specification of a Master’s thesis topic in the research area. As the software of MoCES was developed in a domain-specific context and by experts with an energy and business background, it was part of my thesis to review the user interface (UI) design and the user experience (UX) from the perspective of a UI/UX specialist and to develop a redesign concept. During the following months, several research methods were applied to evaluate the usability and the user experience of the software in order to follow a human-centred design approach.

In a first step, other energy modelling software was evaluated to derive positive and negative aspects of comparable software tools, which could be beneficial for the redesign of MoCES.

Secondly, a heuristic evaluation was conducted to detect violations against reliable design principles regarding the overall usability of MoCES. As the user is an important element in the human-centred design approach and should be integrated in the design process as early as possible, a first usability test with six participants (including energy experts and non-energy practitioners) was conducted. The results showed a relatively high number of usability issues, but especially the system Usability Scale (SUS) score showed users identified potential to improve the software. Generally, users liked the software intention and usefulness. However, opinion about its complexity diverged between energy experts and non-energy practitioners.

Building on all the results of the evaluation of related work, the heuristic evaluation of MoCES, and the first usability tests in combination with the implementation of reliable design practices and methods, a redesign concept of the software user interface was developed. The result was a high fidelity prototype implemented with the graphical suite of Adobe XD including HTML code.

In order to evaluate the redesign and its potential effects, a second usability test was conducted. The results showed that the number of usability issues significantly improved. In particular, the number of severe issues decreased. The perception of the redesign reflected in the new SUS score illustrated a very positive impression on the software. It showed that it was among the top 10% of all tested products and reached a level where users would recommend it to other people. In addition, the interviews reflected a very positive impression especially on the design and the accessibility. The common theme was that it is a very helpful tool for citizens who own or are building a house, but there were some doubts about the applicability of the tool for tenants and governmental institutions.

All in all, MoCES now has improved usability and a better user experience interface, and is singled out by its high levels of user friendliness, visual design and facilitated accessibility for non-energy practitioners in a field of dominantly complex software tools, which are developed for scientists and engineers.

I joined the SEA4cities project motivated by a high level of interest in the topic of sustainable development. As there is great potential in the sector of renewable energy to reduce greenhouse gas emissions, MoCES due to its citizen-centred approach can increase the awareness of citizens towards more sustainable energy behaviour. Also, I noticed during several interviews and during the workshop in Dakar, the interest of several user groups and potential. When I got to meet all project members, as part of the Dakar workshop, I saw a very motivated team who were very passionate about their project. In particular, Aminata Fall, who always had a clear focus and was the driving force behind the project.

Coming to the results of my Master's thesis and regarding potential future improvements, I recommend reviewing the potential user groups and their needs and either focusing on a subset of users or integrating user group sensitive workflows into this, as implementing a hybrid solution that can meet the requirements of all user groups is very difficult.

8.1.4 Enumeration of results

- The energy system-planning model is a piece of software with functionalities that demonstrate the major contribution that the ESMP could make in planning green and resilient cities in Senegal, in particular future urban centres.
- The book *Sustainable Energy Access for sustainable communities: (Re-)thinking energy sustainability in emerging cities* documents important issues related to energy access and transition to sustainability, with chapters drafted according to the perspectives of authors with different backgrounds, and therefore different approaches in addressing the issues of transition to energy sustainability in emerging cities. The book aims to bring the latest developments on energy access and transition to sustainability throughout the overall value chain to the forefront of the research agenda: from basic research in universities to the documentation of lessons learned in the field. The book relays voices of dedicated researchers and professionals who share their work, experiments, findings, but also their driving motivation and passion for a topic many have come to define as the challenge of our generation.
- The SEA4cities Platform was introduced through the Framework Partnerships Agreement, AMES, CERMI, and PROGreen. The SEA4cities Platform of exchange aims to establish a formal framework of cooperation and exchange, in action research and dissemination of knowledge in the field of renewable energies. By mutual agreement, the parties in the Platform agree to collaborate in the areas of: sharing experiences in research and innovation in the area of renewable energies and energy efficiency; capacity building and dissemination of acquired knowledge.
- The SEA4cities Website/Dashboard is a computer-supported cooperative work (CSCW) for the project team, meaning that collaborative activities and their coordination are supported using computer systems. These systems include web conferencing, chat space, document management, calendaring and e-mail services. The SEA4cities Dashboard includes the following applications:

Web conferencing powered by the freely accessible application Big Blu Button that offers data streams of text-based-messages, voice and video chat to be shared simultaneously across geographically dispersed locations. The SEA4cities web conferencing application hosted three webinars and meetings with consultants involved in the development of the ESMP.

Document management application powered by OneNote that allowed project members to collaborate on draft documents as part the project, saving changes and comments made by the project team.

Project calendaring with tasks assigned to the project team through a system of assignment and mail notifications. The SEA4cities IT focal point coordinated this system and printed out the status of assigned tasks every month, ahead of monthly coordination meetings.



*APPEAR in practice event
at the OeAD*



*Governmental building
in Diamniadio, Sphères
ministérielles de Diam-
niadio*



*Senegalese fellows at the
Austrian Institute of Tech-
nology*



*Conference centre in
Diamniadio*



*Senegalese project coordi-
nator at Ecole Polytech-
nique de Thies*



*Second dissemination
workshop*

8.2. Sustainable Management of Water and Fish Resources

Project Coordinator: Andreas H. Melcher

Coordinating Institution: University of Natural Resources and Life Sciences, Vienna, Institute of Hydrobiology and Aquatic Ecosystem Management and Institute for Development Research

Partner Institution: University of Vienna, Department of African Studies; University Joseph Ki-Zerbo Ouagadougou. Laboratory of Animal Ecology and Biology, Polytechnic University of Bobo-Dioulasso, Institute for Rural Development, Ministry of Research, Institute for Environmental and Agricultural Research, International Union for Conservation of Nature, Burkina Faso Office, Ministry of Animal and Fish Resources, General Directorate for Fish Resources, International Institute of Applied Systems Analysis, Risk and Resilience Program, Centre for Systems Solutions, Warsaw Poland

Partner Country: Burkina Faso

Project Duration: 1 December 2016 – 30 November 2020

8.2.1 The project – SUSFISH-plus

The success of APPEAR project Sustainable Management of Water and Fish Resources (SUSFISH) emerged from close cooperation between universities and ministries to formulate policy and provide interdisciplinary, national data on biodiversity and ecological water quality for the first time. It demonstrated that there had been a lack of information sharing between experts and stakeholders of water and fisheries management. It also showed a need for an applied education program on several scales – bottom-up and top-down – for academic and fisheries communities to use scientific knowledge in theory and practice. This encouraged partners to pursue further cooperation within the frame of another APPEAR partnership. At the core of this follow-up cooperation, SUSFISH-plus responded to these two needs: a) establishing an innovation platform, and b) developing an integrated education and research program. Consequently, we focused on capacity building, development, and research on a scientific and policy basis to study and contribute to sustainable fisheries, water and river health when society meets ecology in Burkina Faso.

Our scientific cooperation aimed to produce reliable knowledge that can help improve policies, management, research, and education to make fisheries more sustainable in Burkina Faso. The topics of study included ecology, policies and socio-economy in fisheries, and covered the entire national territory. By producing and institutionalizing knowledge about aquatic ecosystems and fisheries management, SUSFISH continues to help to build capacities in local fisheries to help secure food production, nutrition and development in Burkina Faso. The project took place in two phases: SUSFISH (2011- 2014) and SUSFISH-plus (2016-2019). SUSFISH-plus was designed as a partnership between academic, governmental and local organizations in Austria and Burkina Faso.

As an arid country that experienced profound droughts over the past century, Burkina Faso has implemented a program of reservoir creation to provide water to people for any use. As a result, more than 1,500 bodies of water are currently used for irrigation, livestock breeding, domestic needs, industrial usages, power generation and fishing. For quite some time, fishing was not considered in the planning and valuation of reservoir creation. However, nowadays, fisheries and aquaculture are gradually included in the complementary

purposes of water resource development, especially for large-size reservoirs. Therefore, and in line with national policies for development, the goal of the SUSFISH project has been to build capacity in fisheries management by providing reliable information and strengthening human resources.

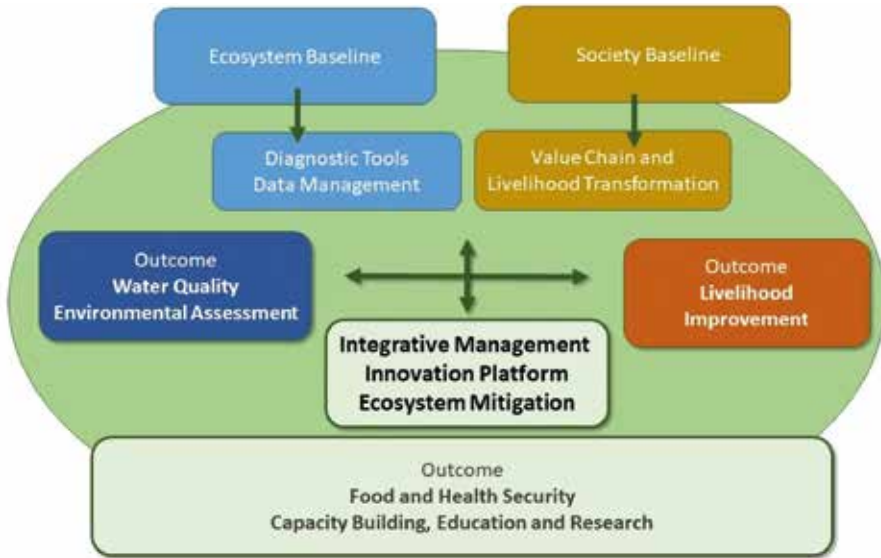


Fig. 1: A general concept for a sustainable and transdisciplinary project integration of ecology and society research, as well as education and policy goals in support of sustainable adaptive management of ecosystems.

As a result of SUSFISH, methods and tools have been developed for standardized assessment of water and river network health and to measure environmental impacts on riverside societies. The subsequent project, SUSFISH-plus, was based on information sharing between experts and stakeholders of fisheries management by establishing an innovation platform and developing an integrated education and research program. The SUSFISH-plus participatory research process allowed academic experts to explore with non-academic stakeholders from government, NGOs and business how interactions between biophysical and social factors may influence a river basin's potential for sustainable development. Research on water and river health and the impacts of the aquatic environment on society revealed a strong linkage between fishery resources and anthropogenic factors. In particular, river ecosystem degradation is strongly coupled with the inadequate use of the riparian forests, which led to river siltation and reduced habitat for fishery resources. The captured fish value chain development is currently driven by the continuously increased market demand for domestic fish, leading to overexploitation of the fishery resources. Anthropogenic pressures on water and rivers have negatively impacted the livelihoods of stakeholders of the value chains in capture fish. This suggests urgent remedial actions, such as the development of ecosystem-based fishery management to connect the market with fishery management systems.

The commitment of the project partners to work together and tackle actual problems in the fisheries sector yielded interesting results covering facets of the natural, political and human sciences related to Burkinabe fisheries and aquatic ecosystems. This research encompassed a systemic assessment of how links and interactions within and between these facets affected fisheries, including threats to the Burkinabe aquatic ecosystems, climatic changes, fish and benthic invertebrates, and the socio-economic sides. It does not pretend to give a complete description of the Burkinabe fisheries and waters. But at least it provides insight and stimulation for development and research in that sphere; thus, it expands our understanding of challenges to the socio-economic development of African inland waters.

The lessons learned from the first SUSFISH project will be further incorporated into curricula and lectures in North and South. Yet, in the SUSFISH project, there is a strong engagement by contributing to the supervision of students' studies and research in Burkina and Austria. The open-source SUSFISHBook, *Sustainable Fisheries and Water Management Transformation Pathways for Burkina Faso*, highlights recommendations to guide science and policy development for a better future in fisheries. This critical publication follows the political trend to have a long-term vision for fish resources development as shown by the current national fisheries strategy (see also Melcher A., R. Ouedraogo, A. Oueda, J Somda, P Toe, J. Sendzimir, G. Slezak, C. Voigt [2020] SUSFISHBook -Sustainable Fisheries and Water Management. Transformation Pathways for Burkina Faso. SUSFISH-plus Project Consortium – <http://susfish.boku.ac.at/>. ISBN: 978-3-9504470-9-5).

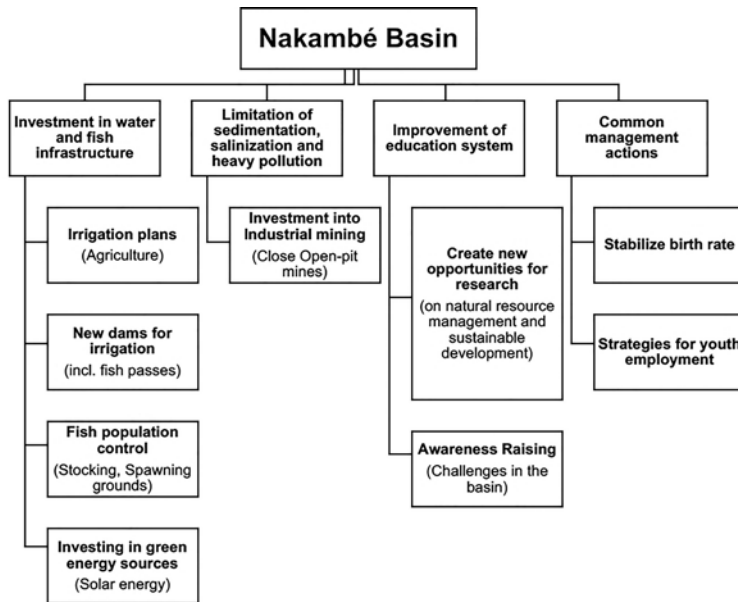


Fig. 2: Priorities for a shared vision for the Nakambé (Volta) basin, as a result from the social simulation workshop in 2019 (see also Sanon et al., 2020).

8.2.2 Learning innovations for sustainable fisheries in Burkina Faso: a social simulation demonstration in the frame of the Agenda 2030

by Gabriele Slezak, Vincent-Paul Sanon, Patrice Toé, Hamid El Bilali, Laura Hundscheid, Charlotte Voigt, Andreas Bauer, Raymond Ouedraogo, Jacques Somda, Adama Oueda, Piotr Magnusewski, Michalina Kulakowska, Jan Sendzimir, Andreas H. Melcher

The path to sustainability for a major sector such as the fisheries and aquaculture sector requires integrating functions at many levels, from the *Sustainable Development Goals* (SDG) that orient research and action to the manifold steps of policy making, planning, training and management. More than ten years of scientific cooperation in fisheries research between universities in Burkina Faso and Austria, financed by the APPEAR program, provided a wealth of insights and information demonstrating the connections between research on aquatic ecosystems in Burkina Faso and the UN-2030 Agenda. Within the framework of the SUSFISH-plus project, the results of this cooperation showed how transformations in inland fisheries increase the contributions of water- and fish-related ecosystem services to human well-being and socio-economic development. But it also revealed the diversification and intensification of the pressures that affect the structure and functioning of aquatic ecosystems. It highlighted the need for balanced and integrated approaches to assess the broad dimensions they encompass, including economy and livelihoods, education and research, power relations, institutions and their enforcement, ways of access and use of resources with less impact.

This research shows how sustainable management of water and fish resources in Burkina Faso needs the comprehensive approach of the SDGs. To benefit future research, we will introduce our approach for using the research data to support sustainable decision-making in practice. In the context of the SUSFISH-plus project in Burkina Faso, this chapter highlights how research on aquatic ecosystems can be linked to sustainable development under the UN-Agenda 2030 through the mediation of the 17 SDGs. Secondly, it emphasizes the great importance that stakeholders in fisheries understand the interactions of social, political, cultural and psychological factors that influence the success or failure of policy implementation by resource users and communities. We used a strategic simulation (also known as policy simulation or policy exercise) process to study and observe such interactions among various stakeholders and thereby integrate expert knowledge and practical experience. This exercise created a learning environment where scientists and stakeholders co-produced knowledge and achieved a more comprehensive understanding of sustainability. Thus, we developed it further to be used as a tool for decision-making in the future.

Participating in strategic simulations

A strategic simulation is an interactive, participatory activity similar to a role-playing game. It engages stakeholders, researchers, and policymakers in developing strategic insights by allowing them to co-create selected representations of real-world structures and processes related to their own experience. By taking part in simulations, they can develop several alternative strategies, also called “pathways,” that are robust to a range of (external) scenarios [4]. This active and experiential process of co-creation helps them understand the critical challenges on the way to their desired futures and the solution options (policy interventions)

required to overcome them. Furthermore, it is quite efficient in the development of strategic decisions [5] by providing an opportunity for stakeholders to meet, define the issues, co-create sustainability visions (desired futures) and pathways leading to them (Figure 1). Over a few hours, it simulates a science-policy dialogue, in this case related to sustainable fisheries, that in real life might have taken months or years. This project applied this tool for the first time in the context of aquatic ecosystems in Burkina Faso [6]. The simulation was newly developed exclusively for the fisheries context in Burkina Faso and then implemented during the APPEAR-Project. It did serve to enhance learning by compressing the space and time within which stakeholders co-develop a mutual, cognitive understanding of crucial issues in connecting science to policy and society.

All elements of the strategic simulation are available for current and future research as an open-access resource on an innovation platform (<https://www.facebook.com/SUSFISH-BurkinaFaso>). The participating stakeholders worked first to characterize the current situation concerning the sustainability of fisheries in Burkina Faso (Figure 1). They used a stylized, two-dimensional map of the Nakambe Basin to define the spatial dimensions of the significant challenges, risks, and opportunities to Burkinabe fisheries. The understanding developed in the opening exercise was used to co-create a causal map of interactions that potentially drive the trends of concern, assess each indicator's level, and translate it into its impact on the following (Figure 2).

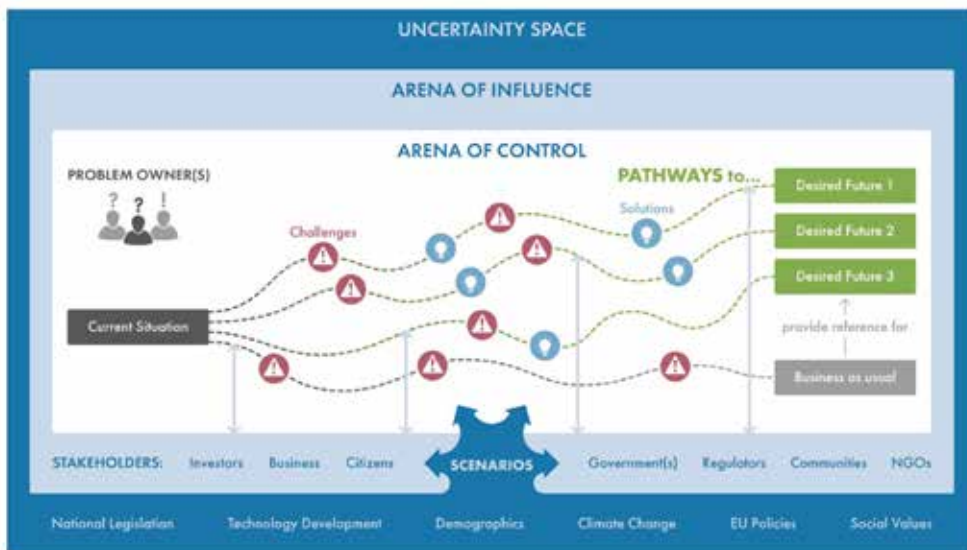


Fig. 3: In strategic simulations, participants explore various possible “pathways” to jointly identify challenges, shared objectives, opportunities and potential strategies.

The interpretation and assessment was shared among the group in a final presentation to create a shared understanding as a basis for the subsequent exercise. In a second exercise, we developed visions for the Nakambe basin as well as pathways leading to such visions in three groups with different focuses: (i) water and environment, (ii) food and fish, and (iii) economy and energy. The groups developed three different visions with their corresponding

pathways, starting from clear, ambitious, but realistic visions of what can be achieved. The pathways were also represented on the causal map to compare the new scenarios with the current situation.

Findings on sustainability

When key causal factors and their relations that influence the sustainability of fisheries in Burkina Faso were mapped together, it showed that development-related indicators reflect newly emerging anthropogenic pressures that can strongly impact fish populations and fish harvests.

One anthropogenic pressure is mining, especially widespread open-pit mining, which increases pollution, both airborne and in surface runoff, threatening waterbodies in multiple ways. To make water use more sustainable, restrictions on water pollution, multi-stakeholders management (SDG 16), and the adoption of advanced technologies are vital to limiting this industry's detrimental effects (loss of connectivity, habitat degradation, and fish mobility) on aquatic ecosystems [8,9] literature reviews, and strategic simulations shows that several human impacts as well as climate change and its effects (such as the decrease of the water level, and the increase of the surface water temperature (SDG 6,9,15). This example shows an urgent need to improve the river's connectivity and increase the quality of critical habitats, thereby enhancing fish migration and fish diversity and abundance [10] (SDG15). Investing in ecological, structural improvements, e.g., fishways, can remove one of the main constraints to fish farming niche development and contribute to sustainable fish production and consumption [8] (SDG 12).

The causal map (Figure 4) revealed the interconnectedness of multiple stressors linked to economic growth (SDG 8), food security (SDG 2), improved nutrition and livelihood (SDG3), and urban water supply (SDG 11). It is a fact that the Burkinabe economy has grown partly through the development of water infrastructures, such as man-made reservoirs, that secure water supplies for urban, industrial, and agricultural uses. The conversion of river habitats to reservoirs affects the type and the size of the natural fish habitat and fish, which, combined with the diversity of species and their sensitivity to pollution, will impact the fish harvest potential. However, in addition to infrastructure, another factor degrades fish biodiversity, food security, and the population's wellbeing, even though it is a crucial source of food in Burkina Faso. That is excessively intensive fish harvests.

The assessment of the current situation provided the participants' group a sound base of heterogeneous knowledge. The fisheries sector's sustainability plays a key role in poverty eradication (SDG 1) by contributing to the Burkina Faso economy, both at the micro- and macroeconomic levels. Indeed, it provides households with a source of income without significant initial investments [11,12]. The estimated gross profit ratios confirmed that all actors at all capture fisheries value chains are making a financial profit [12]. Additionally, fishing as a source of cash contributes to financing fishermen's diverse income-generating activities [8]. Therefore, sustainable management of fisheries should be part of a pro-poor strategy in rural areas.

The involvement of women in the development of reforms is crucial to sustainably manage fish and water as essential resources for improved livelihood. For years, their role has largely been unrecognized [13,14], while the number of women involved in the fishing sector increased significantly. The social simulation allowed stakeholders to develop a mutual understanding of the need for women to have equal rights to economic resources and access

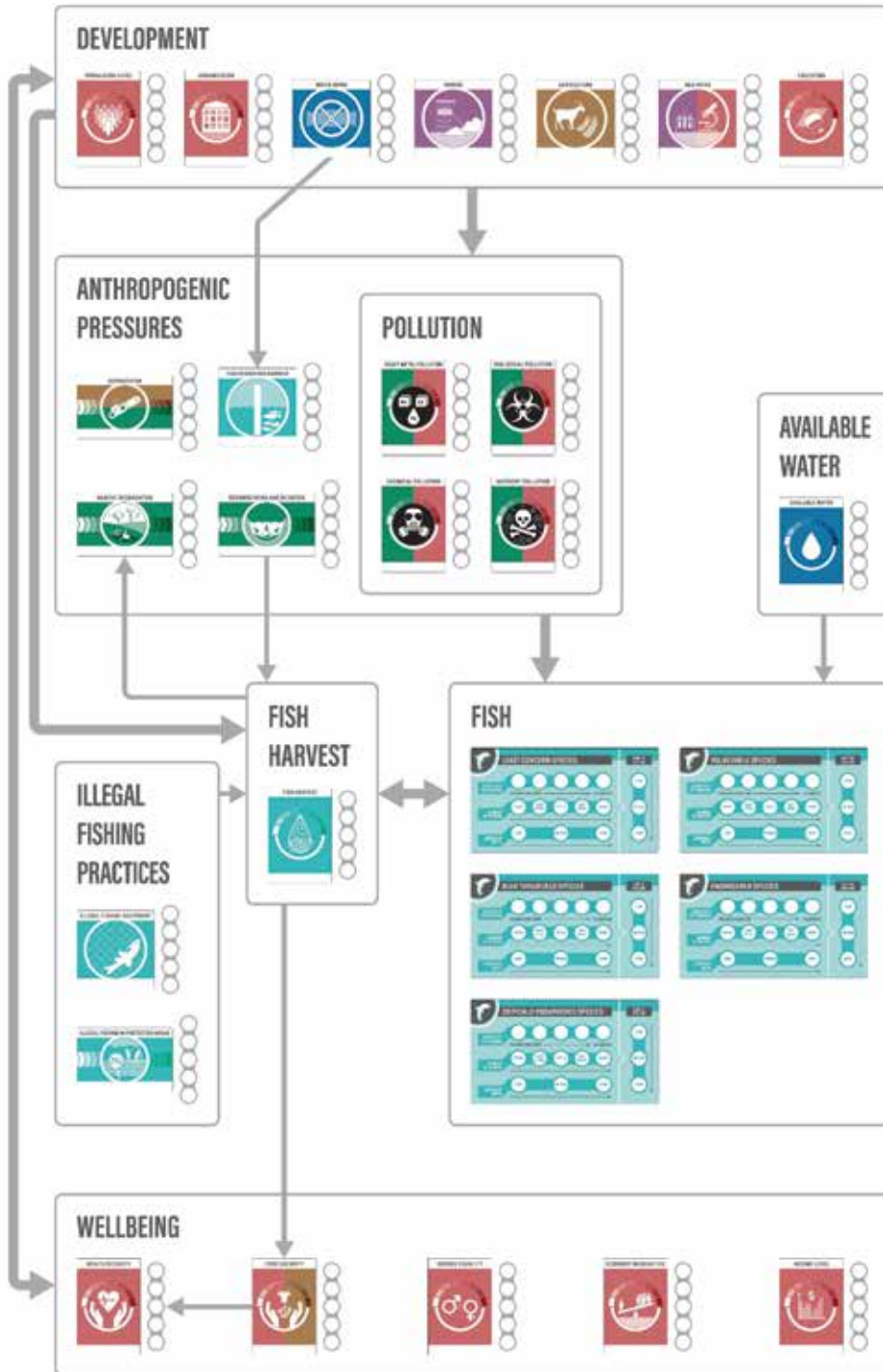


Fig. 4: The causal map used in this strategic simulation was a way to actively engage stakeholders from Nakambé Basin in identifying the indicators that affect the region on multiple levels.

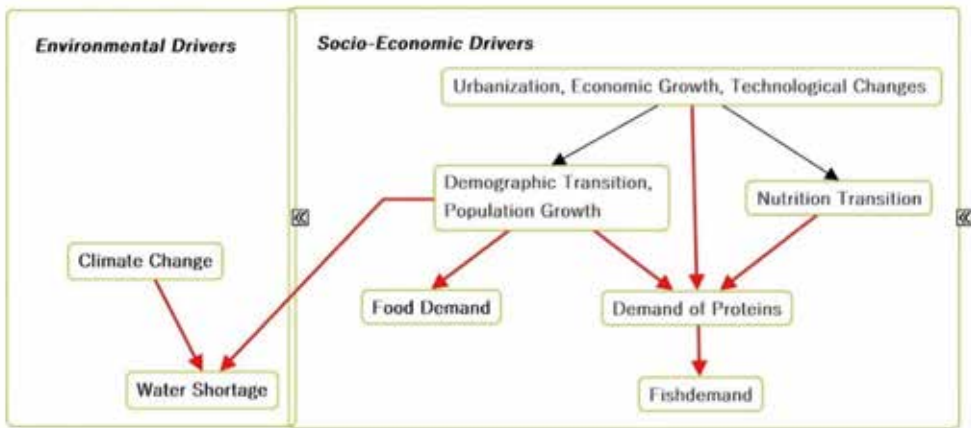


Fig. 5: Main drivers to a change of state of water bodies in Burkina Faso by causing specific pressures. Red arrows indicate reinforcing relations. Black arrows indicate a causal relation.

to ownership and control over property, financial services, training, supervision, and natural resources (SDG5, SDG10). Women's organizations and their representation in provincial, regional and national unions empower them in the decision-making process following national laws [14]. Additionally, women's involvement in the fishing sector contributes significantly to improve their households' diet quality and food security. Thus, gender-balance strategies should include fisheries.

Fisheries and aquaculture have proven to have a lower environmental impact than ruminant meat production [15,16]. In particular, inland fisheries have a low carbon footprint compared to other food sources [15]. However, the narratives of local stakeholders in the simulation revealed that climate change affects aquatic ecosystems, including water and fisheries. For instance, the decrease in water level and availability and increased surface water temperature resulting from climate change impact fish productivity, abundance, and average size [9,16]. Building the capacity of researchers and decision-makers and supporting best local practices are decisive for context-specific approaches in mitigating and adapting climate change impacts [9,16]. In terms of climate action, international cooperation for reducing the disparity between countries is crucial to strengthening resilience and adapting to climate-related hazards and natural disasters (SDG 4,13).

Summarizing the three future narratives (visions and pathways), with a different focus provided by the strategic simulations exercise, we see that they produced consistencies, overlaps and contradictions. They revealed that the knowledge elicited for specific sectors sets priorities for one narrative that are partly compatible with the priorities of the other narratives. We see consistencies and overlaps between all three narratives in terms of priorities for, e.g., inter-ministerial collaboration and coordination (SDG 16), investments in research, raising awareness of challenges among the general public and the policy sector, curriculum development for technical knowledge and soft skills, or the need for alternative energy sources (e.g., solar, wind) (SDG 4,7). On the other hand, the contradictions point, for instance, at the danger of a fisheries collapse, which appears to emerge from reinforcing feedback loops that boost an ever-increasing number of fishermen and harvest income and the relatively high profit rates in the fish value chain. Precisely because fisheries support the

livelihood diversification strategies of households and contribute to addressing unemployment, the sustainable development of this sector is needed (SDG 8).

Conclusion

Overfishing is not the result of one single cause but a constellation of reinforcing feedbacks that have caught Burkina Faso's fisheries in a "regeneration trap" [9]. The strategic simulation developed during SUSFISH-plus for the fisheries and water sector in Burkina Faso is essential for sharing knowledge and expertise. It is beneficial to engage stakeholders without academic backgrounds to enter into a dialogue with experts. The particular value of this method is that it provides an intensive learning space for a heterogeneous group of stakeholders. Thus, to elicit knowledge in various contexts of the fisheries sector, the project team developed a toolbox for stakeholders to use in stakeholder processes at local and regional levels.

This visionary exercise permitted participants to share their views of essential factors and stressors that influence the sustainability of fisheries. It highlighted the multiple connections of our research with almost all the SDGs. The ongoing transformations in inland fisheries in Burkina Faso increased the contributions of water- and fish-related ecosystem services to human well-being and socio-economic development. However, that also means the diversification and intensification of the pressures that affect the structure and functioning of aquatic ecosystems. The long-term sustainability of fisheries involves balanced and integrated approaches to the broad dimensions they encompass, including economy and livelihoods, education and research, power relations, institutions and their enforcement, ways of access and use of resources with less impact.

It clearly shows that sustainable management of water and fish resources in Burkina Faso, which is the main focus of SUSFISH-plus, can serve as a lever for achieving the SDGs in the country. As individuals and as a group, participating scientists and stakeholders both gained essential insights, learned about each stakeholder group's primary concerns, and identified causal relations driving the trends of concern. The final visions for the Nakambe basin developed in the exercise and all phases of the SUSFISH-plus project have been practical to create a joint understanding and gain an overview of complex issues and their interactions that are policy-relevant for sustainable fisheries. The visions presented above serve as an essential source of knowledge about the region, stakeholders and decision-makers in the region, their perception of the stressors, and their main aims and priorities for development.

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8.2.3 Higher education for a sustainable water management

by Adama Oueda, Raymond Ouedraogo, Patrice Toé, Jan Sendzimir, Andreas H. Melcher

Introduction

In Burkina Faso, some 20 million people are distributed among 60 ethnic groups (RGP 2020). The high population growth rate (3.1% / year) and very young population (57% under 20 years old) drive strong demand for education. The enrolment rates are not ideal since only 4 to 6% complete higher education. The number of students per inhabitants (0.29%) is below the UNESCO rate of 2%. In this dynamic and demanding social context, the rapidly increasing annual enrolment rates (around 10 to 15% per year) reflect the great esteem placed on higher education by Burkinabé. However, higher education in Burkina Faso faces significant challenges. First, to overcome the mismatches in material between training that are given and available jobs. Second, to produce knowledge where and when the learning is needed. To address these challenges, the SUSFISH and SUSFISH-plus projects were designed to strengthen in-country capacities for science, policy, and practice to establish the basis for sustainable fisheries in Burkina Faso.

SUSFISH and SUSFISH-plus contribution to higher education in Burkina Faso

Burkina Faso has never had courses that integrate the knowledge and methods needed to research and manage substantially aquatic environments or fisheries in Burkina Faso. Thus, except for the few trained outside Burkina Faso, most of the various national ministries lacked the necessary background in science and policy to manage aquatic environments. Most ministry employees forced by necessity to oversee fisheries and aquatic environments faced these issues without training. Training started to become available in 2010 when Raymond Ouedraogo's doctorate ushered in a new period of cooperation with Austrian universities within the framework of the SUSFISH projects (Sustainable Management of Water and Fish Resources: SUSFISH and SUSFISH-plus). These projects have successively ensured: (1) a transfer of competence in the study of aquatic environments and fisheries analysis, (2) the creation of new knowledge on the aquatic environments of Burkina Faso within the disciplines of ecology, economy, sociology as well as policy science, and (3) improvement in training curricula.

Both SUSFISH and SUSFISH-plus projects aimed to produce reliable knowledge, and to improve policies, management, research, and education to increase the sustainability in ecosystems. The research topics included ecology, policies and socio-economy in fisheries and covered the entire national territory. By producing and institutionalizing knowledge about aquatic ecosystems, water, and fisheries management, SUSFISH has helped build capacities in local fisheries to help secure food production, nutrition, and development in Burkina Faso. The project took place in two phases: SUSFISH (2011-2014) and SUSFISH-plus (2016-2019, which was extended to 2020 due to COVID-19). SUSFISH was designed to partner with academic, governmental, and local organizations in Austria and Burkina Faso. The project was funded through the APPEAR Programme (Austrian Partnership Programme in Higher Education and Research for Development) from the Austrian Development Agency (ADA) and implemented by the OeAD.

Transfer of competence in the field of aquatic environments and fisheries analysis

Within the framework of the SUSFISH projects, the capacities of the research teams in Burkina Faso have been strengthened through exchanges with colleagues from Austria. This capacity building was done by sharing skills with young scientists integrated through their research (master's and doctorate) into projects, with Burkinabe partners by promoting co-supervision of students and by revising and carrying out courses based on knowledge developed within these projects. Indeed, SUSFISH and SUSFISH-plus methods were designed to be “educational research,” in which students carried out all research activities under the close supervision of senior researchers, and the projects involved many students at an early stage of their studies (bachelor's degree programs, master's degree programs and doctorate programs). Austrian BOKU experts such as Otto Moog, Andreas Melcher, Stefan Schmutz, Herwig Waidbacher, Harald Meimberg or Stefan Vogel, accompanied by their colleagues from Burkina Faso, have taught the basics of aquatic ecology and fisheries management to more than thirty students who are currently engaged in the research or management of aquatic ecosystems in Burkina Faso as well as in Austria.

Knowledge creation

The SUSFISH projects have contributed to creating knowledge in several areas of the management of aquatic environments in Burkina Faso, mainly in biology, sociology, and economy. In biology and ecology, fisheries managers urgently needed an updated list of fish from Burkina Faso based on reliable classification methods that ascertained their identity and geographical distribution and identified factors that threatened them and their environment. All such information was produced during these two projects. Indeed, an updated list of fish, a classification of threats, an update to the official Red List of threatened and endangered fish, and the list of benthic macroinvertebrates became available through this research. Of particular interest in managing environmental quality, the SUSFISH study confirmed the reliability of using specific fish and macroinvertebrates as indicators of ecosystem health. These tools can be applied to the analysis of the effects of climate change on Burkina Faso's fish resources (e.g., Kabore et al. 2018, Mano 2016, Meulenbroek et al. 2019, Ouédraogo 2019). SUSFISH research also expanded available knowledge of the socio-economic aspects of concern to researchers and stakeholders, managers, and users of fisheries – e.g., the fish value chain – on the state and the potential of aquaculture, the gender concerns in the management of fishery products and, finally, the governance and anthropology of fisheries in Burkina Faso. All such information is now available (e.g., Dicko 2018, Fofano 2018, Hundschheid 2019, Konaté 2019, Sanon et al. 2020 and 2021, Sawadogo, 2019, Slezak et al. 2021, Sow, 2020) and is already used by all stakeholders (from local fishermen to government agencies, researchers and students) as attested by the Minister of Animal and Fishery Resources in the “Opening Remarks” of the SUSFISHBook (Melcher et al., 2020).

Career development

One consequence of building the capacity of SUSFISH team members and creating knowledge is the career development of those involved. At this level, most SUSFISH project participants received promotions commensurate with the quality of the work they produced in the project. For new PhD holders, this has enabled them to obtain lecturer or research positions in higher education or research institutions. This has been the case of Dr. Idrissa Kabore, Dr. Komandan Mano, Dr. Idrissa Ouedraogo, and Dr. Raymond Ouedraogo. Three of

them have already acquired permanent positions in their institutions after their admission to CAMES (Council for higher education and research in Africa and Madagascar) based on work mainly related to SUSFISH. For the more experienced participants, promotion is done at several levels, e.g., change of academic grade and appointment to administrative positions. These new positions allow for easier integration of the knowledge generated by SUSFISH into higher education. First, as lecturers or researchers, each could directly integrate new information into their teaching and research methods shared with co-workers. Second, being in academic bodies, they can therefore propose improvements to the curricula to integrate, for example, previously absent material on, e.g., aquatic environments. Third, their administrative positions gave some SUSFISH participants an influence on developing training programs in their institutions, which is helpful for rapidly advancing specific reforms.

Curricula enhancement in applied science

Since 2014, new master's programs are being implemented at the University Joseph Ki-Zerbo. The program entitled "Biodiversity and Tropical Ecosystems Monitoring" (BAET: Biodiversité Animale et Écosystèmes Tropicaux in French) is led by the SUSFISH partner from LBEA. This master's program is dedicated to tropical ecosystem (terrestrial and aquatic) management based on knowledge about the aquatic ecosystems of Burkina Faso generated in the SUSFISH projects. Staff from SUSFISH-plus followed current procedures in force to revise the curricula of the above master's program.

As a result, the implementation in this master's program of these new, more modern and current curricula promises to improve graduates' qualifications and aptitudes. These new curricula highlight the tools and skills that SUSFISH research revealed to be essential for fisheries science and policy but was poorly or not at all integrated into the curricula of previous programs. As examples, we can cite improvements in training in the field and the laboratory that boosted a range of student capacities: the use of English, scientific writing, applied statistics (biostatistics), the use of GIS in ecology, the use of standards and principles of systematics and taxonomy, the appreciation of the importance of climate change, green ecology, and the necessity of a transdisciplinary approaches to questions of science and policy. Additionally, Dr. Raymond Ouedraogo used knowledge developed through SUSFISH to support the national school for foresters by giving presentations/conferences, lectures, supervising students' research, and assessing students' work. In October 2020, these endeavors were recognized in a letter of congratulations and encouragement by His Excellency, Mr. Batio BASSERE, Minister of Environment, Green Economy and Climate Change, whose ministry runs that school.

Strengthening academic cooperation and partnership

The SUSFISH projects were designed to integrate inputs from a diverse number of partners. Such diversity can be problematic to manage, but it became a success as the partnership efficaciously worked as a team and covered many relevant research topics. As a result, networking between national institutions of higher education and research was strengthened. For example, the LBEA (UJKZ), GDFA, IDR (UNB) and INERA have closely cooperated. As the SUSFISH projects progressed, some new partners emerged: the French IRD (Institute for Development Research) and the University of Norbert Zongo (UNZ). In addition, several SUSFISH members collaborated with the IRD and the UJKZ to organize several

scientific workshops, and a joint workshop was organized with the LoCaBreed team (UNZ). Strengthening cooperation between institutions in Burkina Faso has ensured the acceptance of the results by a large majority of the scientific community. It will provide the sustainability of the achievements of SUSFISH. In addition, this cooperation makes it possible to consider other joint projects.

Conclusion

SUSFISH and SUSFISH-plus had fundamental and essential impacts on the education and careers of its team members (lecturers, researchers and students) and positively impacted the knowledge base and professional liaisons of partner institutions in Burkina Faso. This was done by strengthening cooperation and partnership by producing relevant scientific information that successfully contributes to the sustainable management of aquatic ecosystems and provides a new generation of aquatic biology and socio-economy experts.

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8.2.4 Enumeration of Results

SUSFISH-plus lessons learned and points of intervention by integrating practices of participatory research in a complex process:

- **Regeneration Trap**
Local aquatic ecosystems and their fisheries should be experimentally restored on a case-by-case basis. Pilot studies should test various approaches to increase local food supply and security and thereby lower fish demand long enough to suspend capture fishing long enough to restore the integrity of local habitats and the productivity of fish populations.
- **Fisheries and Aquaculture**
Assign a clear responsibility to a ministry to develop aquaculture through funded research involving pilot projects and programs to train private-sector civilians in the skills (business, scientific, production) to sustain this arrangement for long enough (minimum five years) to establish trust and understanding across society and increase compliance and cooperation with fisheries policy. Fisheries practices (management patterns) change over the years and influence sustainable development.
- **Value Chain and Food Security**
The foundation of the value chain for capture fisheries should be strengthened by better enforcement to raise the standards of knowledge and equipment employed by those permitted to fish and control the absolute number of fishermen who can access the resource. The ongoing socio-technical transition in fisheries has an essential impact on livelihoods and food security. Knowledge and skills need to be enhanced by establishing and running an extension service exclusively for fisheries to provide better-quality training for fishermen.

- Gender

Women as traders should be integrated into fisheries governance, as their experience and direct financial concerns can inform better choices to support the development of the elements of national fisheries production, e.g., natural fish capture and aquaculture. This can be accomplished by incorporating women's trade associations into governance institutions. Women's involvement in fisheries contributes to improved diet quality and a reduction of households' food insecurity during the year.

Training programs for women should be expanded beyond the usual focus of domestic issues and be designed to enhance their economic and management capabilities. This is widely acknowledged to be a key driver of the second phase of the demographic transition to stabilize population growth and enhance the maturation and modernization of the economy.

- Innovation Platform

The development of scientific tools such as monitoring instruments, mathematical simulations and statistical analysis of trends is vital to support decision-making for sustainable resource management. Strategic simulation supports an innovation platform for interaction in transdisciplinary, tailor-made development research shared on social media.

- Governance

The involvement of agents at multiple levels, e.g., policymakers, stakeholders, and traditional authorities from the beginning of any initiative to enhance sustainability is crucial for demand-driven, bottom-up management.

- Education

Socio-ecological programs should be developed and implemented to enhance existing and complementary master's curricula and lectures at all partner universities. Scientific workshops and public seminars foster ecological and socio-economic awareness. Teaching and supervision of students (i.e., 27 SUSFISH students from North and South worked successfully on their thesis within the last three years, in total 46 in both SUSFISH phases) builds capacities in adaptive and integrative fisheries management.

- Contribution to the SDGs

Science depends on innovation, but it builds on sound knowledge developed in the past. We reflect such an arc of science, developed in stages to help life adapt to times of increasing uncertainty, building, and expanding on each preceding step. We need trans-disciplinary applications of sustainable management approaches, as explained above, in human-impacted ecosystems to avoid past failures arising from arbitrarily constraining management policy concepts and tools within single disciplines.



A joint symposium and gender workshop for the APPEAR project teams SUSFISH+ and LoCaBreed



Supervisors showing students how to sort macroinvertebrates during the first field trip in 2012



Prof. Otto Moog showing Idrissa and Komandan how to take physicochemical parameters



Fish harvesting session in the field; everyone is involved: fishermen, for-ester, students, supervisor, and driver



The SUSFISH team learns about the cultural aspects of fish resource management: the case of the sacred catfish from Bobo-Dioulasso.



Discussion about the ongoing transformation in fisheries and its implications for natural resource management, food security and livelihoods in Burkina Faso

8.3 Local Cattle Breeds of Burkina Faso – Characterisation and Sustainable Utilisation

Project Coordinator: Johann Sölkner

Coordinating Institution: University of Natural Resources and Life Sciences, Vienna

Partner Institutions: University of Veterinary Medicine Vienna, Université Norbert Zongo, Koudougou, Institut de l'Environnement et de Recherches Agricoles, Université Polytechnique de Bobo-Dioulasso

Partner Country: Burkina Faso

Project Duration: 1 April 2016 – 30 November 2020

8.3.1 The project – LoCaBreed

Healthy and well-managed livestock is essential for economic and social development in Burkina Faso. It has been identified as a strategic sub-sector to fight against poverty and facilitate sustainable development, especially in rural areas where the incidence of poverty is high. The cattle population of Burkina Faso is around 8.5 million, providing draft power, meat and milk to the country as well as foreign exchange from exports. The varied natural resources of the country with the semi-arid Sahelian North and the sub-humid Sudanese South yielded a diverse local cattle population, with comparatively large and strong indicine (Zebu) cattle in the North and physically very small taurine cattle, called Lobi, in the disease ridden South. African taurine trypanosomosis (AAT), transmitted by tsetse flies, is endemic in the South and is the most important parasitic disease, causing enormous losses to the cattle population.

LoCaBreed aimed to improve the genetic disposition for trypanotolerance of the local cattle population by developing cost-efficient devices indicating the genetic resistance to trypanosomosis, and spreading this resistance by using community-based breeding programs (CBBP) conducted in rural villages. Improving animals in a more systematic way, via CBBP, and with extra information about the disposition of breeding animals has the potential to improve the situation substantially. For such breeding programs to work, animals need to be identified by ear tags and the systematic recording of body weight and other important characteristics must be implemented. First and foremost, farmers need to be convinced of the potential utility of systematic breeding to an extent that makes them the primary owners of the breeding programs. Various participatory approaches that had been developed and implemented in several countries of Africa and Latin America by the Austrian project partner, were applied. All farmers, particularly those owning the small taurine type, were keen on having animals with a bigger body size, mostly because such animals are better able to pull the plough for preparing crop land for sowing, but also because they will fetch a better market price. Body size is a highly heritable characteristic and can be changed quite easily in the selection of young bulls for breeding. Also, bulls that grow fast typically do not suffer from trypanosomosis. In the course of the project, farmers became more and more enthusiastic about systematic breeding; the choice of the best bulls was always made by a committee of farmers, including information about growth and body size provided by the project team, but also their own preference based on a visual appraisal. By the end of the project, a Lobi Breeders Association had been formally established.

The project also aimed to provide a revised inventory of taurine local cattle breeds of the country to the government of Burkina Faso and the global data base of cattle breeds maintained by the FAO by phenotypic and genetic characterisation of a large number of animals. More than 800 animals were genotyped with a high throughput genetic marker system, providing genotypes for more than 50,000 markers for each animal. This allowed the team to establish a small set of ancestry informative markers the separate taurine and indicine “blood levels”, in order to be able to identify if an animal is pure Lobi or not. Unfortunately, the results of genome wide association studies did not give signals that were strong enough to provide a small number of genomic indicators for routine trypanotolerance testing. With genomic information on diversity and the collection of body measurements of animals, the FAO domestic animal diversity database was able to be expanded.

An important goal of the project was capacity development by training three doctoral and several Master’s students. One of the doctoral students worked primarily on establishing, implementing and scientifically analysing CBBP. Dominique Ouédraogo was the key person for linking project members with farmers while also being able to conduct sophisticated statistical analyses. Bernadette Yougaré performed many genomic analyses and became an expert on genetic diversity. Bienvenue Lassina Zomá performed sociological studies, trying to understand beliefs and values of cattle keepers in the region, and, most importantly, what type of cattle the farmers would like to have, and for which reasons.

The strengthening of institutional collaboration between two universities and the national agricultural research institution was another goal that was successfully achieved. Public awareness about CBBP and systematic breeding was created by active public relations work. Establishing new links and reinforcing the existing ones between the involved Burkinabe and Austrian researchers was an additional benefit for future endeavours.

LoCaBreed succeeded in creating awareness of systematic breeding of local cattle genetic resources in Burkina Faso and successfully implementing breeding programs owned by local livestock keepers. Breeding programs may be started within the framework of a research program, but their implementation must go on for many years after for the endeavour to be considered successful. The engagement of farmers, local as well as the national authorities are essential. Also, universities and research institutions, including the Austrian ones, have already promised long term commitment, hopefully in form of one or two APPEAR follow up projects.

8.3.2 From cattle keepers to cattle breeders. Steps of a transition – development countries’ realities and their implications

by Dominique Ouédraogo

Challenge and routine problems: how to move our project beneficiaries from famers to breeders?

In developing countries, smallholder farmers are usually livestock keepers, but not breeders. While they are aware of the fact that more productive parents will have more profitable offspring, they usually do not intentionally select better animals to be parents of the next generation. While there is some selection on the side of cows, better and more fertile cows having more offspring, male animals that may not be sold at a good price because of poor performance are often the breeding bulls of a herd. One of the main challenges of scientists

or breeding program designers is to raise breeding reflexes and awareness because their approach is sometimes not compatible with implementation of breeding programs. This was also our challenge in the implementation of LoCaBreed project. For example, identification of animals and performance recording are the first main steps in a newly established breeding program. In our study area, some farmers did not agree to the identification of their animals with ear tags. It was also sometimes very difficult to find animals for routine recording due to a free grazing system in the dry season. Another big constraint was blood sampling for genomic studies because some farmers were convinced that taking blood from animals can affect their health. Through the commitment of the project team in raising awareness and the regular training sessions that were organised, these constraints have been lifted and beneficiaries showed high levels of commitment to the breeding programs. However, we were not successful with the Fulani transhumant people due to their seasonal movement with animals searching for grazing making them unavailable during some periods of the year.

Challenge and routine problems: unavailability and or low quality of materials and services in developing countries like Burkina Faso

The implementation of breeding program required items and services which are often missing in developing countries. An example in our case was to find local, quality ear tags because the delivery of material imported from Europe take time. However, ear tags bought in Burkina Faso were low quality and all animals (more than 2000) tagged lost their tags during the first 6 months. We were forced to import tags from Europe to re-start the tagging. Secondly, we did not have capacity in genotyping animals with SNP markers and DNA samples were sent to a commercial laboratory in USA. The delivery of the results also took time and impacted the PhD students' progress.

Contradictions: Why should we conserve local Lobi cattle, which are less productive, while we need to improve farmers livelihoods?

The reason supporting crossbreeding between small-size Lobi cattle and the Zebu type is to produce animals that are bigger than pure Lobi type. Indeed, bigger animals are highly sought after on the market and are more profitable for farmers. However, one of the objectives of the LoCaBreed project was to contribute to conserving local Lobi cattle by genetically improving the breed. One of the community-based breeding programs implemented targeted pure Lobi cattle in one site. This seemed contradictory with the objective of producing bigger animals that are more profitable for farmers. There was a discussion among the scientists of the project team, between those who thought that there is no need to keep pure Lobi cattle with low performance levels and those who thought otherwise with several arguments supporting the need for having pure Baoulé stock. In addition to its economic role through generating income, only pure Lobi animals are in demand in many sociocultural ceremonies confirming the social importance of this breed for Lobi people. Also, in initial discussions with farmers, people showed their interest in preserving their breed. For example, some farmers showed their disagreement when a bull with some features of a crossbred animal was selected as the best breeding bull in the pure Lobi breeding program during the bull selection event. Furthermore, as with any livestock breed, Lobi cattle are part of global biodiversity and there is an international convention in place on the preservation of locally adapted livestock breeds. In addition, at a biological level, similar to several other West Afri-

can cattle types, Lobi cattle are tolerant to trypanosomosis (sleeping sickness) and are able to survive in sub humid areas infested by tsetse flies, vectors of trypanosomosis disease. This trypanotolerance ability of the Lobi breed is used by farmers in crossbreeding, because crossbred Zebu animals are also trypanotolerant. Therefore, pure Lobi stock is needed to ensure reasonable and sustainable crossbreeding. Despite its low levels of productivity, many reasons speak in favour of the conservation of Lobi cattle, and the project scientists agreed to continue implementing pure Lobi cattle community-based breeding program to support the conservation of this locally adapted breed.

8.3.3 The best bulls for Burkina Faso

by Pamela Burger

The small, approximately waist-high cattle in the Southwest of Burkina Faso have a most significant value for the “Lobi” ethnic group. They are highly valued because of their gentle character and are utilised for pulling the plough, providing meat and milk, as dowry, and in traditional ceremonies. In short, they are the principal capital of the farmers, just with one hitch – their small size (average height at withers 93.5; body length: 75.9; weight: 174 kg). Therefore, these Lobi cattle are often crossbred with the larger and stronger Zebu cattle from the North of the country to increase their body size and weight. However, this practice can lead to a dilution of the precious and unique Lobi cattle gene pool. This indigenous breed is specifically adapted to the local environment and has developed resistance towards trypanosome blood parasites causing “sleeping sickness”. By continuous hybridisation with the non-resistant Zebus, this evolutionary adaptation can gradually be lost. In our research and community-based breeding program LoCaBreed, we aimed at selecting the best Lobi bulls from the pool of local cattle stock with the purpose of breeding bigger and stronger progeny. Ideally, to vitiate crossbreeding with the larger Zebus. A selection committee consisting of 2-3 male and female Lobi farmers, respectively, and one youth was entrusted with ranking the bulls for breeding following traditional as well as technical scientific (e.g., weight gain) criteria. Regular weight and growth measurements and accompanying genetic analyses aimed at identifying genomic regions underlying growth traits and tolerance against trypanosomes.

A strong team

Certainly, a fruitful and great project is built around innovative ideas, state-of-the-art methods, excellent facilities and good infrastructure; but its success stands or falls with the people working together. Our diverse, multi-national, -ethnic and -lingual group comprised female (6) and male (12) scientists, students, and practitioners in the fields of social and natural sciences, agriculture, animal breeding, (ethno-) veterinary medicine, (ethno-) botanic, nutrition and economy. While some project partners already knew each other from previous collaborations, for example, the Northern (Johann Sölkner) and Southern (Albert Soudré) project leaders, or colleagues within the Austrian and Burkinabe team, respectively, most of us only met in person during the kick-off meeting in Vienna. It goes without saying that we had a very interesting first project phase informed by diligence, respect and recognition towards and of one another. An absolutely stunning and admirable characteristic of the

Burkinabe team members was their humour and the ability to compensate and stand up for each other. If a conflict arose between two participants, any of the other team members was immediately present, either to solve the underlying technical problem, or to remove the pressure from the situation. I have never experienced such a strong solidarity and team spirit before among scientific colleagues, where often there is more professional rivalry present than unselfish and generous support that in the end makes winners of all.

Dealing with conflicts

As I was able to observe during our LoCaBreed project, conflicts arouse mostly due to technical, missing material or planning issues during the field work. Different expectations towards the project inside and outside of the team, e.g., farmers expected compensation and feed for the cattle, required accepting criticisms, open discussions (including a cool down in the evening with a Brakina beer), and sometimes re-allocation of resources. Critical situations usually could be solved with patience and improvisation, and with humour. As an example of this, I would like to highlight the practical demonstration of a bull castration in Bouroum-Bouroum as one component of the community-based breeding program in presence of local farmers, representatives of the Agricultural Ministry of Burkina Faso, the legal representative of the Austrian Development Agency (ADA; Christian Geosits), and the APPEAR programme coordinator (Elke Stinnig). The purpose of the bull castration is to prevent bulls of lesser quality from breeding, when cattle are unsupervised or meet on common pasture grounds. The correct castration procedure should be demonstrated taking into consideration technique, local anaesthesia, and postoperative treatment. The first problem arose with the tight and ever-changing time schedule of the minister and getting the bulls ready at the same time – the solution here was flexibility and patience; and keeping the animals in the shade with sufficient water. However, a more problematic issue turned out to be the anaesthetic, which had been organised in the wrong application form. Instead of the locally injectable solution the oral version had been brought in insufficient concentrations. A short argument among the technicians if the castration might possibly be executed without local anaesthesia resulted in an outcry from my part as veterinarian (out of concern for animal welfare) and in a painful wince from the (male) audience of the workshop. A technician was swiftly sent to the veterinary office in the next village, where the local anaesthetic was available in the right dosage and application form, and the castration could be executed *lege artis* – again, improvisation, flexibility, humour and patience were a vital part of finding a fast solution.

Dealing with success

Acknowledging each other's success and a broad visualisation of the results are essential to keep up the good spirit and motivation in the team. In this respect, the support of the APPEAR programme coordinators, above all Elke Stinnig, via the APPEAR platform (<https://appear.at/en/projects/current-projects/project-websites/project120-locabreed/>) was absolutely great; the same goes for the valuable back-up and genuine interest in the accomplishments of our project by the ADA representative Christian Geosits – a truly inspiring personality. Specifically, I would like to highlight here the exceptional commitment and work attitude of the PhD students working on the project Dr Bernadette Yougbaré, Dr Dominique Ouédraogo and Dr cand. Bienvenue Zomá. Their enthusiasm and dedication were key to the success of LoCaBreed. Moreover, the effective implementation of the project

in Burkina Faso with its extensive amount of field work, tagging and measuring over 2000 animals, including more than 200 young bulls candidates recorded twice each six month, taking blood and hair samples, and organizing the farmers' workshops is entirely down to the amazing Burkinabe team led by Albert Soudré. As an example for the importance of celebrating success, I would like to point out one of the selection events with the farmers in Bouroum-Bouroum, Kampti and Loropeni. In a small ceremony, the owners of the best bulls were awarded good prize money and the bulls received colourful bands typical for a breed certification. The awards were sometimes presented by local officials and accompanied by discussions and speeches. Importantly, we also provided an award to the most committed farmer in each village; this idea came from the PhD student Dominique, who worked most with the farmers in recruiting bulls for the project. Remarkably, the feedback of the farmers was that for the first time, they said, they felt acknowledged for their work, for being Lobi breeders. They felt proud.

During the course of the project, we learned to be unbegrudging within our team, sharing success and celebrating milestones. Only towards the end of the project, due to the COVID-19 pandemic, were we not able to make our last field trip, which should have provided feedback and the presentation of the results to the farmers – and a final closing event. Unfortunately, celebrations with the students were also not possible, no PhD celebration, no farewell party. This was sad, but we all hope for a reunion and are working hard on a follow-up project.

Development

From my point of view, development within the LoCaBreed project happened at three levels, namely in a scientific way, among the breeders as a group, and on a personal (individual) level. The *development at the scientific level* was excellent and the outcomes of the research results are presented in detail in the next part. I will not repeat them here but try to reflect on the question “Is knowledge created where knowledge is needed?”. – I think we were able to increase the theoretical and practical knowledge not only for the Lobi farmers, but with the concept of community-based breeding program we also contributed to the national strategic plan for the conservation of genetic resources in Burkina Faso. This strategy includes the formation of a Lobi breeders association, which was one of the goals that crystallised during our workshops with the famers. In addition to the planning of founding a breeders association, the *multiple development at the famers level* can best be summarised with their statement, “We developed from cattle keepers to cattle breeders!”. The *development at the level of the individual team members* was enormous. It was wonderful to see the PhD candidates developing into mature scientists, ready to pursue their own (scientific) work. Observing and working with the team in Burkina Faso, slowly starting to understand the challenges (= euphemism for problems), sometimes feeling helpless and out of place, and many discussions also with the female farmers shaped a new perception in me, for which I am tremendously grateful. And finally, our two PIs (Northern and Southern) also managed to be in tune with each other on equal terms; please note that the Burkinabe team leader was a previous OEAD scholarship holder and our Austrian team leader his former PhD supervisor. Reflecting on that, it really is amazing what strong positive dynamics there were at a hierarchical level within the LoCaBreed team. Comparatively, it still is difficult for me to feel on par with my former supervisor, so I guess there is definitely room for development in my case.

Gender and diversity perspectives

As can be seen by the few lines dedicated here, we fell short of our gender representation targets in our project. One possible reason might be that traditionally in Burkina Faso the business of cattle breeding is a male domain, while the breeding of poultry and small ruminants is run by women. Soon it became clear, however, that this strict separation is not reflected in the daily practice. In fact, women can own cattle, even if they are managed by men. As an example of this, I would like to highlight one of the joint workshops for female and male farmers held in Bouroum-Bouroum. After the initial kick-off workshop was attended only by men, we quickly realised that we had to invite female farmers specifically. During this second workshop, the women described their contribution to Lobi cattle breeding, and it turned out that they fed and watered the animals, took care of the calves and supervised the children in cattle herding, and they also were part of the decision-making process on what money from sold cattle should be spent on. Therefore, the general conclusion between all farmers (male and female) was that women have an important role in all activities related to Lobi cattle breeding. In the last project phase, we held a joint workshop with SUSHFISH about gender perspectives, which was useful and in which we could identify large gaps. There is still a lot of room for further gains in this respect and ideally, we will progress further in a follow-up project within the APPEAR III program.

Building trust

The most important foundation for a follow-up project has been laid in the past four years: trust among the team, trust between the team and the farmers. At the beginning it took a lot of courage for the farmers to join LoCaBreed with their cattle herds. One problem actually was that in the beginning the farmers did not recruit their best bulls for the breeding program, because they were not sure what to expect from this “new” community-based breeding strategy. The continuous hard work of the PhD and Master’s students (trained by the PhD students), as well as our biannual presence during the selection events and workshops (even when terrorist attacks started) finally led to the recognition by the farmers of our dedication to the advancement of Lobi cattle breeding in Burkina Faso, and of their own benefits.

8.3.4 Enumeration of results

In terms of results, according to the objectives assigned to the project – with regard to the capacity building, the following was achieved:

- 7 research meetings implemented;
- 1 seminar held;
- 5 MSC/Engineer degree students (3 males, 2 females), 1 female Bachelor’s degree student, 1 male extension worker trained, 4 PhD students (3 males, 1 female) on training beyond the project end;
- 1 training workshop of extension workers, 12 training sessions for farmers;
- 10 workshops for farmers, 2 workshops for administrative and technical staff, 1 workshop for team members;
- Laboratory equipment and consumables provided;
- 6 scientific papers published, 3 oral presentations and 4 posters.

For African animal trypanosomosis, the following was achieved:

- 737 positive animals and 47,843 genetic markers used for purity study. From the results, crossbreds could be distinguished from pure Lobi/Baoulé cattle. Elucidating trypanotolerance genetic is ongoing;
- For ELISA tests, 1,415 individuals were used. The study revealed that 64.10% of the animals had been infected at least once based on circulating antibodies found;
- Assessment of blood parameters during trypanosomal infection in taurine and crossbreds, 367 blood samples used 8 parameters evaluated of which 5 could be used to significantly differentiate crossbreds from pure Lobi/Baoulé cattle.

Community-based breeding programs for pure Baoulé and crossbreds aiming to improve body size and trypanotolerance are being implemented. These breeding objectives have been defined by the farmers themselves during workshops:

- CBBP initiated for pure Lobi/Baoulé and carried out by Lobi people;
- 2 CBBP initiated for Baoulé x Zebu carried out by Lobi, Djan, Fulani, Mossi people;
- more than 25% of livestock keepers moved their attitude to animal breeders;
- 2 breeders associations were set up;
- Awareness-raising of national and regional authorities and the population on the value of CBBP by farmers, extension workers and scientists involved in the project.

Local taurine breeds have been characterised at the morphological level and indigenous knowledge documented. To this respect:

- 44 morphological traits of local taurine breeds have been investigated;
- Distinctions between the 2 local taurine breeds at morphological level were drawn. The Lobi/Baoulé cattle are characterised by their small size and the Gourounsi have a larger size compared to the Lobi/Baoulé;
- 26 medicinal plants used for 9 main cattle disease treatments. Leaves, barks roots, fruits, entire liana, young branches are used for the treatment preparations. The main administration methods for the treatments were: drinking, licking, inhalation, body application.



Project team (including northern and southern partners) with farmers during selection event in Loro-péni. Second from right: project coordinator Mr. Johann Sölkner



Population of crossbred animals in Loropéni



Project team explaining the selection process to the selection committee in Bouroum-Bouroum



Owner and his pure Lobi best bull selected in pure Lobi program in Bouroum-Bouroum



Farmers committee selecting best crossbreed bull in crossbreed program in Kampti



Young crossbreed best bull selected in crossbreed program in Kampti



PhD students, Dominique Ouédraogo and Bienvenue Lassina Zoma, with their Austrian supervisors, Prof. Johann Sölkner, Ass.Prof. Gábor Mészáros, Dr.vet. Pamela Burger, during field work



PhD candidate Bernadette Yougbaré and supervisor Prof. Johann Sölkner after her thesis defense

9 GEORGIA – ARMENIA

9.1 Academic Collaboration for Building Capacity in Environmental Studies

Project Coordinator: Irma Inashvili

Coordinating Institution: Georgian Technical University

Partner Institution: University of Natural Resources and Life Sciences, Vienna

Partner Country: Georgia

Project Duration: 1 August 2016 – 30 November 2020

9.1.1 The project – ACCES

New challenges relating to current climate changes and their tremendous impact on the environment, society and the economy require new educational content and strategies. Capacity building in environmental education is an effective way to deal with this since it strengthens overall awareness and knowledge, particularly of the young generation regarding existing and upcoming ecological hazards and risks.

The Georgian Technical University (GTU) and the Institute of Soil Physics and Rural Water Management (SoPhy) (*previously IHLW*) at the University of Natural Resources and Life Sciences, Vienna (BOKU) both aspire towards establishing an efficient partnership in research-guided educational networking, research and services in the field of the environmental engineering studies.

The overall objective of the ACCES project was to contribute to the modernisation of higher environmental education in Georgia in line with the environmental and labour market demands and European standards by establishing a framework for developing innovative and competence-oriented educational programmes of high-quality addressing key issues in environmental engineering. In particular, ACCES focuses on:

- Strengthening the university and the faculty capacity at the GTU in developing innovative environmental Master's curricula based on the latest teaching methods and tools for the efficient transfer of knowledge and skills;
- Strengthening staff competences by promoting excellence in innovative teaching, research and innovations;
- Enhancing gender equality in the higher education system by promoting diversity, providing equal opportunities for professional qualifications and realization;
- Establishing an efficient partnership in research-guided higher education using dynamic frameworks, dynamic and open-minded dialogue and the exchange of innovative ideas.

9.1.2 Quality assurance of e-learning – mechanisms and approaches

by Irma Inashvili, Konstantine Bziava, Alexander Bagration-Dasvitashvili

Ensuring that learning outcomes are achieved by students who remain outside of e-learning

The Quality Assurance Service monitors the identification of students who do not have ade-

quate technical resources and equipment and/or access to the Internet in order to be fully and actively involved in the learning process, thus being left out of the e-learning process.

For students who do not have adequate resources and are left out of e-learning, the University provides individual approaches and plans drawn up in accordance with the law in order to achieve the learning outcomes set by the relevant educational programs and allow them to complete the study process in a reasonable time or allow the study period to be extended.

Approaches to administering the e-learning process

The university uses electronic platforms to guide the learning process and provide students with e-learning resources, e-learning quality assurance mechanisms and approaches. In particular, the electronic platform, Zoom.us is used for conducting lectures and practical training, and the electronic platform Moodle.edu.ge is also used for sharing textbooks, other compulsory and additional training materials, syllabi and other necessary materials, as well as various teaching and assessment methods for remote use.

We were provided with information about the use of the electronic platforms (Moodle.edu.ge, Zoom.us) by the program implementation staff as well as the administrative staff (deans, educational program managers, training process managers, examination centre staff, quality assurance staff, etc.) The University provides them with training and video instruction via the Innovative Teaching Methods Training Center. The University provides access to video tutorials on the electronic platform (Moodle.edu.ge). Training sessions and video tutorials provide the program staff with the following types of information: How to use an electronic platform to conduct lectures and practical lessons, record lectures, upload electronic files, use classroom activities and assessment methods via electronic platforms, etc.

In order to inform students about the use of electronic platforms (Moodle.edu.ge, Zoom.us), the University provides them with video instructions and messages, both in the form of university mailing addresses and in the form of short text messages. The University provides access to video instructions both on the electronic platform (Moodle.edu.ge) and on the official website of the University.

For students who do not have permanent access to the internet, the University provides them with lecture videos by uploading lecture recordings on an electronic platform (recording of lecture hours is carried out with the consent and permission of the lecturers). After watching the video lectures, if there are any questions, students have the opportunity to use the „offline chat moodle“ function, write questions to the lecturer and get relevant answers.

Possible different approaches to e-learning in educational programs

In order for the students involved in the e-learning process to achieve the learning outcomes defined by the educational programs, the teaching and learning methods can be modified within the training courses, if the teaching methods defined by the training course cannot be used in the e-learning course. This decision can be made by the course lecturer. The teaching methods used by the lecturer during the implementation of the training course in an electronic format should ensure that the learning outcomes defined by the training course are achieved. If different teaching methods are used within the syllabus, the lecturer is obliged to inform the head of the educational program of this and explain the need for the change. Program leaders will provide the Quality Assurance Service with information on changes in teaching methods under the education program, the need for change and training courses in

which different teaching methods have been used in distance learning. This report from the program manager needs to show that it is possible to achieve the learning outcomes using different teaching methods.

In order to protect the interests of students, if necessary, it is possible to make up for a shortfall in credits using the courses offered in the other semester in keeping with the curriculum within the educational programs.

Monitoring the progress of the e-learning process

The quality, compliance with the syllabus, the lecturer's use of teaching and assessment methods is evaluated through the electronic platform. Evaluation and monitoring are provided by learning process management managers, program managers and program committee members.

In order to monitor and evaluate the learning process, it is mandatory for the program implementing staff to post links to online meetings to be held through the electronic platform (Zoom.us) on the Moodle platform. All parties involved in the monitoring process (learning process management managers, educational program managers, program committee members, quality assurance service representatives) are allowed access to electronic platform, on the relevant training course page, to monitor and evaluate the learning process.

The information received from the monitoring is processed by the Quality Assurance Service in order to develop recommendations. Recommendations are sent to the faculty administration to respond to identified cases and take the recommendations into account, thereby improving the quality of the learning process.

Evaluating the quality of e-learning

In order to assess the progress of the e-learning process, the Quality Assurance Service conducts a survey of the staff implementing the program, using an e-learning questionnaire designed to assess the implementation of the e-learning process and their satisfaction with the process.

The survey assesses the progress of lectures, technical support of lectures, the degree of achievement of learning outcomes defined by the course, the degree of interaction, student participation and involvement in the learning process, support from the university administration and the innovative training methods training centre. The issues identified based on the processing of the survey results and the developed recommendations are sent to the faculty administration for them to respond to and improve the quality of the learning process.

In order to assess the progress of the e-learning process, the Quality Assurance Service conducts a survey of students, using a questionnaire developed to assess the implementation of the e-learning process electronically and survey their satisfaction with the process. The survey assesses the progress of lectures, technical support of lectures, the quality of learning outcomes defined by the course, the possibility of interaction and involvement, the effectiveness of the lecturer's use of electronic platforms, activities and assignments used by lecturers on the electronic platform and support from the university administration. The issues identified based on the processing of the survey results and the developed recommendations are sent to the faculty administration for them to respond to and improve the quality of the learning process.

In order to assess the progress of the examination process electronically and to assess the students' satisfaction in this regard, the Quality Assurance Service conducts a survey using a relevant questionnaire modified for the aforementioned purposes.

The survey assesses the progress and organisation of the examination process, the technical support of the examination process, the receipt of relevant information and instructions before the examination process, the organisation of observers, the examination schedule, the examination assignments, the content of the examination course syllabus and the syllabus. The analysis of the survey results and the developed recommendations are sent to the examination centre for them to respond to, consider the recommendations and, subsequently, refine the examination processes

9.1.3 Strengthening the resilience of university education through innovative teaching

by Margarita Himmelbauer, Alexandra Strauss-Sieberth, Andreas Zitek, Claus Rainer Michalek and Willibald Loiskandl

Resilience/educational perspectives on resilience

Resilience has become a popular term used in a broader context. It is generally understood as the capacity to cope with stresses by maintaining your own functions, as well as to adapt to surrounding changes by renewal, reorganisation and development (e.g., Finewood & Henderson, 2019; Luthar et al., 2000; Windle, 2011). Specific disciplines provide further meanings and understandings.

In the scope of education, resilience indicates an ability to prosper educationally despite adverse modifications of the system. Some researchers looked at building resilience by examining the role of educational institutions in adjusting their operative and personal resources to demographics, politics, environments, socio-economic markets and service demands (e.g., Crislip & Bush, 2010; Sacker & Schoon, 2007). In this regard, higher education plays an important role, since universities guide fundamental theoretical background, specific knowledge and professional training, research and practice. The task of academia is bringing an awareness of resilience governance to society.

Strengthening the resilience of university education

Higher university education is currently confronted with distractions on account of environmental, geopolitical and social challenges, and technology development. Therefore, the qualifications and skills desired on labour market are constantly transforming. In addition, the interest in studies abroad and the number of international students is continually increasing, which is challenging for the universities providing international study programs. Strengthening the resilience of the university can increase its capacity for prospective education. University resilience can be sustained by strengthening the capacity building at an organisational level, increasing staff competences and skills, and promoting beneficial broad-based partnerships.

Strengthening the capacity building of university education in Georgia was the objective of the bilateral APPEAR Project 136 “ACCES” between the University of Natural Resources and Life Sciences, Vienna (BOKU), and the Georgian Technical University (GTU), Tbilisi. The overall goal was to contribute to the modernisation of environmental curricula according to ecological needs and labour market demands in Georgia. In line with European educational standards, a framework for developing Master’s programs of high-quality was estab-

lished. A shortage of well-trained experts in environmental (green) technologies appears to be a common hinderance to adequately solving global ecological problems. For this reason, an update of the current water engineering program and the development of a new environmental engineering curriculum based on the latest research findings were developed. A multinational team of teachers, experts and supervisors from both universities contributed to this task. Emphasis was placed on green skills as well as introducing innovative teaching methods and tools. In this paper, the focus is on the implementation of advanced teaching methods with respect to strengthening university resilience.

Contribution of innovative learning and teaching technologies to higher education

The trend of integrating novel information and communication technologies in higher education is continuously expanding. When applied appropriately, digital and online teaching tools plus adjusted pedagogical methods can be very effective and are welcomed by students. Teaching is becoming more interactive, when needed materials are available before the real-time online courses.

The challenge of online teaching is to overcome the lack of social interaction and social exchange between teachers and students. However, well prepared didactic concepts can compensate to a large extent for this lack of interaction in the virtual space. The introduced concepts have already demonstrated their usefulness during the coronavirus crisis.

For successful and pleasant online learning, participants need to be supported by a well-structured procedure. The five-stage-model of Gilly Salmon provides a framework or scaffold for a structured and paced program (Salmon, 2020). The five-stage-model offers essential support and development to participants at each stage as they build up expertise in learning online.



Five-stage-model of Gilly Salmon, Graphics adapted, based on Gilly Salmon, 2020 (<https://www.gillysalmon.com/five-stage-model.html>) Online/e-learning environments stimulate interactive and participative learning and if properly applied, can enhance a sense of community and participation. Some of the advantages for students are accessibility to groups even when they are physically disabled, and to individual training sessions.

ACCES project

Education coupled progressively with e-learning is recognised at Georgian universities and is developing considerably with the advent of internet technologies. There are different e-learning tools known and available, but their practical application still remains challenging. For instance, the high workload for designing and maintaining courses, uncertain systems for identification and control of student work, and a lack of relevant experience among academic staff, appeared to be problems on the ground.

Within the framework of ACCES, a training course on “*Didactic and e-learning Innovative teaching methods and tools in higher education*” was organised in December 2017 at BOKU, Vienna. Representatives of young and experienced teaching staff and academic leaders of the GTU participated in a training sessions provided by experts from the Centre of E-learning and Didactics at BOKU. Preliminary seminars on *Gender sensitive E-Learning and Didactic in Higher Education* given by the BOKU team at GTU and the Tbilisi Teaching University (TTU) served as a basis for this. To facilitate this process, access to the BOKU learning platform (BOKU Moodle system) was prearranged and guaranteed until the end of the training. The activity itself was organised following the blended learning concept and combined *face-to-face* lectures together with *independent* (individual) *learning*. One task included working on computers (virtual learning), individually and as group work, followed by a presentation and discussion of the common pilot projects in the plenary session. The trainees were guided through the basic steps preparing *timelines and developing concepts* for “Moodle” e-learning courses for lectures and practical exercises. Integration of extra digital resources and links, arranging libraries and glossaries, forums for discussions and surveys, etc., was practised. Examples of knowledge assessments and examinations, e.g., multiple choices tests, developing questionnaires, courses and program evaluations were introduced and the usefulness for GTU was evaluated. The group work focused on selected courses of the new MSc programs “Water Engineering” and “Environmental Engineering”. The training outputs (the examples developed) served as pilot projects for further curricula work. The newly created MSc programs in Water Engineering and in Environmental Engineering broadly elaborated the e-learning format using Moodle and supportive digital tools, i.e., they were partially run as e-learning courses, while laboratory and practical classes and training are organised more traditionally.

The trainees were further introduced to up-to-date practices at BOKU for working with different target groups, i.e., applying gender sensitive teaching, initiating open debates, etc. The main idea was that these subject matters are further propagated among young colleagues and are considered when designing new academic courses and syllabuses. In such learning environments, students learn also to work better in groups and share knowledge. They are encouraged to focus on broader aims, beyond successfully passing exams, such as promoting green skills and sustainable development goals. This also benefits their well-being, decreases the risk of social isolation and increases educational resilience.

First level evaluation among students was carried out, asking for comments on teaching methods and tools, learning environments, training resources and any other comments on the new MSc programs. Consequently, the project contributed to strengthening existing feedback structures building on consultation and collaboration with students.

Framework for cooperation and exchange with academia and stakeholders

Academic programs in the field of water and environmental engineering and management educate and train students in green skills, gaining competences to enable green practices and policies in the country. Training in green skills opens the door for an ongoing cooperation not only at university level but also with enterprises and graduates of GTU.

ACCES brought together international and Georgian academic groups focusing on promoting resilience in teachers through professional learning and teaching experiences. A series of meetings and consultations with academic staff, leaders, students and stakeholders (green companies) took place to gain views and feedback about the urgent needs and gaps in current environmental education in Georgia. The topics, among others, reflected the role of the higher ecological education for the development of green skills and competences enabling graduates to promote the green economy and green policies. These discussions resulted in the identification of key topics which have been woven into the goals of new Master's programs, and the teaching practises at the GTU.

Further joint meeting aimed at broadcasting the project to a wider audience placing emphases on the implementation of innovative teaching methods, tools and semantics.

Relevance to current challenging conditions

One of the biggest challenges for societies worldwide is the COVID-19 impact on their national educational system. Lockdown measures involved the closure of schools and universities too. Therefore, academic institutions had to urgently adjust their performance and study programs by providing lessons, training and examinations online. ACCESS had not foreseen this at the start of the project and it proved to be very useful in mitigating the impact of COVID-19.

The COVID-19 pandemic has catapulted university teaching into the digital future of online teaching. Communication and exchange is and was a key factor of online teaching. Communication between teachers at BOKU is carried out via a Moodle course „E-Learning and Didactics Couch“ for teachers. In this course, all of the relevant information about online teaching is collected and made available to teachers. In the age of online teaching, questions about copyright play a central role (BOKU, 2020; Zitek & et al., 2019).

Outlook

The broad framework that has been created for close cooperation and exchange with academia and stakeholders provides a good platform for further exchange of innovative teaching strategies on green education and the green economy. A memorandum for cooperation between BOKU and GTU was signed for future joint activities. The main purpose is to enhance the university exchange in the fields of training and research, curriculum development and quality assurance, institutional development, and the exchange of students and staff. This also includes activities with water engineering enterprises, research institutes, which are planned to enable efficient synergies at different levels. In this way, we link the project outcomes and findings to a larger community.

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9.1.4 Enumeration of results

During the four-year time span, the project brought together large international academic groups focusing on promoting resilience for teachers through professional learning and teaching experiences. The major results of this close collaboration comprised:

- Reviewing and updating the Master's program (MP) in Water Engineering;
 - Development of a new MP in Environmental Engineering based on the latest research findings;
 - Trained academic staff on using innovative teaching methods & tools, support and relevant useful materials provided;
 - Implementation of innovative teaching methods adjusted to the new forms of study and training with a focus on e-learning, paying special attention to gender diversity aspects in higher education;
 - Sharing knowledge and experiences between teachers and students at GTU and BOKU, e.g., via visits, round tables, field trips and workshops, and via internet platforms;
 - Reflecting feedback of students, staff and stakeholders on the new Master's programs
 - Provided quality assurance: MP accreditation launched.
- Dissemination of the project outcomes

Furthermore, a memorandum for cooperation between BOKU and GTU was agreed and signed for close academic cooperation, also after the project has been completed, in the fields of training, research, curriculum development, postgraduate education, quality assurance, institutional development, and the exchange of students, faculties and staff, etc. We announced the major project outcomes and valuable contributions of all collaborators,

teachers, students, academic decision makers, researchers and stakeholders (green companies) and will further broadcast them to the larger community. <https://iinashvili.wixsite.com/project135>



Both female coordinators of the ACCES project – Prof. Irma Inashvili, GTU and Dr. Margarita Himmelbauer, BOKU in discussion



Trainees from the GTU and trainers from the BOKU (Centre of E-learning and Didactic and IHLW) in common actions: gaining knowledge on using Moodle platform by planning of study programs; designing lectures and practical courses and timelines; exchange of views and experience; presenting outputs and defining of the new-fangled ideas behind; happy in getting the certificates



Visiting experimental laboratories at the Institute of Mountain Risk Engineering (IAN)



Meeting with the Vice-Rector Prof. Levan Klimiashvili on prospects for new collaborative activities in the frame of the recently signed memorandum of cooperation between GTU and BOKU



Scientific-technical excursion to the waterworks for drinking water and wastewater treatment plants of the municipality of Tulln with Prof. R. Perfler (SIG, WAU, BOKU)

9.2 Building Organic Agriculture in Armenia. Improving the Knowledge and Skills of Organic Stakeholders through Participatory Curriculum Development and Outreach

Project Coordinator: Milena Klimek; Valentin Fiala; Co-coordinated by Bernhard Freyer

Coordinating Institution: University of Natural Resources and Life Sciences, Division of Organic Farming (IfÖL)

Partner institution: Armenian National Agrarian University, the International Centre for Agribusiness Research and Education (ICARE)

Partner Country: Armenia

Project Duration: 1 March 2017 – 29 February 2020

9.2.1 The project – BOAA

BOAA is a higher-education based project developed in cooperation with the International Centre for Agribusiness Research and Education (ICARE) in Yerevan, the Armenian National Agrarian University (ANAU), and the University of Natural Resources and Life Sciences, Vienna (BOKU). This project was created with the intention of supporting the Armenian organic sector by closing the gap between farmers and science by educating and training young professionals ready to enter the workforce.

BOAA has been created to help deliver on the need to increase in organic agriculture professional skills in research and practice in the Armenian context. The Armenian government, in collaboration with the EU and the ADC, has completed an Organic Agriculture Support Initiative (OASI) project, increasing organic agriculture in Armenia to benefit marginalised people in impoverished areas, better handle small farm sizes within the country and ensure the conservation of Armenian water, soil and biodiversity. There have been projects and support on raising awareness and the implementation of organic agriculture in the country, however with this recent organic support came a demand for trained and skilled Armenian organic practitioners in research as well as in practice. In order to meet this need, BOAA was designed as a transdisciplinary project to develop and implement an Armenian Organic Master's Program (OMP) with a location-based curriculum in three phases.

Phase 1: gathered stakeholder data from focus groups and interviews on current challenges and the needs of present and future farmers and organic practitioners.

Phase 2: encompassed the development of the organic master's program curriculum and the training of the ANAU instructors in not only organic theory, methods and practice, but also modern teaching approaches. The development of the curriculum was completed through many reiterations with different stakeholder groups—students, faculties and staff (from both ANAU and BOKU), project coordinators and organic stakeholders—with each lecturer responsible for incorporating suggestions and changes in their respective courses as they saw fit. The training of instructors was originally conceptualised in two parts: 1) the Armenian partner team visiting BOKU's Division of Organic Farming at the Department of Sustainable Agricultural Systems as well as attending on-site visits; and 2) a BOKU teaching team visiting ANAU to both understand the Armenian agrarian context and help train and develop staff and curriculum.

In the end, there were actually four 1-2 weeklong training sessions and additional funding made it possible for individual Armenian lecturers to receive specialised training throughout Europe, including additional BOKU visits. The first two-week training session in Austria provided an opportunity for 4 lecturers and one Armenian farmer to visit the organic landscape that Austria has to offer. More importantly, the group decided on a common pedagogical philosophy and what direction they wanted the program to head in terms of using modern teaching approaches and methods focused on real-world challenges, stakeholder integration and student-centred education. The final three training sessions all took place in Armenia with many BOKU lecturers and professors giving theoretical and practical organic specific training on various subjects. These trainings sessions also included one-on-one time with Armenian lecturers to go over their course curriculum for improvements. The extra training sessions were possible due to outside funding from two successful bids for Erasmus+ staff mobility grants.

Phase 3: included the finalisation of the OMP and its curriculum, which was officially accepted by ANAU and the Ministry of Education on 24 December 2019. This phase also included the program's dissemination, implementation and evaluation. In addition to a stakeholder committee devoted to the implementation and management of the OMP, project dissemination occurred through social media, newspaper articles, student outreach events, a large public event including organic stakeholders, and a video.

These project phases, completed in their entirety, demonstrate the transdisciplinary development of organic agriculture in Armenia through participatory curriculum development. Although the Master's program will not begin until the fall semester of 2020, the immanent teaching of organic farming through BOAA has already brought together an impressive teaching team community, in which 12 lecturers have made decisions vital for the success of the program, endlessly discussed, continuously learned, and grappled with new teaching methods. The courses and program they have created together with students, staff, project coordinators, BOKU professors and organic stakeholders in Armenia, truly aims at addressing real-world challenges through stakeholder integration and student-centred education. This aims to have highly connected and empowered students graduating with relevant and necessary organic knowledge. We are eager to see the outcome of this project and anticipate graduates to not only be prepared for the field of organic agriculture but also boast competitive skillsets that are relevant for national and international workplace contexts.

Finally, this program also made it possible to work with PhD student Hasmik Hovakimyan, an APPEAR PhD Scholarship holder from Armenia. Her work has encompassed this project via participatory action research in which she has not only been an invaluable participant, but has also observed our process, studying it as a case study for participatory curriculum building, and particularly working out the lessons to be learnt.

9.2.2 The importance of how you teach — modern teaching methods in post-Soviet pedagogy

by Milena Klimek and Astghik Sahakyan

Here we reflect on the realisation that developing our main goal in the BOAA project—an organic Master’s program—was not only about organic content and navigating the existing university system, but also taking into consideration the outdated forms of teaching that are still being used. We quickly learned from our needs assessment that these “archaic” forms of teaching were not looked upon favourably by students, many faculties and staff. This short article highlights this realisation, our tactics to tackle these needs and some lessons learnt doing so.

Determining the current learning atmosphere at ANAU

During the first phase of our project, data was gathered from stakeholders to establish an understanding of the pedagogical status quo, needs and challenges at ANAU. We heard from multiple sources that it would be necessary to revamp and modernise teaching methods if we wanted to go in the direction we intended. It was particularly our focus groups with current students that really opened our eyes to the learning conditions at ANAU. Students gave roughly two categories of feedback concerning these challenges — physical conditions and teaching methods — which were later confirmed by statements and focus groups with ANAU faculties and staff. Examples of physical challenges included cold classroom temperatures in the winter, lack of appropriate classroom equipment, lack of an E-learning platform and no digital registration system for efficient and paperless communication with students.

However, challenges concerning current teaching methods dominated the conversation among students in the focus groups. Many students seemed to be aware, whether through personal study abroad experience or word of mouth, of more modern teaching methods and approaches used particularly in Europe and North America. This created a base that students used to describe and compare the ANAU system with. Students explained teaching approaches akin with the traditional didactics of post-Soviet systems. This includes a hierarchical professor-student relationship, predominantly lecture-based with lecturers speaking at students and evaluation mainly in an exam format. In this kind of atmosphere, students are expected to listen and take notes to study for their exams. When discussing the current teaching and learning atmosphere at ANAU, it was clear from the students and also from our lecturing team that there was a great deal of interest in improving upon these traditional didactics, particularly by creating in-field opportunities, more interactive classroom experiences and significant connections with stakeholders.

A meaningful structure for updating teaching approaches and methods

Taking the information that we learned, one of our very first training opportunities occurred in Vienna, with five Armenian visitors, four of our lecturers from our main teaching team and one farmer stakeholder. The training aimed to address innovative teaching methods and tools.

One of the first activities we did as a group was to determine *how*, as a group, we wanted to teach. We considered the information given to us in the needs assessment; particularly what the students were interested in, what support and knowledge farmers and organic

businesses said was needed, and what the staff and faculty was looking for. In doing so, we went through different teaching approaches and methods; described and discussed them and their potential impact on the project. In the end, the group decided that there was a need for a change in their current pedagogical ideology. Together they decided that to propose a modern program was to offer one in which the students were at the centre. This meant that the teacher becomes a facilitator and that there is a focus on a student's role in their system both during the educational process — how they learn best — and after graduation.

Accordingly, during this first week we came up with our program's 'educational philosophy' that elaborated on many of these thoughts. This pedagogical philosophy has framed and influenced the direction of the OMP curricula, including all of its individual courses. With the larger teaching group, visiting BOKU professors and Armenian organic stakeholders, a vision and values statement was created from this pedagogical philosophy and now guides the program.

With the goal of having a program that is student-centred, it was clear that we wished to initiate a change from the passive post-Soviet reception of information by students at ANAU to an active role in the classroom and also in real world contexts. It was determined that active involvement, critical reflection and systemic, non-linear, inter- and transdisciplinary thinking are essential to understand complex systems in the real world. Our program intends to equip students with the knowledge and skills to make informed decisions within this context. To do so, our teaching team thought that students should be prepared to interact with organic stakeholders, field work, group discussions, case studies, group work, both qualitative and quantitative scientific methods, and multiple assessment methods (not just an exam). Throughout the course development, a variety of assignments aim to produce direct outcomes for Armenian organic stakeholders, linking students, teachers, and researchers with the real world already in classwork.

The integration of these elements in each course was, however, challenging. Even though we have quite a young teaching team, eager for change, they have grown up in a traditional system using older didactics. We then had multiple opportunities for our teaching team to work in groups, co-creating short courses, or near the end of the project, taking existing exercises from their own planned courses and 'teaching' them to the rest of the group. These exercises allowed our teaching team to step out of their comfort zones, actually practicing what they would like to teach, and *how* they want to teach it. These experiences have also included evaluations, both at the individual level and in the groups discussing what worked, what didn't and sharing more ideas. This practice and evaluation have become essential, not only for building a teaching team that is comfortable with each other, but also to practice methods and approaches in a safe environment.

E-learning tools

We were also able address the physical conditions mentioned by our initial student focus group, in combination with modernising techniques by hosting training on E-learning tools. It was important for us to address this issue as the students at ANAU are growing up in a digital generation where the availability and use of digital technologies is growing, yet not always as fast as they might be prepared for. Although, when we began this project an e-learning platform was not being used or provided by ANAU, it is now being introduced to many departments. In the summer of 2018, there was a governmental reform that also effected the university system. A new Rector was elected at ANAU and, fortunately for

us and our program, it was our Armenian project leader. He has been invaluable with the furthering our OMP and understanding the broader implications of our needs assessment within the wider university context. One example of this is the integration of the E-learning management system Moodle in ANAU. To expand upon this, we had training on how to use Moodle at BOKU for 4 teaching team members. They were given not only theory and uses, but also had time to start creating their own Moodle accounts and pages for their specific course content. They have shared their knowledge with the wider teaching team and the use of this platform has been integrated into the OMP with the purpose of clear course organisation and communication with students.

In addition, we also provided explanations to the lecturing team on basic open source resources available to help with teaching and research —e .g., reference management software introductions to endnote and literature search tools such as google scholar. This introduction to digital teaching technologies is one small step into a plethora of possibilities. We hope this introduction will jump-start the skills needed to explore these possibilities individually and add both to the participants' individual repertoires as well as their teaching didactics.

Conclusions

The involvement of students from the beginning was necessary not only to obtain reflections on their current learning environment, but also understand what they would like to have in a program, how they learn best and what motivates them, etc. Not only did we do this with multiple student focus groups in Armenia, we also had a group of 5 BOKU students describe how they learned at BOKU, and what they enjoy and wish would improve. This exchange illustrated to the Armenian lecturers some of the possibilities students have outside of Armenia and that the BOKU program could also improve.

The development of a common pedagogical philosophy was important in this curriculum development process as this process not only built community within our teaching team, it also fashioned a foundation to make sure we were reaching our commonly defined and decided upon Master's program goals.

Finally, continuous reflection as the curricula and its individual course descriptions and structures were developed has been important in the success of our project. Although time-consuming, suggestions not only from lecturers and project team members, but also students, organic stakeholders and BOKU professors were integrated in these processes. While not included in this project, we hope that when the OMP starts, reflection and evaluation continues. An important task of the teacher is to constantly reflect and develop their pedagogical potential; positively influencing their students by their example, and thus changing the future of post-Soviet education.

In recognising the need to address antiquated teaching methods and approaches, we believe that our project has been enriched by creating a common pedagogical philosophy, including *how* our BOAA teaching team would like to teach. We believe it is up to the teachers and program developers to find the right mix of approaches for their specific program, needs of their students and stakeholders, and logistic and administrative boundaries. With this, a modern program can be created, and as the rector of ANAU sees it, act as a model for future programs to come, updating the current-post Soviet educational system and creating more international and competitive teaching, learning and research opportunities.

9.2.3 Participatory curriculum development – lessons learnt

by Milena Klimek, Astghik Sahakyan and Hasmik Hovakimyan

This next section encompasses our overall project process of developing the OMP curriculum. We emphasise the high expectations of participation on paper and how participation can manifest itself differently in action. These differences are particularly evident when working with a rigid university system still somewhat embedded in Soviet-era requirements and expectations.

Participatory curriculum: the development process

To achieve participatory curriculum development, the project team first determined who needs to be involved in the development. Based on our stakeholder needs assessment with 5 different stakeholder participant groups, we decided upon the important players and at what level of involvement (see Figure 1). At the beginning of the process, the core teaching team, consisting of 4 representatives, were at the main level of planning with the project coordinators. As a group, they agreed upon a common shared vision, or pedagogical philosophy. This was later shared and adjusted with input from both the complete group of teachers, the stakeholder committee, other faculty and staff at ANAU and BOKU, and students. Together, the group decided that the main purpose of the program is: to prepare professionals and researchers equipped with relevant scientific and practical knowledge of organic agriculture.

The common pedagogical philosophy helped the teaching team decide as a group as to *how* they wanted to teach. Before the group worked on their specific courses, the structure for the Master's program and its curriculum was described to the group by the Armenian project coordinator and one member of the core teaching team. This structure was pre-defined and is an amalgamation of requirements from the Ministry of Education and the University itself, deviating from the participatory aspects of this project. Once the structure was defined and understood by the group, training for the entire teaching team began. The training sessions were used to give input towards the individual courses themselves, and to build a common base knowledge throughout the teaching team both in the organic context and teaching methods and approaches.

The next step was to create a course list for the OMP. In each focus group participants were asked to share possible course topics they found most important. An initial list was created from these discussions and from existing organic educational programs. The list was then given to the teaching team to shorten and prioritise. It was then shared with the stakeholder committee, an additional student focus group, experts from BOKU, and then given back to the teaching team. The reiterative process of the course list creation was facilitated by the coordination team, taking the university requirements into consideration. After the course list was decided upon, the teaching team was given input on writing clear outcomes and objectives and they first described their courses and then drafted appropriate outcomes and objectives. Finally, after looking at these with each other and also obtaining feedback from the coordinating team, a structure based on university requirements and elements from the program's vision was created — such as teaching methods, stakeholder involvement and the inclusion of training of one research method in each course. This essentially translated learning objectives for individual courses into curriculum activities. Steps still outstanding in the curriculum development are the actual implementation of the curricu-

lum (expected in the fall semester of 2020) and creating a participatory evaluation process for the curriculum in the years to come.

The process of creating a program and curriculum up until now has been a very reflective one. Project coordinators often ask for feedback or facilitating discussions or workshops in order to make decisions important for curriculum development or to understand what is missing or is still needed in the program or the training of the teaching team. This role was given to the core teaching team, to continue this reflective nature as the program runs.

Stakeholder involvement

After the professional needs in the organic sector were identified and the needs assessment study was carried out, the BOAA team initiated the establishment of the stakeholder committee. The research projects conducted in advance and the focus group discussions organised were useful in bringing the appropriate players to this committee. The project stakeholder committee is composed of 20 people. Organic producers, processors, representatives from international organisations, certification bodies, the Ministry of Education, students and lecturers are part of the committee (see Figure 1 below). Previously, ANAU's collaboration with the industry has been weak throughout the years and stakeholder ideas were not adequately introduced to academic programs at the university. Therefore, this stakeholder committee signified a change in direction for the ANAU program and represented a decisive step towards the participatory process.

The stakeholder committee met 2-3 times a year, with the aim of keeping the committee members updated about the project progress and involving them in discussions that were critical for curriculum development, involvement and evaluation.

Stakeholder input was crucial in developing the course list and understanding the priorities in the sector. In addition to face-to-face meetings that were organised, the stakeholder

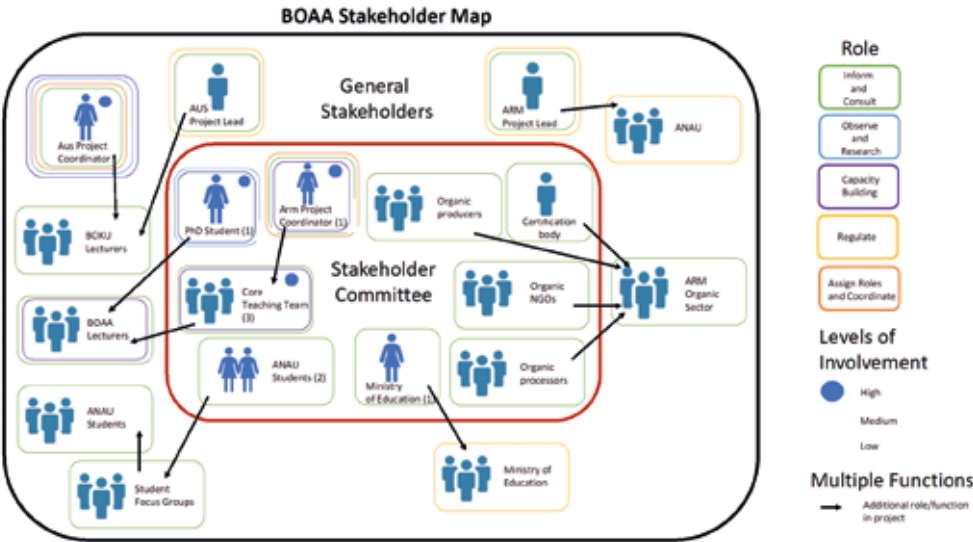


Fig. 1: BOAA Stakeholder map illustrating general stakeholders, those involved in the stakeholder committee, their role, level of involvement in the project, and possible integration in other stakeholder groups.

committee was updated with the project milestones through the newsletters sent each year. Project progress and the events organised were continuously communicated with the stakeholder committee every three to four months. Not only the stakeholders, but also the University representatives in key positions received the newsletters.

The BOAA project team has been consistent in enhancing the collaboration between the lecturers and the stakeholders. One of the successful attempts was the ‘speed dating’ format used at one stakeholder committee meeting. The goal of the meeting was to find stakeholders who would help to add real-world examples to the courses they teach by creating meaningful relationships and connections to the Armenian organic sector. During the meeting, 2 minutes were given to each of the 12 lecturers working on the curriculum development to meet each stakeholder, and discuss the possibilities of collaboration for the courses they teach. The teaching team had been informed about the upcoming meeting with the stakeholders in advance, so they prepared their questions to them. The stakeholders also each had 2 minutes per lecturer to reply and describe what they had to offer and how they could best implement their context into a course. When discussing the possibilities of involving stakeholders in curriculum development, we quickly realised the need to consider their heavy schedules and the willingness to support the process. With the BOAA project, the idea of a stakeholder committee was welcomed by the industry, but the same stakeholder representatives have not always been consistent, and thus many stakeholders have been rotating in or out due to reasons of relevance, time and interest. During the latter stages of the project, stakeholders took part in celebrating the official acceptance of the program curriculum at the ministry level and participated in dissemination events describing their involvement in the courses and bringing their products to sell and taste. A final stakeholder meeting was held in February to evaluate the process and to ensure their participation and connection to the program’s future.

Lessons learnt

The participation of a large stakeholder base in a project can link science and practice together. In our case, with participatory curriculum development, it provided an opportunity to a number of stakeholders from diverse disciplines to collaborate in our project, analyse the existing situation, identify the problems and the needs. We used the participation of stakeholders not only to integrate disadvantaged people but to obtain knowledge and participation from respective key organic players, generally outside of the university context.

The participatory curriculum development process was neither easy nor straightforward. The concept was new to almost all participants, and since different stakeholders had different working styles and ideas about the program, it sometimes led to misunderstandings and a need for a systematic effort to balance powers. Facilitation through project coordinators played a major role in this.

In particular, it was a project goal that the wider Armenian community benefit in having an applicable and competent organic agriculture Master’s program that will not only lead to skilled jobs, but also support the organic community and the Armenian environment. We hope that this greater participation has, and will continue to increase the likelihood of success of the program. To ensure this, the project particularly sought out participation from a wide range of stakeholder groups in order to create a program that is culturally and logistically appropriate. By involving diverse stakeholders — i.e., students, faculties and staff, farmers and representatives from organic NGOs, and ultimately the organic association —

all became project decision makers, albeit at different levels. In particular, BOAA specifically incorporated stakeholder participation in the program development itself and also within the course curriculum in order to increase the overall sustainability of the project. This was specifically addressed in the formulation of the stakeholder committee with the function of advising both curriculum development, training lecturers and advertising the final program. Eventually, however, individuals from the committee were also incorporated in individual coursework and plan to take part in yearly program evaluations, which will take place after the project's end.

Whenever stakeholders are involved, there is an extra level of facilitation required. The facilitation of conflicts, misunderstandings and diverging viewpoints is necessary and is time consuming. It takes time not only to train the facilitator in culturally sensitive situations and the more general necessities of group dynamics, but also to work with the stakeholder groups individually, collectively and over the period it takes to develop, deploy and evaluate, in BOAA's case, the curriculum. Of course, this time also costs money. In BOAA we needed to strike a balance between how often we would really have liked to work with stakeholders and how often it was actually logistically and financially feasible, as some stakeholders need to be incentivised or compensated for travel costs and their own time. Along these lines, stakeholder involvement is not always continuous or predictable. Our stakeholder committee continues to evolve as some participants rotate, drop out due to lack of interest or busy schedules. As we have made great connections to the recently formed Armenian Organic Association, we feel that we have a sustainable connection to the main organic stakeholders in Armenia.

Despite our efforts, the participatory approach did not always succeed. Funding requirements, project leads and existing institutional impediments (structure of curriculum, bureaucratic requirements and time constraints, and funding etc.) influenced the extent to which we could foster participation. This is common in many projects as funders often have a specific set of requirements that then impede the actual participatory process itself as some decisions have already been made. Likewise, many project leads, at least at the university level, are not intimately involved at the stakeholder level and sometimes make unilateral decisions after workshops or participatory stages essentially negating the work accomplished. Consequently, this poses challenges for the execution of a full participatory process.

Although we attempted to achieve participatory process from the start of the BOAA project, we noted three main challenges or limitations specific to our process:

- The lack of stakeholder involvement in proposal development. This would ensure complete involvement from the beginning, enabling more stakeholder empowerment, including more organising being carried out on the part of diverse actors.
- The ANAU system has not been entirely conducive to the participatory process. Complete autonomy was not given to our group in decision making. The university's full and sometimes inflexible timetable, its substantial orientation towards exam-based courses and national curriculum standards, often restrict not only the participatory process but also an environment conducive and open to innovation and alternative approaches.
- Finally, project leads not fully involved in the process sometimes made unilateral decisions undermining participatory work completed — e.g., in course program list development. These challenges, while disappointing, are seemingly very common in participatory curriculum development.

The formation of the stakeholder committee and the willingness of industry players to assist in this process is an illustrative example of mutually beneficial work where industry players and academia can collaborate both within a project and beyond. Through annual meetings that were organised, active participation in organic events in the country and the quarterly newsletters sent to the stakeholder committee members, the BOAA team established effective stakeholder communication that the program lecturers may utilise during their classes and within collaborative research projects. Therefore, through stakeholder participation in curriculum development, we attempted to support future lecturers and university staff in moving away from the process of dominating and managing towards a practice of facilitation that is open to new ideas and approaches.

9.2.4 Enumeration of Results

Results of phase 1

- 5 focus groups conducted for needs-based assessments of organic stakeholders
- Comprehensive report completed on the needs of organic stakeholders, students, staff and faculties, and farmers as input towards course development
- Stakeholder committee was created and used to help in participatory curriculum development and ensure the sustainability of program after project completion. Many stakeholders feel responsible and personally invested in the future and success of this curriculum
- 6 Stakeholder committee newsletters
- 6 Stakeholder committee meetings/workshops

Results of phase 2

- Completed Organic Master's Program (OMP) due to start fall semester of 2020
- Accreditation of the OMP by the Armenian Ministry of Education
- 14 completed course descriptions and structures (complete with prepared course materials) for the OMP
- Internship program set-up for the OMP
- Manual created concerning pedagogical philosophies and teaching approaches
- 4 times 1-2 week training session with 11-12 Armenian lecturers on organic context and teaching methods
- 1 Armenian lecturer trained at the IFOAM summer Organic Leadership Course
- OMP promotional video developed
- Systematic integration of research methods to be taught in each course of the curriculum
- Integration of modern, student-centred teaching methods within curriculum
- Organised connection of lecturers to specific stakeholders to ensure stakeholder integration in each course
- Establishment of an organic book club (so far 8 meetings, ongoing)

Results of phase 3

- 2 additional student focus groups completed to understand student needs/motivations and attraction to programs
- 2 publications in non-scientific magazines
- 1 publication in Scientific journal of ANAU

- 2 publications in scientific journals (forthcoming)
- 2 student-centred dissemination/advertising events
- 1 public, stakeholder involved dissemination/advertising event
- 6 (online) newspaper articles written about project progress or outcomes
- 13 Articles about the project for the APPEAR website
- High level of activity on Facebook
- Creation of promotion video
- Coverage on prime time Armenian television

Additional results

- Procurement of an organic field station by ANAU complete with classroom for field trips and field trials
- 2 scientific conferences attended with project specific presentations
- 3 successful Erasmus+ student mobilities completed
- Equipping ANAU with instruments for a new organic soil lab
- A satisfactory gender balance
- Greatly improved English communication skills by all in the OMP's lecturing team
- Greatly improved social network in the organic field both nationally and internationally
- 1 supervised PhD dissertation
- Successful project management from project team coordinators
- Minutes from numerous meetings and workshops available
- Lessons learnt specifically concerning participatory curriculum development, and trans-disciplinary participation in such a project in general



Austrian team coordinator visiting Shen Organic Training Center, May 2017



Armenian team coordinator Astghik Sahakyan visiting sole organic store in Yerevan



Organic field visit with Alfred Grand, northwest of Vienna



Organic field visit at vegetable production and box scheme company Biohof Adamah, May 2018



BOKU professor Christoph Winckler showing how to teach an easy in-field animal welfare test in Armenia, September 2018



Examining orchard health with BOKU professor Andreas Spornberger, May 2019



Group photo of BOAA lecturing team and stakeholder committee at a tour of organic cosmetic garden and production, Nairian CJSC



APPEAR representative Elke Stinnig moderating a day-long workshop on gender issues relevant to Armenia and the organic context in Yerevan, May 2019



Visit to BOKU research garden with three members of the ANAU lecturing team, November 2019



Field work around newly established Akunq organic training centre (Spring 2020)

9.3 Transdisciplinarity for Sustainable Tourism Development in the Caucasus Region

Project Coordinator: Andreas Muhar

Coordinating Institution: University of Natural Resources and Life Sciences, Vienna

Partner Institutions: Ivane Javakhishvili Tbilisi State University, IMC FH Krems, Armenian State Pedagogical University after Khachatur Abovyan

Partner countries: Armenia, Georgia

Project Duration: 1 July 2016 – 30 November 2020

9.3.1 The project – CaucaSusT

The Caucasus region stretches between the Black and Caspian seas and provides a bridge between Europe and Asia in geographical, biological and cultural terms. It is shared by 6 countries: Armenia, Azerbaijan, Georgia, Iran, Russia and Turkey. The region has been recognised as one of the hotspots for biological and cultural diversity on an international level. However, the Caucasus region has been facing many complex challenges: lack of opportunities for sustainable development, economic and social marginalisation of the mountainous communities as well as national and international conflicts. Armenia, Azerbaijan, Georgia and Russia are dealing with their common heritage of the Soviet Union, as well as with more recent political and economic changes.

Many efforts have been made to-date to support the protection of nature and sustainable development, raise awareness among the population, increase the capacity of national and local institutions and improve livelihoods of the population in this unique region. In the rural mountain areas, development efforts often focus on tourism initiatives. Addressing the challenges of mountain communities in the Caucasus calls for social learning, informed participatory decision-making and co-creation of solutions with the local population. While ownership and motivation by the local actors is a key factor, additional expert knowledge and skills (i.e., fundraising) are often needed.

Universities constitute centres of knowledge production and education – and can thus play an important role in supporting development efforts at a local and national level. Stronger collaboration between universities, the general public, non-academic experts and policy-makers does not only serve to produce more robust knowledge, but can also facilitate the integration of this knowledge into decision-making and practice.

Application of research and teaching methods, focused on real-life problems and integration of scientific knowledge with that of non-academic experts and local stakeholders, can contribute to participatory decision-making. This can also facilitate the co-creation of solutions, more relevant and better adapted to address societal problems. Transdisciplinary approaches to teaching and research have been developed to serve this purpose.

Recently, more attention has been paid to the role of universities in sustainable development of the Caucasus region. A regional Scientific Network for sustainable mountain development in the Caucasus (SNC-mt) was launched in 2014, in order to support cooperation among the universities in the region, to restore and develop research capacities, and to link research to policy and development practice. Linking science, policy and practice in the region has been a challenge, due to the lack of experience in collaboration among universi-

ties and non-academic actors and little familiarity with transdisciplinary approaches in the Caucasus countries.

The project “Transdisciplinarity for Sustainable Tourism Development in the Caucasus Region (CaucaSusT)” was conceived by the universities from Austria, Armenia and Georgia, in order to address this gap. With support from the preparatory funds from the Austrian Partnership Programme in Higher Education and Research for Development/APPEAR, the project partners from Austria (The University of Natural Resources and Life Sciences, Vienna /BOKU, the University of Applied Sciences Krems /IMC Krems), Armenia (Armenian State Pedagogical University/ASPU) and Georgia (Tbilisi State University/TSU) jointly developed the CaucaSusT project activities, which were implemented in the period from July 2016 until November 2020.

The core of the project constitutes a Transdisciplinary Case Study Course, which was co-developed by the partners, integrated into the curricula of ASPU and TSU, and carried out in various mountain communities in Armenia and Georgia for three consecutive years. The course theme – sustainable tourism development – was selected jointly by the partners based on the strategic economic development priorities of Armenia and Georgia. The aim of the course is to co-create recommendations and potential solutions for sustainable tourism development in rural communities via close collaboration by the interdisciplinary team of students and teachers with the local stakeholders.

The first year of the project was devoted to the course elaboration, integration into ASPU and TSU curricula, and to the capacity building of the teachers and younger researchers. Teacher workshops were conducted in Armenia and Georgia. Each workshop brought together teachers from ASPU, TSU, as well as colleagues from Austria, and the PhD candidates from Armenia and Georgia, who discussed the main course topics, tried out interdisciplinary methods (such as systems and scenario analysis) and held initial meetings with the stakeholders in prospective case study communities. Communities were selected based on the status of tourism development and on the interest of the local actors to participate.

Both ASPU and TSU chose the model of introducing a Transdisciplinary Field Case Study Course, and linking it with several existing and newly created courses in the participating faculties and study programmes. The Case Study Course was implemented in two different communities in Armenia (in Meghradzor, 2018 and 2020 and in Dilijan, 2019), and three communities in Georgia (in Tsaghveri, 2018, Kazbegi, 2019, and Racha, 2020), in order for the teaching teams and coordinators to gain experience in working with various stakeholders and in different settings. All stages of the project were accompanied by evaluations using participant observations, focus group discussion, interviews and questionnaires with the university colleagues and students, as well as the local stakeholders.

The lessons learned and the experience gained by all project partners of developing, integrating and implementing a Transdisciplinary Field Case Study Course was brought together in a manual for university lecturers, which was produced in English, and then translated into and adapted to Armenian and Georgian.

Capacity building and networking of young scholars were also supported through a transdisciplinary summer school, organised by the project partners in Kazbegi, Georgia, in June-July 2019, in cooperation with Leuphana University Lüneburg and the Doctoral School Transitions to Sustainability (T2S) at BOKU. Participants from 17 different countries, including the 6 Caucasus countries, representing different cultural and professional backgrounds joined the Summer School. They learned about the theory and practice of

transdisciplinarity and practiced co-developing transdisciplinary research designs in interdisciplinary groups.

The CaucaSusT Project also had a broader regional component – sharing its insights and experience with the Scientific Network for the Caucasus Mountain region in order to promote transdisciplinary and participatory approaches, and contribute to a stronger role of academia in sustainable development processes in all Caucasus countries. The Caucasus Scientific Community is at the early stage of regional collaboration, and we hope that introducing transdisciplinary approaches at the 1st and 2nd Caucasus Forums set an important precedent. During the Second Caucasus Mountain Forum, which took place in Ankara, Turkey, from 30 October to 2 November 2019, the CaucaSusT staff, teachers and students presented their project-related work and organised a workshop “The role of universities in sustainable transformations in the Caucasus region”, with panellists from all 6 Caucasus counties.

The project outcomes demonstrated that integration of transdisciplinary approaches to teaching and research in Armenian and Georgian universities is possible, given the interest and motivation of university staff and administration. Teachers and students can contribute to addressing real-life challenges of the local communities, and the latter welcome collaboration. Interdisciplinary and transdisciplinary courses offer new insights and practices to the students, motivating them not only to learn, but also to make contributions towards solving societal problems. Moreover, there is potential for longer-term collaboration between universities and non-academic actors.

Long-term outcomes of the project include: 1) integration of inter- and transdisciplinary approaches into TSU and ASPU, established collaboration and a friendly working environment among teachers and students from several faculties, including via teaching and research; 2) integration of the project results at a regional level into the activities and resulting publications of the Scientific Network for the Caucasus Mountain Region; 3) deeper insights into Community Based Tourism in the Caucasus region and into the challenges and opportunities of integrating and implementing transdisciplinary approaches into Post-Soviet academic systems; 4) capacity building of a number of project staff at all project partner universities and the establishment of high-level expertise in the field of Community Based Tourism and Transdisciplinary approaches in Armenia and Georgia; 5) established collaboration among TSU and ASPU with several communities in Armenia and Georgia.

The project even achieved some positive outcomes with respect to community governance and rural entrepreneurship. For example, in Tsaghveri, Georgia, the TSU students and teachers’ team supported communication and clarification of disagreements between the local actors and administration. In Meghradzor, Armenia, several local entrepreneurs’ efforts were bolstered through cooperation with ASPU. Moreover, cooperation with the pedagogical university, whose graduates often return to rural communities to teach in local schools, raised questions of the role of community educators in supporting cooperation, networking and co-creation of knowledge at a local level.

Financial and administrative issues in both Armenian and Georgian universities, as well as socio-political and economic challenges in the Caucasus region can pose barriers and thus high levels of interest from the university partners is necessary in order to pursue transdisciplinary research and teaching. Further engagement in international partnerships (through joint projects as well as staff and student mobility) can build up interest and capacity to engage in societal problem-solving among teachers and scientists in the Caucasus, particularly the early-career staff.

9.3.2 At the end of it all, what have we learnt?

by *Tamara Mitrofanenko, Andreas Muhar, Christian Maurer*

Looking back at the past 4 years, all partners agree that the CaucaSusT project was a highly inspiring and valuable learning experience. At the first preparatory partner meeting in Vienna in December 2015, we brainstormed the overall project goals and jotted them down on a flipchart, combining the aims of the APPEAR programme with the national development strategies as well as the needs for capacity building. The resulting collaboration with the project partners, students, and stakeholders in the pilot regions was a real pleasure, and the challenges we met and overcame provided a great chance to learn from each other. The various project outcomes, including students' reports and theses, teaching materials, peer-reviewed publications, and small developments in the rural communities in Armenia and Georgia, are evidence of knowledge we co-created together. However, what do we – the Austrian partners – take away based on this intercultural experience?

The Austrian team itself constituted a cultural and interdisciplinary mix: Austrian coordinators from BOKU and IMC Krems provided expertise in landscape planning, transdisciplinary approaches, and tourism development; project managers with North Caucasus/Armenian and Bulgarian backgrounds contributed a better understanding of the region and its post-soviet heritage.

Communication in times of shifting lingua franca

Communication within the project was conducted in five different languages: Armenian, English, German, Georgian, and Russian, with almost each of them spelled in a different alphabet (Armenian, Latin, Georgian, and Cyrillic). In international cooperation projects, the coordination team often uses one single lingua franca, while the individual partners communicate with their local communities in the respective languages. In the Caucasus region the lingua franca of the academic world has for a long time been Russian, but it is now increasingly being replaced by English. The older generation of researchers often only speaks Russian and has little understanding of the English language, while the younger generation focusses on English as a lingua franca and is not particularly keen to or no longer capable of speaking Russian. In the Austrian team, there was luckily one native Russian speaker, making it possible to communicate in both English and Russian within the project team. Still English remained dominant in most meetings, making it harder to identify and integrate the knowledge and thoughts of researchers who had been socialised with Russian as a lingua franca. Therefore, some long-term experiential knowledge of the older generation of researchers might not always have been sufficiently utilised.

The importance of engaging associated PhD candidates

Despite the understanding of Armenian and Georgian cultural aspects by the BOKU project manager and her knowledge of Russian, intercultural and institutional differences still often came up within the project team. These had to be properly understood and dealt with in order to avoid misunderstandings among the partners. Frequent exchanges and open discussions among the Austrian and the international team, helped to overcome many such challenges; the involvement of PhD candidates from Armenia and Georgia was indispensable in this respect.

Integration of an Armenian and a Georgian scholar into the Austrian project team, and as PhD students at BOKU University, proved to be a fruitful contribution to the CaucaSusT project. Their previous experience and aspirations matched well with what BOKU and our project had to offer and we were lucky to match with respect to our characters as well. Lela Khartishvili from Georgia was an expert tourism practitioner, seeking more knowledge in community-based tourism; Tigran Keryan from Armenia had experience as a teacher at an innovative Armenian school and was eager to focus on integration of transdisciplinary approaches into academic systems in the Caucasus. Their support in interpreting during meetings and events, and in communication with Armenian and Georgian teachers, students and stakeholders was highly useful – however, even more important were their explanations of the local context to the Austrian team. Their new experience of teaching and learning at BOKU in contrast to their parent institutions, as well as contemporary theoretical insights they gained, have helped us better understand the differences in institutional capacities and academic cultures between Austria, Armenia and Georgia. Moreover, they helped us get a better perspective on the challenges our Armenian and Georgian colleagues and students are facing, and identify ways to address them, as relevant within our project.

Challenges of project coordination and administration

While we tried to distribute the planned tasks, responsibilities and leadership for specific parts of the project (i.e., work packages) evenly among the partners, the realities of implementation were often different: the Austrian manager had to assume a central role in many project activities, sometimes even facilitating coordination between the Armenian and Georgian colleagues. One of the main reasons for that was the bureaucratic hurdles faced by the Caucasus partners, which by far exceeded administrative procedures seen in the Austrian universities: we often had to provide official confirmations to justify participation of our partners in project activities and their associated costs. Moreover, the time-consuming bureaucratic procedures absorbed much of our partners' time and resources. In addition to their considerable teaching responsibilities, this lack of time made it difficult for our Armenian and Georgian colleagues to keep up with some of the coordination and dissemination-related tasks. The lack of time among our partners (perhaps, in addition to language-related challenges) also constituted an obstacle for teacher capacity building, especially reading scientific literature, which is only available in English. Providing summaries of the critical academic content and facilitating translations of some materials constituted an important task, which we did not originally consider when planning our project activities.

Well-meant regulations can bring about adverse effects

Many post-soviet countries still suffer from a culture of corruption on different levels of society. In order to avoid such malversation, national authorities as well as funding organisations have introduced controlling mechanisms to detect and avoid corruption. However, some of these regulations turned out to be impractical and caused unexpected delays, e.g., when it came to purchasing decisions (obligatory tenders even for small purchases) or simple money transfers. In some cases, it turned out to be easier to place an order for a service or a product directly from Austria rather than from Armenia or Georgia.

Nurturing motivation

We were of course aware of the importance of individual motivation before the project started. Now, as we have finalised our joint activities, we can say with certainty that motivation among the project staff and students was an undeniable factor in all of the successes of CaucaSusT. The different individual motivational factors, discussed among the partners and experienced by us, include the following:

- Engaging in international cooperation, opportunity for international travel
- Building own professional capacities, in terms of language and project management, as well as in various academic fields
- Developing interpersonal relationships between and among project partner staff
- Feeling a sense of community and partnership within your own university team (engaged teachers and students), and also with the international project partner team
- The possibility to provide national and international training and learning opportunities for students and teachers
- Receiving positive feedback from the students after the project activities
- Receiving positive feedback from the stakeholders
- A sense of achievement after the successful completion of different project activities
- Possibility to present achievements in various fora and to engage in peer exchange beyond the project partnership.

As a project team, we also supported each other in this respect in many ways, considering what motivates our different team members, and trying to accommodate that during virtual and physical meetings, as well as by adjusting the project activities. This personal approach was definitely more time consuming, but we believe it was also worth it, with respect to what we have managed to achieve together.

Food and drinks as part of cooperation culture

Coming from Austria with its history of hospitality and its culinary traditions, we were of course aware that having joint meals can be a substantial component of cooperative work, and that getting to know each other personally between working sessions also enhances productivity within a project. Yet, we were sometimes overwhelmed by the hospitality that we experienced in our host countries Armenia and Georgia during the four project years, and we are happy to have had the opportunity to explore the immense diversity of Caucasian culinary culture and also for having been introduced to the formal customs of being together.

Observations on tourism development and university involvement

While conducting transdisciplinary case study courses with our Armenian and Georgian colleagues, it was interesting to learn that tourism in the pilot regions in both countries is hardly supported by official organisations (such as Destination Management Organisations or their equivalents, which exist in Austria). Collaboration among the local stakeholders in the region exists to a certain extent, but many locals are still reluctant to engage in collaboration, due to remnants of their Soviet heritage. Likewise, there seemed to be a lack of open communication between the local residents and regional administrations. Moreover, there is no defined strategy related to tourism and regional development. The development of a viable and sustainable tourism strategy is a continuous, multi-faceted process which includes

knowledge of different disciplines and requires co-operation among stakeholders and governmental involvement. As such, we expect that facilitating this process in our case study communities should be a long-term process, which our university partners could support. The latter would require universities continuing to be active in local and regional governance and evidence-based decision-making.

Whereas in Austrian Universities and Universities of Applied Sciences, it is rather common to integrate stakeholders into the university curricula and research projects, in both Armenian and Georgian universities the experience with and prioritisation of stakeholder integration is low. During our project, we supported stronger collaboration among our university partners, non-academic experts and the local stakeholders, as well as a greater involvement by universities in addressing the challenges faced by the local communities. The field trips to the pilot regions made both students and university staff aware of the importance of closely linking science, practice and politics. It was positively surprising how supportive, informative, and hospitable the local people were when the students approached them with their questions. We hope that this collaboration will continue in various forms after the end of our project, although repeating longer-term field work with larger student groups would require additional fundraising by our Armenian and Georgian partners.

Geopolitical challenges

The Caucasus countries and peoples are struggling with a complex past and a challenging present with respect to their geopolitical relationships, including the heritage of the Soviet Union, a complicated relationship with Russia, and the unresolved disputes among Armenia, Turkey and Azerbaijan. This context inevitably influences national development trajectories and priorities, institutional setup and personal mindsets and worldviews in Armenia and Georgia. It affected our project-related cooperation slightly during the first three years of the project: We had to take extra care when bringing together students from Armenia and Azerbaijan, and we had to consider whether it was appropriate to speak Russian with the stakeholders in Georgia. Moreover, our Armenian teachers and students were reluctant to attend a conference in Turkey. A revolution in Armenia and protests in Georgia provided some uncertainty and may have caused slight delays, but did not affect the project activities substantially (in fact, the peaceful revolution in Armenia in 2018 even contributed to the project objectives at the time, restoring some faith in bottom-up participatory processes among the local population). However, the break-out of a military conflict between Azerbaijan and Armenia in October – November 2020 exacerbated the already fragile regional cooperation, even putting a temporary strain on communication among Armenian and Georgian partners.

While the conflict happened towards the end of the project, it brought despair and a sense of crisis to our Armenian partners, many of whom were personally affected. Some of their students were deployed to the conflict area, wounded and even killed. The teachers and female students turned their efforts to supporting refugees who fled to Yerevan and some of our case study communities. We from Austria tried to find a way to support our partners in balancing the urgent and immediate needs of their community with our project responsibilities. At the same time, we tried to reflect on and discuss together the relevance of our project aims and of our cooperation amidst the situation of conflict and crisis. It was rewarding to see that (re)focusing on questions of sustainable development, and on opportunities to

cooperate with local stakeholders, and contribute to the revitalisation of rural communities played both a motivational and a cathartic role for our students and teachers.

One of the main takeaways for us is our conviction about the importance of such cooperation and mutual learning, as we, together with our colleagues and students from Austria, have experienced with our Armenian and Georgian partners. We look forward to further opportunities to develop this cooperation and to further exchange with our peers and the local stakeholders in the Caucasus region.

9.3.3 The impact of the CaucaSusT project on ASPU and TSU academic programs – a stakeholder perspective

by Marine Matosyan, Ashot Khoetsyan, Joseph Salukvadze, Merab Khokhobaia. Tigran Keryan

One of the main focuses of the CaucaSusT project was to address societal challenges in the Caucasus mountain region. In order to address these issues in a sustainable way and to co-create societally-relevant knowledge, the project partners implemented all activities together with the local population and other relevant stakeholders. At the initial stage of the project implementation, Armenian and Georgian partners established networks with the selected community members, conducted exploratory interviews and needs analyses in order to ensure successful outcomes for the local mountain villages. The research questions of the case studies were formed based on the societal issues raised.

Reflections from Armenia

Establishing collaboration with locals was very challenging for the ASPU partners at the beginning of the project due to the lack of prior experience, even though different departments at ASPU have been conducting field research in the selected case study regions (Meghradzor and Dilijan) for a long time. Another challenge was to present to locals the benefits of the project beyond financial contribution. Previous cooperation by locals with different organisations and NGOs was mostly based on financial benefits. However, ASPU teachers and students managed to establish close cooperation with local active young people, local government representatives as well as actors from the fields of tourism, education, and agriculture.

During the case study implementation, ASPU students formed multidisciplinary groups facilitated by one or two teachers. They worked with community members in order to explore the real-life challenges and to co-create possible solutions for these problems. This process contributed to overcoming the existing lack of trust towards academia and helped societal actors to perceive academics as useful contributors to combat local community sustainability problems. At the end of the project, students developed scenarios for overcoming the community issues, then, presented and discussed these with locals during the final event. Students also supported community members in advertising the local tourist attractions on different online media platforms.

An example of a local stakeholder, Vardan Yeghiazaryan, illustrates one contribution of the project: Vardan participated in the project activities and the cooperation continues until today. Interaction with students and teachers gave him some business ideas which he has implemented in his “Cultural Heritage Center”. Moreover, the network established

during the case study course helped Vardan to get some funding for his cultural centre from another project.

The CaucaSusT process changed stakeholders' attitudes towards academia in a positive way and enabled other community members to collaborate with students and teachers. Another perspective that has had a very positive impact within the project is the cooperation established among ASPU partners and local schoolteachers, which also continues to date. This collaboration has been intensified during the COVID-19 pandemic when ASPU students and lecturers organised online classes to support local schools.

The CaucaSusT project enabled participating teachers to critically reflect on their teaching subjects and create university courses linked with societal issues. Some students decided to continue collaborating with local communities beyond the project lifetime by choosing Master's degree topics based on local stakeholders' needs. However, some stakeholders find the project outcomes more beneficial for students rather than local communities. Furthermore, our evaluation shows that the project has had a more significant contribution in the first study case Meghradzor, which is a marginalised community. The project has had less success in the second case study region Dilijan, which has developed touristic infrastructure.

In general, all the above-mentioned activities contributed to locals' positive perception of the societal role of ASPU. As a result, the cooperation with some stakeholders continues up to present. For successful outcomes, we would recommend choosing research topics relevant to students' backgrounds and capabilities, and to be involved in the same regions for a longer period of time.

The last year was very challenging one for Armenia. Besides the negative impact of the pandemic, the armed conflict in Nagorno-Karabagh negatively impacted the project implementation process as well as the whole academic system of Armenia.

Due to an increasing number of infections and the strict lockdown, it was impossible to conduct case study research in Armenia as was initially planned. Teaching shifted to distance learning, which for some teachers and students was very challenging due to the lack of online teaching/learning experience and the absence of relevant tools (e.g., devices, good internet connection). However, many teachers created electronic materials and uploaded them into the open platforms (e.g., YouTube). Teachers from the tourism institute and an expert, who cooperated with the CaucaSusT project, made videos regarding tourism development challenges and opportunities. Local stakeholders mentioned that this material was useful to get some ideas for tourism planning. Despite the restrictions, the ASPU team was able to visit the case study regions and work with stakeholders focusing on the impact of the pandemic on tourism in the region. Furthermore, the research focused on the challenges of and opportunities for domestic tourism development in the case study sites and was carried out by exploring and providing some recommendations to overcome the existing issues. Moreover, ASPU teachers and students conducted online learning classes for the case study region schools.

Reflections from Georgia

The main novelty of the CaucaSusT project was the introduction and implementation of the transdisciplinary (TD) method/approach in teaching and research at TSU. The application of this method in academic activities started from the second year of the project, i.e., 2017. Besides teacher training in Yerevan and Tbilisi and the insertion of transdisciplinarity issues in several study courses, the main format of the introduction of TD to teachers and students

was case study fieldwork (students' practice) held in three different mountainous areas of Georgia.

All case studies – in Tsagveri (Borjomi Municipality), Stepantsminda (Kazbegi Municipality), and Ambrolauri (Ambrolauri Municipality) – were launched in close cooperation and interaction with different partners represented by local community members and stakeholders. This format proved to be the most novel, challenging and interesting for both the university representatives (students and lecturers) and local stakeholders as it implied very close collaboration including the intensive exchange of knowledge and expertise from both sides. In this process, the university representatives mostly introduced theoretical and methodological knowledge and skills, while local stakeholders mainly provided their local, on-site knowledge and community context.

Up to 20 stakeholders participated in each case study and they were usually made up of the following parties:

- Owners and managers of tourist facilities,
- Tourism service providers,
- Small- and medium-sized entrepreneurs,
- Representatives of natural reservations/parks,
- Representatives of civil society, e.g., NGOs like LAG (local action group)
- Representatives of local community administrations/governments.

It is remarkable that the interest and attitude usually varied among different stakeholder groups. Based on our experience, representatives of NGOs and small private businesses were most willing to and active in cooperating and engaging in partnerships. They almost always found time and showed flexibility to meet our students, work with them and attend all meetings and workshops organised by TSU teams. The participation of natural reservations and/or regional tourist centres, although busier and less flexible than the former group, also cooperated quite well with us, whilst local authorities did not always show readiness to collaborate and contribute to researchers, usually dedicating more time to their own settlements and their problems. We think that the local officials also tried to avoid sitting with local community members in front of outsiders like the university representatives did; they mostly tried to avoid acute discussions with other stakeholders, which might reveal dissatisfaction from the local public with their governance style and decision-making system. Nevertheless, when we had good personal relationships with local officials (like we had in Kazbegi Municipality and partially in Ambrolauri) things worked more smoothly and TSU teams received good support and cooperation from them.

We also found many regular local citizens who showed an interest and participated in different activities. This is especially true for those cases when community members had certain disputes with other stakeholders, like in the case of territorial/land dispute between the Kazbegi National Park administration and several adjacent village communities of Kazbegi Municipality. A number of community members willingly and actively participated in the participatory mapping exercise launched by the TSU student team for the clear outlining of the problem extent and elaboration of possible resolutions.

During each case study course, the TSU team carried out two stakeholder meetings, the first for introducing a purpose and workplan of a fieldwork, and the second for presenting the outcomes and findings of the study. Both meetings were lively and helpful for research purposes/objectives, as they, first, introduced a local context and opinions of the local com-

munity to the TSU team, and, second, provided sincere feedback and a defined assessment of the work done in the field. The final stakeholder meetings as well as post-case study relations with local stakeholders usually showed that local community members had benefited directly from the presentations and reports of TSU students, or indirectly, like in Tsagveri, by receiving better/more solid arguments for negotiations with local authorities about their problems. It is remarkable that in all cases the overall feedback from stakeholders was positive and constructive. They emphasised the quality of research methodology and ability to correctly interpret data, as well as the relevance of conclusions made by the students. Therefore, normally the stakeholders' attitude towards the project activities was quite positive and they mostly enjoyed the close collaboration with the TSU team.

The project proved to be equally interesting and innovative for TSU academic staff and students. Although in the beginning the teachers who were supposed to be involved in the project activities did not fully understand the essence of TD and felt a bit confused and uncertain even after teacher training sessions in Yerevan and Tbilisi; however, after the first case study course in Tsagveri, the idea of the project became much clearer and attractive for them. Therefore, despite the fact that all TSU participating faculties do have other field practices/case studies in their curricula, it was not a problem to select enough dedicated teachers for the project case studies. The teachers benefited from the case studies as afterwards, in the teaching process, they were able to combine their theoretical knowledge with field experience.

Yet, the main beneficiaries of the project, in our opinion, were students who participated both in study courses and field case studies. In a compressed timeframe (2 weeks in all) they acquired new theoretical knowledge (e.g., system analysis, scenario development, etc.) and research skills, on the one hand, and on a daily basis participated in and themselves conducted field activities, data analysis, presentations and group-work with each other, as well as with local stakeholders and community members. This was serious value added to their education for which they always expressed their gratitude to and satisfaction with the project. Some of them even stated that "in the two-week timeframe of the case study we have obtained more knowledge and skills than during several semesters of university training in classes". We think it is the best indicator of the CaucaSusT project value and achievements.

9.3.4 Enumeration of results

- The CaucaSusT project involved 4 partner universities, including 2 from Austria (the coordinating partner, University of Natural Resources and Life Sciences, Vienna/BOKU, and IMC University of Applied Sciences Krems/IMC FH Krems), and 1 each from Armenia (Armenian State Pedagogical University/ASPU) and Georgia (Tbilisi State University/TSU).
- The partners carried out 2 Teacher Workshops, 1 in Armenia and 1 in Georgia, in which 23 teachers from ASPU and TSU participated, in addition to the project coordinators and Austrian colleagues. During the workshops, the main background information and elements of the transdisciplinary case study courses were discussed, and interdisciplinary methods tried out. Moreover, initial stakeholder meetings took place in both countries.
- Transdisciplinary approaches have been integrated at both ASPU and TSU. At ASPU, teachers from five departments participated in the introduction of new courses and develop-

- ment and implementation of the Transdisciplinary Case Study Course, including: Sustainable Development and Ecology, Physical and Economic Geography and History, Sociology and Biology. Four new courses have been introduced, including the Case Study Course.
- At TSU, three Faculties (Economics and Business, Exact and Natural Sciences, Social and Political Sciences) and three Master's programs (Tourism and Hospitality Management, Landscape Planning & Regional Geography and Human Geography) participated. Six existing study courses in these three programs have been modified, and two new courses have been introduced, including the Transdisciplinary Field Case Study Course
 - 6 Transdisciplinary Field Case Study Courses have been implemented in Armenia and Georgia, in two different communities in Armenia (in Meghradzor, 2018 and 2020 and in Dilijan, 2019), and three communities in Georgia (in Tsaghveri, 2018, Kazbegi, 2019, and Racha, 2020). A total of 46 students took part in the case study courses in Armenia (41 of them female), and 57 students – in Georgia (37 of them female). The case study courses involved close collaboration with local stakeholders: a total of 59 local actors were involved, 40 from Georgia and 19 from Armenia.
 - A Manual for University Lecturers on Developing and Implementing a Transdisciplinary Field Case Study Course has been published based on the experience of all partners, available electronically and in a print version in English, Armenian and Georgian.
 - ASPU colleagues produced a manual on using the Case Study Approach in History, based on their experience in the project. Moreover, input based on the project has been integrated in 12 various manuals, national journals and books, Armenia, Austria and Georgia.
 - 21 Scientific publications in international and national peer reviewed journals have been produced by the project partners.
 - 2 PhD students have received APPEAR scholarships in association with the project, and have supported project implementation, collaboration between the partners, and accompanied project activities with research.
 - 4 PhD (1 from Armenia, 3 from Georgia) students and 2 Master's students (from Armenia) carried out an exchange semester at BOKU, in connection with the project, and with the help of Erasmus+ funds.
 - A number of Master's students from ASPU and TSU had a chance to receive support from IMC Krems staff in developing papers, in order to present them at the International Student Conference in Tourism Research (ISCONTOUR), organised annually by IMC Krems in Austria. 10 Master's students from ASPU and TSU (4 male, 6 female), and 4 staff participated in ISCONTOUR in 2019.
 - 14 students from Armenia and Georgia (13 female, 1 male) sent their drafts of the papers for ISCONTOUR 2020 and received coaching on developing their papers. Papers of the 7 students (4 from Georgia and 3 from Armenia) have been accepted and published in the proceedings, despite the cancellation of the conference due to COVID-19.
 - 16 Master's theses have been completed, based on the project (6 at ASPU, 9 at TSU and 1 at BOKU).
 - The project partners organised a Transdisciplinary Summer School in June-July 2019, in Kazbegi, Georgia. BOKU and TSU, the main organisers cooperated with Leuphana University Lüneburg and the Doctoral School Transitions to Sustainability (T2S) at BOKU. 36 scholars and professionals from 17 different countries, including the 6 Caucasus countries, representing different cultural and professional backgrounds, participated in the Summer School and learned to develop transdisciplinary research projects.

Moreover, the CaucaSusT partners participated in the International Summer School for young researchers “Research for Development”, organised by the Institute of Geography of Russian Academy of Science under the framework of the project “Sustainable Mountain Development in the Caucasus (Sustainable Caucasus)” under the SCOPES program funded by Swiss National Science Foundation (SNSF). The Summer school took place on September 5-16 in the Abastumani Research Center in Georgia and hosted BA, MA and PhD students from six countries: Georgia, Russian Federation, Azerbaijan, Armenia, Iran and Turkey. The CaucaSusT partners made several presentations on transdisciplinarity and sustainable tourism, and organised a World Café (a participatory workshop). Issues discussed included the required skills for students and teachers, envisioned benefits for the students from the CaucaSusT project, recommendations for implementing the Case Study Courses and challenges for integrating transdisciplinary approaches into Caucasus universities.

In order to introduce input from the project on a wider regional level, the CaucaSusT partners participated in the 1st and 2nd Caucasus Mountain Forums, organised by the Scientific Network for the Caucasus Mountain region. During the First Forum, which took place from 28 November to 1 December 2016 in Tbilisi, Georgia, the CaucaSusT partners organised a participatory workshop “Research for Communities and/or Research with Communities: Transdisciplinary research and teaching in sustainable mountain development and tourism”. During the Second Caucasus Mountain Forum, which took place in Ankara, Turkey, from 30 October to 2 November 2019, the CaucaSusT staff, teachers and students presented their project-related work and organised a workshop “The role of universities in sustainable transformations in the Caucasus region”, with panellists from all 6 Caucasus countries.



Kick-off meeting, Georgia, 2016



*Participatory mapping
with stakeholders in Dili-
jan, Armenia*



Stakeholder interview, Meghradzor, Armenia



TD summer school, Kazbegi, 2019



Truso Valley excursion, Georgia

10 STUDENT MOBILITY – *A Historical Perspective on the APPEAR Scholarship Programme*

by Elke Stinnig

With the onset of independence, higher education became the focus of national interest in many developing countries. During the colonial period, access to Western education was limited and the few educational opportunities were mainly granted to the lowest levels of the administration. Senior positions in administration, management and the military were mostly held by Europeans. The focus was on the nationalisation of all areas of public life and the demand for well-trained local professionals was high. The prevailing theory of modernisation postulated a link between education and economic development through manpower. Against this background, special attention was paid to the development and expansion of local universities in the 1960s and 1970s. The UN proclaimed for the first time a developmental decade in the 1960s and also emphasised the importance of higher education for the economic growth of these countries. Due to the still weak development of the higher education sector, due to colonial failure and the lack of training places, study abroad was necessary in many areas, and scholarships were awarded for this by countries in the North or by “West” and “East” (Woldegiorgis / Doevenspeck 2013: 23ff).

Systematic educational mobility from developing countries to Austria began in the late 1950s, with funding initially coming from church institutions. State-funded scholarship programmes were introduced a little later. Since 1963, the annual financial statements from the OeAD have listed the programme “Development Aid for the Training of Turkish Veterinarians” and the programme “Scholarships for Students from Developing Countries” financed by the Federal Ministry of Education. A programme with the aim of providing development aid, financed by the Foreign Ministry, was run by the OeAD from 1977 onwards. This concerns project 307/77 for animal breeding and production at the University of Veterinary Medicine Vienna (Dippelreiter 2015: 46-47). This was followed in 1982 by the EH Scholarship Action for Nationals from Developing Countries (*EH-Stipendienaktion für Angehörige aus Entwicklungsländern*), which was funded by the Federal Chancellery as part of bilateral technical support and was intended to make it possible to study or receive specialised training in Austria. The programme was intended to contribute to “strengthening the capacity for self-rule and increasing the independence of developing countries”. Special attention should be paid to “the return of scholarship holders to their home country and facilitating the possibility of reintegration” (OeAD 1983: 16ff).

Influenced by international discussions, especially at the OECD level, a discussion process on the direction of development aid also took place in Austria in the 1980s. One point of criticism was that the allocation of funding was more based on the “sprinkler principle” than on strategic considerations. In addition, the technical approach in development aid was addressed. Funds should be better allocated to specific sectors and selected countries. As a result, focus and cooperation countries were selected in the early 1990s. In addition, in 1978 the Austrian Research Foundation for International Development (ÖFSE) carried out a study on “educational aid for developing countries in Austria” (1978). The aim was to

review the effectiveness of the various “publicly funded training and mentoring actions” and to make recommendations for reorganisation. Against this backdrop, the further development of scholarship programmes was discussed in the Federal Ministry for Foreign Affairs (BMAA). One outcome of these reflections was the introduction of the grant scholarship programme (later renamed the One World Scholarship Programme) and the North-South Dialogue Scholarship Programme (Zauner / Strickner 1999: 42).

The concept of capacity building was already formulated in World Bank documents at the beginning of the 1980s, especially with regard to African states. In particular, this involved training experts in the field of public administration and political and economic analysis who would serve to support the governments. During the 1990s, the field of application became more comprehensive, and the concept was further developed in the direction of capacity development and expanded to include concepts such as partnership, participation and ownership (Langthaler 2004: 3f).

10.1 Capacity Building and the North-South Dialogue Programme

In this regard, capacity building was also the focus of the North-South Dialogue Scholarship Programme, which the OeAD implemented on behalf of the BMAA from 1984 to 2009. The aim of the programme was to provide “qualified academics from developing countries with access to the training and research capacities of relevant Austrian institutions”. In addition, Austrian experts should be supported in establishing long-term cooperation with institutions in developing countries and encouraged to deal with development-relevant issues. Applicants for scholarships primarily came from universities or public institutions and also had to prove that they had jobs guaranteed for after they graduated. The scholarship programme also focused on the desired return to their home countries, resuming work at their home institutions and, subsequently, applying the knowledge they acquired in Austria. Those interested could either do a PhD (up to 36 months) or a 3-to-12-month research visit. In principle, this option was open to people from all developing countries under the Development Assistance Act 1974. However, anyone who corresponded to the “thematic focus and priorities of Austrian Development Cooperation (ADC)” was selected as a priority (OeAD 1995: 8).

While the programme was being implemented, several measures were introduced to increase the importance of the scholarship for the respective institutions, and also to strengthen the bonds with the home countries. The applicants had to demonstrate that their research topics were relevant to their home institutions as part of their applications. On top of this, it was necessary to collect the data (field research) in the respective home countries.

The North-South Dialogue Scholarship Programme has supported approximately 1,500 students from 1984 to 2009. During the first 10 years, the majority of those funded students came from the following countries: Egypt, China, India, Indonesia, Vietnam and Thailand. In fact, Austrian academics were particularly interested in South and Southeast Asia. However, the share of scholarship holders from ADC priority countries, especially Africa, was low. In order to increase the relevance for ADC, students from focus countries were selected as a matter of priority while the programme was being implemented and finally also fixed at a quota of 75%.

The return rate was quoted as 90% in the OeAD anniversary publication published in 1994. In particular, the professional and personal contacts that still exist with many graduates was given a special mention (cf. OeAD 1995). However, the actual return rate was never surveyed empirically, as this would have required extensive and cost-intensive tracer studies.

10.2 Focus shift from the individual to the institution

An important factor that triggered a paradigm shift was the report from the World Bank Task Force on Higher Education in Developing Countries entitled “Higher Education in Developing Countries: Peril and Promise” (2000), which increasingly put tertiary education on the global agenda. For two decades, international donor organisations had been focused on primary and secondary education. As a result of the economic crisis and the global recession at the beginning of the 1980s, the International Monetary Fund (IMF) and the World Bank tied granting loans to the condition of implementing structural adjustment programmes and, in this way, reducing public spending. This policy was followed by cuts to higher education, which had a disastrous effect on the still developing universities and on science and research in Africa. Due to the lack of investment in infrastructure as well as funding for teaching and research, the quality of higher education declined rapidly. The universities, which were still considered important institutions for social change in the 1960s and 1970s, were financially starved and the shortage of qualified workers was clear to see. The World Bank report highlighted the essential role of the tertiary sector in initiating social change and contributing to the economic competitiveness of a country (Woldegiorgis / Doevenspeck 2013: 41).

Against this backdrop, the direction of scholarship programmes changed from the 2000s onwards. Instead of providing individual funding, an integrated approach at the structural and institutional level was increasingly pursued, i.e., scholarships were embedded in larger projects in the field of teaching, research and management or in the institution’s organisational development plan.

Discussions of holistic approaches covering primary, secondary and tertiary education, as well as results from external evaluations with regard to their effectiveness, led to a rethink among international donor organisations and to a number of new cooperation programmes for the higher education sector. In this regard, the following aspects were included in the development: cooperation programmes were more strongly adapted to the respective bilateral sectoral policies. Actions were to be based on the needs of the partner government or institution. Southern partners were to bear more responsibility (ownership) by identifying their needs, planning programmes and projects and carrying these out themselves. The focus was on results-based implementation of programmes. Instead of distributing the funds according to the “sprinkler principle”, from this point on they were limited to a few partner countries. South-South cooperation and the use of local and regional expertise became more prominent.

An external evaluation was commissioned for the education sector of the Austrian Development Cooperation (ADC) in 2007. The main point of criticism was the wide dispersion of the individual programmes, which meant that hardly any structural effects on the institutions in the partner countries could be detected. As a result, the ADC scholarship programmes, which were based on individual support, were discontinued or redirected (ADA,

2007). In 2009, ADC also developed the “Higher Education and Scientific Cooperation” strategy. This emphasises that “All activities in priority countries and key regions centre around capacity development in public universities and research institutions so that they can contribute more efficiently to reducing poverty and achieving the MDGs. Toward this end, structures are comprehensively strengthened from a human resource, institutional, and systemic standpoint” (ADA 2009: 9). This meant the focus of the new programme announced by the Austrian Development Agency (ADA) was on promoting universities and scientific institutions in the ADC focus countries instead of individual student mobility.

10.3 The APPEAR Programme

Following an international tendering procedure, the OeAD was commissioned to manage this new institutional higher education cooperation programme (Austrian Partnership Programme in Higher Education and Research for Development – APPEAR). The first phase of the programme lasted from November 2009 to 2015. Based on an external evaluation (2014) and an additional tendering process, the second phase was continued until 2020.

The aim of APPEAR is to strengthen teaching, research and management at higher education institutions in the targeted countries through academic partnerships (component 1) with Austrian institutions. In addition, master’s and PhD scholarships (component 2) are funded. In the long term, the partner institutions should gain more qualified higher education staff who are able to carry out locally relevant and qualitatively improved teaching and research. This is intended to make an effective and sustainable contribution to reducing poverty. The importance of APPEAR for the Austrian institutions is also emphasised. This is because cooperation in the scientific and cultural sense should be designed to benefit both sides. Principles that determine the discourse on development cooperation, such as participation and a bottom-up approach, are also reflected in the programme description (cf. Obrecht 2015).

The paradigm shift that has already taken place at the international level is reflected on the one hand in the new focus on academic partnerships, for which two thirds of the programme funds are allocated. On the other hand, the change is evident in the further development of the North-South Dialogue Scholarship Programme (component 2). There are two types of scholarships within APPEAR: individual scholarships, as well as ones integrated into an existing APPEAR project, with 70% of the funds being made available for the latter. The following conditions apply to both scholarships: Applicants are nominated by a partner institution from one of the eligible countries. Individual training needs must demonstrably serve institutional capacity development in the developing country. This will also include whether the person is employed, will be re-employed after the scholarship programme ends and will be supported in carrying out the mandatory field research in the field. Applicants must submit a written declaration of intent that they are willing to take on appropriate and developmentally relevant employment in their country of origin after completing their studies.

If the studies are part of an existing APPEAR partnership, the project coordinator must explain how the studies will contribute to the implementation of the partnership. However, the relevance of the topic is already ensured by the connection to the APPEAR project. At the beginning, the eligible countries were Ethiopia, Uganda, Kenya, Mozambique, Cape

Verde, Burkina Faso, Senegal, Nicaragua, El Salvador, Guatemala, Bhutan, Nepal and the Palestinian Territories. During the second phase of the programme (2015-2020), Armenia, Georgia and the Republic of Moldova were added.

Ever since the introduction of ADA scholarship programmes in the 1980s, there have been debates about their efficiency and scope. Although the programmes have always been focused on global developments over the years, the objective has remained the same: for people to receive a high-quality education in Austria, return to their home countries after successful completion, and contribute to the development of their own countries with the knowledge and newly acquired skills. Thus, improvements are to be initiated at home, which often didn't take place due to a lack of capacity.

Even though capacity development measures aim at long-term structural and systemic changes, scholarship programmes focus on the individual. On top of the intrinsic motivation to complete a degree programme and the ability to integrate in Austria, many factors that cannot be influenced at the individual level determine the successful completion of a degree programme: working conditions at Austrian universities, cooperation with the academic supervisor, social environment at the institute (practiced interculturality), support in administrative matters (e.g., when applying for a residence permit), non-university framework conditions, political developments in the participant's home country or the current coronavirus pandemic. The complex interplay between these factors, most of which cannot be influenced by the funding body, determines whether the objective of a scholarship award is achieved.

The most important indicator for a scholarship programme is the successful completion of studies, if possible, within the regular scholarship period. 41 students were able to complete their studies by the end of the programme period. 33 students were transferred to the third phase of the programme, which started in December 2020. Again, this phase has a scholarship component with a focus on project-linked scholarships, which continues the tradition of capacity development.

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Yirgashewa Bekele is an assistant professor of special needs education in the Department of Special Needs Education at Addis Ababa University, Ethiopia. She has a bachelor's degree in special education from the University of East Finland and a master's and PhD in special needs education from Addis Ababa University. She has rich teaching and work experience in the field of disabilities and inclusive education service provision both at government and non-governmental organizations. She has research involvement on inclusive education and policy issues, teachers' education, higher education, learning assessment and early identification and interventions in schools. She has produced research publications in the areas of inclusive education and policy issues, early literacy assessment and intervention, gender and disability, and inclusion in higher education. Yirgashewa has been involved in various universities-based collaborations with universities from Austria, Germany, Finland, Norway and the USA. She also has successful experience as a project management team leader and projects evaluation team leader. Contact: yirgashewab@gmail.com

Benedek, Wolfgang

Univ. Prof. Dr. Wolfgang Benedek is Professor emeritus at the University of Graz, Institute for International Law and International Relations. He was the lead coordinator of the AAPLHRE project and its predecessor.

Burger, Pamela

Pamela Burger graduated in 2004 as a veterinarian from the Vetmeduni Vienna, with a special focus on mitochondrial disorders in cheetahs and snow leopards. Immediately afterwards, she started her first project about the genetic origin and domestication of Old-World camels. One of the main questions was to identify the genetic origin and species status of the last, wild two-humped camels in Mongolia and China and the process of domestication in dromedaries and Bactrian camels. In 2015, she founded the International Camel Consortium for Genomic Improvement and Conservation together with colleagues from Italy, Saudi Arabia, France and Kuwait. Pamela Burger is senior researcher and independent group leader of the Population Genetics and Conservation group at the Research Institute of Wildlife Ecology, Vetmeduni Vienna. Her current projects investigate the evolution of immune genes in camels and wild felids in response to economically relevant and zoonotic diseases.

Cangola, Jenita

Jenita Cangola has been an environmental engineer since 2012 and has four years of professional experience in the teaching field. She teaches disciplines related to sanitation and drainage, and water resources management at the Faculty of Environmental Engineering and Natural Resources. She is involved in the institution's projects, with special emphasis on the project "Capacity Building for Renewable Energy Technologies in Mozambique". She is enrolled in the Engineers Order of Mozambique, grouped in the Chemical Engineering College.

Cristóvão, Luís

Mr. Luís Cristóvão studied mechanical engineering at Eduardo Mondlane. He worked at Eduardo Mondlane between 2004 to 2014. In 2013, He finished his PhD thesis in wood science and technology at Lulea University. Since 2014, he has been Dean of Faculty of Environmental Engineering and Natural Resources, Zambeze University. He is project manager of several funded projects. Furthermore, he has several publications in areas of energy, environment and material science.

Dietrich, Phillipp

Phillipp Dietrich was born in Linz/OÖ, and has an educational background in agricultural sciences (BOKU, Vienna) and development studies (University of Vienna). Since 2009, he has been involved in BOKU's division of Organic Farming in project activities (ERASMUS+, APPEAR & ELLS), teaching and coordination (international MSc EUR-Organic).

Drexler, Silke-Silvia

Silke-Silvia Drexler is a senior scientist with a focus on fish ecology, limnology and aquaculture at the Institute of Hydrobiology and Aquatic Ecosystem Management, University of Natural Resources and Life Sciences, Vienna (BOKU). She is finalizing her PhD study at BOKU, holds a MSc in landscape architecture and planning and an Executive MBA in general management from the Institute for Management GmbH, Salzburg. Silke has vast experience in designing and managing international research and education projects in aquatic resources, e.g., MEASURES, DCNA, LARIMA, STRECAFISH and ALTE DONAU.

Ekyaligonza, Deous Mary

Deous Mary Ekyaligonza is a Ugandan PhD student at BOKU, Vienna. She is an APPEAR scholarship holder under the project Strengthening of Higher Education, Research and Community Outreach in Agro-Ecology in the Rwenzori Region, Western Uganda (AER) that is implemented by Mountains of the Moon University and BOKU. She has experience teaching and participating in the implementation of the AER project activities at MMU since 2017.

El Bilali, Hamid

Dr. Hamid El Bilali is a researcher and consultant at the International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM-Bari), Italy. He holds a MSc in Mediterranean organic agriculture and a PhD in agricultural sciences. When he was a postdoc at BOKU IDR, he was part of the SUSFISH team as a sustainable food systems and food security expert.

Ellssel, Pierre

Pierre Ellssel is a postgraduate research associate in the Department of Sustainable Agricultural Systems / Division of Organic Farming at the University of Natural Resources and Life Sciences, Vienna. Before working in an academic setting, he was practically involved in agriculture on various farm types and in different environments in Germany, Switzerland, Wales, Spain and Australia. During and after his studies for the master's degree programme organic agricultural systems & agroecology, Pierre worked with the German Development Cooperation (GIZ) in Ethiopia on the improvement of wheat production systems, with the Research Institute of Organic Agriculture (FiBL) on sustainability analysis of farming systems and as a freelance consultant for WWF Germany and the European Bank for Reconstruction & Development (EBRD) in the field of sustainable land management.

Essl, Laura

Laura Essl has been working as project assistant at the Institute of Geomatics at the University of Natural Resources and Life Sciences, Vienna, since 2013. She obtained master's degrees in environmental engineering and Latin American studies. Her main working interest is the transfer of scientific achievements and technological innovations to real life applications. She is working with stakeholders from all sectors ranging from farmers, governmental representatives to NGOs and children.

Ewert, Xenia

Xenia Ewert was employed in the project Sustainable Energy Access for Sustainable Cities (SEA4cities) as a master's student specialising in UI/UX design of software. She graduated in computer science from the Rheinische Friedrich-Wilhelms-Universität of Bonn (Germany). In SEA4cities, Mrs. Ewert developed a redesign concept of the user interface (UI) and the user experience (UX) of the Modelling Cities Energy System (MoCES) software, which facilitates access to all energy and non-energy practitioners. As energy specialists developed MoCES, the main steps of the redesign process were to review the tool from the perspective of a UI/UX designer, to adapt functionalities to the users' needs, and to improve the overall user experiences. To this end, she conducted two-round usability tests with users in Vienna (Austria) and Dakar (Senegal). The lessons learnt from the redesign work have been compiled in a Master's thesis on media informatics that was successfully defended in 2020 at the Human-Computer Interactions Group of the Vienna University of Technology (TU HCI).

Freyer, Bernhard

Prof. Bernhard Freyer serves as the chair of the Division of Organic Farming at BOKU, leads the working group Transdisciplinary System Research, and is a senior fellow of agricultural systems, MISA, CFANS, at the University of Minnesota (USA). He is experienced in a broad spectrum of disciplines, combining natural and social sciences, following a systems approach, and is responsible for guiding national and international research projects. He is/has been a member and organiser of several inter- and transdisciplinary research projects in the fields of natural and socioecological research in Switzerland, Germany, Austria and various developing countries, e.g., Ethiopia, Kenya, Mozambique, Uganda, Egypt, Tunisia, Burkina Faso, Nigeria, Ghana, Nicaragua, and Guatemala.

Gacheiya, Raphael M.

Dr. Raphael M. Gacheiya graduated with a First Class Honours degree in Kiswahili and sociology and attained his Master of Arts degree as well as Doctor of Philosophy (PhD) degree in Kiswahili from Egerton University. He has been a project coordinator of two European Union funded projects (ROSA & CLARA projects) and spearheaded the Kiswahili translation of the Sustainable Sanitation Alliance vision document: www.susana.org. Dr. Raphael M. Gacheiya has interests in translation, communication and language use, and its influence on adoption of ICT. Currently, he works as a Kiswahili lecturer and the examination officer at the Department of Literature, Languages and Linguistics in addition to being the Co-Principal Investigator of the SCARA project, an Austrian OeAD APPEAR funded project at the Division of Research & Extension, Egerton University.

Graf, Wolfram

Wolfram Graf is Associate Professor and Head of the working group Rheophylax at the Institute of Hydrobiology and Aquatic Ecosystem Management at the University of Natural Resources and Life Sciences (BOKU), Vienna. The focus for his research and education is the ecology and taxonomy of benthic macroinvertebrates throughout Europe, the Himalayan Region, and parts of Africa. More specifically, his research focuses on issues of biodiversity in waters of different types and effects of anthropogenic activities. He is also interested in the impacts of climatic changes, and the invasion of non-indigenous species.

Haile, Aschalew Lakew

Aschalew Lakew Haile is a researcher, and Director of the National Fisheries and Aquatic Life Research Centre at the Ethiopian Institute of Agricultural Research. He completed his MSc in environmental science from the UNESCO-IHE Institute for water education in The Netherlands, and his PhD in natural resources and life sciences from BOKU, Austria, both funded by the Austrian Development Cooperation. His professional experience focuses on aquatic pollution, fisheries and aquaculture, and he has a strong familiarity with project development, management and proposal writing for funding projects such as the LARIMA-APPEAR project.

Hakizamungu, Alexandre

Alexandre Hakizamungu holds a master's degree in social work and human rights. He is currently a lecturer in the Department of Social Sciences at the University of Rwanda. He is a licensed social work specialist and member of the Rwanda Allied Health Professions Council.

Hamed, Adham

Adham Hamed is an Austrian peace, conflict and development researcher. He has taught at the University of Innsbruck (Austria), the University of Baghdad (Iraq) and Haramaya University (Ethiopia). He has been Austrian Coordinator of the Austrian Development Cooperation funded APPEAR project HU-UIBK Partnership for Strengthening Institutional Capacity in Peacebuilding and Conflict Transformation. Adham Hamed is author of the monographs *Elicitive Curricular Development: A Manual for Scholar-Practitioners Developing Courses in International Peace Studies* (2019, together with Josefina Echavarría Alvarez and Noah Taylor), and *Speaking the Unspeakable: Sounds of the Middle East Conflict* (2016); he is also editor of *Revolution as a Process: The Case of the Egyptian Uprising*.

Hartmann, Anne

Anne Hartmann is a river ecologist and works as Senior Scientist at the University of Natural Resources and Life Sciences Vienna (BOKU), where she completed her PhD with a focus on aquatic ecology in 2011. Her research interests are freshwater ecology, benthic invertebrates, freshwater assessment systems, conservation management, and the ecology and taxonomy of Astacoidea (crayfish).

Hassen Ayele, Meseret

Meseret Hassen Ayele is a researcher and academic staff member at the Department of Special Needs and Inclusive Education at the University of Gondar. Her research focuses on disability, inclusive education, gender-based violence against girls with disability, employability of people with disability, and folklore & education. Contact: mesyhasen@yahoo.com

Hundscheid, Laura

Laura Hundscheid, Dipl.-Ing., studied environmental- and bioresource management in Vienna and Munich. Currently, she is working at the Institute for Development Research at BOKU, Vienna. Her research focus is on protein transition in Austria as a contribution to the SDGs. She did her field research for her master's thesis within the SUSFISH+ project.

João, Paulino

Paulino João obtained a master's in economics and is currently attending the PhD program in economics at the Catholic Business School in Beira, a partnership between UCM / UCP. He has been working for 23 years as a teacher: nine years in high school, and eight years in technical professional education, of which two were in the agricultural branch and six were in the commercial branch. He also worked two years as coordinator of the World Bank-funded Sowing Future project, and six years as regional coordinator of the agricultural program to support orphans. He has worked in four private universities and two public universities as a partial lecturer (2014-2018). He is currently a lecturer at the Faculty of Social Sciences and Humanities of Uni Zambeze (2014- present), and a researcher at the Centre for Innovation Studies and Advanced Training of Zambezi University (2014- present). He has been the coordinator of ISAM from 2018-2020.

Karungi-Tumutegereize, Jeninah

Jeninah Karungi-Tumutegereize is Associate Professor for Entomology and Pest Management at Makerere University in Uganda. She graduated from Makerere University, Kampala, Uganda, and the Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden. Her research focus on the ecological management of pests using the help of natural predators calls for an expansion of traditional definitions of natural resources in agriculture. Jeninah is the co-principal investigator of the CapNex project.

Keno, Gutema Imana

Dr. Gutema Imana Keno is an associate professor of sociology at Haramaya University (Ethiopia). He obtained his bachelor's and master's degrees in history from Addis Ababa University (Ethiopia) and his PhD in sociology from the University of Klagenfurt (Austria). He has been actively engaging in learning-teaching, research, and community service activities for over 25 years. He has also assumed different administrative positions, such as Director for

Development Works Directorate, Dean of College of Continuing and Distance Education, and Director of the Institute for *Gadaa* Studies. Recently, he served as the principal coordinator of the Austrian Development Cooperation-funded APPEAR project *HU-UIBK Partnership for Strengthening Institutional Capacity in Peacebuilding and Conflict Transformation*. Currently, he is serving as Associate Editor of the East African Journal of Social Sciences and Humanities, and he is Haramaya University's Representative to the Africa-UniNet.

Kisakye, Violet

Violet Kisakye graduated in 2006 with a BSc in agricultural land use and management from Makerere University, Uganda. She went on to obtain a master's in integrated water resources management from the University of Dar es Salaam in Tanzania in 2010. She specialized in water and land resources from the HOORC Institute in the Okavango delta in Botswana in 2010. She has previously worked at Makerere University as a teaching assistant in the Faculty of Agriculture, Soil Science Department. Since 2010, she has been a lecturer at Mountains of the Moon University (MMU), in Fort Portal, Uganda. Currently, she is the leader of the VLIR-IUC project 1, which focuses on action research & community engagement for development at MMU.

Knauder, Bernadette

MMag. Bernadette Knauder, E.MA was research assistant at the University of Graz, European Training and Research Centre for Human Rights and Democracy (UNI-ETC) and has managed the AALHRE project since 2017.

Krohn, Juliana

Juliana Krohn is a peace and conflict researcher and university assistant at the Department of Philosophy at the University of Innsbruck (Austria) where she coordinates the interdisciplinary doctoral program "Dynamics of Inequality and Difference in the Age of Globalization". She has been the Austrian Co-Coordinator of the Austrian Development Cooperation-funded APPEAR project *HU-UIBK Partnership for Strengthening Institutional Capacity in Peacebuilding and Conflict Transformation* from July 2020 onwards. Her interdisciplinary research focuses on decoloniality, epistemic violence, and philosophical and literary expressions of the human-nature relationship and their relevance for defining an ecological dimension of peace. Her previous work and studies led her to countries such as Israel and the Palestinian Territories and the Islamic Republic of Iran.

Kulakowska, Michalina

Michalina Kulakowska is a senior game designer at the Centre for Systems Solutions. She runs workshops with simulations and games for players from all over the world. In the project, Michalina co-developed the strategic simulation process and supported its delivery.

Lederer, Jakob

Jakob Lederer is Senior Researcher at the Institute of Chemical, Environmental and Bioscience Engineering, TU Wien, Vienna, Austria. Holding a master's degree in civil engineering and international development studies, and a PhD in engineering, his professional interests focus on opportunities to reconcile socio-economic development and environmental protection in order to improve and/or maintain the life quality of modern societies. Jakob is the

principal investigator of the CapNex project.

Magnuszewski, Piotr

Dr. Piotr Magnuszewski is a systems modeler, game designer, professional trainer, facilitator, and researcher, with a special interest in complexity and sustainability. In the project, Piotr worked on the strategic simulation and led the simulation process in the face-to-face workshops.

Mananze, Sosdito Estevão

Sosdito Estevão Mananze received a PhD in surveying with a focus on remote sensing of agriculture and natural resources at the University of Porto, Portugal. He is Deputy Dean for Research and Extension affairs at the Escola Superior de Desenvolvimento Rural (ESUDER) of the University Eduardo Mondlane in Mozambique, where he is also a lecturer in remote sensing and GIS. He was the local coordinator for the EO4Africa project, funded by the Austrian Development Agency with the objective to strengthen the remote sensing data processing and interpretation capacities for operational use in agricultural system monitoring in Mozambique.

Mansberger, Reinfried

Reinfried Mansberger is Assistant Professor at the Institute of Geomatics at the University of Natural Resources and Life Sciences, Vienna (BOKU). He obtained his master's degree (Dipl.-Ing.) at the Technical University Vienna and his PhD degree at BOKU. For more than 30 years, he has worked as a teacher and scientist on the topics of surveying, and land administration (cadastre and land rights), as well as photogrammetry. He was and is involved in numerous, international capacity building projects (LARIS, TEMPUS, ERASMUS+ CBHE, APPEAR).

Melcher, Andreas

Priv.-Doz. Dipl.-Ing. Dr. Andreas Melcher is Deputy Head of the Institute for Development Research at BOKU and lecturer on aquatic ecosystem modelling and applied development research. He is also an overall project coordinator, member and initiator of both SUSFISH projects, and has acted as a co-supervisor for bachelor's, master's and PhD theses during the project. He is lead editor of the SUSFISHbook.

Mengesha, Ayelech Kidie

Ayelech Kidie Mengesha is a PhD candidate at the University of Natural Resources and Life Sciences, Vienna (BOKU). Before she joined BOKU, she worked as a lecturer at Debre Markos University, Ethiopia, since September 2010. Ayelech has two master's degrees: an MSc in mountain forestry from BOKU, Austria, and an MSc in rural development from Hawasa University, Ethiopia. She received her bachelor's degree in rural development from Ambo University, Ethiopia, in June 2010.

Muchiri, Susan Wanjiku

Susan Wanjiku Muchiri is a lecturer at Hope Africa University, Burundi, where she serves as the Head of Department of Social Work and Community Development. She holds a bachelor's degree in social work and a master's degree in counselling psychology. She served as

Project Co-coordinator of the project PROSOWO II in Burundi. She has been in charge of research and development in the National Association of Social Work in Burundi (NAS-WA-B). She is also a member of the African Governing Committee of the Haley McCready Fund.

Navratil, Gerhard

Gerhard Navratil is Senior Scientist at the Department of Geodesy and Geoinformation at TU Wien. He obtained his master's degree (Dipl.-Ing.) and his PhD at TU Wien. Since 2006, he holds a *venia docendi* from the same university. He has worked as a teacher and researcher for more than 20 years. His research interests are GIScience, navigation, and land administration, and he regularly conducts teaching on GIS, data quality and parameter estimation. He supervised 45 master's theses and four PhDs, and was involved in several capacity-building projects on an international level (APPEAR and EC programs).

Nzisabira, Serges Claver

Serges Claver Nzisabira served as Assistant Project Coordinator for Burundi in the project PROSOWO II. He holds a bachelor's degree in social work and community development and a master's degree in community development from Hope Africa University, Burundi. Currently, he serves as Child Protection Officer at Social Action for Development, a child's rights organization in Burundi, and as President of the National Association of Social Workers, Burundi.

Oueda, Adama

Dr. Adama Oueda is a senior scientist and lecturer at the University Joseph Ki-Zerbo. His research focus is on biodiversity, pollution/human pressures, and the food web. He is very active in regional and international projects for collaborative research and education. His main focus in the SUSFISH project was on education and biodiversity.

Ouédraogo, Dominique

Dominique Ouédraogo graduated in December 2020 with a PhD degree in animal breeding and genetics at the University of Natural Resources and Life Sciences, Vienna (BOKU). Dr.nat.techn. Dominique Ouédraogo is a former APPEAR scholarship holder. He carried out his research study in the framework of an APPEAR project called LoCaBreed "Local cattle of Burkina Faso – characterization and sustainable use". His PhD research aimed to contribute to improve and conserve locally adapted cattle breeds in Burkina Faso through the design and implementation of appropriate breeding programs using a community-based approach. He currently applied for an assistant lecturer position at his home university, the Nazi Boni University of Burkina Faso. His research area of interest is the genetic improvement of livestock in low-income countries. An ongoing research project in which he is actively involved is a USDA-funded project in the framework of the African Goat Improvement Network (AGIN), aiming to implement community-based breeding programs of local goat breeds in Burkina Faso.

Ouédraogo, Raymond

Dr. Raymond Ouédraogo holds a master's degree in aquaculture and in fisheries policy & planning, and a PhD. He has worked since 1991 as a fish resources manager, and since 2013 as researcher at the INERA, Burkina Faso. In SUSFISH, he was the national coordinator and leader of work packages.

Porcuna Ferrer, Anna

Anna Porcuna Ferrer studied environmental biology at the Autonomous University of Barcelona, and earned a master's in organic agricultural systems and agroecology from the University of Natural Resources and Life Sciences, Vienna (BOKU). In 2018, she was in charge of the technical coordination of the ISAM project. She is currently doing a PhD at the Institute of Environmental Science and Technology (ICTA-UAB). Her work focuses on agrobiodiversity through the lens of ethnoecology, agroecology and political ecology. Anna is passionate about all kinds of community-based, bottom-up initiatives that aim at halting (or reversing) agrobiodiversity loss and are about creating learning opportunities that contribute to agroecological transitions towards more sustainable food systems.

Proyer, Michelle

Michelle Proyer holds a TT professorship for inclusive education at the Centre for Teacher Education and Department of Education, University of Vienna. Her teaching and research focusses on inclusive education in and out of school and the nexus of disability and culture.

Reisenbauer, Simon

Simon Reisenbauer is a researcher at the Department of Education of the University of Vienna. His teaching and research focuses on global perspectives on inclusive education, inclusive teaching practices, inclusive school and community development, diversity and (in)equality from an international perspective, and disability and education in development cooperation. Contact: simon.reisenbauer@univie.ac.at

Ruffeis, Dominik

Dr. Dominik Ruffeis is a senior scientist at BOKU University Vienna at the Institute of Soil Physics and Rural Water Management (SoPhy). He has many years of experience working in multinational research and development cooperation projects in Africa, Asia and the Pacific. His interests include sustainable transformation processes and implementation of projects and strategies in a community context. Dominik Ruffeis' work is related to climate change adaptation, resilience, water resources management and agriculture, tightly integrated with learning and co-creation processes and ICTs.

Sametinger, Johannes

Johannes Sametinger is a professor at the Johannes Kepler University Linz (JKU) at the Department of Business Informatics – Software Engineering. His research interests include various aspects of software engineering in general and software security in particular. He has spent several years at universities in the USA (Texas A&M University, Brown University, University of Arizona) and in Canada (University of Toronto, Université de Montréal). Besides the JKU, Sametinger has also worked in Germany at the University of Regensburg and with Siemens in Munich.

Sanon, Vincent-Paul

Vincent-Paul Sanon studied sociology at the Catholic University of West Africa in Bobo-Dioulasso (UCAO/UUB). He is now a PhD student at BOKU working on tradition, governance and science for water management within work package two of SUSFISH+.

Schieder, Jeannine

Ms. Jeannine Schieder studied at the FH JOANNEUM University of Applied Sciences at the Institute of Energy, Transport and Environmental Management, and finished her master's degree in 2017. She also graduated in technical environmental management at the FH Technikum Vienna and completed her master's thesis, "Process indicators in the Integrated Management System of the voestalpine Tubulars GmbH & Co KG with focus on Environmental and Energy Management", in collaboration with the voestalpine Tubulars GmbH & Co. KG Kindberg. Furthermore, she is a certified waste and environmental manager, as well as an internal environmental auditor. Since September 2018, she has been working as a researcher at the Institute of Energy, Transport and Environmental Management at the FH JOANNEUM University of Applied Sciences.

Sendzimir, Jan

Dr. Jan Sendzimir is a systems ecologist working on questions of adaptation to and mitigation of impacts of global change processes in social-ecological systems. He uses conceptual and formal modeling as well as social simulation integrated with field research within participatory science to guide research and policy.

Silota, Júlia da Percília David Gaspar

Júlia da Percília David Gaspar Silota has a degree and a master in environmental and natural resources engineering earned in 2011 and 2014 respectively by Zambeze University. She has been a lecturer at Zambeze University, Faculty of Environmental and Natural Resources Engineering since 2015. She is involved in subjects related to water resources management, solid waste management and treatment technologies, waste energy and economy, and management of natural resources. Her research focus is technology for the treatment of solid urban waste, especially those that allow the use of energy.

Slezak, Gabriele

Dr. Gabriele Slezak is a senior lecturer at the Department of African Studies at the University of Vienna. She is an expert in sociolinguistics and transdisciplinary research methods who has had multiple, medium-term stays in Burkina Faso.

Somda, Jacques

Dr. Ir. Jacques Somda holds an engineering degree on agronomy from the University of Ouagadougou, Burkina Faso and a doctoral degree on rural economics from the University of Cocody, Côte d'Ivoire. He is the Head of the IUCN Program in Burkina Faso. In SUSFISH+, he co-designed and co-supervised the work of two master's students on capture fish value chain analysis.

Sow, Salif

Salif Sow was employed in the project Sustainable Energy Access for Sustainable Cities (SEA4cities) as a doctorate student specializing in physics. He graduated in energy engineering from the Pan African Institute of Water and Energy Sciences (PAUWES) of Tlemcen (Algeria). In SEA4cities, Mr. Sow was the focal point of the platform with partners. In this role, he represented SEA4cities in meetings called by partners of the project. He worked with CERMI and ProGREEN in drafting the cooperating agreements signed with these organizations, and served as representative of the project in the ProGREEN initiative to create a database of all renewable energy and energy efficiency projects implemented in francophone West Africa. Mr. Sow is currently finalizing a PhD thesis in the Laboratoire Eau, Energie, Environnement et Procédés Industriels of Ecole Supérieure Polytechnique de Dakar (L3EPI ESP). His thesis is titled “Towards sustainable energy solutions in the new Senegal urban poles: A study of techno-economic requirements”.

Spitzer, Helmut

Helmut Spitzer, PhD, is Professor of Social Work at Carinthia University of Applied Sciences, Austria. He served as Overall Coordinator of the projects PROSOWO I (2011–2014) and PROSOWO II (2016–2019) on the promotion of professional social work in East Africa. His teaching, research and publications (in German and English) focus on international social work, social work methods, social work with older people, and social work in African contexts.

Sumereder, Christof

Mr. Christof Sumereder studied electrical energy systems at Graz University of Technology. He worked in industry at a grid operator and a transformer company as project manager. He was an assistant professor at the University of Technology in Graz at the Institute for High Voltage Engineering. He finished his PhD thesis with honors and a postdoctoral thesis (venia docendi). Between 2011 and 2012, he was Professor for High Voltage Engineering at TU Berlin. Since 2015, he is Associate Professor for Energy Systems at FH JOANNEUM, University of Applied Sciences at the Institute of Energy, Mobility and Environmental Management. At the University of Applied Sciences Upper Austria, he is Lecturer for High Voltage Engineering. He is project manager of several funded projects (e.g., regional Fund of Styrian County, national Fund FFG, ÖAD, European Fund Interreg Alpine Space).

Tachiua, Iolanda

Iolanda Tachiua, born in Chimoio, Manica Province, graduated from Eduardo Mondlane University with a degree in agronomic engineering, is currently working at Uni Zambeze – Faculty of Agricultural Sciences – Ulónguè as a lecturer in food engineering, with a focus on post-harvest technologies, technologies for vegetable production and food processing. She is the coordinator of research and extension and the gender focal point.

Teklegiorgis, Rahel Bekele

Rahel Bekele Teklegiorgis is a professor at the School of Information Science of the Addis Ababa University in Ethiopia. She obtained her doctorate in Computer Science from the University of Hamburg, Germany. Rahel's greatest passion in life is using her technical know-how to benefit disadvantaged and marginalized communities. She has been actively

engaged in technology-enabled maternal and child healthcare projects in collaboration with European colleagues. As principal investigator, she laid the groundwork for ethnographic and participatory approaches to user-centered design in improving public health practices in remote rural settings.

Teklemariam, Alemayehu

Dr. Alemayehu Teklemariam is an associate professor in special needs education and inclusive education at Addis Ababa University, Ethiopia. Areas of teaching and research interests include research methods, education of children with hearing impairments, learning disability, sign language, philosophy in special needs and inclusive education, CBR, education of gifted and talented children, early childhood education and development, gender, teacher education, and disability and society.

Teshome, Ababu

Dr. Ababu Teshome is director of the Special Needs Education Support Centre and researcher at the Department of Special Needs and Inclusive Education at Dilla University in Ethiopia. His research focusses on inclusive education for students with special needs, inclusive classroom management, Community-Based Inclusive Development, education of children with visual impairments, HIV/AIDS and disability, and disability and society.

Toe, Patrice

Dr. Patrice Toe is a socio-anthropologist and senior lecturer at Nazi BONI University. He is also Vice-President of the University and Director of the Laboratory of Rural Studies on Environment and Socio-economic Development (LERE/DES). He is a coordinator for SUSFISH and SUSFISH+ projects, and is also in charge of research on socio-economical governance aspects and gender issues.

Tomo, Helton

Helton Tomo is a forest engineer, researcher and extensionist at the Centre for Innovation Studies and Advanced Training, Zambezi University – Mozambique. Before working in the academic environment, he joined the select group of the Paleo Primate Project of Gorongosa / Field School – Mozambique, a partnership between Gorongosa National Park – Mozambique and Oxford University – England. During and after his master's program studies, he was involved in research on participative community management integration and rural extension. He is also a researcher and instructor in organic fertilization and agro-forestry systems.

Turinawe, Alice

Alice Turinawe is a senior lecturer at the Department of Agribusiness and Natural Resource Economics, College of Agricultural and Environmental Sciences, Makerere University. She graduated from Makerere University, Kampala, Uganda, and the Swedish University of Agricultural Sciences (SLU), Uppsala, Sweden. Her research focuses on the economics of agricultural production systems and particularly soil and water conservation. In the CapNex project, Alice was leader of case study C on soil and water conservation.

Twikirize, Janestic

Janestic Twikirize, PhD, is a senior lecturer in the Department of Social Work and Social Administration, Makerere University, Uganda. She has also served as a visiting lecturer at Gothenburg University, Sweden, University of Stavanger, Norway, and Lincoln University, UK. She has published over 15 scientific papers, including four books, and made over 30 presentations at international conferences. She was Vice President of the Association of Schools of Social Work in Africa and a board member of the International Association of Schools of Social Work until 2018. She served as the East Africa Regional Coordinator of the project PROSOWO II.

Uwihangana, Consolee

Consolee Uwihangana is an assistant lecturer in the Department of Social Sciences, University of Rwanda, where she is also part of different research teams in social work. She served as the Rwandan Country Coordinator of the project PROSOWO II, under which she has published on social work in Rwanda and organized the International Social Work Conference in Rwanda in 2018. She is a holder of the “Ubuntu Social Work Award”, awarded by the International Federation of Social Workers / Africa Region, in recognition of her role in ending gender-based violence.

Voigt, Charlotte

Charlotte Voigt completed her bachelor’s degree in environmental and bioresource management at BOKU, and is now doing her master’s in food and agricultural economics. She joined the SUSFISH+ Project in 2019 as an assistant in completing the reporting, as well as putting together the SUSFISHbook.

Vuolo, Francesco

Francesco Vuolo received the doctoral degree in management of agricultural resources and forests at the University of Naples Federico II, Italy, in 2007. He works as a senior scientist at the University of Natural Resources and Life Sciences, Vienna (BOKU). His main interest is the application of remote sensing techniques to support sustainable water and nutrient management in agriculture. He has conducted extensive work and training with farmers in Italy, Spain, France and Austria to support the application and uptake of technologies in the field.

GEORGIA – ARMENIA

Bziava, Konstantine

Konstantine Bziava, Dipl.-Eng. Dr. is Full Time Associate Professor at the Faculty of Civil Engineering of Georgian Technical University (GTU). He is also Senior Scientist at the Tsothe Mirtskhulava Georgian Water Management Institute of Georgian Technical University (WMI GTU). He is a member of the National Team of the Academy of Agricultural Sciences of Georgia, which has activities dedicated to water resources management and land reclamation. He led several projects related to the rehabilitation of irrigation and drainage systems of Georgia. He participated in the international project implemented by the Ministry of Education of Georgia and U.S. Agency for International Development and developed

standards for institutional accreditation in Georgia. He has participated in many national and international projects.

Davitashvili, Alexander

Alexander Davitashvili, Dipl.-Biol. Dr. is Univ. Professor at the GTU. He is a member of Sigma Xi, an American scientific international organization. He coordinated an international project supported and financed by UNDP VET dedicated to development of curricula, syllabi and textbooks in construction and agriculture specialties for regional Vet Centers of Georgia.

Himmelbauer, Margarita

Margarita Himmelbauer, Dipl.-Ing. Dr.nat.techn. BEd is Senior Scientist at the Institute for Soil Physics and Rural Water Management (SoPhy). She earned her PhD degree in environmental engineering at the BOKU University, Vienna, her MSc degree at the Forestry University, Sofia, and BEd degree, thesis in adult education, at the Univ. College for Agrarian and Environmental Pedagogy, Vienna. Her research interests are mainly focused on the soil-plant-atmosphere continuum, and interdisciplinary environmental studies. As member of the university academic staff, she participated and headed national and international research and education projects with partners from industry (financed by FFG programs COIN & Qualinetz) and with universities in West and East European countries, Asia, etc. (e.g., SUSFOR, SUSDEV, QANTUS, DESAWY).

Hovakimyan, Hasmik

Hasmik Hovakimyan holds a master's degree and honorary diploma from the Armenian State University of Economics and is a doctoral candidate in the Division of Organic Farming at the University of Natural Resources and Life Sciences, Vienna (BOKU). She has received an APPEAR scholarship for her studies in Austria. Her research focuses on participatory curriculum building for organic agriculture and higher education modernization issues. She has more than seven years of work experience in different governmental organizations and university teaching. She has been an active member of Youth Parliament (National Assembly of the Republic of Armenia) for the past five years.

Inashvili, Irma

Irma Inashvili, Dipl.-Ing. Dr. holds a doctoral degree in engineering ecology, graduated from the Georgian State Agrarian University (GSAU), and recently became Full Time Professor at the Georgian Technical University (GTU). She coordinates several educational programs at the master's degree and doctoral levels at the GTU. She coordinated and developed an international bachelor's degree curriculum on soil and water resources engineering, which was implemented by Iowa State University (U.S.A.) and GTU. She is a member of the National Team of the Academy of Agricultural Sciences of Georgia, and executor of international and national projects granted by national and international organizations. Recently, she is a scientific supervisor for three doctoral and one master's degree students.

Keryan, Tigran

Tigran Keryan completed his doctoral studies associated with the CaucaSusT project through the Doctoral School Transitions to Sustainability (T2S) at the University of Nat-

ural Resources and Life Sciences, Vienna (BOKU), Austria. His thesis was focused on the integration of transdisciplinary approaches in post-Soviet higher education systems. Before beginning his doctoral studies, he worked as a geography and environmental sciences school teacher in Armenia and was involved in different sustainable tourism and youth development projects.

Khoetsyan, Ashot

Prof. Ashot Khoetsyan is Doctor of Geography Sciences and Head of Chair of Geography and its Teaching Methods at Armenian State Pedagogical University (ASPU). He coordinated the CaucaSusT project activities at ASPU. Prof. Khoetsyan served as the Dean of the Faculty of Geography, Yerevan State University in 2000-2008, and as the Head of the Department of Physical Geography, Yerevan State University from 1997-2000. His scope of academic interests include development and changes of landscapes, degradation of landscapes and the desertification problems, rational utilization of soils, landscape geoecology, protection of natural resources and natural conditions, organization of touristic activities, as well as geomorphology and biogeography

Khokhobaia, Merab

Merab Khokhobaia holds a PhD in economics, and currently is an associate professor at the Ivane Javakhishvili Tbilisi State University (TSU). He managed CaucaSusT project-related activities on behalf of TSU. He is the head of the Department of Scientific Research and Development at the Faculty of Economics and Business. His research interests are focused on sustainable development, regional policy and development, and the economics of tourism.

Klimek, Milena

BA DI Milena Klimek is a doctoral candidate at the Division of Organic Farming in the University of Natural Resources and Life Sciences, Vienna where she completed her masters and teaches a course on ethics in sustainable agriculture. She completed her undergraduate degree in 2005 at St. Olaf College in Northfield, MN with a double major on environmental studies, sustainable development and alternative agriculture. She has practical experience in a variety of environmental and natural resource management and design positions, and at a small, organic, alpine dairy. Her project work includes food and farming issues around the globe, sustainable food system education and curriculum development.

Klimiashvili, Irina

Irina Klimiashvili holds a doctoral degree in environmental engineering and safety, graduated from Georgian Technical University (GTU), and recently is an assistant professor at the Georgian Technical University (GTU).

Loiskandl, Willibald

Willibald Loiskandl, Univ.-Prof. i.R. Dipl.-Ing. Dr.nat.techn., is former head of the Institute for Soil Physics and Rural Water Management (SoPhy) (formerly IHLW), CDU. He has wide professional research and teaching experience in Austria and abroad. In his university career, he devoted much time to international relations, curriculum development and life-long learning activities. He led research projects sponsored by the Austrian FWF and other

national and international founding organizations. His major interests are related to soil physics and rural water management. Prof. Loiskandl is involved in many activities of the Centre for Development Research at BOKU and is a member of the steering committee.

Matosyan, Marine

Marine Matosyan supported coordination of the CaucaSusT project activities on behalf of the Armenian State Pedagogical University (ASPU). She has a PhD in geographical sciences, and is Associate Professor of the Chair of Geography and its Teaching Methods at ASPU, and the author of multiple scientific-methodological articles, with a thematic focus on territorial management, regional policy, tourism, and geographical culture.

Maurer, Christian

Prof (FH) Mag Christian Maurer is Head of the Institute for Tourism, Wine Business, and Marketing, and Programme Director for the Master Programme Marketing at the IMC University of Applied Sciences Krems, Austria. He is as an active researcher and teacher. His areas of lecturing and research are digital marketing, e-tourism, marketing and communication management, and strategic marketing planning. Christian Maurer has published several research papers, led international research projects and has held many presentations at international conferences. He is founder of the annual International Student Conference in Tourism Research (ISCONTOUR).

Michalek, Claus Rainer

Claus Rainer Michalek, Dipl.-Ing. is head of Teaching and Learning Services, head of the Division of E-Learning and Didactics, BOKU. He earned his degree in landscape architecture and planning at the University of Natural Resources and Life Sciences, Vienna and has been responsible for introducing and establishing new forms of teaching and learning at BOKU since 2004. He has been active in national and international networks (e.g., Forum Neue Medien in der Lehre Austria, Academic Moodle Cooperation, Euroleague for Life Sciences). His current research focus is on mobile learning and related usability.

Mitrofanenko, Tamara

Tamara Mitrofanenko managed the CaucaSusT project on behalf of the University of Natural Resources and Life Sciences, BOKU, Institute of Landscape Development, Recreation and Conservation Planning (ILEN). She combines her work at BOKU with supporting the United Nations Environment Programme (UNEP), Vienna Office, Secretariat of the Carpathian Convention, in the field of sustainable regional development, education for sustainable development, and science-policy-practice interface in the Caucasus and the Carpathian Mountain regions.

Muhar, Andreas

Andreas Muhar was the leader of the CaucaSusT project consortium. He is a professor in sustainable landscape development, transdisciplinarity and knowledge integration at the University of Natural Resources and Life Sciences (BOKU) in Vienna, Austria. His research interests are in the theory and practice of transdisciplinary knowledge production for sustainable development with a particular focus on mountain regions.

Sahakyan, Astghik

Astghik Sahakyan holds a bachelor's and master's degree in economics. She studied agribusiness and marketing at the Agribusiness Teaching Center at the International Center for Agribusiness Research and Education foundation in Yerevan. There she worked as a project coordinator on the APPEAR-funded Building Organic Agriculture in Armenia (BOAA) project and is currently working as a course coordinator on the Greenhouse Crop Production and Management (GCPM) program. Throughout her career, she has been involved in different agribusiness research projects that were mainly focused on stakeholders' need assessments, capacity building, curriculum development and value chain analysis.

Salukvadze, Joseph

Prof. Joseph Salukvadze coordinated the CaucaSusT project on behalf of Tbilisi State University (TSU). He is the head of the department of human geography at the faculty of social and political sciences, and a supervisor of the doctoral program in urbanism. Prof. Salukvadze is a member of the steering committee of the Scientific Network of the Caucasus Mountain Region. His academic interest is focused on urban studies, land policy and land-use planning. He served as the vice rector of TSU from 2014 to 2017, and as the deputy president of the Georgian Geographical Society from 2008 to 2016. He was a Fulbright Scholar at MIT in 1998–1999, and an invited professor to the Technical University of Munich from 2002 to 2018.

Strauss-Sieberth, Alexandra

Alexandra Strauss-Sieberth, Dipl.-Ing., BEd, is a senior lecturer at BOKU Teaching and Learning Services, Division of E-Learning and Didactics, and has a wide range of teaching experience, with special focus on gender issues in rural water management and in higher educational didactics. Currently, her interests focus on data quality objectives in field research and on building university-school networks. She has many years of experience in many national and EU education projects with partners from West and East European countries (e.g., MINT, WATERMAN, SUSFOR, QANTUS, STREAM), and in organizing trainings and summer schools. She also gives lectures in soil physics and rural water management at BOKU. Since 2016, she has specialized in teaching and learning in higher education, currently completing a master's in education.

Zitek, Andreas

Andreas Zitek, MSc. Dr.nat.techn., BOKU Teaching and Learning Services, Division of E-Learning and Didactics, is working as an e-learning innovator and didactical designer and as Scientific Project Manager in the field of applied ecogeochemistry. He has been involved in the development of innovative teaching and learning approaches in EU FP 6 and EU FP 7 projects. Currently, he is coordinating the Erasmus+ project INTRINSIC with a focus on empowering life science university teachers to develop their students' sustainable entrepreneurship competencies in relation to the SDGs. He is also working as a lecturer, developing, applying and evaluating innovative, blended learning activities (e.g., web-based teaching and learning), and offering courses on scientific writing as a certified coach at BOKU.

STUDENT MOBILITY

Stinnig, Elke

Elke Stinnig started her career as the programme manager for the North-South Dialogue Scholarship Programme at Austria's Agency for Education and Internationalisation in 2005. She was involved in setting up the Austrian Partnership Programme in Higher Education and Research for Development (APPEAR) and since then has been working as a programme officer, with a focus on the scholarship component and gender issues. She is also the representative of the APPEAR team in the Advisory Board and Donor Harmonization Group. Elke Stinnig obtained a master's degree in Agricultural Sciences from the University of Natural Resources and Life Sciences, Vienna, and a bachelor's degree in African Studies from University of Vienna. She is presently undertaking a master programme in African Studies at the University of Vienna.