

**AUSTRIAN FOUNDATION FOR
DEVELOPMENT RESEARCH**

AQUAHUB Impact Evaluation
Final Assignment Report

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ABBREVIATIONS

AAU	Addis Ababa University
ACEWM	Africa Centre of Excellence for Water Management
ADA	Austrian Development Agency
ADC	Austrian Development Cooperation
AEEM	Joint Master's Programme in "Aquatic Ecosystems & Environmental Management"
AfDB	African Development Bank
APPEAR	Austrian Partnership Programme in Higher Education and Research for Development
AQUAHUB	Education and Research Hub for the Sustainable Management of Aquatic Ecosystems in Eastern Africa
BDU	Bahir Dar University
BMBWF	Austrian Federal Ministry of Education, Science and Research
BMEIA	Austrian Federal Ministry of European and Foreign Affairs
BOKU	University of Natural Resources and Life Sciences, Vienna
DAAD	Deutscher Akademischer Austauschdienst
EAAWA	East African Austrian Water Association
EAWA	Eastern African Water Association
EFASA	Ethiopian Fisheries and Aquatic Sciences Association
EGU	Egerton University
EIAR	Ethiopian Institute for Agricultural Research
EIAR-NFALRC	Ethiopian Institute for Agricultural Research, National Fishery & Aquatic Life Research Center
EU	European Union
HEST	Higher Education Science and Technology
IHE Delft	Institute for Water Education
IPGL	International Post-Graduate Training Programmes in Limnology
IWA	International Water Association
KMFRI	Kenya Marine & Fisheries Research Institute, Kenya
LWM	International Joint-Degree Master's Programme in "Limnology & Wetland Management"
NaFIRRI	National Fisheries Resources Research Institute, Uganda
NGOs	Non-Governmental Organizations
OeAD	Agency for Education and Internationalisation
OECD	Organisation for Economic Co-operation and Development
ÖFSE	Austrian Foundation for Development Research
SDGs	Sustainable Development Goals
ToC	Theory of Change
ToR	Terms of References
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization

1. EXECUTIVE SUMMARY

ÖFSE was commissioned by the BOKU to undertake an impact assessment of the “Education and Research Hub for the Sustainable Management of Aquatic Ecosystems in Eastern Africa (AQUAHUB)” project. The assessment was supposed to cover the whole project period from 1975 to 2021, when AQUAHUB was known as “International Post-Graduate Training Programmes in Limnology (IPGL)”. The AQUAHUB project serves two main purposes: supporting natural resource preservation and fostering Higher Education Science and Technology (HEST) systems in the Eastern African region. AQUAHUB intends to strengthen individual and institutional research capacities to allow for long-term independent and context-relevant knowledge production in the region.

The purpose of the impact assessment is to support the further development of the AQUAHUB project through the promotion of organisational learning and support to decision making at the strategic and the operational level. The assessment aims at enhancing the understanding of change processes induced by the project over time and the project’s impact mechanisms, in particular in relation to the given societal context.

The project team has mainly used qualitative methods (alumni workshops, interviews), complemented by quantitative tools (alumni survey, publication analysis). The assessment has included extensive data collection phases in Vienna, Kenya, Uganda and Ethiopia.

Findings

Over the years, AQUAHUB has importantly contributed to **establish limnology as a scientific field** and to **create and enhance HEST institutions** in Kenya, Uganda and Ethiopia. This is tangible in terms of established units at partner and other universities, the significant enhancement of research institutions as well as a considerable number of projects and publications in internationally renowned journals by IPGL alumni.

Over the years, AQUAHUB, formerly IPGL, has substantially supported the **quality improvement in HEST** through highly qualified graduates, high-quality curricula, capacity development at the academic, administrative and management level and provision of infrastructure and equipment especially for practice-oriented teaching. This is tangible in **structural, methodical and didactical change processes** in higher education including national and regional cooperation, curricular modularisation, combination of theoretical and practice-oriented teaching and fieldwork. This impact is most distinct within the AQUAHUB programmes (LWM and AEEM) at the partner institutions (EGU, AAU, BDU) and within the national research institutes (KMFRI, NaFIRRI, EIAR). While inclusion of Ugandan HEST institutions into the joint MSc programmes could not be achieved so far, there is high potential to do so in the near future. **Spill over effects to the wider university structures at the partner institutions are less visible**, mostly due to strong contextual constraints such as budgetary restrictions and others.

Impact is highly **tangible at the HEST level**, and to some extent **at the policy and community levels**. In Uganda, many IPGL graduates are employed in governmental institutions and have contributed to policy making. In Kenya, there are IPGL graduates working at the policy level, although less than in Uganda. In Ethiopia, the percentage is even lower, due to the more recent programme inception. An apparent challenge in all three countries is the weak and unpredictable implementation of policies.

Community projects are ongoing in all three countries and awareness about their importance is widespread among stakeholders. Yet, there is still room for improvement. For instance, students often prefer academic topics which can be published in international quality journals for their MSc theses rather than those with a focus on social relevance.

Networking and cooperation are well-functioning resulting in several project applications and scientific publications. Collective impact, however, would benefit from a higher degree of formalisation. Earlier efforts to set up a **regional association** have eventually not been successful due i.e. to administrative hurdles for regional registration. By contrast, in Ethiopia the national professional association EFASA provides an excellent formal framework for networking and cooperation.

The **AQUAHUB online platform**, launched in April 2020, has achieved wide outreach with more than 400 registered members in 53 different countries. Mostly younger alumni highlighted the platform's usefulness for jobs, calls, and publications, but others had little knowledge about it. The platform's potential for networking, especially beyond the Eastern African region, is obvious, yet this would require additional resources. In addition, many alumni consider regular physical meetings indispensable for effective cooperation.

A high number of alumni have been **publishing in internationally recognized academic journals** listed in the online database Scopus (around 50 % of alumni from Kenya and Uganda, 26 % from Ethiopia). Nevertheless, publishing is a particular challenge due to high pressure from funding structures and university authorities to publish in high-ranking journals, but restricted possibilities to do so. Reasons for this are, among others, structural barriers for many African institutions to access costly international journals and databases.

Interviewees almost unanimously expressed their desire to extend the AQUAHUB project to the **PhD level**. However, this must not come at the expense of the MSc programme, which constitutes an indispensable foundation for the limnological scientific field in the region.

The AQUAHUB project has made important contributions to **gender equality in HEST** through quota regulations and positive role models. Challenges include a lower female participation rate in Ethiopia than in Kenya and Uganda, mostly for historical reasons. The Ethiopian society used to be closed up against foreign influence for a long time, which has led to more traditional gender patterns in education and employment. Since a few years there have been promising change dynamics in Ethiopia thanks i.e. to affirmative university gender policies. A challenge for all three countries is the low rate of women at the higher ranks of academic and professional hierarchies. Another challenge, raised by female alumni in Kenya and Uganda, points to psychological stress put on female students who have to leave their children while attending the course modules abroad.

Although stated as a project goal there has been no major breakthrough in terms of financial diversification of the AQUAHUB baseline funding. In addition to the scarcity of available funds, particularly at regional level, the growing administrative workload of the already existing complex collaboration and multi-source funding (via IHE-Delft and other fellowship- & project funds) has not allowed to allocate new baseline funding sources so far.

The emergence of a **resilient and self-confident Eastern African limnology** is incipient, but remains ambiguous and a formalised regional structure has not materialised yet. Exchange of findings and cooperation with other tropical regions is limited. On the other hand, the institutional strength and scientific quality that have been built over the years have resulted in visibly established scientific fields and tangible degrees of resilience and self-confidence.

Over the years, AQUAHUB has importantly contributed to the **advancement of Austria's education sector strategy in development cooperation** in terms of its strategic orientation towards institutional cooperation and establishment of programmes in Southern partner countries. It has also substantially contributed to the **advancement of the Austrian development research community** in terms of supporting BOKU's development as a driver in Austrian academic North-South cooperation.

Conclusions

- **Key factor: long programme duration**

The programme's impact would not have been possible without its long duration over decades. Thanks to this long time span the decisive element of successful cooperation – trust – could materialise between the partner organisations allowing for mutual learning.

Key learning: Successful institution building requires time and continuous financial support.

- **Key factor: “anchor individuals” in enabling institutional environments**

Motivated individuals who act as game changers in their workplaces play a decisive role as “anchor individuals”. But individual commitment needs to translate into institutional change at some point to secure lasting impact. AQUAHUB's trajectory illustrates this impact mechanism: From a scholarship programme it has developed into one of lasting institutional cooperation. Prolonged processes of collectively negotiating institutional change in all involved partner institutions have been the basis for impact as they have facilitated collective learning and institution building. The programme's success has constituted an enabling institutional environment, which has helped to create committed “anchor individuals”.

Key learning: Individual and institutional capacity development condition and reinforce each other. HEST cooperation programmes should integrate both components.

- **Key factor: context**

Contextual factors such as resource constraints, institutional logics of competition, conflicting political priority setting and weak labour markets act as major inhibitors to the intended change processes, in particular at the levels of policy, communities and wider society. In unfavourable contexts, individual commitment might not be enough to translate into lasting change.

Key learning: The programme should strive for impact in wider society, but expectations should remain sensitive to contextual constraints.

- **Key impact mechanism: collectively negotiating change**

The prolonged processes of collectively negotiating the requirements for successful institutional cooperation (e.g. in setting up an international joint MSc programme) have resulted in lasting change at all involved institutions, including the Northern partners. While these collective processes inevitably occurred in contexts of power asymmetries, the latter have always been mediated by a high level of mutual trust and a true sense of cooperation at equal footing. This means that change processes cannot be conceived of in linear ways without accounting for the structural, agential and contingent factors that may constrain or enable them. The broader the context of an intended change process, the stronger the weight of structural factors.

Key learning: Development cooperation projects targeting change processes should aim at providing enabling factors that can mediate inhibiting factors. At the levels of policymaking, communities and wider society, it appears useful to increase the number of opportunities to engage in dialogical processes at equal footing over an extended period of time to facilitate the emergence of enabling environments based on mutual trust.

Recommendations at strategic level:

- **Prioritise financial diversification**

Recommendation to the programme management: Seek cooperation with various funding agencies/programmes from other donor countries and the EU as well as regional and continental funding sources.

Recommendation to BOKU University Management: As the AQUAHUB project has been playing an important role for BOKU's further development, it is recommended for BOKU Management to consider supporting the sustainability of AQUAHUB through baseline funding.

Recommendation to the donor: Assess the possibility of incentive schemes to facilitate fund-raising by the African partners. Promising models could be e.g.: a) provision of personnel expenses earmarked for fund-raising for a limited number of years; b) provision of bonuses for successfully acquired third party funds. Support and facilitate efforts to establish collaboration with funding agencies/programmes such as DAAD, NUFFIC, etc.

- **Assess the possibility of further relocation to African partners**

Recommendation to the programme management: Conduct an assessment of feasibility and technical/financial implications of further relocation of programme components/tasks to the African partners.

- **Assess the possibility of including Ugandan institutions into the formal network**

Recommendation to the programme management: It is recommended to assess possibilities to establish formal collaborations with Ugandan institutions (e.g. Makerere University, Kyambogo University, NAFIRRI etc). This could reach from supporting local university programmes, through linking Ugandan MSc programmes with LWM to establishing a Ugandan joint degree programme, similarly to the AEEM programme in Ethiopia.

- **Increase systematisation of access to PhD positions (PhD network)**

Recommendation to the programme management: Establish a network for matching PhD requests with the existing offers in the academic sphere involved in the programme. Funding should be raised in addition to existing funds deploying a multi-donor approach.

- **Further develop the AQUAHUB online platform**

Recommendations to the programme management: Review the concept and draw up an organisational development plan for the platform.

- **Leverage the potential in Austria/Europe**

Recommendations to the donor: Assess the possibility of drawing up a funding scheme to stimulate the establishment of international joint master programmes between Austrian universities and those in the Global South. Synergies should be sought with the APPEAR, Africa UniNet, Erasmus+ and other (EU) programmes.

Recommendations at operational level:

- **Introduce specific support measures for female students**

Use annual evaluations to assess whether support measures (e.g. retreats for thesis writing, peer support, funding for family reunion) are helpful in the given context. Encourage the elaboration of gender policies including specific support measures at university level.

- **Add teaching units on science communication and community projects**
- **Offer support on proposal writing, project management and scientific writing**
- **Offer systematic support and exchange for lecturers**
- **Offer refresher courses**
- **Enhance attention to quality improvement of local limnology programmes**

Assess possible measures to elevate the quality of local programmes, e.g. inclusion of local students into field research; peer tutoring initiatives (between IPGL students and those of local MSc programmes).

- **Establish collaboration with institutions for internships and projects**
- **Encourage and support students to choose research topics of high social relevance.**
- **LWM: Assess measures to institutionalise the informal networks**

Systematically assess the lessons learnt from the earlier EAWA activities and, on that basis, draw up measures to reinvigorate national associations in Kenya and Uganda. Analogue to EFASA, they could focus on knowledge exchange and stakeholder dialogue rather than project acquisition and envisage regular physical meetings (with financing secured at national level). At regional level, review the concept and formal set-up of the online AQUAHUB platform. For regional physical meetings, seek synergies with the Africa UniNet or similar programmes.

- **AEEM: Increasingly leverage the potential of BDU and address imbalances**

Leveraging the potential of BDU as a “living lab” thanks to its proximity to Lake Tana and the Blue Nile, it is recommended to strengthen BDU’s capacities for field research and to assess whether short courses on the implementation of community projects could be held at BDU. Introduce a final evaluation to AEEM to gain a better picture of the imbalances between the modules held at AAU and BDU.

- **AEEM: Assess the possibility of granting financial support to EFASA**
- **AEEM: Increase individual stipends**

Increase individual stipends to make them meet real costs of living.

2. INTRODUCTION

The Austrian Foundation for Development Research (ÖFSE) was commissioned by the BOKU to undertake an impact assessment of the “Education and Research Hub for the Sustainable Management of Aquatic Ecosystems in Eastern Africa (AQUAHUB)” project, covering the whole project period from 1975 to 2021 (ADC funded projects with the project numbers IPGL 612-00/1975 to 612-00/2009; CAPAQUA 612-00/2009 to 612-00/2018, AQUAHUB 612-00/2018).

The AQUAHUB project serves two main purposes. In Eastern Africa, as in other parts of the world, climate change, population growth and unsustainable economic strategies increasingly put freshwater ecosystems under strain. However, these systems are of key for the survival of local populations, in particular of the poor. Against this background, the project aims both at supporting natural resource preservation and at fostering higher education systems in the Eastern African region. AQUAHUB intends to strengthen individual and institutional research capacities to allow for long-term independent and context-relevant knowledge production in the region.

The purpose of the impact assessment is to support the further development of the AQUAHUB project through the promotion of organisational learning and support to decision making at the strategic as well as the operational level. At a general level, the assessment aims at enhancing the understanding of change processes induced by the project over time and the project's impact mechanisms, in particular in relation to the given societal context. Building on a previous evaluation (Syspons 2021), the impact assessment has evaluated to what extent outcomes have been achieved and whether the contributions to overarching impacts are plausible. The assessment has used mainly qualitative methods such as alumni workshops and stakeholder interviews. These were, however, complemented by an alumni survey and a publication analysis based on quantitative methodologies. The assessment has included extensive data collection phases in Vienna, Kenya, Uganda and Ethiopia.

3. BACKGROUND AND CONTEXT ANALYSIS

The UN Agenda 2030 and its 17 Sustainable Development Goals (SDGs), adopted by the UN General Assembly in 2015, have merged the international environmental and development agendas calling for a socio-ecological transformation at global scale. The preservation of natural resources is a key concern in this debate.

Tertiary education has an important role to play in the Agenda 2030. Unlike previous development agendas, it is explicitly included as a sub-goal in the SDGs (see SDG 4.3). It is, moreover, implicitly mentioned in a series of other sub-goals and as a cross-cutting issue in terms of technological and innovation capacities required for the agenda's achievement.

Based on its longstanding and successful history and its double objectives of natural resource preservation and support to higher education systems, the AQUAHUB project is directly relevant to a series of SDGs including SDG 4 (education), SDG 6 (clean water and sanitation), SDG 15 (life on land) and SDG 17 (partnerships). The project is also relevant to national development and sustainability strategies in the partner countries.

The preservation of freshwater ecosystems is of utmost importance for the livelihoods of populations in the Global South, in particular the rural poor. Besides potable water, freshwater

ecosystems provide many resources to allow for food, housing, health, income and energy supply of local populations. Yet, in many parts of the world, and Eastern Africa is one of them, such ecosystems come increasingly under pressure through various factors. Climate change impacts may transform average temperature levels as well as duration and dimension of rainfalls, among others. Population growth tends to cause overstrain of natural resources through extensive agriculture, fishery and grazing. Local capacities at scientific, technical and administrative level are required to develop context-specific, innovative and balanced policies as well as technical solutions necessary for the preservation of these sensitive ecosystems.

Hence, while the AQUAHUB project undoubtedly aims at highly relevant objectives, it is decisive to consider several contextual factors, which have immediate implications for the project's impact.

As many countries in the Global South, also the Eastern Africa partner countries have specific policies and strategies on sustainability and resource preservation (see Syspons 2021). However, there is a **tension between accelerated industrial development strategies**, following objectives of rapid economic growth, **and sustainability policies**. In practice, government political priorities appear to supersede the former. This may result in big infrastructure or industrial projects adversely affecting freshwater ecosystems. Furthermore, there is an apparent weakness in the implementation of sustainability policies, where they exist.

A major contextual inhibiting factor are **resource constraints** both at the level of public budgets in the partner countries as well as at household levels. The economic downturn following the Covid-19-pandemic as well as the war in Ukraine have aggravated the situation in most countries. **Sharply rising prices** for consumer goods and accommodation put hardship on families and considerably constrain their possibilities to support their children's education, especially at upper secondary and tertiary level.

Rising insecurity and armed conflict are another issue, especially in Ethiopia. Civil unrest during the last years, in particular in the Amhara region, have caused course interruptions and administrative delays, and often render fieldwork difficult, if not impossible.

Another key contextual factor are the **constraints within the national HEST systems**. Although HEST participation in Sub-Sahara Africa has increased substantially throughout the last decades, **participation numbers are still considerably lower** than in other parts of the world (9 % tertiary education gross enrolment ratio in Africa, versus 40 % global average, and 80 % in high-income countries (UNESCO 2023: 373)). In particular, women's enrolment rates are low, stemming from already lower female participation rates in secondary education. As an unintended consequence of tertiary expansion's high pace, the institutional landscape shows a fragmented and highly heterogeneous picture in terms of instruction quality and research capacities. **Lack of resources and facilities** jeopardize the quality of higher education in many ways. Besides the general lack of well-trained staff, low wages often force existing staff to seek additional sources of income, which lowers their attention to teaching and research. In addition, suspension of wages often result in university closures and strikes. Lack of resources also means limited opportunities for fieldwork and practical learning and fewer possibilities to establish alternatives to the traditional top-down and teacher centred teaching methods.

In addition, since state regulatory capacities in the Global South tend to be weaker than in OECD countries, **global trends such as internationalisation, commodification and privatisation** of higher education affect Africa to a much higher extent than OECD countries.

Among others, these trends tend to amplify **educational inequality and institutional asymmetries** within countries as well as in a North-South perspective. This asymmetric global HEST landscape materialises e.g. in terms of international university and publication rankings that structurally disadvantage institutions in the Global South. For instance, access to high impact journals, publication databases or international accreditations requires excessive financial means, which many universities in the Global South cannot afford. Yet, researchers in the Global South are equally pressured to publish in such journals as a prerequisite to their academic career. In addition, a Western-based definition of scientific excellence tends to distort research agendas insofar as locally relevant research topics might not comply with the criteria and therefore might not receive adequate funding.

National resource constraints and the logic of an asymmetric global HEST landscape tend to fuel **unfavourable dynamics of competition and control over limited resources** rather than of cooperation and synergistic thinking. This may result in even further institutional fragmentation.

Last but not least, it is important to reflect on the **gender** topic as a mediating contextual factor, all the more since contribution to gender equality is one of the project goals. While during the last decades, school enrolment of girls has much increased in Eastern Africa, it still tends to be lower for girls than for boys, in particular at the level of upper secondary and tertiary education. Social expectations of fulfilling family duties often put considerable pressure on female graduates not to proceed with their academic career, especially if this requires stays abroad. Enabling environments at institutional level (e.g. child care facilities or specific support measures for women) are often weak or missing.

4. EVALUATION DESIGN AND APPROACH

4.1. Methodological Approach and Data Collection

The impact assessment is based on a **theoretical approach** informed by decolonial and critical postcolonial research (e.g. Watson 1994; Crossley/Tikly 2004; Rizvi 2007; Coloma 2009; Hickling-Hudson 2011; Tikly/Bond 2013; Takayama et al. 2016). This is complemented by critical research on globalization of (higher) education and its (asymmetric) impact on HEST systems in different parts of the world (e.g. McCowan 2016; Altbach 2008), particularly in terms of deepening epistemological asymmetries between the Global North and South (e.g. Stein et al. 2016, Andreotti 2016). Based on these conceptual tenets, the assessment aimed at gaining an understanding of the project's impact in terms of the societal dynamics it is embedded in.

The evaluation design, methods and instruments have primarily aimed at the collection of experiences and judgments of former and current participants in the AQUAHUB / IPGL programmes as well as of stakeholders from the academic, public and where appropriate civil society sectors. These target groups of the investigation were given expert status.

The **methodological approach mainly deployed qualitative instruments**, namely expert interviews and workshops using the meta-plan method. These were complemented by two quantitative instruments: an online alumni survey and a web-based publication analysis.

The methodological approach was structured along three phases. An **inception phase** aimed at getting a detailed overview of the AQUAHUB project along its almost fifty years of existence. Based on an extensive literature review of available projects documentation (project proposals,

annual reports, earlier evaluations and other early literature, see Annex 8) and an analysis of the IPGL-database the research objectives and questions as well as the ToC, as detailed in the assessment ToRs, were evaluated and slightly adapted (see Inception Report). Appropriate analytical steps and tools were discussed and determined with BOKU and the other partners.

The following **data collection phase** was itself structured into several parts. Between October and November 2022 an **online alumni survey** was conducted using the application Limesurvey. The anonymous questionnaire was sent to a total of 370 IPGL alumni in Kenya, Uganda and Ethiopia and obtained a response rate of about 28 %. Results are summarised in Annex 4. In October, the evaluation team coordinator attended the Africa UniNET conference at Egerton University, Kenya. Taking advantage of many alumni being present, she conducted two workshops (one with alumni, the other one with EGU staff) and two short interviews with alumni. Between October 2022 and February 2023, **qualitative data collection** took place in **Vienna** and included two workshops, one with current, the other one with former LWM students; 16 semi-structured expert interviews with stakeholders from BOKU, current and former ADA staff, BMEIA, former IPGL staff and the OeAD. This was complemented with an interview with stakeholders from IHE, Delft. A **publication analysis** was conducted between February and May 2023 using the web-based database Scopus. Results are summarised in Annex 5.

Field data collection in the three African partner countries had to be postponed due to an unforeseeable change in the evaluation team composition (see below). Eventually, field research in Kenya and Uganda was conducted in May; and in Ethiopia in June/July 2023. In Kenya, 9 semi-structured interviews with stakeholders from EGU, KMFRI, research institutions, NGOs and the Austrian Ambassador were conducted, as well as one alumni workshop. In Uganda, also 9 interviews were conducted with stakeholders from Makerere and other universities, research institutions including NaFIRRI, public and semi-public water administration structures as well as the ADA coordination office. The evaluation team carried out two alumni workshops. In Ethiopia, 11 interviews with stakeholders from AAU, BDU, EIAR, research and extension agencies as well as ministries were conducted as well as one alumni workshop (see Annex 7 for a list of interviews and workshops).

The third and final phase was dedicated to **data assessment and triangulation** as well as to **report writing**. Triangulation was deployed in terms of sources (project documents and involved persons from various countries), data (written documents, questionnaires, surveys, interviews), methods (qualitative and quantitative) and investigators (two members of the study team collecting and discussing data in all of the three countries of investigation).

4.2. Limitations, Risks and Mitigations Measures

A major limitation arose from the fact that at the end of 2022 the evaluation team's senior expert, Werner Siebel, had to withdraw from the assignment due to serious health problems. He recommended Arnold Groh as his replacement who finally accepted to join the team. However, due to the short notice for Arnold Groh and the additional administrative workload for the evaluation team coordinator, field research had to be postponed from its originally envisaged period in February/March to May/June 2023.

A methodological limitation arose during the publication analysis. Before starting, intensive methodological consultations were carried out between the evaluation team and IPGL office members as well as with BOKU research information system experts and quality managers.

These consultations pointed to a number of limitations with regard to the explanatory power of a publication analysis using Western databases. The BOKU experts advised the evaluation team that it might be problematic to assess the scientific impact in terms of relevance and quality of African researchers by means of databases which are programmed according to Western academic standards. The high cost of access to these databases and the journals listed therein can probably not be afforded by African institutions. Hence, these databases will most probably not realistically reflect the actual publication activity of IPGL alumni. Rather, scientific output by IPGL alumni might be published to a greater extent in regional journals, which does not necessarily diminish their relevance. It was therefore agreed between the IPGL management and the evaluation team to consider the database publication analysis as but one aspect of responding to the research question of the alumni's scientific impact, which needs to be complemented by qualitative research.

During field research in Ethiopia, security risks arose as a limitation to one originally planned visit. Due to the increasingly insecure travelling situation on the ground, the evaluation team, upon recommendation by the contractor and the local coordinators, refrained from visiting Batu Fishery Research Centre at Lake Ziway. Since this visit had been supposed to offer insights into community-relevant work, the evaluation team had less opportunity than expected to assess the programme's impact at community level on the ground. However, two visits in Bahir Dar as well as a number of interviews offered sufficient information to make up for this limitation.

5. FINDINGS

In this section, we will first outline and discuss overall findings. Subsequently, we will answer the evaluation questions as outlined in the ToRs in focussing specifically on Kenya/Uganda on the one hand and on Ethiopia on the other.

5.1. Overall Findings

Against the background of the above-described contextual limitations, quantitative and qualitative findings overall confirm that the AQUAHUB project's impact is highly relevant in terms of the sustainable management of aquatic resources, the quality improvement of HEST institutions and the strengthening of their capabilities to support the implementation of the SDGs in the three investigated Eastern African countries; Kenya, Uganda and Ethiopia. Moreover, the investigation has revealed the project's highly relevant impact in Austria in terms of fostering the leading role of BOKU as a development-oriented university and of contributing to the further advancement of Austria's education strategy in development cooperation.

In a historical perspective, quantitative and qualitative findings point to the following achievements of the AQUAHUB project over the time span of its 48 years of existence:

- Important contribution to **create basic awareness about the significance of sustainable management of aquatic resources**, which existed only rudimentarily at the time of the project start in the 1970s;
- Stimulation and enhancement of **regional cooperation** that hardly existed before, e.g. around Lake Victoria, and development of corresponding capacities;

- Important contribution to **establish limnology as a scientific field** in the three countries of investigation. This is tangible in terms of established units/departments at partner universities and other universities in the partner countries; the significant enhancement of research institutions in the partner countries as well as a considerable number of projects and publications in internationally renowned journals by IPGL alumni (see publication analysis in Annex 5),
- Important contribution to the **creation and enhancement of institutions in the higher education and research sector** in the three investigated countries in terms of academic programmes, university departments and research institutions. This has been achieved mainly through the provision of highly qualified graduates and through the longstanding process of institutional cooperation during more than 40 years. This long standing collaboration process has generated a multitude of dialogical and learning processes at many different levels and has facilitated the building of an extraordinary level of trust between the involved institutions;
- Stimulation of and support to **structural, methodical and didactical change processes** in higher education including national and regional cooperation, curricular modularisation, combination of theoretical and practice-oriented teaching and fieldwork.
- Support to **quality improvement in higher education** through highly qualified graduates and (future) lecturers, high quality curricula, capacity development at the academic, administrative and management level and provision of infrastructure and equipment especially for practice-oriented teaching (e.g. laboratories, vehicles);
- Stimulation of and support to **research activities and cooperation both in North-South and South-South** direction. The incremental development of IPGL in itself from a fellowship course in Austria to a fully-fledged North-South joint international MSc programme has to be highlighted as a considerable success of North-South cooperation. The same is true for the establishment of its “offspring”, the AEEM MSc programme as a successful high-quality South-South cooperation programme. While the inclusion of Ugandan HEST institutions into the joint MSc programmes could not be achieved so far, there is high potential to do so in the near future. Besides cooperation in the MSc programmes, there is a variety of common research projects, joint publications, capacity development, staff exchange and other activities going on in North-South and South-South direction. For achieving this, chances of building long-lasting and continuing relations of cooperation and trust over the years has played a key role, as well as synergies with other support programmes such as APPEAR, and more recently Africa UniNet and Erasmus+;
- Contribution to **gender equality in higher education and research** through quota regulations in the admission processes and, importantly, positive role models;
- **Stimulation of, influence on** and, in some cases (esp. Uganda), **active participation and/or leadership in the elaboration of policies and strategies** relevant to the sustainable management of aquatic resources;
- Important contribution to the **advancement of Austria’s education sector strategy in development cooperation** in terms of its strategic orientation towards institutional cooperation (rather than support to individuals alone) and establishment of programmes in Southern partner countries (rather than scholarships for programmes in Austria);

- Important contribution to the **advancement of the Austrian development research community** in terms of supporting BOKU's development as a driver in Austrian academic North-South cooperation projects.

Subsequently, we will discuss some of these achievements in more detail pointing also to shortcomings and/or room for improvement in certain areas. Details are also described in the following sections discussing the findings for LWM and AEEM as well as findings in Austria separately.

As the assessment has revealed, AQUAHUB's **impact** is greatest and **most tangible at the level of higher education and research** and **less so at the policy and community levels**. This somehow naturally results from the project's priority setting on enhancing research capacities. Besides this, it reflects a tension between scientific excellence and social relevance that constitutes an important contextual constraint for many development-oriented interventions in HEST.

As for the policy level, the situation is different in the three countries in question. In Uganda, many IPGL graduates are employed in governmental and parastatal institutions. Many of them have also authored or contributed to policy and strategy papers. In Kenya, there are IPGL graduates working at the policy level, although less than in Uganda. In Ethiopia, the percentage is even lower, which certainly has to do with the more recent programme inception and the smaller number of IPGL graduates from earlier times. Yet, an apparent challenge in all three countries, beyond the degree of influence on policy elaboration, is the implementation of policies, which is weak, unpredictable and beyond the reach of AQUAHUB stakeholders everywhere.

At community level, there are projects ongoing in all three countries. Mostly, national research institutes (NaFIRI; KMFRI; EIAR) and extension agencies (e.g. in Ethiopia, Bahir Dar Fisheries and Other Aquatic Life Research Center) are involved in such projects. In Ethiopia, the national association EFASA (Ethiopian Fisheries and Aquatic Sciences Association) plays an important role in community activities. Awareness about the significance of cooperating with communities is widespread among AQUAHUB stakeholders. However, in practice, there is still room for improvement. Some findings point out that students often prefer academic topics which can be published in international quality journals for their MSc theses rather than those with a focus on social relevance. Others describe that while some projects address concrete needs of communities in terms of aquatic resource use and preservation, attention for the integration of community knowledge and experience into research processes is limited. While meaning- and respectful cooperation with communities is certainly a complex endeavour that requires time, the AQUAHUB project should dedicate increased attention to the issue of improving its impact at this level, e.g. through specific curricular amendments (see below and recommendations for details).

AQUAHUB's impact in terms of **institution building** is most visible within the national research institutes (NaFIRRI; KMFRI; EIAR) and the partner organisations (Kenya: EGU; Ethiopia: AAU, BDU and again EIAR). Here, the AQUAHUB project and its predecessors have had a decisive role for establishing high-quality programmes, improving the quality of teaching and learning, installing necessary facilities and increasing the scientific output. However, quality improvement is strongest in the ADC funded MSc programmes (LWM, AEEM) and less tangible at the level of local programmes in aquatic sciences. Hence, spill over effects are less visible than might have been expected. The reasons for this are complex and mostly point to cumbersome contextual conditions. Resource constraints in HEST, for instance, act as a

barrier to the intended spill over effects to local programmes and institutions in various ways. Lecturers and staff of local programmes often do not receive their regular wages for an extended period of time, which causes strikes and cancellation of lectures. There is a lack of facilities and consequently of opportunities for practice-oriented teaching and fieldwork. The lack of individual stipends for students in local programmes often leads to small numbers of applications. In addition, in some cases students might not be able to entirely focus on the study programme due to the need to make a living.

Networking and cooperation are well-functioning and appear well-established over the decades. Networking effects are visible in terms of project applications (three to six/year) and scientific publishing (between 9 and 40 publications/year) throughout the last three years resulting from the network (Aquahub Progress Reports 2019–2020, 2020–2021, 2021–2022). Collective impact, however, would benefit from a higher degree of formalisation. While earlier efforts to set up an East-African Water Association (EAWA) have eventually not been successful, interviewees in Kenya and Uganda pointed out that further institutionalisation of the currently informal network would be welcome (see discussion below). In Ethiopia, on the other hand, the professional association EFASA appears to provide an excellent formal framework for networking, cooperation and extension activities.

The **AQUAHUB online platform** was launched in April 2020 and has increased its membership from 121 to 420 registered members in 53 different countries between June 2020 and October 2022. Currently, 65 % of members were from Eastern Africa. The platform appears very dynamic with 291 news posted during 2022 (Aquahub Progress Report 2021–2022: 5, 2019–2020: 1). Given its recent establishment, these numbers indicate great outreach and a big potential for further expansion and networking, including beyond the Eastern African region. However, while many, mostly younger interviewees highlighted the platform's usefulness for jobs, calls, fellowships and publications, others had little knowledge about and made little use of it. In addition, results from the anonymous questionnaires (see Annex 6) highlight that many alumni consider regular physical meetings indispensable for effective and sustainable cooperation.

Following the idea of popular social networking platforms like Facebook and Researchgate, initially, AQUAHUB was established to provide a platform and certain tools enabling freshwater enthusiasts to link up, share and exchange news about freshwater ecosystems in East Africa. Thus, the content was supposed to be user-generated. However currently, the major share of the content is created solely by the project leader and the platform is widely perceived as a service providing content which is contradictory to the originally intended vision of the platform. This indicates that in order to leverage on the online platform's potential for networking, this would require an internal review process as well as additional attention and resources.

An important challenge was pointed out by many interview partners at the level of **academic publications**. The publication analysis (see Annex 5) confirms that a high number of alumni have been publishing in internationally recognized academic journals listed in the online database Scopus. Out of all Kenyan, Ugandan, Tanzanian and Rwandan alumni, around 50 % are listed on Scopus, the percentage of women being around 40 % of all alumni listed. Numbers for Ethiopia are 26 % and 4 % respectively. In addition, the online alumni survey (see Annex 4) showed that many alumni have published also in other journals, some of which are of local/regional outreach and not listed on Scopus. Nevertheless, interviewees described publishing as a particular challenge. They experience a tension between pressure from national and international funding structures and university authorities to publish in high-ranking journals and restricted possibilities to do so, due to the difficult context described

above. Personal time constraints due to low wages (often unpaid over extended periods of time) resulting in the necessity to look for other sources of income add to structural barriers for many African institutions to access costly international journals and databases.

In this context, interviews and questionnaires almost unanimously expressed their desire to extend the AQUAHUB project to the **PhD level**. However, it was also stated that this must not come at the expense of the MSc programme, which constitutes the indispensable foundation of the limnological scientific field in the countries in question. On the other hand, both at the level of personal careers (scientific publications) and for further institution building at universities and research institutions (e.g. project applications), PhD degrees turn out to be increasingly required. Where local PhD programmes exist, they are sometimes experienced as of limited quality and/or associated with other limiting factors such as lack of stipends.

Although in terms of **gender equality**, the AQUAHUB project as a whole and especially in Kenya and Uganda has made important achievements, there are still some challenges, in particular with regard to Ethiopia. As the analysis of the IPGL database (see inception report) reveals, gender patterns show differences in terms of female participation between Kenya/Uganda on the one hand and Ethiopia on the other. The lower female participation rate in Ethiopia has complex root causes. One important factor is that the Ethiopian society has been closed up against foreign influence for a long time, which has led to more traditional gender patterns in terms of education and employment for women. For a long time, female participation in upper secondary education was weaker than male, which led to fewer women in undergraduate studies at universities and consequently to fewer, and academically weaker, applications by women for the AEEM programme¹. However, since a few years there have been remarkable change dynamics to which a number of factors have contributed, not least affirmative gender policies at universities, the 40 % female quota for admission to AEEM and active support for female students within the programme. Today, as interviewees confirm, female students are academically as strong, if not stronger in many cases, than their male colleagues and they are actively claiming their places in society and academia.

Since these dynamics of change are quite recent, women at the level of lecturers, supervisors, professors and directors are still the exception rather than the rule in Ethiopia. This means, in turn, that female role models for young women in academia are scarce. While this is an obvious difference to the situation in Kenya and Uganda, also in the latter countries there remains much to be done to increase the rate of women at the higher ranks of academic and professional hierarchies.

Another challenge related to gender has been raised by female alumni in Kenya and Uganda in terms of psychological stress put on female students who have to leave their children in their home countries while attending the course modules abroad. Historically, parental duties have proved to be a major obstacle for female participation in the IPGL courses and the modularisation and partial relocation to Africa, as recommended in the 2001 evaluation (Siebel et al. 2001), helped to facilitate female participation. Yet, family duties remain an issue, especially for female graduates who wish to pursue their careers.

A matter of concern is the limited **financial diversification** of the baseline funding of the AQUAHUB project, beside the fellowships provided by NUFFIC via IHE-Delft. Although stated as a project goal in application and reporting documents throughout the last years, the baseline funding is still provided by ADC. However, the AQUAHUB consortium is writing 3 to 6 project

¹ According to information provided by the IPGL management, the percentage of female applications for the AEEM programme varied between 18 % and 26 % in the years 2019-2023.

proposals per year and has been successful in acquiring funds for student & staff mobilities, research activities and additional fellowships. Interviews with stakeholders revealed a high degree of awareness about the key role of financial diversification for the project's long-term sustainability. However, in addition to the scarcity of available research funds, in particular at regional level, it was stated that the ever-growing administrative workload within the already complex collaboration, while capacities remain restricted, has not allowed to allocate new baseline funding sources so far.

The question whether the AQUAHUB project and its predecessors have supported the emergence of a **resilient and self-confident Eastern African limnology** has turned out to be more complex than expected. Despite earlier attempts to establish an East-African Water Association (EAWA), such a formalised regional structure has not materialised successfully. The same holds true for regional academic journals. Also, exchange of findings and cooperation with other tropical regions is limited, particularly beyond Africa. On the other hand, the institutional strength and scientific quality that have been built over the years have resulted in visibly established scientific fields and tangible degrees of resilience and self-confidence. Rather than viewing their work as a specific approach to limnology emerging from a tropical context, stakeholders self-confidently claim to be part of the international limnological science community.

5.2. Findings on Kenya/Uganda (LWM) – Answering the evaluation questions

Evaluation criterion: Outcome

- ❑ *To what degree did the implementation of the LWM & AEEM master's programmes, as well as the implementation of international standards contribute to the **establishment of high-quality joint-degree master's programmes** for the sustainable management of freshwater ecosystems?*

Findings from both quantitative (alumni survey, publication analysis, database analysis) and qualitative (stakeholder interviews, alumni workshops) research confirm that AQUAHUB activities have effectively contributed to the establishment of high-quality academic programmes and research activities for the sustainable management of freshwater ecosystems in Kenya and Uganda.

Graduates interviewed by the evaluation team confirmed the very high academic, but also practical-scientific level of the LWM master's programme. The evaluation team holds the view that this high quality level is the result of many years of cooperation in the field of limnology, beginning as an 8-month course at Lake Mondsee under the Austrian Academy of Sciences as a UNESCO project 48 years ago up to the present Joint-Degree-Master. Without the previous study programmes the high level of the current Master would not be conceivable.

Main contributing factors to achieve this high quality are:

- a) highly qualified and dedicated staff;
- b) multiplicity of training sites (BOKU, EGU, IHE). For students, this allows for a multitude of enriching experiences and (international) exposure. At the institutional level, this allows for peer learning, capacity development and networking;
- c) curricula that provide for a combination of theoretical and practical training including laboratory and field work (which is rare in comparable MSc programmes);

- d) the provision of adequate facilities for the practical training;
- e) financial support to students (monthly stipends) that allow for students' full-time dedication to the study programme.

Besides the LWM programme in itself, the AQUAHUB project has also contributed to the establishment and/or strengthening of local programmes and institutional structures in the field of freshwater resource management at the partner universities and other universities in the partner countries (e.g. Makerere University and University of Kyambogo, Uganda). These spill-over effects are most visible in the national research institutions KMFRI (Kenya) and NaFIRRI (Uganda), which have been recruiting a high number of IPGL graduates as scientific staff.

- *To which extent did the implementation of the AEEM master's programme, the involvement of external resource persons, the network of southern and northern HEST institutions, and the web-based network platform contribute to **South-South collaborations and to an enhancement of collective impact?***

According to the African interviewees in Kenya and Uganda, the introduction of the AEEM Masters has not had a significant impact on the further development of "their" programme. The majority of interviewees were participants in the LWM Masters or its predecessor degree programmes. Accordingly, interviewees noted little impact of the AEEM Master's. The interviewed key persons for the structural further development of the master programs in East Africa, however, had presented the cooperation with Ethiopia as an enrichment, but also as a challenge. Among students from different African countries participating in the EGU module, mutual exchange appears to be increasing, and, according to our observations, might result in active cooperation in terms of research projects in the future.

The cooperation with external key persons was seen as very valuable by all interviewed participants, and a very high percentage explicitly praised the lecturers.

The cooperation between the HEST in the Global South, here in particular Egerton University, with the very high-performing European institutions is a key to success. While earlier attempts in the 1990s to establish an institutionalised cooperation between the IPGL programme and Makerere University were not successful, our findings point to a very high potential, and expressed interest by stakeholders, to draw up systematic cooperation programmes with Ugandan HEST institutions (see recommendations below). European institutions are not limited to the current partners at BOKU and the IHE Delft, but in a long-term perspective also include the institutions of the Austrian Academy of Sciences and the institutions in the Czech Republic. As interviewees emphasised, it is through this international exchange that the quality improvement of the programme and the success of the participants were made possible. Within the last 15 years, synergies with the APPEAR programme in terms of research projects and PhD openings have also played an important role.

The encounter of the many different students from the Global South in the various study programmes over time has created a personally grounded network that can be drawn upon. However, as this does not happen systematically enough, room for improvement was identified.

It is surprising in this context that, according to the respondents, the influence of a web-based platform is considered to be low at this point in time, although all of them attach great importance to this possibility. The background to these somewhat contradictory statements might be the experiences associated with activities to establish a networking structure under

the aegis of East African academic institutions. This network structure had not been very successful; rather it had not progressed in the shallows of academic "sensitivities" and the lack of resources.

Regional and international networking is very much desired by the interview partners in Kenya and Uganda, the aim being in particular to formalize the informal networks between graduates, but also to address resources and opportunities for research projects. According to the impression of the evaluation team, however, this will necessitate an organizational development process that will also require financial and material resources.

Experiences from earlier attempts to establish a professional association at regional level within the IPGL programme, namely the East African Austrian Water Association (EAWA), later East African Water Association (EAWA), were described as rather disappointing. On the one hand, it was emphasised that the EAWA conferences had had an important effect on networking within, but also beyond the scientific community. In particular, interviewees pointed out that the conferences had facilitated cooperation with NGOs and communities. However, finally it was not possible to establish the EAWA as a functioning regional association. The evaluation team collected some anecdotal evidence of the constraints related to such an activity, including *inter alia*: a) the administrative barriers to register an association of regional character in each of the involved countries; b) the EAWA's objective to secure funding for research projects conflicted with the request from university administrations to do so; c) the overburden of the academic staff with regular work and the weak time and personal resources of the departments for developing such an association; d) the underfunding of the activities for the establishment of such an association.

Despite this mixed experience, interviews and results from the questionnaires (see Annex 6) highlight the need for a formalisation of the existing network. Many wish this to include physical meetings, besides the online opportunities offered by the AQUAHUB platform. Rather than trying to re-invigorate EAWA, some interviewees suggested membership in the IWA (International Water Association), where in principle it would be possible to establish a professional community (IWA Communities) or to join an already existing one.

Due to the high number of graduates of the "extended limnology" from the long-term academic cooperation there are important collective effects in Kenya and Uganda. In both countries, graduates often work at the various fisheries research institutions or in environmental agencies, or have climbed to important positions in the institutions. This mutual knowledge and the shared experiences, as fellows ensure, are key to the fact that the Master's programmes and their predecessors have a considerable influence on policy formulation. In Uganda for instance many graduates are now active in public authorities and state administration and formulate policy papers there. To a lesser extent, graduates are responsible for the implementation of environmental measures relevant to freshwater (e.g. Buvuma Island).

- *To what extent did the implementation of the LWM & AEEM master's programmes, the implementation of international standards, and the research, teaching & skills training of staff contribute to the provision of **highly qualified graduates to the job market** in order to improve the management of freshwater ecosystems?*

Alternative forms of teaching, in particular the strong student-centeredness, the problem-based design of teaching formats, the necessary self-direction of learning processes and the presentation of results in the study programmes as well as the strong practical orientation of the study components in Austria (earlier also in the Czech Republic) as well as at Egerton

University, have a strong influence on the effects of the program. For example, participants reported that IPGL graduates have been making a big difference in their teaching activities at universities, as they have been delivering their courses with a strong practical orientation and using teaching methods that helped students to advance as individuals.

Graduates are not specifically trained for the broader job market, but are focused on fields of activity in government research institutions, government administration or universities. Only a few graduates are employed outside of government jobs. On the one hand, this is because there is no large job market in the formal private sector in East Africa. On the other hand, while the course programme does offer some instruction on writing grant proposals, science communication or science marketing, these special skills appear to require a stronger focus. Equally, some form of entrepreneurship training, namely with regard to aquaculture, is currently incorporated in several course models, but might need enhancement in order to effectively stimulate graduates for pursuing entrepreneurial activities in the private sector.

- *To what extent did the implementation of the LWM & AEEM master's programme, the network of southern and northern HEST institutions, and the MSc research projects and publications contribute to the **implementation of projects and research** towards the sustainable management of freshwater ecosystems and its resources?*

The research network between North and South is essentially based on the support provided by established university teachers for the doctoral projects of candidates from the South. This personal cooperation often results in joint scientific publications. These can indirectly contribute to the implementation of projects on freshwater issues. One example can be described here. Much of the fish feed for fish farms (both fishponds and aquaculture) is sourced from abroad. However, there are also some projects and research that aim at developing regional methods of fish feed production. This would have economic (economic self-reliance), ecological (shorter transport distances), as well as social (involvement of local actors) advantages.

Due to the existing personal networks and the corresponding research institutions in Uganda and Kenya, which benefit greatly from the graduates of the various IPGL study programmes, many scientific research projects have already been initiated. Also, it was reported from Uganda that the policy papers and the formulated government policies on freshwater resources issues are highly relevant thanks to the fact that many IPGL graduates are involved in their elaboration.

The issues of policy implementation, i.e., the implementation of results of research projects, is considerably more difficult. According to many interviewees, rigorous scientific research has little influence on policy implementation. The latter depends very much on political interests and influence groups, and on the enforcement power of law against private interests. An example as described by an interviewee may illustrate this: In Uganda, according to state policy, the use of lake and river shores within an area of 200 meters is prohibited for agriculture, but must be forested. Now, many riparian regions belong to influential politicians, who clear everything and practise agricultural use up to the very shores of the water bodies. This often results in devastating consequences such as pollution of the water bodies, danger of flooding, soil degradation, etc.

In order to achieve this increased influence on the implementation of scientific findings, but also on compliance with existing regulations in policy implementation, the evaluation team feels that there is a need for increased communication of science to society and to the

respective target groups, in order to present the findings in a prepared form and to win the target groups for implementation and participation, respectively. There is a need for more science communication and low-threshold information offers differentiated according to the corresponding target group. This could be supported by appropriate training modules either as part of the master courses or as in-depth courses afterwards.

The research projects carried out during the study programme, which also include the final thesis, always have a strong focus on local topics. The integration of communities into concrete research work is highly demanding and presuppositional. However, the short time available for research in the master's programme very often makes good and lasting integration difficult. Yet, according to interviewees, it can be stated that the great attention paid to user-oriented research has, in retrospect, produced great effects. Further development of a Citizen Science approach in Kenya and Uganda would be an important step. According to the statement of various participants, interlocutors are already active in this direction and actively involve communities in data collection. They also state that the involvement of communities is an important orientation for quality research.

However, the conceptually correct engagement of communities is a very challenging task if it is to be translated into a living research practice, which would also require additional funding, e.g., for science communication, to provide communities with relevant and appropriately prepared information. It was reported to the evaluation team that the IPGL experts in Kenya at Lake Victoria have started a project to work with the fisheries communities to ensure data collection and analysis of water quality, and thus ensure a closer link to fisheries research. Here it also became clear that the collected and evaluated data must be fed back to the communities, and a permanent communication must be established, which in turn requires resources. According to the information available, similar projects exist at other sites, often initiated by IPGL graduates.

- ❑ *To what degree did the network of northern and southern HEST institutions and the research, teaching & skills training of staff **increase the capacity of Eastern African HEST institutions and strengthen them in achieving their development goals?***

Quantitative and qualitative findings confirm that the AQUAHUB project has substantially contributed to the enhancement of Eastern African institutions of higher education and research. Three transmission channels have to be pointed out: a) the provision of highly qualified graduates who act as multipliers of high quality and practical oriented teaching and research of aquatic sciences in universities and research institutions throughout the country; b) the provision of facilities to allow for practical (as opposed to only theoretical) training, such as laboratory equipment and facilities for field research. The possibility to acquire practical knowledge and skills is perceived by alumni, staff and stakeholders as a major distinguishing feature of the LWM programme; c) the institutional cooperation at national and international level facilitating important institutional learning processes.

In general, the influence on East African universities and research institutions is shaped by the personal connections and personal influences of graduate students on research and teaching at the institutions. Graduate students in IPGL programmes teach differently and, because of their training, have a research perspective that is very much related to practice and application. It is the individuals who make the impact on capacity development at HEST institutions in East Africa.

Besides LWM being a scientific field of utmost importance for the SDGs by itself (SDG 6: clean water and sanitation, SDG 15: life on land), its overall contribution to the quality enhancement of Eastern African HEST increases these institutions' developmental impact in terms of access to quality education (SDG 4), gender equality (SDG 5) and partnerships (SDG 17).

- ❑ *To what degree did the network of northern and southern HEST institutions and the dissemination of research results and outreach to stakeholders and society contribute to **increasing the knowledge and awareness on sustainable management of freshwater ecosystems**?*

This contribution is unfortunately not sufficiently pronounced, since IPGL programmes focus on scientific expertise and train for the scientific field at a high level. Dissemination of scientific findings by itself has not necessarily an awareness raising effect. For this, other ways of science communication are needed, but these are not well developed in the IPGL programmes. According to some interviewees, the same can be stated regarding the ability to apply for projects. These skills are generally not provided for in the programme, but they would be helpful to trigger such dissemination effects. Two elements are missing for strong dissemination effects, namely target group specific science communication and the ability to write proposals for research and development projects. Appropriate teaching components should be included in the IPGL study courses.

Furthermore, from the evaluation team's point of view, it should be noted that more systematic support for community involvement should be taught in the master courses. Individual positive examples of dissemination into society exist. In particular, the strong focus on local problem situations in students' research topics for the MA theses encourages an involvement of communities. However, it is recommended that the courses offer additional support on systematic community involvement, either as electives during the MA courses, additional weekend classes or additional in-depth courses after graduation.

Evaluation criterion: Impact

- ❑ *To what extent did the project outcomes (high quality joint master programmes, south-south collaborations, highly qualified graduates, relevant projects and research, increased institutional capacities) **contribute to enhanced institutional capabilities supportive of the sustainable management of freshwater ecosystems and their resources in Eastern African countries as well as the **emergence of a resilient and self-confident Eastern African limnology****, as part of the global limnological science community, tangible in terms of the locally/regionally determination of research topics, the perception of and reference to local/regional research findings in the regional/international research community. In particular, it shall be assessed to what extent the specific limnological knowledge about subtropical and tropical conditions that has arisen in the East African limnology has strengthened the resilience awareness of the regions and to what extent a self-confident, global South-South knowledge transfer is promoted.*

As described above, qualitative and quantitative findings confirm that AQUAHUB outcomes have substantially contributed to enhanced institutional capabilities in Kenya and Uganda in terms of strengthening the scientific field at universities and providing highly qualified experts to research institutions and extension agencies.

The main transmission channels for these outcomes are two: technical resources and highly qualified graduates.

The technical infrastructure, specialized libraries, and especially well-developed laboratories, which have been developed through many years of cooperation in East Africa, are of high importance. The existence of a mobile laboratory, which is taken to the rivers, lakes and wetlands for the practical assignments, has made the high-quality practical training possible in the first place. It was criticized, however, that the laboratories lack modern infrastructure, hence are not able to carry out advanced analyses, such as heavy metal analyses, which is an important issue especially for the fishery at Lake Victoria.

It is the impression of the evaluation team that, in addition to the important technical infrastructure, the effects of soft factors such as personal, often rather informal, influence are significant. The project results contribute to institutional strengthening mainly through the effect of personal influence. In Kenya and Uganda, a large number of IPGL graduates are now working in administration, parastatal enterprises (water supply and wastewater disposal) and research institutions. In Uganda, water policy is formulated by IPGL graduates. Uganda has the most progressive water policy in the whole region, but unfortunately mostly only on paper, as implementation is the major challenge due to the political and economic conditions in the country. The few private companies in the water sector that hire IPGL graduates are closely linked to the government sector as consulting and research companies, so that a positive influence on institutional strengthening also emanates from there. In Kenya, another feature worth noting is that IPGL graduates can be found in many regional and local authorities on water issues. The 2010 constitutional reform introduced a federal structure, with county governorates with influence and, most importantly, budget. Many IPGL graduates are employed in these regional administrative authorities and, according to our exemplary observation in the Busia region, very successfully implement the community approach, stakeholder involvement in development projects and successful stakeholder management with private companies.

It also became clear during the visits to the various research and scientific institutions that both in Uganda and Kenya, the two fisheries research institutions have benefited greatly from the IPGL programmes. Many graduates of the different IPGL study formats can be found there, and partly in leading positions. The evaluation team met some laboratory technicians in one institution who had received further training as technicians in Austria. According to the head of the institute, they still benefit from this as an institute today. Also, at the universities visited, the personal influence of the IPGL graduates is clearly noticeable, and – according to the impression of the evaluation team – it is this personal influence that makes the difference in terms of the high level of quality.

One finding of our survey that cannot be interpreted unambiguously in the context of institutional strengthening is the fact that respondents, even when asked, did not make any clear pronouncement on the development of a specific East African, or international tropical limnology approach. They did not talk about tropical limnology as a specific feature of international limnology. Rather, it appeared that interviewees viewed limnological issues in a tropical environment as an integral part of international limnology. This normalization of the East African scientists' knowledge can mean two things. On the one hand, as a recourse to the power differentials in the international science system, it has been reported on various occasions that articles in internationally renowned journals have better chances of publication if co-authored by a renowned scientist from a university in the Global North. On the other hand, and the evaluation team is inclined to this assessment, the self-evident practice of scientific

research in Kenya and Uganda and the high confidence with which their own findings are communicated and processed internationally precludes speaking about a special feature of tropical limnology. Rather, it can be assumed that limnological research in tropical regions, such as East Africa, is a self-evident part of international limnological research. In this view, the scientific field of limnology has been broadened towards including tropical issues through the long-standing international scientific cooperation.

South-South knowledge exchange exists in terms of research projects involving institutions from other African countries and results being discussed at regional level. There is, however, no specific knowledge exchange with other tropical regions in the world.

- *To what extent did the project outcomes (south-south collaborations, networking highly qualified graduates, relevant projects and research, increased knowledge and awareness) contribute to **enhanced individual capacities** supportive of the sustainable management of freshwater ecosystems and their resources in Eastern African countries as well as the **emergence of a resilient and self-confident Eastern African limnology**, as part of the global limnological science community, tangible in terms of the locally/regionally determination of research topics, the perception of and reference to local/regional research findings in the regional/international research community. In particular, it shall be assessed to what extent the specific limnological knowledge about subtropical and tropical conditions that has arisen in the East African limnology has strengthened the resilience awareness of the regions and to what extent a self-confident, global South-South knowledge transfer is promoted.*

All interviewees and workshop participants described the very high personal effect that the participation in the IPGL programmes had on them. The respective courses had laid the foundation for their successful professional life, as they also all unanimously described that the experiences of the study courses had led to a very positive personal development. The vast majority of them described personal experiences and challenges during the study courses as central to their own academic and personal advancement. The challenge of giving independent presentations on a subject, the international exposure including exchange with colleagues from many different countries and cultural backgrounds, the experience of studying in another country, successfully completing the study workload – which was described by all as very challenging – climbing this high mountain successfully had a decisive effect on personality development, according to the unanimous opinion of the interviewees.

- *To what extent did increased institutional capabilities and individual capacities contribute effectively to **change processes** at the level of **knowledge production and dissemination**, in **policymaking**, as well as to **attitudes and practices in society** to foster sustainable development?*

As described above, change processes at the level of knowledge production and dissemination are tangible above all in terms of the combination of theory and practice-oriented teaching in the LWM courses, which distinguishes it from other MSc programmes. This approach is cascaded down to other institutions, mainly by way of the well-trained and highly motivated LWM graduates, and will to a larger or smaller extent (depending on the circumstances) generate change processes there.

As for the level of policymaking and wider society, this question is difficult to answer because the impacts on society can only be assessed indirectly. Moreover, the IPGL programmes'

prioritized objective is impact in the scientific field rather than society as a whole. However, at the level of policy making impact is visible in terms of IPGL graduates' influence on the elaboration of policies and strategies. Change processes have been and continue to be stimulated by way of their personal commitment. Yet, as described above, whether they materialize or not at the level of implementation is highly dependent on the given circumstances.

In terms of change processes at the level of wider society, according to our observations they exist in any case, their intensity depending on the different persons. As two positive examples, we will mention Buvuma Island in Uganda or the various cooperation projects in Busia County undertaken by the regional water authority. As to the impact on wider society, it is generally observable that beyond the foundations laid by the IPGL programmes individual commitment is key.

5.3. Findings on Ethiopia (AEEM) – Answering the evaluation questions

Evaluation criterion: Outcome

- ❑ *To what degree did the implementation of the LWM & AEEM master's programmes, as well as the implementation of international standards contribute to the **establishment of high quality joint-degree master's programmes** for the sustainable management of freshwater ecosystems?*

As for the LWM programme, the study findings confirm that AQUAHUB activities have effectively contributed to the establishment of high quality academic programmes and research activities for the sustainable management of freshwater ecosystems in Ethiopia.

The AEEM programme is highly valued within the academic world as well as by stakeholders. Compared to their counterparts from similar MSc programmes, AEEM graduates are highly competitive in the labour market, especially at universities and research institutes, but also in ministries and extension institutions, and in PhD project calls (both nationally and internationally).

Main effect mechanisms to achieve this high quality are similar to those in LWM (see above). It should be pointed out here that backstopping and management support from BOKU continues to play a decisive role for the high quality of AEEM insofar as it ensures organizational efficiency.

During the data collection, an issue emerged that appears relevant in this context. Some graduates pointed to lower quality levels of teaching, available facilities and management at BDU with respect to AAU. AEEM Management stated that such issues had been pointed out by students from earlier batches in their annual course feedback and efforts had been made by the management to redress the shortcomings. Students and graduates from more recent batches confirmed their satisfaction with the (re-organised) course module at BDU in all the above respects, which was also confirmed by annual students' evaluations.

Mainly through the provision of highly qualified graduates, the AEEM programme has contributed to establish and upgrade relevant aquatic science programmes at the universities involved (AAU, BDU) as well as in other parts of the country (e.g. Hawassa University, Arba Minch University).

- ❑ *To which extent did the implementation of the AEEM master's programme, the involvement of external resource persons, the network of southern and northern HEST institutions, and the web-based network platform contribute to **South-South collaborations and to an enhancement of collective impact?***

The implementation of the AEEM programme has contributed significantly to South-South collaboration and collective impact in several ways.

In Ethiopia itself, the AEEM programme has succeeded in establishing cooperation and peer learning between two universities (AAU and BDU) and one research institute (EIAR). This is remarkable insofar as university cooperation at national level has been practically absent prior to the establishment of the AEEM programme. With the addition of a course module at EGU, Kenya, another important step has been accomplished in establishing effective collaborative relations in higher education and research between Ethiopia and Kenya and hence getting Ethiopia closer to the Eastern African region.

For the AQUAHUB project as a whole, the implementation of the AEEM programme proves the project's maturity, sustainability and collective impact in terms of being able to generate national and regional 'off-spring programmes' in Eastern African countries which offer high quality training without directly involving Northern institutions.

The network of southern and northern HEST institutions has played a key role in establishing South-South collaborations and in enhancing a collective impact. A decisive factor for this impactful role is the long duration of the network over decades that has allowed for a multitude of learning processes and, importantly, for the building of trust. For the Ethiopian partner institutions, the integration of the LWM module at EGU into the AEEM programme, beyond its direct effects on cooperation, has been helpful to stimulate joint participation in research projects.

It has to be added that other Austrian programmes, above all the APPEAR programme, have been playing an important complementary role to foster the network, in particular in offering PhD opportunities to graduates. This potential is, however, not as much visible as in Kenya and Uganda yet, due to the more recent start of the systematic collaboration with Ethiopia.

As for the web-based AQUAHUB network platform, interview and questionnaire findings indicate a picture of diversified use and functionality. Generally, young graduates appreciate the platform for its timely provision of information on project, job and publication opportunities, while more established stakeholders appear to nurture their networks rather from different sources. In Ethiopia, the association EFASA plays a key role for networking and collaboration (see below).

- ❑ *To what extent did the implementation of the LWM & AEEM master's programme, the implementation of international standards, and the research, teaching & skills training of staff contribute to the provision of **highly qualified graduates to the job market** in order to improve the management of freshwater ecosystems?*

Quantitative and qualitative findings confirm that the AEEM programme effectively provides highly qualified graduates to the job market. AEEM graduates are employed above all at universities and research institutes and to a lesser extent at governmental bodies and extension agencies (e.g. Bahir Dar Fisheries and Other Aquatic Life Research Center). They are highly competitive, compared to graduates from similar MSc programmes, both in the job market and in competing for PhD openings.

Alumni and stakeholders confirmed that the knowledge and skills acquired during the AEEM programme are highly valuable in their professional careers and that they can apply them effectively. Many, however, emphasize that they wish to proceed to a PhD level to further their careers and expressed their wish that the AQUAHUB project might increasingly offer PhD opportunities in the future.

Generally, the alumni stated that the highly qualified staff and resource persons, the high-quality curricula corresponding to international standards, the facilities for laboratories and fieldwork and the high degree of organizational functionality contributed to the excellence of knowledge and skills imparted through the AEEM programme. An unexpected finding in this context is the key role of financial support to AEEM participants, which stands in contrast to local MSc programmes. Thanks to these stipends, students can focus on their studies, rather than on providing for a living, which facilitates that course curricula can be demanding and of high quality. Besides this, financial support has an important inclusiveness effect for students from disadvantaged backgrounds.

Even more than in Kenya and Uganda, employment in the formal private sector in Ethiopia is scarce, if at all existing. This is widely due to the fact that the private sector in fisheries and aquaculture is in its infancy and hardly offers any jobs.

This, together with rising living costs and widespread economic hardship, also explains that a certain trend to leave the country (brain drain) still exists among alumni, although it has much decreased.

- *To what extent did the implementation of the LWM & AEEM master's programme, the network of southern and northern HEST institutions, and the MSc research projects and publications contribute to the **implementation of projects and research** towards the sustainable management of freshwater ecosystems and its resources?*

Interviewees pointed out that, different to usual MSc graduates, some AEEM graduates succeeded in publishing their MSc theses' research in scientific journals, which proves the relevance and the high quality of their research. Also, AEEM graduates turn out to be very successful when competing for PhD openings, both at the national and international level.

In comparison to the situation in Kenya and Uganda, the number of projects might be lower, due to the fact that the AEEM programme is younger than LWM. On the other hand, EFASA plays a key role in stimulating projects and disseminating their results.

Many stakeholders from extension agencies working with fishermen and other communities emphasise the relevance of AEEM research results for their purposes. However, there were also some statements pointing to insufficient attention to community issues in choosing research topics for the MSc theses. This is due to the fact that topics perceived as purely scientific appear to be more useful in furthering academic careers than those of social relevance. Currently, new university regulations are being discussed to increase attention to socially relevant research.

- *To what degree did the network of northern and southern HEST institutions and the research, teaching & skills training of staff **increase the capacity of Eastern African HEST institutions and strengthen them in achieving their development goals?***

The study findings confirm that the AQUAHUB project has substantially contributed to the enhancement of Ethiopian institutions of higher education and research. Besides the above

mentioned transmission channels for LWM, in the Ethiopian context a fourth channel has to be pointed out, namely the successful establishment of the national association EFASA which provides an efficient network for researchers, policy makers and communities in the field of freshwater ecosystems.

Hence, it can be confirmed that the AQUAHUB project has substantially contributed to the establishment of the field of aquatic sciences and freshwater ecology at Ethiopian institutions of higher education. This is all the more significant since this scientific field is both relatively young and highly important for the future of the country in terms of food security, the protection of aquatic resources and more generally the achievement of the SDGs.

The capacity and institution building effect is most strongly visible in the case of the associated partner institution EIAR, which has multiplied its scientific staff and facilities thanks to AQUAHUB. Capacity development and institution building have also been strong in the case of the university partner institutions AAU and BDU and have extended to other universities (see above). Other institutions, which have benefitted from AEEM graduates as well as from research findings produced by the involved universities, include Bahir Dar Fisheries and Other Aquatic Life Research Center as well as Oromia Agricultural Research Institute.

However, there are strong quality challenges in the HEST sector emerging from unfavourable contextual conditions such as serious and increasing public resource constraints, rapid enrolment expansion and rising costs of living. Against this background, it has to be stated that in some cases quality enhancement in the wider sense might have been less pronounced than expected. Quality increase in the local programme of aquatic ecosystems at AAU and BDU is slow and quality differences between these programmes and AEEM are apparent. This is despite explicit efforts, as stated in project reports and by interview partners, to align local with AEEM curricula and to teach students from both programmes in the same classes. The lack of financial support to local students has emerged as a major inhibiting factor. It prevents local students from focusing on their studies due to the necessity to provide for a living. Lack of financial resources also leads to little or no practical training and fieldwork in the local programmes.

In this context, a tendency of fragmentation through pockets of excellence that transmit their quality levels far less than expected poses a general limit to quality increase in HEST. It is unfortunate that a variety of university centres or institutions that receive external funding behave in competitive rather than cooperative or synergistic ways. An example for this might be the trajectory of the World Bank financed Africa Centre of Excellence for Water Management (ACEWM) at AAU. While initially, AEEM was part of the project to establish this centre and AEEM expertise helped to secure the bid, cooperation has become difficult and a logic of securing control over resources and influence seems to prevail. This is all the more regrettable since meaningful cooperation could provide for highly demanded PhD openings.

- *To what degree did the network of northern and southern HEST institutions and the dissemination of research results and outreach to stakeholders and society contribute to **increasing the knowledge and awareness on sustainable management of freshwater ecosystems.***

As stated above, outreach to policy makers and communities is less developed than within the HEST system. Here, the main transmission belt is EFASA. Through its annual conference, EFASA disseminates knowledge and awareness not only to alumni and researchers, but also to decision makers and community members, who are invited to join the conference and its

panel discussions. Many of the key ministerial staff in the Ministry of Agriculture and the Ministry of Water are members of EFASA. Knowledge dissemination to communities is also an important task of extension agencies such as Bahir Dar Fisheries and Other Aquatic Life Research Center, which employs a number of AEEM graduates.

However, some interviews and questionnaires pointed to the necessity to strengthen EFASA's visibility in order to increase its impact on knowledge dissemination and awareness raising.

Evaluation criterion: Impact

- ❑ *To what extent did the project outcomes (high quality joint master programmes, south-south collaborations, highly qualified graduates, relevant projects and research, increased institutional capacities) contribute to **enhanced institutional capabilities** supportive of the sustainable management of freshwater ecosystems and their resources in Eastern African countries as well as the **emergence of a resilient and self-confident Eastern African limnology**, as part of the global limnological science community, tangible in terms of the locally/regionally determination of research topics, the perception of and reference to local/regional research findings in the regional/international research community? In particular, it shall be assessed to what extent the specific limnological knowledge about subtropical and tropical conditions that has arisen in the East African limnology has strengthened the resilience awareness of the regions and to what extent a self-confident, global South-South knowledge transfer is promoted.*

As described above, the findings confirm that AQUAHUB outcomes have substantially contributed to enhanced institutional capabilities in Ethiopia in terms of establishing the scientific field at universities. This has mainly been achieved through providing highly qualified experts to research institutions and extension agencies, through enhanced opportunities for practice-orientation such as provision of technical facilities and appropriate training and through continuous cooperation processes between the involved institutions.

It is, however, visible that the emergence of a resilient and independent Eastern African approach to limnology is in a more juvenile state in Ethiopia, compared to Kenya. The main cause for this may be that the establishment of limnology as a scientific field in Ethiopia as well as the AEEM programme, and hence a systematic process of institutionalization, is much younger than the LWM programme. There are, consequently, less alumni with doctoral degrees, corresponding publications and research projects. This is clearly reflected in the publication analysis (see Annex 5). However, about 10-15 years ago, a dynamic process started and in the meantime, almost all universities in Ethiopia have been implementing courses/programmes in aquatic science. EFASA is interlinking the aquatic academia and stakeholder groups of relevance in the water, environment and food-production sector efficiently.

A second dampening factor is the global academic system and its logic of academic excellence. This engenders a tension between locally and regionally relevant research topics and those internationally deemed "excellent". In order to pursue one's academic and professional career, it appears less attractive to choose a locally relevant research topic (e.g. for one's MSc thesis) than a purely academic one.

Discussions on the strengthening of locally relevant research are currently running within Ethiopian university administrations. It appears expedient to reflect on how this could be implemented at the level of the AEEM programme (see recommendations).

South-South knowledge transfer exists in terms of research results being discussed at regional level. There is, however, little specific knowledge transfer with other tropical regions in the world.

As outlined above, there has been a significant impact on the resilience awareness of the regions through the emergence of specific limnological knowledge of Ethiopian and Eastern African tropical conditions. This is mainly implemented through EFASA activities and the extension agencies working with communities. However, this impact is constrained by the tension at the level of political priority setting between economic development/infrastructure and ecological objectives. Priority setting is still biased towards the former, which is tangible in terms of weak or no implementation of existing policies.

- *To what extent did the project outcomes (south-south collaborations, networking, highly qualified graduates, relevant projects and research, increased knowledge and awareness) contribute to **enhanced individual capacities** supportive of the sustainable management of freshwater ecosystems and their resources in Eastern African countries as well as the emergence of a resilient and self-confident Eastern African limnology, as part of the global limnological science community, tangible in terms of the locally/regionally determination of research topics, the perception of and reference to local/regional research findings in the regional/international research community? In particular, it shall be assessed to what extent the specific limnological knowledge about subtropical and tropical conditions that has arisen in the East African limnology has strengthened the resilience awareness of the regions and to what extent a self-confident, global South-South knowledge transfer is promoted.*

It can be stated unequivocally that the project outcomes have decisively enhanced individual capacities supportive of the sustainable management of freshwater ecosystems. As described above, the high level of scientific capacities of AEEM graduates is unanimously confirmed by the interviewees. The high share of graduates working at universities, research institutions or otherwise in the field of freshwater ecosystems, the fact that many of them have laid the foundation for the establishment of the scientific field at Ethiopian HEST prove the project's contribution to enhanced individual capacities.

As for the contribution to the emergence of a specific Eastern African limnology, the observations stated above apply.

At the personal level, students and graduates described that participating in the programme had a very strong impact on their personalities and personal lives. They highlighted the high quality teaching and the high share of practical training which helped them to gain a significant amount of self-confidence. Another impactful aspect, which was emphasized by the graduates, was the module held at Egerton University. Though challenging for many as their very first experience outside Ethiopia, most of the alumni highly valued this international and multi-cultural exposure as an extremely enriching experience.

This positive personal development triggered by the participation in the AEEM programme is the basis for the high degree of motivation of the graduates in their respective work places.

- *To what extent did increased institutional capabilities and individual capacities contribute effectively to **change processes at the level of knowledge production and dissemination, in policymaking, as well as to attitudes and practices in society to foster sustainable development?***

Qualitative findings confirm effective change processes at the level of knowledge production, particularly in the institutions of higher education participating in the AEEM programme. Most significantly, the successful establishment of limnology as a scientific field at these institutions, and at a number of other throughout the country, indicates increased attention to sustainable development in institutions of higher learning.

Other important changes are tangible at the level of teaching and learning. As confirmed by alumni and stakeholders, the programme's approach combining theoretical learning and field research, as well as institutional cooperation and exchange at national and regional level is considered superior to the traditional top-down transmission of theory alone. However, given the overall conditions of financial scarcity in the higher education sector, it is obvious that the deepening and establishing of such an approach to knowledge production is highly dependent on external resources. This evidently jeopardizes the expected change process beyond the AEEM programme itself. In addition, dependence on external resources to develop and apply new forms of knowledge production has inevitably been leading to some kind of fragmentation in the structures of higher education with externally funded pockets of excellence (e.g. ACEWM and Horn of Africa Regional Environment Center at AAU) in a wider system that severely struggles to keep pace. Unfortunately, a logic of competition over these scarce external resources, rather than one of synergies and cooperation, additionally decelerates the generalization of change processes in higher education.

Another limitation of the change process at the level of knowledge production, in particular in terms of its relevance for sustainable development, is the impact of the global academic system, whose rankings and admission criteria to journals and funds are still mainly based on Western criteria of scientific excellence without much attention to (local) social relevance. As described above, incentives to choose research topics according to social relevance are weak. Similarly, cooperation and knowledge exchange with communities as part of knowledge generation processes are still in their infancy.

Change processes at the level of policymaking and in terms of attitudes and practices in society are less tangible than the ones at the level of knowledge production. As described above, EFASA plays a key role in outreaching to policy makers and communities. Some extension agencies, such as Bahir Dar Fisheries and Other Aquatic Life Research Center, are also important vehicles to disseminate knowledge and awareness to both policy makers and communities. There are many success stories about how knowledge transfer on natural resource preservation has stimulated the elaboration of appropriate policies that did not exist before, and has helped to change practices among communities.

However, at policy and community levels AEEM's impact is strongly mediated by the socioeconomic, cultural and political context. Here, major inhibiting factors are visible. At policy level, continuous priority setting on industrial development with insufficient attention to natural resource preservation hampers a fruitful environment for awareness raising in governmental institutions. At community level, economic hardship plays a similar role. Material scarcity, not least of water resources, and lack of income-providing jobs pushes communities to practice any form of maintaining a livelihood regardless of their potentially damaging effects on natural resources.

5.4. Findings on Austria

A series of interviews with stakeholders in Austria has revealed the considerable impact that the AQUAHUB project has had in Austria over the decades. These will be briefly outlined below.

The AQUAHUB project and its predecessors have significantly contributed to the **further advancement of the education sector strategy of Austrian Development Cooperation**. The long duration of the project over more than four decades; the good working relations between the project management team and responsible Ministry and ADA staff and the active role of the project management within the Austrian research development community have facilitated mutually beneficial learning processes. Key points in these processes were a) establishment of an institutional cooperation with the IHE Delft in 1997, which allowed for the upgrading of the programme to a full MSc programme; b) the dislocation of IPGL course modules to Africa following the 2001 programme evaluation, c) the shift from individual funding of scholarships to institutional cooperation leading to the first joint MSc programme between an Austrian and an African university (LWM); and d) the establishment of a full MSc programme at African institutions alone (AEEM). These key points correspond to major principles of ADC strategies and programmes in higher education (most importantly the APPEAR programme) such as institutional cooperation, rather than only support to individuals; and increasing dislocation of programme components and responsibility to the Southern partners (cf. ADC's strategy in higher education and scientific cooperation (ADC 2009)).

While it is exaggerated to see AQUAHUB as having generated these strategic shifts in ADC's strategy on its own, it is plausible that thanks to its long duration the programme has somehow acted as a living lab for strategies in higher education cooperation. Moreover, the lessons learnt from its continuously successful transformation over the decades have stimulated important reflection processes in the respective community of practice in Austria, including the donor organisation itself.

Similarly, the AQUAHUB project has importantly contributed to the **establishment of BOKU as a lead driver in the Austrian development research community**. BOKU has been implementing cooperation projects with developing countries long before the IPGL programme joined it in 2012. Yet, since the early years, many BOKU staff have acted as lecturers, supervisors and project leaders with IPGL. After IPGL was established at BOKU in 2012, the intensive negotiation processes in the context of the LWM establishment have importantly contributed to change processes at BOKU, first at the level of teaching (e.g. modularisation), later on also in the internationalisation strategy (e.g. establishment of international joint MSc programmes; facilitation of outgoing mobility to Africa) and administrative level. The latter is particularly remarkable since at many Western universities, administrative regulations tend to put barriers to North-South cooperation. Over the years, BOKU has enacted certain changes in its administrative regulations to respond to the specific requirements of such cooperation projects (e.g. wider time frames for visa issues, specific support for students from the Global South etc.) and is striving for further improvements in its procedures.

BOKU's role as a driver and standard setter in the Austrian development research community is expressed, among others, in its leading role in the Africa UniNET Programme and its high share of funded projects through the APPEAR Programme. BOKU's experience in successful implementation of North-South cooperation projects offers valuable inputs for other HEST and research institutions in Austria. There is certainly untapped potential for fostering development research in Austria.

6. CONCLUSIONS AND LESSONS LEARNT

Based on the above-described findings the following conclusions can be drawn.

- **The long duration of the programme has been a key factor for its successful impact.**

It is important to acknowledge that the programme's impact in terms of individual and institutional capacity building would not have been possible without its long duration over more than four decades. Thanks to this long time span, the decisive element of successful cooperation – trust – could be incrementally built between the partner organisations allowing for mutual learning and common further development of the programme. A key learning emanating from this is that successful institution building takes time and requires continuous financial support.

- **Successful institutional cooperation needs “anchor individuals” who need enabling institutional environments.**

Findings above have described the decisive role of motivated individuals who act as game changers in their respective workplaces and thus facilitate impact. An obvious conclusion is that such a long standing and highly successful cooperation programme owes much of its success to committed individuals who act as programme managers, country coordinators, lecturers, administrative staff and in any other duty. We might call them “anchor individuals”. While this is unambiguous, the study has also made it obvious that individual commitment needs to translate into institutional change at some point to secure lasting impact. AQUAHUB's trajectory is in itself an illustration of this form of impact mechanism: From a programme based on individual scholarships it has developed into one of lasting institutional cooperation. The cumbersome efforts over the years of collectively negotiating institutional change in all involved partner institutions is what has been the key to collective learning and institution building and the basis for impact. On the other hand, the success of the programme has constituted an enabling institutional environment, which has helped to create committed “anchor individuals” and motivated graduates, eager to become themselves “anchor individuals” in their future workplaces. A key learning from this is that individual and institutional capacity development cannot be conceived of in a separate way, but condition and reinforce each other. HEST cooperation programmes should integrate both individual and institutional components.

- **Contextual factors importantly mediate intended impact**

The findings describe how factors such as structural resource constraints, institutional logics of competition rather than cooperation, conflicting priority setting at policy level, weak labour markets, lack of job opportunities and others act as major inhibiting factors to the intended impacts in terms of change processes. This is particularly true at the level of policymaking, communities and the wider society. In unfavourable contexts, individual commitment can make a difference, as some examples pointed out in the findings have shown. This might, however, not be enough to translate into lasting change processes. A learning from this is that while the programme should strive to better prepare students not only for scientific careers, but also for work in the wider society (see recommendations), expectations on possible impacts should remain sensitive to contextual constraints.

- **Impact mechanisms for change processes: collectively negotiating change**

As described above, findings emphasise that the processes – over extended periods of time – of collectively negotiating the requirements for successful institutional cooperation (e.g. in setting up an international joint MSc programme) have resulted in lasting change processes at all involved institutions, including the Northern partners (see findings on Austria). Inevitably, the context in which these collective negotiation processes took place could not have been without asymmetries of power, e.g. in the sense that the involved institutions have had very different access to resources. However, importantly these asymmetries have always been mediated by a high level of mutual trust and a true sense of cooperation at equal footing, and that is why they have been successful. This suggests that change processes cannot be conceived of in linear and uncontextualized ways without accounting for the multitude of structural, agential and also contingent factors that may constrain or enable them (see above). The broader the context of an intended change process (ranging from individuals, over single institutional units to the whole of society), the stronger the weight of structural factors.

A learning from this might be that development cooperation interventions targeting change processes need to aim at providing enabling factors that can mediate inhibiting factors. In the case of the AQUAHUB project and its predecessors these enabling factors were essentially sufficient time to allow for the growing of mutual trust between involved parties and the willingness to engage in collective negotiation processes at equal footing. This has allowed for lasting change processes in the involved institutions. As for the targeted change processes at the level of policymaking and wider society, what appears useful, besides realistic expectations (see above), is to increase the number of opportunities to engage in collective dialogical processes at equal footing with both policymakers and communities over an extended period of time. This could support the emergence of enabling environments based on mutual trust.

- **Modifications to the Theory of Change (ToC)**

What follows on from these conclusions for the project ToC, as presented in the ToRs and updated in the Inception Report? Can the impact hypotheses set out in the ToC be validated? Overall, from a scientific point of view it is questionable whether impact mechanisms within complex societies can be conceptualised in linear ways following an input-output-outcome-impact logic. In practical terms and mindful of this limitation, the evaluation team suggests the following modifications to the ToC: a) Outcome 6: “Knowledge and awareness on sustainable management of freshwater resources are increased” should be amended in the following way: “Knowledge and awareness on sustainable management of freshwater resources are increased within the scientific community, and, where possible among policy makers and in the wider society.”; b) Context as overall framework should be accounted for in terms of acknowledging a multitude of interrelated factors that inhibit or enable the change processes targeted by project interventions; c) The dialectical relation between the individual and the institutional level has to be considered.; d) The factors “time/continuity”, “trust” and “equal footing” should be actively made visible.

An attempt to visualise these modifications, necessarily inadequate against the background of the real complexities, is attached in Annex 3.

7. RECOMMENDATIONS

Based on the findings and conclusions, the evaluation team has elaborated the following recommendations. First, general recommendations on the AQUAHUB project will be described at strategic and at operational level. These are followed by specific recommendations on the LWM and the AEEM programmes respectively. Where applicable, the recommendations include indications on the target group (donor, programme management) and indicative timelines.

Additional recommendations emerged from the anonymous questionnaires that were distributed during the alumni workshops held in Nairobi, Kampala and Addis Ababa. These are summarised in Annex 6.

7.1. General recommendations

7.1.1. General recommendations at strategic level

- **Prioritise financial diversification and enhance attention on fund raising to ensure long-term sustainability**

It is acknowledged that the administrative workload for the IPGL management team and for the national coordinators has been increasing over the years, while personnel resources have not followed suit. As an obvious result, it has been difficult to put special emphasis on the issue of financial diversification, as had been planned according to the available project reports. In the light of the sustainability of the AQUAHUB project, and even more so of the desired expansion to the PhD level (see below), the evaluation team highly recommends treating the issue of financial diversification as a priority of further programme development.

Recommendation to the programme management: Cooperation with various funding agencies/programmes from other donor countries and the EU might be sought in this regard. It might be assessed, for instance, whether cooperation at the academic level with German universities and/or research institutions such as the Leibnitz Institute for Freshwater Ecology and Inland Fisheries (IGB) is useful and feasible, as such cooperation might facilitate access to the well-funded DAAD programmes. Importantly, regional and continental funding sources (e.g. AfDB) should also be envisaged.

Indicative timeline: medium term.

Recommendation to the BOKU University Management: As discussed above, the AQUAHUB project has been playing an important role for BOKU's further development, amongst other things at the level of its internationalisation strategy (e.g. model of joint MSc) and at the level of teaching (e.g. modularisation). It is therefore recommended for BOKU Management to consider supporting the sustainability of the AQUAHUB project through baseline funding.

Recommendation to the donor: For the donor's side, it might be useful to assess the possibility of incentive schemes to facilitate and reward successful fund-raising activities by the African partners. Promising models could be e.g.: a) provision of personnel expenses earmarked for fund-raising for a limited number of years; b) provision of bonuses for successfully acquired third party funds. In order to increase the commitment of partner universities' management, it might be envisaged to allow for repurposing of a part of the

bonuses for the general university budget. In addition, the donor could facilitate and support the establishment of collaborations with other suitable international donors/agencies, such as DAAD, NUFFIC, etc.

- **Assess the possibility of further relocation of programme components and tasks to African partners to enhance institution and capacity building effects**

As detailed above, the long-term continuation of the AQUAHUB programme and its predecessors has laid the foundations for consecutive relocations of programme modules to the African partner countries. Currently, EGU is fully in charge of the Kenyan semester and AAU is fully in charge of coordinating the AEEM programme. The organisational and financial management of all project activities in Eastern Africa, including financial audits from independent audit firms, is implemented by EGU, AAU and BDU.

This in turn has enabled successful institution and capacity building in the partner countries and has allowed for the successful establishment of joint international master programmes of high quality and on an equal footing. As a next step in this direction, further relocations to the African partner countries might be considered. Based on the successful example of the APPEAR programme, where in some cases the Southern partners are responsible for administrative project implementation, such relocations might include further transfer of coordinating, administrative and financial responsibility to EGU and AAU respectively. However, this would require prior rigorous assessment of which programme components might be usefully and feasibly transferred to the African partner countries and what kind of technical and financial preparations this would imply. For example, in light of the well-known administrative challenges in terms of visa issuance for Austria, respective administrative responsibility might preferably remain at BOKU rather than be transferred to EGU. In addition, it should be considered that the change of the administrative culture and methodologies from Austria to the African universities could be a challenge. This implies that there might be little to no saving of costs through such a relocation, since the above challenges would require the establishment of a position of a chief administrative officer for international cooperation projects.

Recommendation to the programme management: Conduct an assessment of feasibility as well as technical and financial implications of further relocation of programme components/tasks to the African partners.

Indicative timeline: 1–2 years

- **Assess the possibility of including Ugandan institutions into the formal network**

AQUAHUB/IPGL has a very high number of Ugandan alumni, many of them are holding key-positions both in HEST as well as in policy development & implementation. Several alumni expressed their interest to establish formal collaborations within the AQUAHUB project context – hence there is high potential to establish formal collaborations with Ugandan institutions.

Recommendation to the programme management: It is recommended to assess possibilities to establish formal collaborations with Ugandan institutions (e.g. Makerere University, Kyambogo University, NAFIRRI etc) in higher education and research, based on the demands and priorities of Ugandan key-stakeholder. This could be the support of local university programmes in Uganda, to support the integration of research institutions into

university curricula, linking Ugandan MSc programmes with LWM and/or to establish a Ugandan joint degree programme of high quality, similarly to the AEEM programme in Ethiopia.

Indicative timeline: medium term

- **Increase systematisation of access to PhD positions (PhD network)**

The majority of students, graduates and stakeholders expressed their request for better access to PhD opportunities within the AQUAHUB project, although it was also clearly stated that this must not come at the expense of the existing MSc programmes. From the evaluation team's perspective, increased and better structured access to PhD positions for graduates are not only desirable for their academic and professional careers. This would be moreover an important step to ensure consolidation of the scientific field and further quality improvement at Eastern African HEST. On the other hand, required funding must not be generated through reassignment of the MSc programmes' funds.

Recommendation to the programme management: The evaluation team therefore recommends to establish a kind of a more structured PhD programme at the European and East-African universities. It should work like a network for matching existing PhD requests from the IPGL courses with the existing offers in the academic sphere involved in the programme. However, access to a PhD position should remain a competitive endeavour for the applicants from the IPGL programmes.

Funding for such a PhD network should be raised in addition to existing funds deploying a multi-donor approach, i.e. assessing external donor sources and, where available, funding opportunities in the departments of the participant universities.

Indicative timeline: medium term

- **Further develop the AQUAHUB online platform deploying an organisational development approach**

As described in the findings, while the AQUAHUB online platform is appreciated by many, it is still not as widely used as a tool for networking and for academic exchange as it could be. We therefore recommend reviewing the platform in light of its original objectives and further potential. Subsequently, it might be assessed whether a further development targeting features of an online association might be feasible and desirable. This would imply a re-structuring process deploying an organisational development approach. This in turn would require additional personnel capacities to cover proper editorial and promotional work.

A re-organised platform could aim at becoming a virtual space for international exchange of limnology experts, e.g. through regular (online or offline) meetings, the merging of the member activities concerning research offers or staff recruitment etc. In particular, the platform offers the potential for networking with other tropical regions in terms of South-South or triangular cooperation.

Recommendations to the programme management: Review the current concept and define conceptual and organisational targets. If deemed appropriate and feasible, draw up an organisational development plan. This might include establishing country responsables for the website in the African partner countries.

Indicative timeline: one year.

Immediate measures to increase the platform's visibility could include its introduction to new students from the very beginning of the programme as part of the welcoming activities, rather than at its end.

- **Increasingly leverage the potential in Austria/Europe**

As detailed above, the AQUAHUB project and its predecessors have played an impactful role in the further advancement of Austria's development cooperation policy in the education sector as well as of BOKU's internationalisation strategy. It is recommended to increasingly leverage this potential in terms of increasing AQUAHUB's visibility as successful model of North-South cooperation projects at Austrian HEST institutions. In particular, the features of international joint Master's programmes with partner universities in the Global South, and the administrative reform processes these entail within university structures (e.g. establishment of a welcoming culture for students from the Global South), can trigger change processes at Austrian HEST institutions that support their compliance with the SDGs and the UN Agenda 2030.

Recommendations to the donor: It is recommended that the donor agency ADA, in cooperation with other possible funding sources (e.g. Austrian Federal Ministry of Education, Science and Research, Austrian Federal Ministry for Climate Action, Austrian Federal Ministry for Labour and Economics etc.), assesses the possibility of drawing up a funding scheme (or strengthening existing ones) in order to stimulate the establishment of similar international joint master programmes between Austrian universities and those in the Global South. A possibility for this could be to strengthen and expand the APPEAR programme component on MA programmes. Other possible synergies should be assessed in terms of Erasmus+ and other EU Programmes, Africa UniNet, etc.

Similarly, incentive measures to enhance outgoing mobility of Austrian (or EU) students to partner universities in the Global South should be envisaged.

7.1.2. General recommendations at operational level

7.1.2.1. Gender

- **Encourage the establishment of gender policies and support initiatives at university level to help creating an enabling environment**

The existence of an enabling environment has proven crucial to increase female participation and ensure that female graduates continue their academic/professional careers. Such an enabling environment at university levels can include a variety of elements, i.e. positive discrimination policies; the establishment of childcare facilities, female dormitories, gender advisory services etc. at campuses; specific support funds for female students and researchers; specific support initiatives for women such as retreats for thesis and/or proposal writing, peer exchange groups etc. Much of this might fall under the responsibility of university administration. Where possible, AQUAHUB coordinators, management and staff should encourage the establishment of such an enabling environment.

- **Assess the feasibility and usefulness of specific support measures for female students within the IPGL programmes**

Where useful, specific support measures for female IPGL students might be envisaged. These could include special retreats for thesis writing; peer support groups; counselling and tutoring by female alumni. The latter can also have an important positive effect in terms of encouraging role models. Possible support measure should also include assessing the possibility of developing additional sources of funding to allow for families accompanying female students while doing their course modules abroad.

Recommendation to the programme management: Use annual evaluations to assess whether such support measures are required and could actually be helpful in the given context.

Indicative timeline: short term

7.1.2.2. Curricula and teaching

- **Add teaching units on science communication and community projects to increase impact at policy and community level**

In order to increase AQUAHUB's impact at policy and community level, appropriate units should be included in the curriculum. However, these should not come at the expense of scientific quality. Given repeated statements by alumni, students and lecturers that the course programmes are already (excessively) dense, it might be challenging to include additional modules.

Recommendation to the programme management: It is therefore recommended to assess whether there are overlapping or redundant elements in the current curriculum which might be eliminated or reduced. In this case, the time thus set free might be used for additional course modules (e.g. as electives) on science communication, community projects and entrepreneurial activities. Otherwise, appropriate teaching units might be introduced as special short courses at the end of the regular course programme.

Indicative timeline: medium term

- **Offer specific support and tutoring on proposal writing, project management and scientific writing**

Recommendation to the programme management: In order to increase student's opportunities for further education (e.g. PhDs) and job openings, it is recommended to offer specific support on proposal and project application writing as well as on project management. The same applies for scientific writing in order to support students in publishing their findings in scientific journals.

Indicative timeline: short to medium term

- **Offer systematic support and exchange for lecturers**

Recommendation to the programme management: As envisaged before the Covid-19-pandemic and described in the project proposals, it is recommended to establish lecturer exchange schemes at national, regional and international levels to maintain and enhance the high quality of teaching as well as to ensure regular updating in relevant technologies. Special

focus should also be given to the transmission of learner-centred and interactive teaching methodologies. In addition, opportunities for exchange between lecturers should be created at different scales of formality, e.g. from regular further training courses to informal web-based platforms of peer exchange (e.g. in the context of the AQUAHUB web-platform). Intensified mobility funded through the Erasmus+ programme could be leveraged for such a lecturer exchange scheme.

It might be envisaged to open up these (or some of these) teacher support initiatives to lecturers from other universities (see below) to increase the impact at the level of networking and general HEST quality enhancement.

Indicative timeline: medium term

- **Offer refresher courses**

Many of the interviewed alumni expressed their need for short term courses for refreshing specific contents or topics in the courses or for specific short-term courses from the wider range of requested themes, topics and higher sophisticated contents. Some of these activities are already done at IHE Delft, but it seems that it should be extended or done in a more systematic way within an academic cooperation.

Recommendation to the programme management: It is recommended to assess whether an expansion to other partners for the offering of these short-term courses would be helpful and the establishing of a network for short term course offering might be suitable.

Indicative timeline: short to medium term

7.1.2.3. Institutional impact

- **Enhance attention to quality improvement of local limnology programmes**

As stated above, the findings report that while local programmes in limnology or related fields have been established at the African partner universities, there are quality differences between the local and the IPGL programmes. The size of this gap might vary between the involved universities, yet it has been mentioned in all cases. In terms of the AQUAHUB project's contribution to the overall improvement of HEST institutions in Eastern Africa, increased attention should be paid to elevate the quality of the local programmes. The AQUAHUB project might not be able to tackle structural impediments such as lack of general resources, the absence of individual stipends or cancellation of classes due to strikes. Yet, other measures might be easily actionable and helpful.

Recommendation to the programme management: Assess possible measures to elevate the quality of local programmes, e.g. inclusion of local students into field research; peer tutoring initiatives (between IPGL students and those of local MSc programmes).

Indicative timeline: short term

- **Offer systematic lecturer support to other universities to increase impact at the level of national and regional HEST systems**

Much of the project's impact in terms of institution building and quality improvement at HEST institutions stems from graduates joining other universities or research institutions as lecturers.

Recommendation to the programme management: In order to enhance this impact and help to elevate the teaching quality at those institutions it is recommended to open up the above described support measures (or at least some of them) to lecturers from other universities.

Indicative timeline: short to medium term

7.1.2.4. Impact on wider society (policy and communities)

A fundamental recommendation in this regard is the inclusion of appropriate teaching content into the curricula (see above).

- **Establish systematic collaboration with appropriate institutions for internships and projects**

Recommendation to the programme management: It is recommended to seek systematic collaboration (i.e. MoUs) with key institutions in the field (i.e. ministries, stata and parastatal administrative bodies, extension agencies, private companies, NGOs etc.) to secure internship places for IPGL students and graduates and to implement common projects.

Indicative timeline: short to medium term

- **Encourage and support students to choose MSc research topics of high social relevance**

As described, in many cases primarily scientific research topics seem more attractive to students for their MSc theses than those of direct relevance to communities and the wider society. One reason for this is that academic career prospects are more attractive than others.

Recommendation to the programme management: It is therefore recommended to introduce appropriate measures of encouragement and support (including incentives, if deemed appropriate) to increase the share of MSc theses of high social relevance.

Indicative timeline: short to medium term

7.2. Specific recommendations on the LWM programme

- **Offer IT preparation courses at BOKU to compensate for lacking/weak computer knowledge among African first term students**

One finding reports the lack (or weakness) of prior knowledge in usage of standard computer programmes (e.g. Excel) among African students who start their first term at BOKU due to lack of computer facilities at their home universities. As reported, in some cases this decelerates their overall study progress and puts additional burden on themselves as well as on lecturers.

Recommendation to the programme management: To compensate for this, it might be considered to offer crash courses in basic computer programmes at the very beginning of the first term.

Indicative timeline: short to medium term

- **Assess possible incentive schemes to increase the number of students writing their MSc theses at EGU**

There is currently an imbalance in the numbers of students who choose to write their theses at one of the partner institutions in favour of IHE Delft. This might have several root causes beyond the immediate reach of the LWM programme, such as attractive offers of refreshment activities for IHE graduates or legal opportunities for work while studying (as in contrast to Austria).

Recommendation to the programme management: In order to further increase the programme impact in terms of institution building and social relevance in Kenya, it is recommended to assess incentive schemes to increase the number of students choosing to write their thesis at EGU.

Indicative timeline: short to medium term

- **Add teaching units on entrepreneurial activities and provide internships**

Recommendation to the programme management: In order to increase AQUAHUB's impact at societal level and help graduates to find employment and income in the private sector, appropriate training units should be offered, e.g. as electives or as special short courses at the end of the regular course programme. In addition, agreements with relevant companies in the private sector (e.g. aquaculture) could be sought to provide internships for LWM students and graduates and to invite entrepreneurs to guest lectures.

Indicative timeline: short to medium term

- **Assess appropriate measures to institutionalise the informal national and regional networks**

The experience of EFASA in Ethiopia as an important transmission belt for the outreach to the political and community level as well as the expressed wish of interviewees in Kenya and Uganda suggest that an institutionalised network of stakeholders in the sector of freshwater ecosystems is required in the latter countries. Indeed, stakeholders often described the establishment of a proper professional association as an important requirement. Yet, the experiences specifically in the Ugandan and Kenyan academic sphere with the regional EAWA are rather disappointing. As a lesson from both EAWA and EFASA experience, it might be more promising to formalise structures at national, rather than at regional level and to focus on knowledge exchange and mutual learning rather than targeting project acquisition through the association. According to interviews and questionnaire results, physical meetings remain important occasions for networking.

Recommendation to the programme management: It is recommended to systematically assess the lessons learnt from the earlier EAWA activities. On that basis, if deemed appropriate, measures to re-invigorate national associations in Kenya and Uganda should be drawn up with a focus on knowledge exchange and dialogue with stakeholders at policy and community level. Regular national conferences or meetings should be envisaged, but financing for that should be secured at national level.

At the regional level, it should be assessed whether formalisation through the online AQUAHUB platform might be an appropriate format. With the possible performance and potential of the digital AQUAHUB platform it could be a viable alternative to establish a regional sub-chapter under the general umbrella of the International Water Association (IWA).

For physical meetings at regional level, synergies with the Africa UniNet general assemblies or similar programmes could be envisaged.

Indicative timeline: assessment of lessons learnt from EAWA experience: short term; developing appropriate measures of reinvigoration of national associations: medium term

7.3. Specific recommendations on the AEEM programme

- **Increasingly leverage the potential of BDU in terms of its surrounding natural resources**

The position of BDU at Lake Tana and in the proximity of the Blue Nile provides it with excellent prerequisites for practice-oriented research on freshwater resources and for corresponding community projects. As stated by one interviewee, BDU could act as a “living lab” for the scientific field. It appears that to date this potential has not been fully realised. Obviously, such a further development of BDU is highly dependent on the security situation and the restrictions it entails in the Amhara Region.

Recommendation to the programme management: It is recommended to strengthen the capacities at BDU for field research (short term) and to assess whether a potential additional AEEM module or short course on the implementation of community projects could be held at BDU (medium term). In this context, it is also recommended to assess whether the strengthening of collaborative efforts with other universities in the region (e.g. Gondar university) could be useful and feasible (medium term).

- **Address perceived imbalances between AAU and BDU**

Although graduates and students from recent batches confirmed that earlier dissatisfaction with the quality of the AEEM modules at BDU have been successfully addressed, it is recommended to constantly assess such perceived imbalances.

Recommendation to the programme management: In particular, it is recommended to analyse the causes for the fact that the majority of AEEM students choose to write their MSc theses at AAU rather than at BDU, which is even more surprising considering the rich aquatic resources available at the proximities of BDU. It is recommended to introduce a final evaluation to AEEM, which is currently missing (short term). This might be helpful to gain a better picture of the imbalances between the modules held at AAU and BDU and in particular of their causes. In this context, it could be examined whether the restructuring of the AEEM curriculum could be helpful to redress this imbalance, in terms of avoiding the course programme to end at AAU (short term). Another measure worth considering might be to develop incentives for students to do their MSc projects at BDU (short to medium term), for example through an upgrading of the BDU laboratories (purchase of laboratory- & field instruments), special research funds, etc.

- **Assess the possibility of granting financial support to EFASA**

As has been pointed out, EFASA has been playing a decisive role for fostering the scientific community and for reaching out to the policy and community level in Ethiopia. As such, EFASA can be regarded as a model for further national and regional networking.

Recommendation to the programme management: Assess the possibility of facilitating financial support through AQUAHUB to EFASA.

Indicative timeline: short to medium term

- **Increase individual stipends**

Economic hardship through sharply rising costs of living, above all in Addis Ababa, has been pointed out as a major burden for students. On the other hand, a finding of this study points to the strong leveraging effect of the individual stipends for the programme's quality, in addition to important equity effects.

Recommendation to the programme management: It is therefore recommended to increase individual stipends to make them meet real costs of living.

Indicative timeline: short term

- **Assess possibilities of creating opportunities for students' and lecturers' exposure to international experience in Europe**

Overall findings underline the importance, in a historical perspective, of facilitating participants' studying at European institutions. Intercultural experience, the possibilities of learning in a European environment (and its boosting effect on self-confidence) as well as building solid North-South networks have had key and lasting effects for quality improvement at Eastern African Universities. The high quality of AEEM as a programme without direct participation of a European university can only be understood if the long process of quality institutional and individual capacity development within the IPGL programme throughout the decades is accounted for.

Recommendation to the programme management: In view of further quality improvement, network strengthening and increase of research projects, it is therefore recommended to assess possibilities for Ethiopian students and lecturers to gain direct experience at European universities. In a first step, it might be useful to prioritise opportunities for lecturers, e.g. in terms of lecturer exchange schemes.

Indicative timeline: short to medium term

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