

PROJECT PROPOSAL 2015 -2018

Development of Educational and Research CAPacity in Eastern Africa for the Sustainable Management of AQUAatic Ecosystems (CAPAQUA)



University of Natural Resources
and Life Sciences, Vienna



EGERTON UNIVERSITY



UNESCO-IHE
Institute for Water Education



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Ethiopian Institute of Agricultural Research
(EIAR)

PROJECT TITEL

DEVELOPMENT OF EDUCATIONAL AND RESEARCH CAPACITY IN EASTERN AFRICA FOR THE SUSTAINABLE MANAGEMENT OF AQUATIC ECOSYSTEMS (CAPAQUA 2015-2018)

COUNTRY

KENYA & ETHIOPIA

REGION

EASTERN AFRICA

PLANNED PROJECT PERIOD**FROM**

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TILL

30-09-2018

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FINANCING (EURO)

Project Budget (total)	Requested Grant ADC	Contribution in Cash by the Applicant	Possible Contributions from Third Parties
100%	80%	7%	13%
EUR 2,074,000.-	EUR 1,650,000.-	EUR 144,000.-	EUR 280,000.-

1. SUMMARY

The overall project objective is to foster the sustainable management of aquatic ecosystems and aquatic resources towards the achievement of the SDG's. CAPAQUA is supporting capacity enhancement processes at Eastern African institutions, which are educating professionals, carrying-out relevant research/extension activities and contributing to the development of evidence-based policies. At least 86 young water/environmental professionals from primarily Eastern Africa are attending collaborative M.Sc. programmes, whereas 52 participants receive ADC/NFP fellowships and 34 students are external/self-funded. Implemented is the international joint-degree Master's programme "LWM" by BOKU, Egerton University (EGU) and UNESCO-IHE with 49 students. Addis Ababa University (AAU), Bahir Dar University (BDU), EIAR-NFALRC and BOKU implement the joint M.Sc. programme "AEEM" with 37 students. Hence, 86 students are attending the academic programmes in Eastern Africa and at least 50 M.Sc. research projects are carried-out in Eastern Africa. At least 40 Eastern African experts from at least 10 different institutions contribute to the LWM and AEEM programmes. Both M.Sc. curricula put special emphasis on skill-orientated courses, student centred teaching approaches and contain inter- and transdisciplinary course elements to enhance the quality and relevance of the academic programmes. Two academic quality assurance workshops are held with academic and administrative AEEM/LWM personnel, plus external experts (15 participants in Kenya, 15 participants in Ethiopia). One Train-the-Trainer workshop with 20 participants is implemented in Ethiopia for academic personnel of the AEEM partner institutions. Developed is a road-map and adequate measures to ensure the sustainability of AEEM and LWM within stakeholder consultations and two stakeholder workshops in Eastern Africa, with 28 participants in total. An external evaluation is assessing the effectiveness and impact of CAPAQUA project activities. The target institutions and programme graduates are perceived as key-agents to initiate transformation processes towards the sustainable management of environmental assets to the benefit of Eastern African people.

TABLE OF CONTENTS

1. SUMMARY.....	VI
ABBREVIATIONS.....	X
2. BACKGROUND / CONTEXT	1
2.1. RELEVANT GOVERNMENT AND SECTOR POLICY.....	1
2.1.1. Kenya Vision 2030.....	1
2.1.2. ESP – Economic Stimulus Programme (Kenya)	1
2.1.3. Ethiopia's Five Year Growth and Transformation Plan (GTP)	1
2.1.4. United Nations / UNESCO.....	2
2.1.5. Strategy of the Austrian Development Cooperation (ADC)	2
2.2. CHARACTERISTICS OF PROJECT ENVIRONMENT	4
2.2.1 Higher Education & Science in Eastern Africa.....	4
2.2.2 Water & Aquatic Resources in Eastern Africa	5
2.2.3. Environmental Conservation in Eastern Africa	6
2.2.4. Climate Change	6
2.3. CONSISTENCY WITH OBJECTIVES OF THE AUSTRIAN DEVELOPMENT COOPERATION	7
2.3.1. Goals, principles, guidelines and sector policies of ADC.....	7
2.3.2. Contribution to SDG's / Post-2015 Development Agenda	8
2.4. TARGET GROUPS, BENEFICIARIES & LOCAL PROJECT-PARTNERS	11
2.4.1. Target groups.....	11
2.4.2. Direct beneficiaries.....	11
2.4.3. Indirect beneficiaries	13
2.4.4. Local project-partners.....	13
2.5. PROBLEM ANALYSIS AND ANALYSIS OF LOCAL POTENTIALS	16
2.5.1. Problem Analysis	16
2.5.2. Project Strategy.....	17
2.5.3 Local Potentials	18
2.6. HARMONISATION AND ALIGNMENT.....	18
2.7. DATA BASIS AND DOCUMENTATION	19
3. INTERVENTION LOGIC	19
3.1. OVERALL OBJECTIVE.....	19
3.2. PROJECT OBJECTIVE.....	19
3.3. EXPECTED RESULTS	19
3.3.1. Expected result 1.....	19
3.3.2. Expected result 2.....	20
3.3.3. Expected result 3.....	20
3.4. ACTIVITIES	21
3.4.1. Project activity 1.1.: Implementation of joint-degree Master's programme in "Limnology & Wetland Management" in Europe (4-months in Austria and 4- months in The Netherlands) with 28 participants.....	21
3.4.2. Project activity 1.2.: Implementation of 28 M.Sc. research projects within the joint-degree Master's programme in "Limnology & Wetland Management"	23
3.4.3. Project activity 1.3.: Implementation of Kenyan LWM-semester at Egerton University (4-months) as integral part of the international joint-degree	

	<i>Master’s programme in “Limnology & Wetland Management” with 49 participants.....</i>	<i>24</i>
3.4.4.	<i>Project activity 2.1.: Implementation of joint M.Sc. programme in “Aquatic Ecosystems & Environmental Management (AEEM)” of Addis Ababa University, Bahir Dar University and EIAR-NFALRC with 37 participants</i>	<i>25</i>
3.4.5.	<i>Project activity 2.2.: Implementation of one Train-the-Trainer Workshop for 20 AEEM lecturers/resource-persons.....</i>	<i>29</i>
3.4.6.	<i>Project activity 3.1.: Implementation of stakeholder consultations and two workshops to establish a concept and road-map to ensure sustainability of AEEM & LWM.....</i>	<i>29</i>
4.	PROJECT IMPLEMENTATION	31
4.1.	METHODOLOGY	31
4.2.	TIME SCHEDULE.....	31
4.3.	NECESSARY MEANS & COSTS.....	31
4.3.1.	<i>Funding Scheme.....</i>	<i>32</i>
4.3.2.	<i>Disbursement Scheme.....</i>	<i>32</i>
4.4.	ORGANISATIONAL STRUCTURE & PROCESSES.....	32
5.	ASSUMPTIONS	36
5.1.	EXTERNAL FACTORS	36
5.2.	ASSESSMENT OF RISKS AND THE NEED FOR MODIFICATIONS	36
6.	MONITORING AND EVALUATION.....	37
6.1.	MONITORING, INFORMATION SYSTEM, INDICATORS.....	37
7.	SUSTAINABILITY ISSUES	38
7.1.	POLITICAL SUPPORT.....	38
7.2.	APPROPRIATE TECHNOLOGY.....	38
7.3.	ENVIRONMENTAL IMPACTS / ENVIRONMENTAL PROTECTION.....	39
7.4.	SOCIO-CULTURAL ASPECTS	39
7.5.	GENDER EQUALITY.....	39
7.6.	DEVELOPMENT OF INSTITUTIONAL AND MANAGEMENT CAPACITIES.....	39
7.6.	ECONOMIC VIABILITY	40
 ATTACHED DOCUMENTS		
	<i>ANNEX I: Logframe Matrix</i>	
	<i>ANNEX II: Time schedule</i>	
	<i>ANNEX III.a.: Summary project budget (project budget relevant for accounting/auditing)</i>	
	<i>ANNEX III.b.: Detailed project budget</i>	
	<i>ANNEX IV: Monitoring plan</i>	
	<i>ANNEX V: Environmental impact questionnaire</i>	
	<i>ANNEX VI: Gender questionnaire</i>	

ABBREVIATIONS

AAU	Addis Ababa University
ADA	Austrian Development Agency
AEEM	Joint M.Sc. programme “Aquatic Ecosystems & Environmental Management”
ADC	Austrian Development Cooperation
APPEAR	Austrian Partnership Programme in Higher Education & Research for Development
BDU	Bahir Dar University
BOKU	University of Natural Resources and Life Sciences, Vienna
BOKU-IHG	Institute of Hydrobiology and Aquatic Ecosystem Management, BOKU
CIDA	Canadian International Development Agency
DAAD	German Academic Exchange Service
DANIDA	Danish International Development Agency
DGIS	Directorate General of International Cooperation, The Netherlands Ministry of Development Cooperation
ECTS	European Credit Transfer System
EGU	Egerton University
EIAR-NFLARC	Ethiopian Institute for Agricultural Research, National Fish and Other Aquatic Lives Research Center, Sebeta
EPA	Ethiopian Environmental Protection Agency
FAO	Food and Agriculture Organization of the United Nations
GTP	Ethiopian National “Growth and Transformation Plan”
HEST	Higher Education, Science and Technology
HEI’s	Institutions of Higher Education
ICT	Information and Communication Technologies
IPCC	Intergovernmental Panel on Climate Change
IPGL	International Postgraduate Training Programmes in Limnology
IWRM	Integrated Water Resource Management
KMFRI	Kenya Marine & Fisheries Research Institute, Kenya
LWM	Joint-degree Master Programme in Limnology & Wetland Management
LARIMA	APPEAR project “Sustainable Highland Rivers Management in Ethiopia”; coordinated by BOKU and EAIR-NFLARC
MDGs	Millennium Development Goals
NAFIRRI	National Fisheries Resource Research Institute, Uganda
NCST	Kenyan National Council for Science and Technology
NEPAD	“New Partnership for Africa’s Development”, African Union
NORAD	Norwegian Agency for Development Cooperation
NFP	The Netherlands Fellowship Programme, administered by NUFFIC
NUFFIC	Netherlands Organization for International Cooperation in Higher Education

OECD	Organisation for Economic Cooperation and Development
SDG's	Sustainable Development Goals, United Nations
SIDA	Swedish International Development Cooperation Agency
STRECAFISH	APPEAR project "Strengthening regional capacity in research and training in fisheries and aquaculture for improved food security and livelihoods in Eastern Africa"; BOKU and EAIR-NFLARC project partners
UNESCO-IHE	UNESCO-IHE, Institute for Water Education, Delft
WRMA	Water Resource Management Authority, Kenya

2. BACKGROUND / CONTEXT

2.1. RELEVANT GOVERNMENT AND SECTOR POLICY

2.1.1. Kenya Vision 2030

“Education, Water/Sanitation and Environment” are important sectors within the “Social Pillar” of the Kenyan Vision 2030. Efficient, motivated and well-trained public service personnel is expected to be one of the major foundations of the Vision 2030. Therefore, the Vision is anchored on globally competitive education, training and research to provide relevant skills required for development for enhancing the individual well-being of Kenyans. The Vision 2030 recognises the critical role played by “Science, Technology & Innovation (STI)” for accelerating economic development. Thus, more resources are planned to be devoted to schools, polytechnics, universities and research institutions, implemented via the Science, Technology and Innovation Policy Framework within the Vision 2030. The Vision 2030 also encourages public and private universities to expand their enrolment in science and technology courses. One of the flagship projects of the Kenyan government is to increase the funding of these institutions to support the achievement of the former MDG’s and recent Post-2015 Development Agenda. The Vision 2030 aims to have a nation with clean, secure and sustainable environment by 2030. Specific strategies promote environmental conservation and one focus is the “Water Catchment Management Initiative”, through rehabilitation of the Kenyan main water towers, meaning mountainous areas in Kenya.

2.1.2. ESP – Economic Stimulus Programme (Kenya)

ESP intervention measures are framed within broader policy objectives, as stipulated in the Vision 2030 and the Constitution of Kenya. Two activities covered under ESP are the construction and stocking of fishponds with fingerlings and the expansion of irrigation-based agriculture. The fish farming project is establishing, stocking and managing 28,000 fishponds to create employment and income opportunities for 120,000 people.

2.1.3. Ethiopia's Five Year Growth and Transformation Plan (GTP)

On important target of the “Growth and Transformation Plan (GTP)” is the development of Ethiopian water resources for economic development in a fairly and sustainable manner and to increase the coverage of drinking water supply

and irrigation constructions. The “Education Sector Development Program” is giving key priority to ensure the quality and relevance of Higher Education. The expansion of institutions of Higher Education is continued with a special focus on science and engineering. Priority is given to the implementation of quality assurance programmes and to enhance the capacity of Research and Technology institutions in terms of institutional management/administration, increasing the numbers of university personnel and increasing the numbers of skilled graduates. The main objectives of the “Environmental & Climate Change Initiative” within the GTP, are to formulate and implement policies, standards and laws effectively, which foster social and green economy development, as to enhance the welfare of citizens and environmental sustainability.

2.1.4. United Nations / UNESCO

The strategic project-partner UNESCO-IHE is representing the “water-arm” of the United Nations with the mandate “to strengthen and mobilise the global educational and knowledge base for integrated water resources management and to contribute to meet the water-related capacity development needs of developing countries and countries in transition”. With this mandate, one of the missions of UNESCO-IHE is to contribute to the education and training of professionals and to enhance the capacity of water-sector organisations and knowledge centres in developing countries and countries of transition. Since 2010, UNESCO-IHE gives continuing emphasis on the development of joint M.Sc. programmes with capable institutions in the developing world.

2.1.5. Strategy of the Austrian Development Cooperation (ADC)

Education

Education is one of the thematic priorities of Austrian Development Cooperation (ADC) and is regarded as an important tool towards the sustainable eradication of poverty. The ADC-strategy on “Higher Education & Scientific Cooperation” is based on international agreements (MDG’s, Paris declaration), reports/recommendations of international organisations (OECD, UNESCO, EU and WB) and former evaluation studies on the education-sector of ADC. The overarching sector-objective is to support capacity development processes at public universities and research institutions in the target countries of the Austrian Development Cooperation. Activities are streamlined towards regional (ADC key regions and priority countries) and thematic priorities (e.g. Water supply &

Sanitation, Environment & Natural Resources). Furthermore, the ADC-strategy emphasises on capacity and quality enhancement/assurance in Higher Education and Sciences, regional/international partnership/networking and “Science & Research for Development”.

Environment & Development

The ADC strategic guideline on “Environment & Development” defines its priority operational fields and aims at the interfaces between environmental and development policy as follows:

- Sustainable natural resource management, combating desertification and preserving biodiversity;
- Sustainable chemicals and waste management;
- Climate protection;
- Water and sanitation.

Water Supply & Sanitation

The ADC-strategy in the “Water Supply & Sanitation” sector builds on recognised principles of international initiatives such as the Dublin Principles, EU-Guidelines/Initiatives, World Water Forums, OECD-DAC (POVNET), among others. ADC perceives its function as being the support of an autonomous and sustainable development process of the water sector in the partner countries, which will fulfil the following:

- Ensure that all user groups, including in particular the economically and socially marginalized groups of the population, have adequate and affordable access to drinking water and basic sanitation;
- Ensure the availability of sufficient water resources for all types of uses and for further economic development;
- Guarantee the long-term conservation of the natural resources basis and the eco-systems;
- Contribute to conflict prevention by promoting equitable distribution (within a catchment area, between social groups).

Nexus Approach

Recently, the “Nexus Approach” has received wide attention with the provision of a holistic conceptual approach, which is integrating the water, energy and food security sectors. The current ADC Programme (2013-2015) emphasises the

importance to address water supply, energy, climate protection, forestry, agriculture and food security in a closely interlinked way. The ADC objectives are to:

- Feed the Nexus approach strongly into the design for new interventions (“basic programming principle”), joint programming across sectors and cross cutting issues to transform available information on interdependencies into intervention measures;
- Change the policy dialogue - open dialogue and joint learning with partners leading to “nexus-driven” national development plans.

2.2. CHARACTERISTICS OF PROJECT ENVIRONMENT

2.2.1 Higher Education & Science in Eastern Africa

Increasingly the role of Higher Education is perceived as a key-factor for societal and economic development in Eastern Africa (e.g. Ethiopia's GTP, Kenyan Vision 2030, etc.). Kenya and Ethiopia expanded the number of public and private universities and the number of undergraduate students dramatically.

Student enrolment statistics depict the massive increase of undergraduate student numbers, whereas the enrolment numbers in postgraduate programmes are still at a rather low levels, though increasing (Annual Abstract, Education Statistics 2012/2013, Ethiopian Ministry of Education; University Enrolment Statistics 2013, Kenyan National Bureau of Statistics). Virtually no governmental fellowships, nor governmental loan and/or cost-sharing programmes are available for postgraduate students in Kenya. Ethiopia is offering a cost-sharing model (governmental loan programme) to a very limited number of postgraduate students.

Both, the Kenyan and Ethiopian government continued to increase investments into the HEST sector. However, even with substantially increased funding, Kenyan and Ethiopian HEI's are struggling with the rising undergraduate student numbers due to the lack of infrastructure/facilities, inadequate staff numbers, high student drop-out rates and deficits in offering skill-orientated course modules.

Private universities provide almost exclusively income-generating and/or sponsor-driven academic programmes (e.g. MBA/economics, ICT, media & communication, languages, education, theology, etc.). Postgraduate programmes

in natural sciences are more than rarely offered by private universities, since the education costs per student are high (expensive course equipment/ laboratories, laboratory/field-work can be done in small groups only).

Following the massive student enrolment expansion and the establishment of a large number of new universities with limited capacity, the issue of quality has become a crucial issue of discussion and major concern among stakeholders in both, Kenya and Ethiopia. The lack of highly qualified staff, adequate infrastructure and financial resources to support student learning were identified as the most critical factors to affect the quality of education negatively. These issues are even more crucial for academic programmes in natural sciences, medicine, engineering and technology, since these subjects require laboratories, equipment and practical courses to generate highly skilled graduates.

Despite the massive increase of student enrolment, tertiary education attainment is still very low in sub-Saharan Africa, compared to OECD countries (data from OECD Education at a Glance Report 2013):

Countries	tertiary education attainment
OECD	30%
EU 21	28%
Ethiopia	estimated <5%
Sub-Saharan Africa	6%

2.2.2 Water & Aquatic Resources in Eastern Africa

Due to current water-resource limitations, Eastern African governments are putting increasingly efforts into the sustainable development of aquatic resources. The East African Community (EAC) developed a “Protocol for Sustainable Development of Lake Victoria Basin” and the “Lake Victoria Basin Commission (LVBC)” was established in 2005, as a permanent apex institution of the East African Community responsible for the Lake Basin. National authorities have been established in Kenya (Water Resource Management Agency, WRMA) and Uganda (Directorate for Water Resource Management, DWRM) to develop and implement water resource management plans. In Ethiopia the Ministry of Water and Energy is following-up the “National Water Resource Management Policy” to steer the development and management of water resources.

Fisheries and aquaculture are important sectors of the national economies of Uganda, Tanzania and Kenya and are increasingly promoted in Ethiopia. The legal framework for fisheries and aquaculture is under intense discussion in Eastern African countries and governmental institutions are working on the development of evidence-based sector policies to tackle current and future challenges.

2.2.3. Environmental Conservation in Eastern Africa

Eastern African lakes, rivers and wetlands are unique ecosystems, hot-spots in biodiversity and still many organisms are waiting to be discovered. Beside ethical values, the immense medical and bio-technological potential of unique organisms, genes and chemical-components give strong arguments to protect these unique aquatic ecosystems. Aquatic ecosystems provide crucial resources (water, fish, plants as house-building material, etc.) and a functional ecosystem renders services, such as water purification, protection against floods and water provision in dry seasons. On the global scale, aquatic ecosystems are amongst the most sensitive ecosystems and aquatic organisms are highly over-represented in the list of endangered species (Millennium Ecosystem Assessment Report, Ecosystems and Human Well-Being, 2005; A Global Species Assessment - The 2004 IUCN Red List). The situation in Eastern Africa is even more dramatic, due to the increasing resource demands of the growing human population, combined with the in-effective implementation of management-policies. Most Eastern African lakes, rivers and wetlands are heavily affected by various human activities, though no detailed baseline-information on their biodiversity and natural hydrology/functioning is available. The alarming speed of environmental degradation is calling for immediate action at all levels and significant financial means for fundamental research, the development of evidence-based policies and interventions in order to mitigate negative effects. Without drastic interventions, several Eastern African lakes and rivers will dry-up in the soon future, many surface water bodies will be unsuitable for fisheries and safe water for human consumption will become very expensive for many people in Eastern Africa.

2.2.4. Climate Change

The IPCC-Reports from 2007 to 2014 confirm that Africa is a highly affected and vulnerable continent to climate change, due to the range of projected impacts, multiple stresses and low adaptive and mitigation capacity. The World Bank Group developed a strategic framework on development and climate change for

developing countries. Key-sectors affected by climate change include health, water supply and sanitation, energy, transport, tourism, agriculture, forestry, fisheries, environmental protection and disaster management. In addition, the “World Development Report 2010” focused on development in a changing climate (released by the World Bank Group).

2.3. CONSISTENCY WITH THE OBJECTIVES OF THE AUSTRIAN DEVELOPMENT COOPERATION

2.3.1. Goals, principles, guidelines and sector policies of ADC

Poverty reduction is largely based on the sustainable development of environmental resources and ecosystem services, which are key-features influencing social and economic development. The project is fulfilling all key-criteria and priorities of the ADC-strategy for “Higher Education & Scientific Cooperation” and is supporting the regional and thematic priority goals of ADC.

CAPAQUA addresses the priority operational fields “sustainable natural resource management & preserving biodiversity”, “water & sanitation” and “climate change” of the ADC strategic guideline on “Environment & Development”, with special emphasis on sustainable management of environmental resources, ecosystem services, nature conservation & biodiversity, climate change adaptation/mitigation, IWRM and improved water quality. Within the “Water Supply & Sanitation” sector, the project activities contribute to ensure the availability of sufficient water resources and the long-term conservation of the natural resources basis and ecosystems. The project is promoting the Nexus approach and contributing to its main objectives, such as “resource efficiency”, “system efficiency”, “equal access” and “sustain ecosystem services”. The thematic focus is laid on the sustainable management of aquatic ecosystems and its interactions with the energy sector (e.g. hydropower), the food security sector (e.g. fisheries & aquaculture, irrigation for agriculture), the provision of additional ecosystem services, climate change effects and biodiversity aspects. Gender equality is another cross-cutting theme in all project activities, thus fellowships are given to female applicants with priority and female resource persons are approached to contribute to the academic programme. The project proposal was jointly developed by BOKU, UNESCO-IHE, Egerton University, Addis Ababa University, Bahir Dar University and EIAR-NFALRC in order to safeguard the orientation towards local demands and to ensure the ownership of the project

partners in Eastern Africa. The Eastern African partner institutions play leading roles in the implementation of all project activities.

2.3.2. Contribution to SDG's / Post-2015 Development Agenda

The outcome document of Rio+20 underlines the importance of water, energy, land and biodiversity as priority areas for Sustainable Development Goals (SDGs). The project contributes towards the following SDG Target Goals and the Post-2015 Development Agenda zero draft document (supposed to be adopted by the UN Summit in September 2015) respectively:

- Goal 4: Ensure inclusive and equitable quality education and promote life-long learning opportunities for all.
 - By 2030, substantially increase support for scholarships available to developing countries for enrolment in higher education and scientific programmes, in developed countries and other developing countries.
 - By 2030, all learners are taught by qualified teachers, including through international cooperation for teacher training in developing countries.

- Goal 6: Ensure availability and sustainable management of water and sanitation for all.
 - By 2030, improve water quality by reducing pollution, eliminating dumping and minimising release of hazardous chemicals and materials, halving the proportion of untreated wastewater and at least doubling recycling and safe reuse globally.

- Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.
 - By 2020 ensure conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.

- Take urgent and significant action to reduce degradation of natural habitat, halt the loss of biodiversity, and by 2020 protect and prevent the extinction of threatened species.
- Ensure fair and equitable sharing of the benefits arising from the utilization of genetic resources, and promote appropriate access to genetic resources.
- By 2020 introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems, and control or eradicate the priority species.
- By 2020, integrate ecosystems and biodiversity values into national and local planning, development processes and poverty reduction strategies, and accounts.
- Goal 12. Ensure sustainable consumption and production patterns.
 - By 2030 achieve sustainable management and efficient use of natural resources.
 - By 2030 ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.
 - By 2020 achieve environmentally sound management of chemicals and all wastes throughout their life cycle in accordance with agreed international frameworks and significantly reduce their release to air, water and soil to minimize their adverse impacts on human health and the environment.
- Goal 13: Take urgent action to combat climate change and its impacts
 - Strengthen resilience and adaptive capacity to climate related hazards and natural disasters in all countries.
 - Integrate climate change measures into national policies, strategies and planning.
- Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development.
 - By 2025, prevent and significantly reduce marine pollution of all kinds, particularly from land-based activities, including marine debris and nutrient pollution.

- Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
 - Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers and public and private research and development spending

- Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable.
 - Strengthen efforts to protect and safeguard the world's cultural and natural heritage.
 - By 2030, substantially reduce the number of deaths, the number of affected people and the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations, including through humanitarian assistance.

- Goal 3: Ensure healthy lives and promote well-being for all at all ages
 - By 2030 substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water, and soil pollution and contamination.

2.4. TARGET GROUPS, BENEFICIARIES & LOCAL PROJECT-PARTNERS

2.4.1. Target groups

The direct target groups are water/environmental professionals and institutions of Higher Education and Research in Eastern Africa.

2.4.2. Direct beneficiaries

2.4.2.1. Fellowship holders attending academic programmes

52 young Eastern African water/environmental professionals receive fellowships to attend academic programmes organised by BOKU, UNESCO-IHE, EGU, AAU, BDU and EIAR-NFALRC. Fellowships are awarded to applicants holding a relevant B.Sc. degree. The selection criteria include academic merits, gender considerations, socio-economic backgrounds and the relevance of the employing institution in Eastern Africa.

2.4.2.2. Other participants of academic programme

- Students studying relevant M.Sc. programmes at Eastern African universities, in particular M.Sc. students studying Limnology/Aquatic-Sciences at EGU, AAU and BDU;
- External sponsored and self-funded participants;
- Participants from Eastern African universities via regional/international exchange programmes.

2.4.2.3. Local partner institutions

The project enhances the education, research and extension capacities/portfolios of the local partner institutions EGU, AAU, BDU and EIAR-NFALRC via various measures:

- The implementation of high-quality educational programmes, using modern teaching methods within a skill-orientated curriculum (student centred teaching, inter- & transdisciplinary course components, adequate amount of laboratory and field-work courses) and achievement of international standards (Bologna & following declarations);
- Provision of financial means and know-how to set-up and maintain well-equipped and well managed aquatic laboratories and field-research facilities;

- Strengthening of the internationalisation process at EGU via regional/international student exchange, lecturer exchange and the implementation of the international joint-degree Master's programme LWM;
- Facilitating extension services to public and private sector via the support of experimental field-research facilities (e.g. Constructed Wetlands; Aquaculture);
- Initiation of national-, regional- and international collaborations, projects and partnerships.

2.4.2.4. Eastern African institutions

Prerequisite for the award of ADC/NFP fellowships for LWM is an ongoing employment at Eastern African institutions of thematic relevance – typically universities, research institutions, environmental agencies & NGO's, water & sanitation agencies, environmental & water consultancy firms, ministries, and international agencies. Hence, these institutions are direct beneficiaries via the academic training of its staff, M.Sc. projects carried-out on priority topics of the employing institution and amplified networking with CAPAQUA partner institutions.

2.4.2.5. Academic and technical staff of Eastern African partner institutions

Academic and technical staff of EGU, AAU, BDU and EIAR-NFALRC benefit from the Train-the-Trainer course, international exchange programmes, international collaborations and have opportunities to advertise and expand their research activities.

2.4.2.6. Other lecturers from Eastern Africa

Lecturers of the academic programme are drawn from several consortium external institutions in Eastern Africa, who are also benefiting from international-, regional- and inter-sectorial collaborations among institutions of Higher Education & Research, Research and Management, Policy-Advise and NGO's (e.g. Makerere University, Uganda; University of Dar es Salaam, Tanzania; Moi University, Kenya; Kenya Marine and Fisheries Research Institute, Kenya; Department of Fisheries, Kenya; Fisheries Resource Research Institute, Uganda; Water Resource

Management Authority, Kenya; Ethiopian Environmental Protection Agency; BFALRC, Amhara Regional Agricultural Research Institute).

2.4.3. Indirect beneficiaries

- Eastern African ministries, environmental agencies, PPP's (water & sanitation sector), research institutions and environmental consultant firms (M.Sc. programme graduates for staff recruitment, enhanced networking, scientific contributions via joint M.Sc. research projects).
- International, regional and national programmes targeting the sustainable management of environmental/water resources and environmental conservation (M.Sc. programme graduates for staff recruitment, enhanced networking, exchange of staff/experts, scientific contributions via joint M.Sc. research projects);
- Eastern African GO's and NGO's who are stakeholders within the conservation and sustainable management of aquatic ecosystems/resources (access to information and experts; M.Sc. programme graduates for staff recruitment; scientific contributions via joint M.Sc. research projects);
- The whole population in Eastern Africa benefits from initiatives and activities of programme graduates/resource-persons towards the sustainable management of aquatic ecosystems and resources.

2.4.4. Local project-partners

2.4.4.1. Egerton University

Egerton University (EGU) was granted a full university status by an Act of Parliament in 1987. Prior to this, it was an agricultural school for British ex-service men since 1939. Nowadays, EGU has more than 12,000 students taking various undergraduate and postgraduate programmes. EGU has the capacity to carry-out research to address aquatic issues and more than 25 staff members in aquatic sciences have been trained in water-related disciplines in Austria, The Netherlands, United Kingdom, Germany and USA. EGU's international partnerships provide synergy effects and networking platforms for Eastern African universities, other stakeholders and the larger society.

Recently, EGU has established a new research and extension concept - the "Agro Science Park", whose mandate is to provide research and extension services to the public and private sector. Within the "Agro Science Park" context, the former

CAPAQUA project provided funds to establish experimental field/lab-sites on “Constructed Wetlands (CW)” and “Aquaculture - Improved Fish-Fingerling Production” for the enhancement of the education, research and extension capacity/portfolio of EGU. The current CAPQUA project will carry-out at least 6 research projects at the newly established experimental field/lab-sites.

The LWM-programme is hosted by the Department of Biological Sciences, which is hosting joint activities with Austrian scientists in aquatic sciences for more than 30 years and the international Joint-Degree Master programme in “Limnology & Wetland Management” since 2012.

2.4.4.2. Addis Ababa University

Emperor Haile Silassie I declared the foundation of the University College of Addis Ababa in 1950. Starting with 33 students in 1950 and only one diploma and certificate granting department, namely Biology, Addis Ababa University (AAU) today comprises more than 25 faculties, offering 70 undergraduate and 293 graduate degree programmes with 50,000 students enrolled.

The Department of Zoological Sciences, within the College of Natural and Computational Sciences, is the host and overall coordinating institution of the joint M.Sc. programme in “Aquatic Ecosystems & Environmental Management (AEEM)” since 2013. The history of the Department of Zoological Sciences goes back to the foundation of the former Department of Biology under the University College of Addis Ababa in 1950. The Department of Zoological Sciences started running as a full-fledged unit in October 2010, having 15 academic staff members currently. Beside hosting AEEM, the Department is offering a M.Sc. programme in “Fisheries & Aquatic Sciences” and has a long tradition in aquatic sciences such as: Freshwater Fisheries and Limnology Project (CIDA funded); inter-institutional research collaboration between animal ecologists and fisheries biologists with the Ethiopian Science and Technology Commission in the Joint Ethio-Russian Biological Expedition; and fishery biologists and limnologists of the Department are currently collaborating with EIAR and EPA (Ethiopian Environmental Protection Agency). The existing international collaborations and partnerships have the potential to provide synergy effects and to intensify regional and international networking.

2.4.4.3. Bahir Dar University

Bahir Dar University (BDU) was established in 2000 by merging two former institutions of Higher Education - namely Bahir Dar Polytechnic and Bahir Dar Teachers' College. Bahir Dar University is now among the largest universities in the Federal Democratic Republic of Ethiopia, with more than 35,000 students in 57 undergraduate and 39 graduate programmes. The current research focus of Bahir Dar University aims at creating knowledge packages and deliverables for various applications. These packages shall concentrate on (1) Lake Tana and its watershed, (2) pedagogical issues, (3) textile, (4) energy, (5) biotechnology and (5) ICT.

The "Blue Nile Water Institute (BNWI)" of Bahir Dar University has been established in 2011 and has currently 14 academic core staff members. The main objectives of BNWI are:

- To contribute to sustainable management of water and water related resources in upper Blue Nile basin through conducting applied and basic researches;
- To provide consultancy and advisory services; and
- To document and disseminate water and water related information and proven technologies.

The BDU-semester of the Ethiopian joint M.Sc. programme in "Aquatic Ecosystems & Environmental Management (AEEM)" is coordinated and managed by BNWI, whereas the College of Agriculture and Environmental Science is handling academic administration issues. Staff members of BNWI, College of Agriculture and Environmental Science and the College of Science contribute within the AEEM programme. Currently, Bahir Dar University is offering two M.Sc. programmes, which are including aquatic sciences. The M.Sc. programmes in "Fisheries and Wetland Management", administered by the College of Agriculture and Environmental Science and the M.Sc. programme in "Biology" within the College of Science.

2.4.4.4. EIAR-NFALRC

The Ethiopian Institute of Agricultural Research (EIAR) has evolved through several stages since its first initiation in the late 1940s. The Ethiopian Agricultural Research System (EARS) consists of EIAR, RARIs (Regional Agricultural Research

Institutes) and HLIs (Higher Learning Institutions). EIAR is responsible for running federal research centres, whereas the regional state governments administer RARIs. In addition to conduct research at its federal centres, EIAR is in charge of coordinating agricultural research countrywide and to advise the Ethiopian government on agricultural research policies. Currently, EIAR comprises 15 federal research centres, including the NFLARC (National Fish and Other Aquatic Lives Research Center, Sebeta).

The federal research centre NFLARC is conducting research and providing policy advice on aquaculture, fisheries and water-quality/limnology issues. NFLARC was involved in planning and developing the AEEM curriculum and is contributing to AEEM since 2013, by hosting field- and laboratory courses, contributing academic staff for teaching within AEEM and providing access to research facilities for AEEM students.

2.5. PROBLEM ANALYSIS AND ANALYSIS OF LOCAL POTENTIALS

2.5.1. Problem Analysis

Biodiversity, natural resources and ecosystem services are important for all, but essential for the rural poor who often rely directly on local ecosystem services and biodiversity for their food, health, income, shelter, energy and quality of life. In addition, the conventional sectorial approach to water supply & sanitation is increasingly shifted towards holistic concepts, such as the Nexus approach.

Aquatic ecosystems provide crucial resources (water for drinking & irrigation schemes, fish, grazing area for livestock, plants as house-building material) and functional aquatic ecosystems render services, such as water purification, protection against floods, water supply during dry-periods, hydropower generation and the provision of fertile land. On the global scale, aquatic ecosystems are amongst the most valuable and sensitive ecosystems. The situation in Eastern Africa is even more dramatic, due to the growing population, high poverty prevalence and climate change effects. The divergence between increasing water resource demands, changing availability of water resources and conflicting objectives of stakeholder groups is calling for innovative ecosystem management solutions adapted to the Eastern African context. Sustainable solutions are ideally

developed, promoted and implemented by Eastern African institutions and professionals by aligning interests of a wide range of stakeholders and thus mobilising society, policy makers and financial resources in Eastern Africa.

Institutions of Higher Education & Research are considered as key-agents for innovation, transformation and the provision of highly qualified professionals. However, though the massive increase of university enrolment numbers, still tertiary education attainment is very low in sub-Saharan Africa, compared to OECD countries. Furthermore, the quality-issue has become a crucial subject of discussion and major concern among stakeholders in Eastern Africa, as a result of the recent student enrolment expansions and the establishment of a large number of new universities with limited capacity. The lack of highly qualified staff, adequate infrastructure and financial resources to support student learning are the most cited factors to affect the quality of education negatively. These issues are even more crucial for academic programmes in natural sciences, medicine, engineering and technology, since these subjects require laboratories, equipment and practical courses to generate highly skilled graduates.

2.5.2. Project Strategy

CAPAQUA 2015-2018 supports capacity enhancement processes at Eastern African universities at the qualitative level, which is considered to be highly appropriate for the Eastern African context developments. The project supports Eastern African efforts to enhance the quality and relevance of education/research/extension programmes and increases the number of well-educated and well-skilled postgraduates, hence delivering highly qualified HEST-staff for Eastern Africa.

The project is supporting capacity enhancement processes at Eastern African institutions, which are educating professionals, carrying-out relevant research and contribute to the development and implementation of evidence-based policies in Eastern Africa. The target institutions are key-agents for: (1) developing and implementing sustainable ecosystem management strategies, which are adapted to the local context; (2) monitoring the effect of management strategies and contribute towards the development of evidence-based policies; and (3) mobilising society and financial resources to improve the management of environmental assets to the benefit of all people in Eastern Africa. Furthermore,

the project is simultaneously feeding-back the Eastern African expertise and capacity into international collaborations and efforts.

2.5.3 Local Potentials

Egerton University

EGU has conclusive education, research and extension capacity in aquatic ecology and water resource management. EGU proved to be a reliable and highly committed project partner within the last 16 years of collaborative activities within ADC-funded projects. EGU is situated within the heart of the Kenyan Rift Valley, in close proximity to unique and highly diverse lakes, rivers and wetlands within a complex geo-morphological set-up. Various human interventions are affecting the aquatic ecosystems, thus providing excellent scenarios for educational programmes and research activities. EGU has good linkages with Eastern African universities, research institutions and other stakeholder institutions (policy advice/development and governance institutions, NGO's), hence significant potential to intensify collaborative activities.

Ethiopian project partners

The Ethiopian consortium of Addis Ababa University, Bahir Dar University and EIAR-NFALRC are highly distinguished representatives of the Ethiopian Education and Research landscape in aquatic ecology and aquatic resource management. The Ethiopian institutions are located in different ecological zones, providing easy access to unique and highly diverse lakes, rivers and wetlands, including Lake Tana – the source of the Blue Nile River. The project is combining the capacity and expertise of three prestigious Ethiopian institutions, is implementing a pioneering joint M.Sc. programme in Ethiopia and integrates academia with research and policy-advisory institutions. EIAR-NFALRC and BOKU are partner institutions within two ADC-funded APPEAR projects, hence a multitude of synergy effects are highly anticipated (APPEAR projects: “LARIMA - Sustainable Highland Rivers Management in Ethiopia” and “STRECAFISH - Strengthening regional capacity in research and training in fisheries and aquaculture for improved food security and livelihoods in Eastern Africa”).

2.6. HARMONISATION AND ALIGNMENT

All project-partners are well connected with national, regional and international activities and programmes in Eastern Africa. The enhancement of national,

regional and international collaboration is an important project objective, thus the project is intensifying current partnerships and establishing new collaborations in Eastern Africa. The project has been developed jointly by BOKU, EGU, AAU, BDU, EIAR-NFALRC and UNESCO-IHE, based on the consortium knowledge on relevant actors, activities and interventions in Eastern Africa. The project activities are aligned to the UNESCO recommendations for "Water Education and Research" and are implemented in cooperation with UNESCO-IHE.

2.7. DATA BASIS AND DOCUMENTATION

The project is a result of long-term collaborations among the project partners, a number of workshops and meetings of BOKU, UNESCO-IHE, EGU, AAU, BDU, EIAR-NFALRC and ADC representatives to explore options to intensify the support of capacity development processes at Eastern African institutions of higher education. Thus, the project is largely build-upon conclusions derived from former joint-projects of the project consortium. The project documentation is done within yearly project-reports, containing project activities, project progresses and monitoring results.

3. INTERVENTION LOGIC

3.1. OVERALL OBJECTIVE

To foster the sustainable management of aquatic ecosystems and their resources in order to improve livelihoods in Eastern Africa and to contribute towards the achievement of the SDG's.

3.2. PROJECT OBJECTIVE

To enhance the capacity of Eastern African HEST-Institutions to provide highly qualified graduates to the job market and to develop and implement strategies/projects towards the conservation and sustainable management of aquatic ecosystems and aquatic resources.

3.3. EXPECTED RESULTS

3.3.1. Expected result 1

International joint-degree Master's programme in "Limnology & Wetland Management (LWM)" successfully implemented as high-quality programme by

Egerton University, UNESCO-IHE & BOKU and attraction of external funded students.

3.3.2. Expected result 2

Joint M.Sc. programme in “Aquatic Ecosystem & Environmental Management (AEEM)” successfully implemented as a sustainable high-quality programme by Addis Ababa University, Bahir Dar University & EIAR-NFALRC, delivering at least 20 highly qualified graduates.

3.3.3. Expected result 3

Concept and road-map to ensure sustainability of AEEM & LWM developed and suitable measures initiated.

3.4. ACTIVITIES

3.4.1. Project activity 1.1.: Implementation of joint-degree

Master's programme in "Limnology & Wetland Management" in Europe (4-months in Austria and 4-months in The Netherlands) with 28 participants

3.4.1.1. International joint-degree Master's programme in "Limnology & Wetland Management (LWM)"

LWM was established in 2012 and is still a pioneer programme at BOKU, Egerton University and UNESCO-IHE. In April 2014, LWM-graduates have received the first joint-degree Master certificates issued by any of the three partner universities ever. Two external evaluations confirmed the high quality of the LWM programme and the CAPAQUA 2015-2018 project is implementing further measures to increase both the quality and efficiency of LWM.

The first semester of the international joint-degree programme is organised by BOKU from October to January in Austria, the second semester by Egerton University from January to May in Kenya and the third semester by UNESCO-IHE from May to September in The Netherlands. The 12-months taught-period is followed by a 7-months M.Sc. research project, which is preferably carried-out at Egerton University, or at other partner institutions in Eastern Africa. 28 LWM participants are graduating within the project cycle in total, whereby 24 participants are sponsored via ADC/NFP fellowships and 4 students are external/self-funded.

The key-competence areas of graduates of the international joint-degree Master's programme in Limnology & Wetland Management are:

- To identify and critically evaluate human impacts onto aquatic ecosystems, to evaluate the consequences for aquatic ecosystems and to develop measures for the protection, restoration and sustainable management of aquatic ecosystems and aquatic resources;
- To collate stakeholder views and integrating potentially conflicting objectives for the efficient and sustainable use of lakes, rivers and wetlands by using environmental management concepts for developing realistic action plans;

- To apply knowledge and scientific-skills in international and multicultural teams and different socio-cultural environments;
- To evaluate the interaction of environmental and socio-economic challenges in both developed and developing countries; and
- To contribute to global development efforts (SDG's; policies and programmes of national and international development cooperation agencies).

Curriculum of the international joint-degree Master's programme in "Limnology & Wetland Management (LWM)":

	Study location	ECTS points	Total hours
BOKU semester (October - January)			
LWM1: Basics in Limnology	AT	9,0	225
LWM2: Ecology of Aquatic Organisms	AT	6,0	150
LWM3: Basics in Applied Limnology	AT	6,0	150
LWM4: Aquatic Ecosystem Management	AT	4,0	100
LWM5: Scientific Working	AT	3,0	75
EGERTON semester (January – May)			
LWM6: Lake Ecology	KE	5,6	140
LWM7: Stream & River Ecology	KE	5,6	140
LWM8: Wetlands for Water Quality	KE	5,6	140
LWM9: Fisheries & Aquaculture	KE	5,6	140
UNESCO-IHE semester (May – September)			
LWM10: Wetlands for Livelihoods & Conservation	NL	5,6	140
LWM11: Aquatic Ecosystems: Processes and Applications	NL	5,6	140
LWM12: Data Analysis and Modelling for Aquatic Ecosystems	NL	5,6	140
LWM13: Group-work	NL	5,6	140
LWM14: Research Methods & Summer School	NL	3,8	95
Electives / MSc proposal			
LWM15: Research plan, logistics, site assessment, application & societal relevance	KE/AT/NL/ etc.	13,4	335
MSc-Thesis			
LWM16: M.Sc. Research and Thesis writing	KE/AT/NL/ etc.	30,0	750
TOTAL	120	120	3000

The LWM-JMC (Joint Management Committee of LWM) is in charge of the overall coordination of LWM and to oversee and implement quality assurance measures,

based on continuous student feedback mechanisms (anonymous student questionnaires, LWM student feed-back-workshops), internal- and external evaluations and the institutional-internal quality assurance procedures at BOKU, EGU and UNESCO-IHE.

3.4.1.2. BOKU semester and UNESCO-IHE semester of LWM

Both, the Austrian semester at BOKU and the Netherlands semester at UNESCO-IHE are structured into course modules. The Austrian semester is held at BOKU and the Interuniversity Research Centre WasserCluster, Lunz. Additionally, various other institutions are contributing to the BOKU semester and/or the supervision of M.Sc. research projects (University of Vienna; University of Graz; Federal Environmental Agency, Vienna; University of Technology, Vienna; etc.), plus international guest lecturers. All course modules integrate fundamental science and applied aspects for achieving practical solutions, which are based on solid scientific foundations. The majority of course modules include skill-orientated elements such as: laboratory/field-work, excursions, group-work, seminars, data analysis/interpretation, student presentations, report writing and environmental modelling. The obtained data/findings are put into a broader context and/or legal frameworks to derive relevant conclusions and recommendations. Several course modules include problem-based learning, case studies, transdisciplinary aspects and action learning components in order to achieve educational objectives at higher levels of learning.

Both, BOKU and UNESCO-IHE are fully responsible for the organisation and implementation of their semesters. BOKU is in charge of the admission and registration of all LWM students, all student affairs within the Austrian semester and all logistics plus the fellowship handling of ADC-funded participants for the whole 19-months study period. UNESCO-IHE is in charge of all student affairs within the UNESCO-IHE semester and all logistics plus the fellowship handling of NUFFIC/NFP-funded participants for the whole 19-months study period.

3.4.2. Project activity 1.2.: Implementation of 28 M.Sc. research projects within the joint-degree Master's programme in "Limnology & Wetland Management"

28 M.Sc. research projects are fully, or partly carried-out in Eastern Africa, from October to April each year (24 students are sponsored by ADC/NFP fellowships,

plus 4 external or self-funded students). The M.Sc. project duration is 6-months, plus 1 month for finalising the M.Sc. thesis and preparing for the M.Sc. examination. The M.Sc. students are allowed to choose their M.Sc. topic by themselves, under consultation of BOKU, UNESCO-IHE, EGU and their employing institution. BOKU, UNESCO-IHE and EGU are facilitating the whole process, including the identification of appropriate M.Sc. supervisors and host institutions in Eastern Africa. EGU, BOKU and UNESCO-IHE are also facilitating the implementation of the M.Sc. project in Eastern Africa, the production of the M.Sc. thesis and other preparations for the M.Sc. examination. BOKU, UNESCO-IHE and EGU are jointly responsible for all logistics and administrative issues during the M.Sc. research project phase.

3.4.3. Project activity 1.3.: Implementation of Kenyan LWM-semester at Egerton University (4-months) as integral part of the international joint-degree Master's programme in "Limnology & Wetland Management" with 49 participants

The Kenyan LWM-semester is structured into four 3-weeks course modules of 22.4 ECTS in total (560 teaching-hours). At least 20 resource persons from at least five different research/management institutions in Eastern Africa (Kenya, Uganda, Ethiopia, and Tanzania) are contributing as lecturers. Several policy-related stakeholder institutions are contributing to the academic programme (WRMA – Water Resource Management Authority; Kenyan Ministry of Fisheries; KWS – Kenyan Wildlife Services; LVBC - Lake Victoria Basin Commission). Course modules are held at Egerton University, KMFRI (Kenya Marine and Fisheries Research Institute, Kisumu & Mombasa) and Sagana Aquaculture Centre (KMFRI & Kenyan Ministry of Fisheries). The majority of course modules include interdisciplinary aspects and two course modules integrate transdisciplinary elements, such as interacting with communities who are using aquatic resources (wetlands, fish, etc.), private enterprises (e.g. flower farms, fish farms), conservation parks, municipalities and NGO's. Each of the course modules includes laboratory/field-work, excursions, group-work, data analysis and data interpretation. Various excursions and field-trips are organised as integral components of the curriculum.

49 students are attending the Kenyan LWM-semester. In addition to the 24 regular LWM-participants sponsored via ADC/NFP fellowships, 3 young water/environmental professionals from Eastern Africa receive ADC-fellowships to attend the Kenyan LWM-semester. The ADC fellowships for the Kenyan LWM-semester are awarded to applicants holding a B.Sc. degree of thematic relevance. The selection criteria include individual academic merits, gender and socio-economic backgrounds. Special consideration is given to applicants who are enrolled in M.Sc. programmes of Eastern African universities, which have accredited the academic credits awarded within the Kenyan LWM-semester. Furthermore, at least 22 external/self-funded students are attending the Kenyan LWM-semester.

Egerton University is responsible for the organisation and implementation of the Kenyan LWM-semester and is in charge of all student affairs, logistics, financial management and the provision of financial statements and external audit reports.

3.4.4. Project activity 2.1.: Implementation of joint M.Sc. programme in “Aquatic Ecosystems & Environmental Management (AEEM)” of Addis Ababa University, Bahir Dar University and EIAR-NFALRC with 37 participants

The collaborative joint M.Sc. programme in “Aquatic Ecosystems & Environmental Management (AEEM)” was established in October 2013. AEEM serves as a model for high-quality and skill-orientated joint M.Sc. programmes and inter-university partnership in Higher Education in Ethiopia, combining thematic expertise, facilities and human capital of two universities and one research/policy institution.

The first AEEM semester is organised by Addis Ababa University (AAU) and held at AAU and EIAR-NFLARC. The second semester is organised by Bahir Dar University (BDU) and held at BDU. The 3rd semesters includes integrative modules, research-skills and the M.Sc. research topic is developed at any institution of the Ethiopian consortium. In the fourth semester, the M.Sc. research project is carried-out, the M.Sc. thesis is written, defended/examined and the graduation takes place. 37 participants are attending the AEEM programme in total, whereby 25 AEEM participants are sponsored via ADC-fellowships and 12 students are external/self-sponsored.

AEEM CURRICULUM - OUTLINE		
Joint M.Sc. Programme “Aquatic Ecosystems & Environmental Management (AEEM)” Addis Ababa University and Bahir Dar University, in collaboration with EIAR-NFALRC		
	ECTS	Working load (hours)
1st Semester: AAU		
Inland Water Ecology & Management	7	175
Fish Biology, Production and Management	7	175
Case Studies on Lakes, Rivers & Wetlands	9	225
Aquaculture	7	175
2nd Semester: BDU		
Wetland Ecosystem Management	7	175
Advanced Water Quality Management	7	175
IWRM – Integrated Water Resource Management	7	175
Environmental Policy & Advocacy (aquatic)	7	175
Environmental Planning & Case Studies	7	175
3rd Semester: AAU / BDU / EIAR-NFLARC		
Modelling of Aquatic Ecosystems (Ecological & Env. Modelling)	7	175
Research methods	9	225
Graduate Seminar	5	125
MSc Research Proposal & Defense	9	225
4th Semester: AAU / BDU / EIAR-NFLARC		
MSc Research Project & MSc Thesis	30	750
TOTAL	125	3125

The AEEM programme equips graduates with the following competences:

- Understand the various water resources of the country, its irreplaceable role in food security and development and the threat they are facing;
- Understand and internalise the mechanisms of how aquatic systems function;
- Integrate and adapt existing indigenous knowledge with contemporary scientific developments on freshwater systems to meet the growing needs of the population without compromising the need of future generations;
- To devise management plans for sustainable utilisation of aquatic resources without compromising their ecological integrity;
- Mitigate water related problems such as pollution (organic, pesticides, heavy metals, etc.), siltation, floods, droughts, waterborne diseases,

overfishing, etc. which could come along the development efforts of the nation;

- Have adequate research skills to identify research problems, write proposal and conduct research independently, data analysis and interpretation, and writing reports and peer-reviewed publications;
- Have practical skills to establish and run aquaculture facilities, monitor water quality, manage wetland & lake ecosystems and conduct environmental impact assessments;
- Become pro-active leaders and influence society, policy and decision makers, in matters related to aquatic sciences, fisheries, aquaculture and wetland management;
- Educate and train others in the area of aquatic resources/ ecosystems management; and
- Be an entrepreneur in self-employment and creating jobs for others in aquatic sciences.

The majority of AEEM course modules include skill-orientated elements such as: laboratory/field-work, excursions, group-work, seminars, data analysis/interpretation, student presentations, report writing and environmental modelling. Several course modules include problem-based learning, case studies, transdisciplinary aspects and action learning components in order to achieve educational objectives at higher levels of learning.

The first semester is organised by the Dept. of Zoology of AAU. The course modules are held at AAU and EIAR-NFLARC, including field-sampling sessions at lakes, rivers, fishponds and wetlands. At least ten lecturers from AAU and EIAR/NFLARC contribute to the course modules, plus at least two lecturers from external research/management institutions. Two modules focus on skill-orientated components such as: (1) "Case Studies on Lakes, Rivers & Wetlands", including a two weeks field-sampling trip to Lake Wonchi, Lake Ziway, Debrezeit Wetland and Kebena/Bulbula river and (2) "Fish Biology, Production and Management", including a one week field/lab course on aquaculture at EIAR-NFLARC in Sebeta. Within these modules, field-samples are analysed in laboratory sessions, further data analyses/interpretation is performed and finally the research results are presented, discussed and written reports are prepared.

The second semester is organised by the Blue Nile Water Institute (BNWI) of Bahir Dar University. The modules are held at BDU and the Amhara Regional Health Research Laboratory Bahir Dar, including field sampling sessions at Lake Tana and at various reservoirs, rivers and wetlands. At least ten lecturers from BDU and staff from the Regional Health Research Laboratory Bahir Dar contribute to the course modules. Two course modules include practical field/laboratory sessions of at least 5 days. In addition, a 5 days module-cross-cutting field-excursion is illustrating case examples of previous course modules. Two modules include intensive student assignments, emphasising on literature analysis, case-study analyses, synthesising competences and presentation/writing skills.

The third semester is organised by AAU, BDU and EAIR-NFLARC and builds-up on the first and second AEEM semester. Provided are modules strengthening the integrative thinking of students, research-skills are developed and the M.Sc. research proposal document is written. In the fourth semester, the M.Sc. research project is carried-out, the M.Sc. thesis is written, defended/examined and the graduation takes place. Students can chose their M.Sc. project of choice and supervision is provided from either AAU, BDU, or EAIR-NFLARC and co-supervision from BOKU eventually. Both AAU and BDU sign and issue the joint-degree Master certificates.

The AEEM-JMC (Joint Management Committee of AEEM) is in charge of the overall coordination of the joint M.Sc. programme. The AEEM-JMC is also in charge to oversee and implement quality assurance measures, based on continuous student feedback mechanisms (anonymous student questionnaires, student feed-back-workshops), internal- and external evaluations and the institutional-internal quality assurance procedures of AAU and BDU. AAU and BDU are responsible for organising and implementing theirs taught semesters, including student affairs and logistics. Either AAU, or BDU are in charge of the M.Sc. research semesters, depending whether the students have decided to do theirs M.Sc. research projects at AAU/EAIR-NFALRC or BDU. The responsibilities for the M.Sc. research semesters include all student affairs, logistics and the M.Sc. examination/graduation process. AAU and BDU are in charge of the administration of ADC-funds provided via BOKU, including financial accounting, the provision of financial statements and the delivery of audit reports by external audit firms.

The selection of ADC-fellowship candidates is done within a two-staged procedure. Firstly, all applicants with a suitable academic background are ranked based on (a) the academic performance during the B.Sc. studies, (b) results achieved within the written AEEM study entrance examination, (c) gender & marginalised group aspects and (d) the socio-economical background of the applicant. Secondly, the 20 top-ranked applicants are interviewed by AEEM-JMC-members, with special emphasis on English language skills, thematic knowledge, the motivation and expectations of applicants', the applicants' perception how AEEM may support the applicants' ambitions and career goals, plus gender & marginalised group aspects.

3.4.5. Project activity 2.2.: Implementation of one Train-the-Trainer Workshop for 20 AEEM lecturers/resource-persons

A 5-days Train-the-Trainer Workshop is organised in Ethiopia for at least 20 AEEM lecturers and personnel from institutions, which are collaborating with AEEM. The workshop is an important measure to enhance the academic quality of the AEEM programme and to bolster the education and research capacity of AEEM institutions. Thematically, the workshop is capturing contemporary scientific concepts/methods towards the sustainable management of aquatic ecosystems and resources. The workshop provides skill-orientated training with intensive field- and laboratory sessions at state-of-the-art level. The thematic focus of the workshop is determined by the specific demand of AEEM personnel, in conjunction with the demands expressed by stake-holder institutions.

3.4.6. Project activity 3.1.: Implementation of stakeholder consultations and two workshops to establish a concept and road-map to ensure sustainability of AEEM & LWM

The recently established joint M.Sc. programmes AEEM and LWM are pioneering models towards inter-university partnership in Higher Education in Eastern Africa. Concepts, suitable measures and road-maps towards the sustainability of AEEM/LWM are developed within stake-holder consultations and two workshops, in order to build a solid foundation for AEEM/LWM and paving the way for wider applications of inter-university collaborations in Eastern Africa.

The following action-points are followed-up, in addition to further options, which are anticipated to arise within the process:

- Strengthening synergy effects between AEEM/LWM and suitable M.Sc. programmes at AAU, BDU and EGU and establishing collaborations with other Ethiopian/Kenyan M.Sc. programmes (enlarging student numbers benefiting from AEEM/LWM modules, programme cost-sharing, promotion of high quality programmes and inter-university collaborations);
- Enhancing the visibility, ownership and commitment to AEEM/LWM at the administration/management level of AAU, BDU, EIAR-NFALRC and EGU (e.g. enlargement of AEEM-JMC with administrators, mobilise administration/management to provide personnel, office-space, in-kind contributions to AEEM and governmental fellowships to AEEM students; intense engagement of LWM within extension projects of EGU, etc.);
- Attracting AEEM/LWM students who are sponsored by Ethiopian/Kenyan stakeholder institutions (federal and regional governments, research institutions and agencies) and/or self-sponsored, in order to generate income for the implementation of AEEM/LWM via tuition-fees;
- Acquisition of financial support and fellowships from international funding agencies (DAAD/Germany, Dutch Embassy/DGIS/NUFFIC, SIDA, CIDA, DANIDA, NORAD, etc.);
- Promotion of inter-university academic programmes within the Ethiopian and Kenyan Ministry of Education and Regional Education Bureaus in Ethiopia.

The concept and road-map towards the sustainability of AEEM and LWM is developed within a 5-step process:

- Development of a key-stakeholder matrix;
- Consultations with key-stakeholders;
- Development of a concept, suitable measures and road-map;
- Implementation of two workshops “Concept & Road-Map towards Sustainability” to ensure commitment and endorsement of the road-map and measures to be implemented;
- Delivery of report on suitable measures and road map towards sustainability.

The road-map and endorsed measures are followed-up in the 2nd and 3rd project year. The road-map and results achieved are finally complemented by recommendations of the external evaluation in the 3rd project year.

4. PROJECT IMPLEMENTATION

4.1. METHODOLOGY

The project implementation builds upon former collaborations among BOKU/IPGL, UNESCO-IHE, EGU, AAU, BDU, EIAR-NFALRC and several other institutions in Eastern Africa. Each project partner is responsible for the implementation of specific project activities, which are outlined in the current project proposal. The Eastern African partner institutions play leading roles in the implementation of all project activities to ensure local ownership, institutional capacity and regional networking in Eastern Africa.

4.2. TIME SCHEDULE

The time schedule is presented in ANNEX II.

4.3. NECESSARY MEANS & COSTS

The project budget summary is provided in ANNEX IIIa and the detailed project budget is presented in ANNEX IIIb.

Financial means of EURO 1,650,000.- are requested from ADC. BOKU, EGU, UNESCO-IHE, AAU, BDU and EIAR-NFALRC are contributing in-kind with the provision of personnel and infrastructure (office space, teaching & research facilities, research equipment, technical & scientific personnel and administration and management personnel). The Austrian Federal Ministry of Science, Research and Economy is contributing via the HRSM project "Internationalisierung der Lehre: International Joint Degree Master Programme in Limnology & Wetland Management via BOKU with EURO 144,000.- for covering 50% of the salary costs of the CAPAQUA project coordinator at BOKU. Additionally, NUFFIC/NFP fellowships are contributing via UNESCO-IHE to the implementation of the project in the amount of EURO 280,000.-.

4.3.1. Funding Scheme

FUNDING SCHEME	EURO	%
Project funds provided by ADC	1,650,000.-	80
HRSM project contribution via BOKU	144,000.-	7
Financial contribution provided via UNESCO-IHE from NUFFIC/NFP fellowships	280,000.-	13
OVERALL PROJECT COSTS	2,074,000.-	100

4.3.2. Disbursement Scheme

Funding agency / institution	Year 1 (EURO)	Year 2 (EURO)	Year 3 (EURO)
Yearly disbursement of ADC-funds to BOKU	600,000.-	450,000.--	435,000.--
Disbursement of final ADC-instalment of 10% after acceptance of financial statement for the whole project period	165,000.-		
OVERALL DISBURSEMENT of ADC-funds	1,650,000.-		

4.4. ORGANISATIONAL STRUCTURE & PROCESSES

Leading institutions

BOKU, UNESCO-IHE and Egerton University are the leading institutions for planning, steering and managing the joint-degree Master's programme in "Limnology & Wetland Management (LWM)". Addis Ababa University, Bahir Dar University, EIAR-NFALRC and BOKU are the leading institutions for planning, steering and managing the joint M.Sc. programme in "Aquatic Ecosystems & Environmental Management (AEEM)", whereas Addis Ababa University is the overall coordinator of the AEEM programme. The organisational procedures are described within written agreements among the project partners in detail (Cooperation Agreements, Operational Agreements, and Education & Examination Regulation Agreements).

Programme coordinators at each partner institution are responsible for the management of the project, including financial management:

- BOKU: Mr Gerold Winkler (M.Sc.)
- UNESCO-IHE: Mr Edwin Hes (M.Sc.)
- Egerton University: Ms Nzula Kitaka (Ph.D., Assoc. Prof.)

- Addis Ababa University: Mr Seyoum Mengistou (Ph.D., Prof.)
- Bahir Dar University: Mr Goraw Goshu (M.Sc.)
- EIAR-NFALRC: Mr Adamneh Dagne (Ph.D.)

The Joint Management Committees (JMC's) of the LWM and AEEM programme are in charge of achieving inter-institutional agreement, overseeing the programme implementation and monitoring the academic quality.

The LWM-JMC consists of:

- BOKU: Mr Gerold Winkler (M.Sc., LWM Coordinator Austria, CAPQUA project coordinator)
- BOKU: Mr Wolfram Graf (Ph.D., Ass Prof)
- UNESCO-IHE: Mr Edwin Hes (M.Sc., LWM Coordinator The Netherlands)
- UNESCO-IHE: Mr Kenneth Irvine (Ph.D., Prof)
- EGU: Ms Nzula Kitaka (Ph.D., Assoc Prof, LWM Coordinator Kenya)
- EGU: Mr S. F. O Owidoo (Ph.D., Prof., Registrar Academic Affairs)

The AEEM-JMC consists of:

- Addis Ababa University: Mr Seyoum Mengistou (Ph.D., Prof., Overall AEEM Coordinator, Coordinator of AAU semester)
- Addis Ababa University: Mr Getahun Abebe (Ph.D., Assoc. Prof., Chairperson Zoological Science Department)
- Bahir Dar University: Mr Goraw Goshu (M.Sc., Director Blue Nile Water Institute, Coordinator of BDU semester)
- EIAR-NFALRC: Mr Adamneh Dagne (Ph.D., Coordinator of AEEM courses at EAIR-NFLARC)
- BOKU: Mr Gerold Winkler (M.Sc., CAPQUA project coordinator)
- Three more JMC-members from administration/management of AAU, BDU and EAIR-NFLARC are integrated as JMC members in October 2015.

The programme coordinators and JMC-members have a long experience in working together and there is mutual agreement on project goals, objectives and activities, as well as on the procedures for implementing the project.

ToR's for the CAPAQUA project manager at BOKU

The responsibilities of the CAPAQUA project manager are:

- Overall management of ADC-funded CAPAQUA activities;
- Coordination and joint-planning of CAPAQUA activities with partner institutions in Kenya, Ethiopia, The Netherlands and associated partner institutions in Eastern Africa and Europe;
- Development, coordination and quality assurance of academic programmes and M.Sc. research projects;
- Organisation and implementation of joint academic programmes, M.Sc. research projects and M.Sc. curricula;
- Teaching within academic course programmes;
- Organisation and coordination of student examinations;
- Developing and coordinating application procedures for academic programmes with international partner institutions;
- Screening programme applicants for academic admission and selecting fellowship candidates;
- Organisation and coordination of M.Sc. topics, proposals, theses and final M.Sc. examinations;
- Planning and implementing of workshops, PR-activities and developing of information/dissemination material;
- Acquisition of new cooperation partners and research institutions for programme/project participation;
- CAPAQUA project development.

ToR's for the CAPAQUA project officer" at BOKU

The responsibilities of the CAPAQUA project officer are:

- Planning, organising and implementing logistics for academic course programmes and M.Sc. research projects;
- Planning, organising and implementing logistics for programme participants and guest lecturers (travel/transport, accommodation, visa, financial issues, etc.);
- Students affairs (health & medical treatment issues, counselling);
- Planning, organising and implementing social events;
- Organisation and implementation of academic programmes;
- Organisation of student examinations;

- Implementing application procedures for academic programmes and fellowships, including communication with applicants;
- Organising and implementing PR-activities and production of information/dissemination material;
- Organisation and production of hand-outs and lecture notes for academic programmes;
- Production and evaluation of course questionnaires (anonymous questionnaires are provided to course participants for internal programme assessment/monitoring);
- Production of time-tables for course modules;
- Organising and implementing joint activities with partner institutions.

Financial procedures, accounting and auditing

As the project applicant, BOKU receives project funds from ADC and is overall accountable to ADC, according to ADC regulations. All ADC-funds for planning and implementing project activities in Kenya are transferred to Egerton University, which is responsible for accounting and financial reporting according to ADC regulations. In addition to the internal auditing procedures at Egerton University, the accounting and financial reports are audited by an external audit firm situated in Kenya. The selection of the audit firm is done according to ADC guidelines. Egerton University opens a project account for ADC-funds to cater for ADC accounting procedures. Thus, for all ADC-funds transferred to Egerton University, receipts and accounting procedures are handled by Egerton University and the financial reports are provided to the external audit-firm, BOKU and ADC. EGU is in charge that the audit-firm is delivering an audit-report to EGU, BOKU and ADC. Established is a contract between BOKU, Egerton University and the external audit-firm to safeguard that accounting procedures and financial statements comply with ADC-regulations.

UNESCO-IHE receives fellowships from NUFFIC/NFP and is accountable to NUFFIC/NFP. All UNESCO-IHE funds, which are transferred to Egerton University, are administered by Egerton University. Egerton University opens a project account for UNESCO-IHE funds.

ADC-funds for planning and implementing CAPAQUA project activities in Ethiopia are transferred to AAU and BDU, which are responsible for accounting and

financial reporting according to ADC-regulations. AAU and BDU use project specific project accounts for ADC-funds and implement accounting procedures according to ADC regulations. In addition to the internal auditing procedures, AAU and BDU are in charge that the accounting and financial reports are audited by an external audit firm situated in Ethiopia. The selection of the audit firm is done according to ADC-guidelines. The audit firm is delivering an audit-report to AAU, BDU, BOKU and ADC. Established is a contract between BOKU, AAU, BDU and the external audit-firm to safeguard that accounting procedures and financial statements comply with ADC-regulations. For all ADC-funds transferred to AAU, receipts and accounting procedures are handled by AAU, whereas BDU is handling receipts and accounting procedures for all ADC-funds transferred to BDU. Both, AAU and BDU provide their financial reports/statements to the external audit-firm, BOKU and ADC. Addis Ababa University is providing ADC-funds further to EAIR-NFALRC for the implementation of CAPAQUA project activities agreed.

5. ASSUMPTIONS

5.1. EXTERNAL FACTORS

The following external factors which could possibly have substantial negative impacts on the project implementation are identified:

- Socio-political and financial crises/disasters in Eastern Africa;
- Severe policy changes within the Education sector in Eastern Africa;
- Drastic changes of the socio-political environment and legal frameworks, which are disabling project institutions, resource people and programme alumni to put their expertise into action;
- Availability of financial resources from funding agencies.

5.2. ASSESSMENT OF RISKS AND THE NEED FOR MODIFICATIONS

- The project cannot guarantee jobs for programme graduates; however, former external evaluation reports and recurrent CAPAQUA project reports confirm that LWM graduates are well received at the job market and working at relevant institutions such as universities, research institutions, governmental/non-governmental institutions and in environmental management & consultancy.

- International, regional and national policies/programmes/initiatives in the field of aquatic ecosystem management are important to increase the impact of the project, such as that graduates apply their expertise/skills within projects/programmes and research results are transferred to the policy-sector and into legal frameworks. The project itself has no direct influence on these factors, yet, well-trained professionals have a competitive advantage at the job-market and the project is initiating collaborative projects/programmes, facilitating north-south and south-south networking and is engaging the policy sector actively.
- Socio-political developments may possibly increase competition at the job-market in Eastern Africa; however, highly qualified professionals did have a competitive advantage in the past and are supposed to have an even higher advantage in a competitive environment.
- Strike periods did occur at Eastern African institutions in Higher Education in the past and will occur in future; however, due to the set-up of CAPAQUA and the flexibility of the partner universities in Eastern Africa, strikes did not have any significant impact on the implementation of former CAPAQUA projects.
- The project is developing a concept and road-map to ensure the sustainability of AEEM/LWM and implementing adequate measures to broaden the foundation of AEEM and LWM.

6. MONITORING AND EVALUATION

6.1. MONITORING, INFORMATION SYSTEM, INDICATORS

The overall project monitoring is done by the project coordinators of BOKU, UNESCO-IHE, EGU, AAU, BDU, EAIR-NFALRC and the Joint Management Committees of LWM and AEEM. The annual CAPAQUA project reports include monitoring results and conclusions concerning the project context and project progress. The detailed monitoring-plan is presented within ANNEX IV.

An external evaluation on the academic quality of LWM has been done in 2014 and both, the AEEM and LWM curriculum has been reviewed in 2015. All AEEM and LWM curriculum changes are monitored and approved by the curriculum committees and senates of the involved universities. The academic quality is monitored continuously and overseen by the LWM and AEEM JMC's, plus the

quality assurance offices of all universities involved. The programme participants evaluate each course module of the academic programmes via anonymous questionnaires and student-feedback-workshops. The evaluation results are provided within the annual CAPAQUA project reports.

Two “Evaluation & Quality Assurance Workshops” are organised in the 2nd project year, one in Kenya and one in Ethiopia with 15 participants each (academic and administrative personnel of AEEM & LWM, plus external experts). The “Evaluation & Quality Assurance Workshops” are attended by programme coordinators, programme resource persons, representatives of stakeholder-groups and external experts. The workshops are focussing on the following aspects:

- Evaluation of the academic quality of LWM and AEEM (student satisfaction, suitability and achievement of learning outcomes);
- LWM and AEEM curricula review and improvement;
- Recommendations to improve the quality, impact and sustainability of CAPAQUA project activities.

An alumni survey is carried-out in 2017 and an external evaluation is done in 2018. The external evaluation is focussing on the DAC evaluation criteria “Effectiveness” & “Impact” of the CAPAQUA project, but also including “Efficiency” and “Sustainability” aspects.

7. SUSTAINABILITY ISSUES

7.1. POLITICAL SUPPORT

The project is fully in line with the missions and strategies of the Eastern African project partners, which itself are backed by national education and development policies. All project partners entirely agree on the project strategy and implementation procedures. There are no indications that political interferences will hamper the project implementation significantly.

7.2. APPROPRIATE TECHNOLOGY

ICT facilities are used intensively as means of communication to plan and implement CAPAQUA project activities. The purchase of equipment is based on local demands to complement already existing teaching and research infrastructure at EGU, AAU, BDU and EAIR-NFALRC. Considered is the equipment

suitability for the Eastern African context (power and water pressure fluctuations, availability of spare-parts and maintenance). The purchase and maintenance of equipment is crucial for the implementation of a skill-orientated M.Sc. programme.

7.3. ENVIRONMENTAL IMPACTS / ENVIRONMENTAL PROTECTION

The sustainable management of aquatic ecosystems and aquatic resources is the overall project objective. The project does not create any significant negative impacts on the environment, beside emissions generated from project specific ground/air travels, standard energy consumption for office and laboratory equipment and emissions from standard laboratories. The project supports the improvement of the constructed wetland for the treatment of waste-water of the main campus of EGU, which is anticipated to enhance the water quality of Njoro River.

7.4. SOCIO-CULTURAL ASPECTS

Within the context of implementing the inter-university partnerships, there are no significant contradictions between the socio-cultural conceptions in Europe and Eastern Africa. In order to minimise socio-cultural conflicts, Eastern African institutions are leading the implementation of project activities, which are involving local communities in Eastern Africa.

7.5. GENDER EQUALITY

All leading institutions have clear gender policies and the project implementation is following the gender policy of ADC. Gender is a major criterion for the award of fellowships and at least 40% of ADC fellowships are awarded to female applicants. Gender is also a decisive factor for the selection of lecturers and resource persons contributing to the project, though, still the pool of qualified female experts is very limited in Eastern Africa.

7.6. DEVELOPMENT OF INSTITUTIONAL AND MANAGEMENT CAPACITIES

The support of institutional capacity development processes in Eastern Africa is the objective of the project. The project activities include workshops and training

programmes for academic and administrative personnel of EGU, AAU, BDU and EAIR-NFALRC. The project management, quality assurance and administration is done jointly by the partner institutions. Clear responsibilities are set for each partner institution and the Joint Management Committees. The project implementation is done via agreed and harmonised procedures, based on international standards.

7.6. ECONOMIC VIABILITY

There are no follow-up costs after the end of the project intervention; however, it is highly recommended to enable all LWM and AEEM students, who started their studies within CAPAQUA 2015-2018, to finalise their studies.

Programmes in Higher Education and Research are an investment into future and in most cases subsidised by national governments and/or national international sponsors. However, the CAPAQUA project is including dedicated project activities to enhance the sustainability of AEEM & LWM (CAPAQUA project activity 3.1.). The project strives to enhance the commitment of EGU, AAU, BDU and EIAR-NFLARC management/administration and pursues measures to strengthen synergy effects between LWM/AEEM and other local/regional M.Sc. programmes. Furthermore, measures are implemented to utilise the great potential of both LWM and AEEM to receive support from Ethiopian and Kenyan authorities, to attract external funded participants (income generation via tuition fees) and to engage additional funding agencies to provide financial support.

ATTACHED DOCUMENTS

- ANNEX I: Logframe Matrix**
- ANNEX II: Time schedule**
- ANNEX III.a.: Summary project budget (project budget
 Relevant for Accounting/auditing)**
- ANNEX III.b.: Detailed project budget**
- ANNEX IV: Monitoring plan**
- ANNEX V: Environmental impact questionnaire**
- ANNEX VI: Gender questionnaire**