

PROCEEDINGS OF THE REGIONAL WORKSHOP ON ESTABLISHMENT OF A NETWORK FOR PARTNERSHIP OF UNU-FLORES BASED IN MAPUTO, MOZAMBIQUE

PROCEEDINGS - No.2



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Institute for Integrated Management
of Material Fluxes and of Resources



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Proceedings of the Regional Workshop on Establishment of a Network for Partnership of UNU-FLORES based in Maputo, Mozambique

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About UNU-FLORES

BACKGROUND

The United Nations University Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES) was established in Dresden, Germany in 2012. The institute is supported by the Federal Ministry of Education and Research (BMBF) and the Ministry for Higher Education, Research and the Arts (SMWK) of the Free State of Saxony, Germany. As part of the United Nations University (UNU), the institute helps to build a bridge between the academic world and the United Nations. The UNU was founded in 1973 as an autonomous organ of the UN General Assembly. It encompasses 16 research and training institutes and programmes in 12 countries around the world. UNU as a whole aims to develop sustainable solutions for pressing global problems of human survival and development. Through a problem-oriented and interdisciplinary approach, UNU aims at teaching, applied research and education on a global scale. Find more information under: unu.edu

VISION

The Dresden-based institute of UNU-FLORES acts at the forefront of initiatives promoting a nexus approach to the sustainable management of water, soil and waste. UNU-FLORES acts as a think tank for the United Nations and its member states, in particular addressing the needs of developing and emerging countries. As a think tank, UNU-FLORES will be an internationally recognized hub and intellectual focal point promoting integrated management strategies. Additionally, UNU-FLORES will attract high-calibre students for postgraduate study and research programmes in cooperation with other research institutions. The institute will build the capacity of future leaders in the area of environmental resources management and develop innovative concepts for target- and region-specific knowledge transfer.

MISSION

UNU-FLORES develops strategies to resolve pressing challenges in the area of the sustainable use and integrated management of environmental resources such as soil, water and waste. Focusing on the needs of the UN and its member states, particularly the developing and emerging countries, UNU-FLORES engages in research, capacity development, advanced teaching and training as well as dissemination of knowledge. In line with UNU's general mission to promote sustainability, UNU-FLORES also considers impacts of global change on resources management.

THE NEXUS APPROACH

Advancing a nexus approach to the sustainable management of the environmental resources water, soil and waste is the main mission of UNU-FLORES. The nexus approach is based on the belief that vital environmental resources are strongly interconnected and require an integrated perspective to manage them sustainably. Such a nexus perspective must take into account different sectors and disciplines in both research and capacity development and strive for holistic management strategies.

RESEARCH AREAS

UNU-FLORES aims at a truly integrative and global perspective on resources management, considering interrelated resources in a comprehensive manner. This holds also true for impacts of global change and its nexus to green economy. In all of the following research areas of UNU-FLORES, the institute will cooperate closely with other universities and research institutions in both research and teaching:

- Water inventory and fluxes;
- Soil and land use management;
- Management and treatment of waste;
- Systems and flux analysis;
- Resources quality and quantity; and
- Global change assessment.

EDUCATION AND CAPACITY DEVELOPMENT

UNU-FLORES will engage in the following areas of postgraduate education, capacity development and trainings:

- UNU-FLORES will establish PhD as well as other postgraduate programmes together with its partners, especially with the Technische Universität Dresden (TUD). The programmes will focus on each of the research areas of UNU-FLORES and will include course work according to a pre-defined scheme.
- Additional capacity development and training programmes will focus on the further education of professionals who are working in the area of environmental resources management.

A unique feature of all education activities will be the emphasis on the global dimension of the covered issues. One aspect of this global nature will be international exchange programmes for students and teachers as well as internships with other UNU and UN bodies.

Foreword

Being involved in the initiative to establish UNU-FLORES in Dresden and its envisioned partner institute in Maputo since 2010, I am pleased to present here the proceedings of the Regional Workshop on Establishment of a Network for Partnership of UNU-FLORES based in Maputo, Mozambique, which took place in Hotel VIP Grand Maputo, Mozambique on 06-08 May 2013.

The proceedings presented offer a comprehensive documentation of the regional workshop as a reference for all involved stakeholders and as a source of information about the state of the art of the establishment of a partner institute of UNU-FLORES in Maputo and its regional network in research, education and capacity development.

The Regional Workshop, following up on two International Scoping Workshops in 2010 and 2011 in Dresden and Maputo, respectively, indeed represents a major step towards the implementation of concrete actions and projects in Africa. Compared to the earlier workshops, two major differences were obvious: (a) UNU-FLORES had been established in Dresden, Germany in 2012 providing the organizational, legal and scientific basis for starting activities in research, education and capacity development; (b) important progress had also been made with respect to the establishment of a partnership in Maputo, namely the signing of a MoU (UNU, Ministry of Science and Technology, Mozambique and University Eduardo Mondlane) and subsequent steps of implementing the MoU by a working group. Therefore, in this workshop the focus could be shifted from conceptual issues to more concrete planning of activities in research, education and capacity development, focusing in particular on networking.

Overall, the workshop demonstrated the strong interest in cooperation with UNU-FLORES in the region and the clear commitment of Mozambique to host a partnership of UNU-FLORES with a mandate to act as a hub for the region.

The network established during the regional workshop, including stakeholders from universities and research institutes from Botswana, Egypt, Ethiopia, Ghana, Kenya, Malawi, Mauritius, Namibia, Nigeria, South Africa, Tanzania, Yemen, Zimbabwe, from Mozambique and from Germany (TU Dresden) and from international Organizations is already active in establishing various joint research projects. It will add value and, given the mandate of the partnership to act as a regional hub, represents a major cornerstone of the institute, ensuring its success. With this network and with UNU-FLORES in Dresden being established and operational, thriving with scientific activities and with the commitment of the government of Mozambique and Eduardo Mondlane University to provide support in scientific terms and also concerning the provision of premises and a financial contribution, the prospects to get the partnership going in due course are very positive indeed. UNU-FLORES is looking forward to eventually establishing the partnership in Maputo and to cooperating with a wide network of partners in Africa!

Dresden, September 2013

Reza Ardakanian

Director, UNU-FLORES

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1. Introduction

The United Nations University (UNU) – the academic arm of the United Nations system – implements research and educational programmes in the area of sustainable development, with the particular aim of assisting developing countries. Established by the UN General Assembly in 1973 as “an international community of scholars, engaged in research, postgraduate training and dissemination of knowledge in furtherance of the purposes and principles of the Charter of the United Nations”, UNU operates through a worldwide nexus of institutes and programmes that are coordinated by UNU Centre in Tokyo.

UNU aspires to be a world-class international research, teaching and capacity-building institution that provides global leadership on aspects of peace, development and sustainability. UNU serves as a think tank for the United Nations system and provides a bridge between the UN and the international academic and policymaking communities. With a systems-oriented approach that is necessary for achieving sustainable solutions to the world’s challenges, UNU’s activities are clustered into five interlinking thematic areas: Peace, Security and Human Rights; Human and Socio-economic Development and Good Governance; Global Health, Population and Sustainable Livelihoods; Global Change and Sustainable Development and Science; Technology, Innovation and Society.

The **United Nations University Institute for Integrated Management of Material Fluxes and of Resources** (UNU-FLORES) was established in 2012 in Dresden, Germany. The main goal of the institute is to advance a nexus approach to the sustainable management of the environmental resources water, soil and waste. The nexus concept considers the strong interrelationship of resources, proposing that a truly integrative and interdisciplinary perspective will facilitate their sustainable management. UNU-FLORES is dedicated to research, postgraduate education and training of professionals, dealing first and foremost with the environmental resources soil; water and waste, focusing in particular on developing and emerging countries. Its core scientific task is to develop a “linked cycle management”, replacing traditional input-output models for the management of water (as resource, dissolver and transport agent) as well as soils, recyclable organic matter and nutrients to foster their efficient and sustainable use. Based on this integrative research approach, innovative concepts for target- and region-specific knowledge transfer and capacity development will be put into action.

UNU-FLORES is closely collaborating with the Technische Universität Dresden (TUD), in particular with the faculty of Environmental Sciences, and affiliated research institutions, which offer a research environment with an interdisciplinary structure and an integrative approach to environmental science and resource management. UNU-FLORES thus explores the potential and contributes to the international up-scaling of the available competence and institutional framework related to integrated management of material fluxes and of resources.

During the **1st International Scoping Workshop (ISW)**, held in Dresden in November 2010, the focus of research as well as the teaching strategies for UNU-FLORES were reshaped and specified, in particular considering the cooperation with TUD. The outcomes of that workshop as well as several background documents are comprehensively documented in the workshop proceedings (Ardakanian et al. 2010). The idea to establish a partner institute of UNU-FLORES had been introduced during the 1st ISW.

Both the Mozambican Government, represented by the Ministry of Science and Technology and the Ambassador of Mozambique to Germany and the largest University of Mozambique, the Eduardo Mondlane University (Universidade Eduardo Mondlane, UEM), Maputo, confirmed their interest and commitment to host a twin campus of UNU-FLORES and it was agreed on that occasion that a **2nd ISW** would be held in Maputo in 2011 to further elaborate on specific issues of the twin.

During the **2nd ISW**, held in October 2011 in Maputo, the foreseen research areas of the proposed institute in Maputo were specified for the region and basic aspects, both conceptually and structurally to be considered in joint study programmes were discussed (Ardakanian et al. 2012). The 2nd ISW mainly focused on the planned cooperation with UEM, while the involvement of regional partners was limited.

Therefore, considering the envisioned role of the partner institute of UNU-FLORES in Maputo to act as a hub for the region, a major effort was made to promote the concept of UNU-FLORES in the region and to invite potential partners to get involved at an early stage. By this, the future partners should have some ownership and see the added value of being involved in the network. A first step in this direction was made in 2011, when the concept of UNU-FLORES was introduced to participants of the **12th WaterNet Symposium** in Maputo, Mozambique (Ardakanian and Liebe, 2012). After the initiative had gained momentum with the signing of the MoU and establishment of a working group (see below) in late 2012/early 2013, it was decided that a regional workshop is organized to build up a network in research and education. Potential partners in the region were identified and invited. Their interest in cooperation was analysed by a questionnaire. Results of the regional workshop are presented hereafter.

2. Milestones of the partnership initiative

In its role as a capacity builder for developing countries and countries in transition, and in order to intensify north–south research and teaching interaction, UNU has launched an initiative to establish partner institutes of existing UNU institutes in developing countries. This means, UNU institutes, mostly located in a developed country may have a partner (or even a twin-) institute in a developing country. The Government of Mozambique confirmed its willingness to support the establishment of a UNU-FLORES twin in Maputo, which could provide and strengthen the capacity needed (both at individual and institutional levels) to address various challenges related to the sustainable management of water, soil and waste. The twinning concept foresees a close interaction of the twin campuses both in research (joint projects) and teaching activities (exchange programmes for students and lecturers). By establishing and strengthening partnerships within the region, the envisioned twin institute of UNU-FLORES shall act as a hub for integrated management of material fluxes and of the resources water, soil and waste for Southern Africa and even beyond (Ardakanian et al. 2012).

The initiative to establish a partnership of UNU-FLORES based in Maputo, Mozambique, started in 2010. The most important milestones are:

- UNU invited the Ministry of Science and Technology of Mozambique (MCT) and University Eduardo Mondlane, Maputo (UEM) to participate in the 1st International

Scoping Workshop on the establishment of UNU-FLORES and its twin in Mozambique, taking place in November 2010, Dresden, Germany.

- In the same year UNU was granted a project by the Federal Ministry of Education and Research (BMBF) of Germany to perform a feasibility study on establishing a twin institute of UNU-FLORES in Mozambique. This project is to be finished in summer 2013 and the final report shall set out clearly the feasibility to establish the twin institute in Mozambique.
- In early 2011 the Hon. Minister of MCT responded favourably to a Letter from the rector of UNU asking for the commitment of Mozambique to host a twin institute of UNU-FLORES.
- A fact-finding mission to Maputo was organized by UNU in May 2011. During various meetings with MCT and UEM several committees were established to start preparations for the 2nd Scoping Workshop.
- The 2nd Scoping Workshop took place in October 2011 in Maputo.
- A draft MoU (based on the MoU which had been signed for UNU-FLORES in Dresden) had been prepared by UNU in autumn 2011 and provided to MCT and UEM.
- After the appointment of Hon. Minister Pelembe in October 2012 the initiative was resumed and the MoU finalized until December.
- Signing of MoU on the occasion of the official opening of UNU-FLORES in Dresden (10 December 2012), which was attended by a high-ranking delegation of MCT and UEM, headed by the Hon. Minister.
- A working group was established consisting of members of UNU, MCT and UEM to oversee and organize the implementation of the start-up phase of the twin institute according to the MoU.
- The working group completed a report to the parties (April 2013) including:
 - o A commitment letter by UEM concerning the provision of premises.
 - o A commitment letter by MCT concerning the overall contribution of the Republic of Mozambique, both as in-kind and in-cash support.
- One task of the working group was to organize the regional workshop, results of which will be important for finalizing the feasibility study mentioned above. Results are reported below.

3. Preparatory work

The working group on implementation of the MoU decided in early 2013 to organize a regional workshop in Maputo to promote the concept of the partnership of UNU-FLORES in the region and to build network in research, education and capacity development.

The concept note below had been sent to selected stakeholders from all over Africa to ask them for their interest and availability to attend the regional workshop on 06-08 May 2013 in Maputo, Mozambique.

3.1 Concept note

Outline

The workshop is a follow-up to the 2nd International Scoping Workshop (ISW) on UNU-FLORES which took place in Maputo on 24–25 October 2011. The 2nd ISW was attended by stakeholders from UNU, from TU Dresden (TUD), the main partner of the UNU-FLORES, Dresden, from several faculties of Eduardo Mondlane University (UEM), international experts and, to a limited extent, potential regional partners. The workshop resulted in a clearly worked out list of proposed research areas and topics for the twin institute in Maputo and a general outline for the future study programmes.

The planned regional workshop may build on two major achievements since the 2nd ISW: the official opening of UNU-FLORES, Dresden and the signing of an MoU on the establishment of UNU-FLORES, Maputo, between the Ministry of Science and Technology of Mozambique, Eduardo Mondlane University and UNU. Recalling the envisioned role of the UNU-FLORES, Maputo, to act as a regional hub for research and education in integrated management of environmental resources, the following aspects of the scientific concept of the institute need to be worked out in more detail: the scientific network in the region and the planned study programme(s) for the start-up phase. The relationship with UNU-FLORES, Dresden and with TUD shall in both cases receive ample consideration. The goals of the regional workshop are:

1. Identify regional partners for the twin in Maputo and define their role in joint activities.
2. Building a network in research and education for the twin institute of UNU-FLORES in the region.
3. Conceptualize potential joint research activities within the network (topics and suitable regions for case studies), considering results of the 2nd ISW.
4. Work out a concept for an MSc programme of UNU-FLORES, Maputo, based on a mapping of available courses by regional partners and considering its relation to the joint study programme of UNU-FLORES, Dresden and TUD.
5. Provide an exercise of joint teaching in the area of integrated resources management: regional needs of integrated resources management strategies.

The first point will largely be covered during the preparation of the regional workshop and be finalized during the event (2). Based on the research areas identified in the 2nd ISW and available partners, the third point can be addressed, e.g. by broadly defining a research consortium for some transboundary issues in resources management in the region.

Based on the mapping of available study programmes in the region which should be prepared for the workshop and taking the planned study programme of UNU-FLORES, Dresden as a template, details of the study programme and the potential contributions of regional partners may be worked out (4).

In the last part of the workshop (5), a group of graduate students (with a background in engineering, natural or social sciences related to resources management) from various countries in the region and coming from different universities (UEM, TUD, as well as from other participating universities) shall be involved in the discussions. To provide a common starting point, international experts (participating in the workshop) could provide a brief introduction to the management of the resources water, soil and waste. Some field trips or site visits related to the issue can be part of the student's programme. Based on experience in their home country, students could work out specific needs and common features of resources management. Finally, they can join (and be invited to engage in) a panel discussion on "How to advance a nexus approach to environmental resources management? Curricula requirements for the next generation of environmental managers".

Items to be included in the agenda of the regional workshop:

- Brief introduction by all participants highlighting their experience and expertise in the field of environmental resources management and presenting ongoing study programmes.
- Status report of mapping of available study programmes related to environmental resources management at UEM and in the region.
- Presentation of the proposed joint study programme of TUD and UNU-FLORES (update of presentation at 2nd ISW).
- Working group session: required components of a curriculum on integrated resources management of the twin institute.
- Working group session: balancing required components and available modules, defining contributions of partners.
- Working group session: research on integrated resources management in the region – needs and opportunities.
- Panel discussion on "How to advance a nexus approach to environmental resources management? Curricula requirements for the next generation of environmental managers".

3.2 Workshop questionnaire for regional stakeholders

In preparation for the workshop some questions had been formulated and distributed to the invited participants. The questions are grouped into the topics Research areas, Capacity development and postgraduate education, Further issues.

Responses to these questions have been collected, analysed and presented during the workshop, being an integral part of the programme. Below, the responses are summarized and reported in condensed form. Detailed responses will be considered in bilateral contacts and cooperation.

3.2.1 Research areas

UNU-FLORES shall be engaged in research, teaching, advanced training, capacity development and dissemination of knowledge in the area of sustainable use and integrated management of environmental resources, focusing in particular on water, soil and waste and on respective challenges in developing and emerging countries. Its overall goal is to advance a nexus approach to the sustainable management of environmental resources.

Concerning the specific research topics of the planned twin institute of UNU-FLORES in Maputo, five major research areas were identified during discussions at the Scoping Workshop in Maputo in October 2011 (please refer to the summary provided earlier, available also on the UNU-FLORES website (flores.unu.edu)). For each area, major topics were listed. Among these areas, 1–3 are to be seen as a triangle of interrelated resources, 4 as well as 5 is a cross-cutting area:

1. Integrated water resources management;
2. Waste management and sanitation (drinking water);
3. Soil and land-use management;
4. Systems and flux analysis (industrial water processing, cleaning water);
5. Water economics and governance.

Question1.1	(a) Which topics are of particular interest to your organization and would provide an opportunity for further cooperation with UNU-FLORES? (b) Please specify the ways of cooperation you envision with UNU-FLORES
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Summary of responses

- a) Each topic was considered relevant by a large number of regional stakeholders, integrated water resources management and soil, with land-use management receiving most attention.

Research area	Relevant to stakeholders
Integrated water resources management	15
Waste management and sanitation	7
Soil and land-use management	10
Systems and flux analysis	7
Water economics and governance	8

These topics were partly described in more detail by the stakeholders and some proposals for specifications have been made, e.g. by University of Ghana, IESS (Dr. Mensah), mentioning various issues related to wastewater and sanitation, e.g. safe water and water resource management, waste management, management of disease threats (to reduce infection and promote health), sanitation and health, socio-economic consequences of poor sanitation, limitations of conventional sanitation, commercial value of nitrogen and phosphorus from human excreta, financial aspects of EcoSan: human excreta containment, sanitization and recycling, human excreta, cultivation and food security; The Urban Sanitation Challenge. Further areas of joint research might include protection and treatment of water sources, current mainstream economic models and lack of incentives for increasing the productivity of natural resources and impact of aerosols; improving the productivity of natural material resources compared to resource consumption in the current Western model; prospects of switching to inexhaustible sources of energy with the help of innovative technology; developing and setting indicators related to resource saving for monitoring ecological, economic, social and institutional developments.

CapNet (Dr. Gumbo), concerning research, rather would focus on knowledge adaptation and transfer. Being a network of various partners (and networks), CapNet has minimal focus on research topics but assumes the knowledge base already exists or new knowledge is generated elsewhere in the quadrant of knowledge management. CapNet is engaged on new knowledge generation via case studies and recording and publishing experiences in the field.

b) Virtually all stakeholders envision cooperating in undertaking joint research on above areas. Such research activities should address

- Comparative studies across the region;
- Cooperative studies across disciplines.

Research activities should result in joint publications, reports and other outlets.

Joint research projects should capitalize on experience and consider technology transfer and could have various foci: collaborative multidisciplinary projects, demonstration projects (e.g. water harvesting or recycling), applied R&D, project replication/deployment, capacity-building, dissemination, and strategy and policy development.

A further major area of cooperation, mentioned by all stakeholders, was related to education, training, capacity-building, and dissemination of knowledge. This might in particular include

- Student exchange programs;
- Faculty and staff exchanges;
- Exchange and sharing of materials, documents and equipment;
- Possible joint degrees;

Other cooperative actions could target

- Creation and organization of conferences;
- Collaboration on the organization of conferences.

Question1.2	Would you propose any other or additional research priority for UNU-FLORES?
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Responses

Besides the topics mentioned above, a major topic to be addressed in joint research might be related to impact of climate change on water resources, nutrient recycling, soil properties, soil loss, etc. and on food security. Research would largely be related to adaptation and mitigation strategies and also consider other aspects of global change.

Concerning waste management, solid waste may receive more emphasis than in the list of topics developed during the 2nd ISW. Related to waste, the flux of pollutants and the links to human and ecosystem health could be an issue for UNU-FLORES.

Other suggested aspects related to resources management include energy and extractive industries and cleaner production. Within IWRM also integrated coastal area and river basin management (including disaster and risk management) and in general the ecological aspects of IWRM might be an issue.

Within the area of governance joint research might deal with international conventions and, for example, human rights based approaches to water and sanitation. Further topics mentioned by stakeholders include knowledge management and the knowledge economy, quantitative policy analysis in natural resources management and vulnerability and poverty analysis.

Methodological aspects to be addressed in joint research include the use of earth observation systems in IWRM and soil and land use management; practical application of models and estimation methods, addressing various aspects of environmental resources management: water quantity and quality, food security, etc.

Question 1.3	<p>(a) Would you propose any existing research network with which UNU-FLORES should establish cooperation?</p> <p>(b) Which role has/do you envisage for your organization in this/these network(s)?</p> <p>(c) Which role would you envisage for UNU-FLORES?</p>
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Responses

a) Many networks related to environmental resources management already exist and may provide opportunities for cooperation:

- South African NEPAD Water Centres of Excellence (SANWATCE) Hub at Stellenbosch;
- AgMIP (Agricultural Model Inter-comparison);
- Agra, RUFORUM – these are involved both in training and research activities in Africa
- WARIMA;
- Tallories Network;
- GUPES (Global Universities Partnership on Environment and Sustainability, UNEP);
- The Southern African Science Service Centre for Climate Change and Adaptive Land Use (SASSCAL) group in Southern Africa;
- WATERNET in SADC;
- FETWATER in South Africa;
- Carnegie RISE (SSAWRN Sub-Saharan Africa Water Resources Network);
- CSIR, Water Research Commission of South Africa;
- CGIAR and other UN partners;
- ICRISAT in Watershed Management for Poverty Reduction;
- The Mediterranean Agronomic Institute;
- Bari in the areas of drought preparedness.

b) Stakeholder involved in any of above-mentioned networks envisioned to participate in joint research and in teaching of various courses/modules and joint supervision of Masters and PhD students or other areas of capacity development, such as training courses.

Information brokerage, contributing in bridging knowledge gaps, provision of staff to participate in UNU-FLORES' academic activities (training and research), offering tailor-made short courses were also among the roles stakeholders would envision for their institution.

Further, some may provide laboratory facilities for student's research and training, technical staff to conduct research or research sites in the field.

c) For UNU-FLORES, similar roles as listed in (b) were envisioned. It was, however, often mentioned as potential facilitator/coordinator, lead/co-lead role, contributor, major stakeholder in joint activities. There is also an expectation that UNU-FLORES would engage in resource mobilization, provision of financial support and of technical expertise to provide capacity-building and training of personnel.

3.2.2 Capacity development and postgraduate education

It was discussed in the Scoping Workshop in Maputo in October 2011 that postgraduate programmes of UNU-FLORE shall reflect the research priorities worked out and thus should cover the areas:

1. Integrated water resources management;
2. Waste management and sanitation (including drinking water);
3. Soil and land management;
4. Systems and flux analysis;
5. Water economics and governance.

Question 2.1	<p>Within the mentioned framework, which educational focus would you consider particularly important (relating to your area of expertise) in the fields relevant to UNU-FLORES concerning</p> <p>a)Topics to be covered;</p> <p>b)Methodologies to be taught to students; and</p> <p>c)Ways of teaching.</p>
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Responses

a) The educational focus should be strongly linked to the research topics addressed. Topics therefore largely reflect the research topics mentioned above.

- IWRM, Water resources planning and development; water allocation; water demand management, urban water supply;
- methods of detecting changes in climatic and flow variables (including regime changes), outlier/inlier analysis;
- Water quality and environmental management;
- Water economic and governance;

- Water treatment, wastewater treatment, Low cost/appropriate water and wastewater technologies, Wastewater (and sludge) reuse;
- Interaction of surface and groundwater and recycling;
- Efficient use of water in agriculture, Water harvesting, nutrient recycling, Water productivity and food security;
- Land use and dynamics, Soil fertility mapping, Land resource rehabilitation and/or restoration;
- Soil erosion and degradation;
- Solid waste management;
- Stakeholder participation.

When it comes to capacity development activities in a broader sense, including institutional capacity development, it was suggested that topics to be covered should be dictated by the general development needs, especially across Africa, and thus include raising awareness especially among government officials and politicians towards IWRM, waste management and sanitation and soil and land management; calls for participation and bringing different actors together to discuss tough issues and agree on the way forward on all the areas; capacity-building initiatives to address the changing demands of the different planning and implementation stages in the three areas; information sharing on all the areas as there is the need to understand local experience across different regions; development of financing and funding strategies by ministries of finance and planning, and resource allocation through national budgeting exercises; formation of stakeholders' forums for proper integration and coordination. This is based on the principle that decision-making processes involve various stakeholders at the appropriate level. Hence, all stakeholders need to be involved.

b) In general the training should include practical aspects that will result in students being able to participate not only academically, in these fields, but will also be able to provide practical solutions to problems in their countries. Major competencies to be acquired include the ability to conceptualize systems (natural and altered), the ability to analyse complex data and provide information that is useful to decision makers, the ability to model complex systems (including the use of a wide range of modelling tools) and the ability to work within trans-disciplinary environments. Application of GIS and remote sensing should also be part of the curriculum. Competencies in practical field and laboratory work were also considered important. The curriculum should also include lectures, case studies, role play, discussion and demonstrations.

The courses are to be built through curricula of multidisciplinary dimensions primarily to enrich/strengthen activities in different areas of research applications. Courses to be developed with cross-sectional approach aimed at finding solutions to specific developmental problems.

The approach to teaching should be multidisciplinary. This is to enable trainees to identify and provide solutions to the challenges in the different areas of focus.

Also adult learning, refresher courses (5 day duration) for professionals and water managers should be considered as well as courses on emerging issues, e.g. green growth and water, human rights-based approaches, coastal zone management (ridge to reef).

c) Teaching in general should take a participatory, problem-based approach. Hands-on exercises/practicals complementing lectures through field and laboratory experimentation was considered very important by many stakeholders.

Exchange visits and experience sharing, demonstrations, R&D projects, industry-oriented projects were considered useful, but also elements of distance education, online, short courses and seminars.

Teaching can be as blocks to accommodate visiting professors. An attachment/internship/practical component (e.g. industry-based) would also be very good. These probably need to be quite flexible and include formal coursework, lecturing and research project supervision and mentoring. The overall objective would be to encourage students to think and work independently but also be able to work within collaborative trans-disciplinary teams.

Concerning other means of capacity development (developing training materials, training of trainers, training and monitoring and evaluation of outcomes and impacts), face-to-face short courses including use of e-learning and CapNet's virtual campus was suggested.

Question2.2	Does your institution offer postgraduate study programmes in the areas mentioned above, which might provide opportunities for cooperation in teaching?
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Responses are included in Table 4, Section 4.

Question2.3	Besides postgraduate programmes, do you envision cooperation with UNU-FLORES in other capacity development activities?
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Responses are presented in Table 1, Section 4.

3.2.3 Further issues

Question3.1.	Considering the draft structure of the programme, would you recommend specific issues to be addressed in the regional workshop?
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Responses

Suggestions made in response to this question were partly congruent with answers to Question 1.2 (Would you propose any other or additional research priority for UNU-FLORES?). Proposed topics included:

- Climate change, adaptation and mitigation strategies; methods of downscaling climate scenario using regional and/or GCMs;
- Disaster and risk management and early warning systems for floods and droughts;
- Environmental flow assessment method, particularly in semi-arid/arid regions;
- Methods of improved catchment management;
- Stronger focus on soil and land management and also on systems and flux analyses;
- Long-term ecosystem research monitoring.

A general proposal was to define research topics of relevance for Africa that require research as a basis for problem-solving. Then partners could work on them – and thus generate research topics relevant to society (out of which students could do their postgraduate research).

This proposal was actually taken up in the working session on day 1 (see Section 4.3).

It was also suggested to discuss an appropriate approach to be adopted for popularizing the work undertaken and disseminating the outcomes to the region.

Another set of suggestions rather referred to organizational issues:

- Prepare MoU for the Strategic Plan for the future cooperation;
- Strengthening north–south cooperation;
- Sustainability of programme;
- Fostering of specific research networks;
- Equitable access and sharing of resources;
- Governance of UNU-FLORES Institute and how other partners can collaborate particularly in the region.

Further suggested questions to be addressed:

What are the existing constraints to postgraduate development programmes in the region that can be addressed through the UNU-FLORES programme?

How will UNU-FLORES link up with existing networks to avoid a sense of competition (for people and resources)?

Funding for cooperative research and training is always a major constraint within sub-Saharan Africa region. What impact will the UNU-FLORES programme have on this issue?

4. Summary of Regional Workshop on Establishment of a Network for Partnership of UNU-FLORES Based in Maputo, Mozambique

The workshop was organized by UNU-FLORES in close cooperation with University Eduardo Mondlane (UEM), Dresden University of Technology (TUD) and the Ministry of Science and Technology (MCT) of Mozambique. Participating regional stakeholders represented 19 universities and organizations from 14 countries across Africa (see stakeholder list, Annex 7.1). The workshop had the following objectives:

- Identify regional partners for the twin in Maputo and define their role in joint activities;
- Building a network in research and education for the twin institute of UNU-FLORES in the region;
- Conceptualize potential joint research activities within the network (topics and suitable regions/countries for case studies);
- Define activities for capacity development and work out a concept for an MSc programme of UNU-FLORES, Maputo considering the joint study programme of UNU-FLORES, Dresden and TUD.

In addition, a student seminar was integrated, in which students enrolled in postgraduate programmes of UEM and TUD analysed and compared available study programmes related to the topic of UNU-FLORES and worked out required components of a curriculum on integrated management of environmental resources.

4.1 Opening session

Facilitator: Prof. Reza Ardakanian, UNU-FLORES

During the opening session, which was well attended, (additional stakeholders and officials from Mozambique, as well as local media) welcome addresses were delivered by:

1. The Rector of UEM, Prof. Orlando Quilambo;
2. Under-Secretary-General of UN and Rector of UNU, Dr. David Malone (video message) and;
3. Hon. Minister Pelembe of MCT, who officially opened the workshop.

4.1.1 Welcome address of the Rector of UEM, Prof. Orlando Quilambo

Your Excellency the Minister of Science and Technology of Mozambique,

Your Excellency the Deputy Minister of Education of Mozambique,

The Vice-Chancellors of Eduardo Mondlane University,
The Representative of the Chancellor of Eduardo Mondlane University,
The Permanent Secretary of the Ministry of Science and Technology,
The Partners from countries in Africa and Europe,
The Directors and Research Workers of the Ministry of Science and Technology,
The Directors of Faculties and Organs of Eduardo Mondlane University,
The participants, Esteemed guests,
Ladies and Gentlemen,

In the name of the Eduardo Mondlane University (UEM) I have the privilege, first and foremost, of acknowledging and sincerely thanking the honoured presence of participants and our distinguished guests at this, the 3rd workshop regarding the establishment of UNU-FLORES in the UEM and, through it, in Mozambique and in the region.

We thank in particular the Minister of Science and Technology for this further demonstration of the value which is placed on higher education, in an educational subsystem, which of itself is full of many challenges and, specifically, the training of postgraduates, and it is this which may propel the higher education institutes because, in addition to such training it permits carrying out research, one of the greatest weaknesses in the system in developing countries.

We especially greet our guests from Northern, Central, Southern and Island Africa, together with those from Europe who have designed to be associated with us in this, the final stage of the establishment of this institute in our country and in the region.

This Seminar has a broader expression and dimension on being constituted not solely as an occasion on which specialists from various fields meet to exchange experiences on the subject of specific technical topics, but also as an exercise in the renewal of a constantly growing commitment of institutional cooperation at an international level between our Universities, the UEM, the Technical University of Dresden and the United Nations University.

2010 was the year in which we commenced this journey which at this very moment is on the way towards being put into concrete form, and this workshop is the time for reflection regarding the strategies which will allow the results of the implementation of this institute to be translated into actions with significant impact in our country, in Africa, and internationally. It is, then, in this general context in which the impetus for the holding of this workshop is framed, because its success will dictate the future of this programme.

Your Excellency,
Esteemed Guests,

In your name, permit me to state how honoured we feel being the pioneer candidate to house a relation of the United Nations University in Africa, and this fact makes the Eduardo Mondlane University in particular, and Mozambique in general, a vector of good practices in the field of

management of resources and material fluxes. Developing countries argue about the selection of the best way of exploiting their resources, and the resolution of these issues will not be found outside science and technology, because these are the best instruments in the struggle for development.

Your Excellency,
Esteemed Guests,
Ladies and Gentleman,

In this, the 3rd workshop regarding the establishment of UNU-FLORES in the UEM, the opportunities which the installation of this institute will bring will be presented, from the development of joint research, teaching, training and dissemination of information regarding the various fields of interest of the participant institutions, in particular, in the matter of the sustainable use and integrated management of environmental resources, specifically water, soil and waste, and the respective challenges in the widest context of the development of our countries.

The component of training, in particular of postgraduates, also falls within the context of training of leaders in the fields of the exact sciences and engineering. The requirement for trained leaders is a strategic commitment for the sustainability of the programmes offered by our University. In effect, with the postgraduate programme, the bases of which are now being launched for information and discussion, the intention is to tackle the need for leaders in the fields of environmental management who are capable of making use of the most recent advances in the matter of environmental resource management.

The commitment to a postgraduate programme, in addition to the meeting training, will also connect with the previously referred to intention of promoting research, in a wide research network, to which our students will be exposed.

The exchange programmes of both students and teachers from the various participating institutions will also support the multiplying effect of this partnership, both at national and at a regional level, and, perhaps, at a global level.

In general terms the world is facing enormous challenges in the management of environmental resources, in particular those selected as the preferential target for this programme, specifically water, soil and waste management. Consequently, the creation of this institute, the launch of this programme, could not be more opportune, given its relevance, by virtue of the fact that it is dedicated to real necessities in our country and our region.

To our partners, we are very grateful to our partners for your presence and we trust that in the coming days you will be able to share experiences with us which will allow us to demonstrate that the African capacity exists to house an institute of the dimension and added value such as is the case of UNU-Flores.

To our students who will participate in this workshop through several activities, including visits, we trust that they will be aware of the responsibility which falls on you due to the expectations associated with the great potential of this programme.

To all participants, I wish you very good success and thank you very much for your attention.

4.1.2 Welcome address of Dr David Malone, Under-Secretary-General of the United Nations and also Rector of the United Nations University (video message)

Hello, my name is David Malone. I'm an Under-Secretary-General of the United Nations and also Rector of the United Nations University.

What is the United Nations University? It's a confederation of research institutes around the world, including in Africa, that focus on issues of relevance to the UN's agenda, with a very strong emphasis in recent years on sustainability.



Dr. David Malone, Under-Secretary-General of the United Nations and Rector of the United Nations University

from where I speak to you – is to establish a strong collaboration – a twinning arrangement, if possible – with a counterpart institution in Mozambique. We have been discussing with university authorities in Mozambique – with the government of Mozambique as well – the form such a collaboration could take.

A variety of modalities have already been discussed: possible premises in Mozambique, cash contribution by the government of Mozambique, significant contributions also by the UN University, and the possibility – if an impressive network of researchers in Mozambique and beyond Mozambique in Africa can be built – of turning to the donor community to support the work of this group of researchers in the very important field of integrated resource management.

I have happy memories myself of Mozambique. Not very long ago, with my great friend Carlos dos Santos hosting me in Maputo, I was in town to look back on the civil war of Mozambique. And I was fortunate to meet with former President Chissano, his former adversary – now in the parliament of Mozambique as part of the country's reconciliation – and to think more about how Mozambique was able to recover from what was one of the most bitter and bitterly fought civil wars in recent human history.

We have, as a vocation, also capacity-building beyond our think-tank function for the United Nations, and we teach a very limited number of graduate university courses ourselves, as well.

Our youngest institute is in Dresden, Germany: UNU-FLORES. It's directed by Reza, who is with you and is our terrific director in Dresden now, but with a very strong commitment to partnering with colleagues in Mozambique in the area of integrated resource management. When we think of integrated resources, we think of water, soil, and waste management also, which tend to go together as a group of challenges, although each of them offer opportunities and pose challenges of their own.

We're delighted that you're meeting in Mozambique for this workshop where a wider network of scholars is working. Reza's project – strongly supported by those of us at headquarters of UNU in Tokyo,

The achievement of Mozambique, not just in recovering from the war, but in initiating very strong economic growth ever since then, is one of the truly remarkable stories of development that we have known over the last 20 or 30 years, and provides a powerful narrative of its own within the broader story of success of development in Latin America, in Asia, and over the last ten years, particularly in Africa, where growth rates have been impressive, where societies are becoming very optimistic, and where the future increasingly seems to belong to Africa just as much, if not more so, than any other continent.



Participants at the workshop listening to the video message of Under-Secretary-General of UN and Rector of UNU, Dr David Malone.

While today, UNU may have something to contribute to Mozambique, all of us have a great deal to learn from Mozambique and neighbouring countries. That's why I visited Mozambique a few years ago, to learn from it. If we are successful – and this workshop is a very important step in that direction – in creating a strong partnership between a research network centred on Mozambique and our institute in Dresden – which should also involve other UNU institutes, for example in Bonn, Germany; in Tokyo, Japan; in Yokohama, Japan; in Hamilton, Canada, and I could mention others – then we will be contributing a great deal to learning about the role of integrated resource management in successful societies in successful development processes.

As you can imagine, I'm very sorry to be missing your meeting. I loved my time in Mozambique and I look forward to returning one day. But unfortunately, this workshop of yours clashed with an earlier engagement of mine, actually on a research project of my own that I'm involved in with a number of research partners that had been scheduled a couple of years ago, as research events tend to be.

I wanted to join you, at least for this brief message, to wish you well, to encourage you all, and

to commend my valued colleague Reza to you. I find him a very exciting research leader to work with. He has done great things for his own country, Iran, and now he is going great things for the wider world.

Thank you all, and goodbye from Tokyo.

4.1.3 Welcome address of Hon. Minister Pelembe, Ministry of Science and Technology of Mozambique

Your Excellency the Deputy Minister of Education, Dr Itai Meque,

The Chancellor of Eduardo Mondlane University, Prof. Orlando Quilambo,

The Representatives of Research and Teaching Institutions from Mozambique and the Region,

The Vice-Chancellors of Eduardo Mondlane University, Prof. Ana Mondjana and Prof. Ângelo Macuácuá,

The Director of UNU-FLORES, Dresden, Prof. Reza Ardakanian,

Members of the Diplomatic Corps,

Teachers and Research Workers,

Esteemed Guests,

Ladies and Gentleman,

In the first place I wish to acknowledge all those present at this workshop **regarding the creation of the twin institute of the Institute for Integrated Management of Material Fluxes and of Resources**, and to greet all participants with my wish for a profitable discussion and stay in Maputo.

The Government has been establishing policies, legislation, programmes, projects and institutions with a view to promoting increased activity in science, technology and innovation in the search for solutions to the challenges facing the development of our country in the most varied social and economic fields.

This event is being held at a moment in which Mozambique is rebuilding itself following the devastating effects of the recent floods which affected a great part of our population, it consequently being an opportunity to reaffirm the importance of the establishment of a research institution in the field of integrated management of materials, waste and water resources, as an instrument of support in the development of solutions for the problems which Mozambique and the region's countries face.

We have witnessed the holding of the 1st and 2nd workshops for the establishment of the Institute for Integrated Management of Material Fluxes and of Resources and of the twin UNU-FLORES institute in Maputo, and it is with great satisfaction that we are holding this event which marks a very important step towards the creation and establishment of a network of scientific collaboration, a fundamental factor in the operation of this important body.

In addition to scientific exchanges and the creation of multidisciplinary networks, we consider that, through this regional seminar, participants should contribute in a selfless manner, putting forward specific proposals in respect of the priority fields of research and the research strategy of the Institute for Integrated Management of Material Fluxes and of Resource 'UNU-FLORES-Mozambique'.

More than 80 rivers cross Mozambique, carrying great volumes of water to the Indian Ocean and which, in the rainy season, burst their banks and create displaced persons, destroying agricultural infrastructure and production, and leading to grief in our population.

The Government hopes that each of the participants in this seminar will make contributions which may lead to specific solutions for the integrated exploitation of materials and fluxes from water resources for the benefit of our population. It is because of this that we have decided to create UNU-FLORES Institute in Maputo.

Dear Participants,

We do not want UNU-FLORES in Mozambique to be merely a Research Institution in Mozambique and its region, but that it shall be a proactive scientific institution to which reference is made, and which will have a role of being involved in society. UNU-FLORES in Mozambique must continually promote communication between the scientific community, Governments, and society in general, in the solution of concrete problems.

Furthermore, it is our expectation to see UNU-FLORES in Mozambique prioritise and carry out concrete studies regarding current issues and challenges, with a focus on seeking solutions. Equally, we hope to see our UNU-FLORES in Mozambique issue independent and scientifically-credible observations and opinions based on evidence and scientific rigour, with a view to advising the Government, Parliament, industry and society in general in respect of the way to proceed.

To finish, I wish to state my sincere thanks to the United Nations University and to the Eduardo Mondlane University for their inestimable support at all stages in the process of the establishment of UNU-FLORES Institute for the Integrated Management of Material Fluxes and of Resources in Mozambique, making available human and material resources, in addition to taking other very important measures, to make UNU-FLORES in Mozambique into a reality in our country.

I extend my gratitude to the members of the UNU-FLORES in Mozambique technical installation team and to the very different levels which have been found to be fundamental in the process of establishment of this body.

With these words I declare the Regional workshop regarding the creation of the twin institute for the Integrated Management of Material Fluxes and of Resources opened.

Thank you very much for your attention. Khanimambo!



Opening of the workshop by H.E.Minister Pelembe, MCT.

Panellists: Prof. Reza Ardakanian, Director UNU-FLORES, H.E. Dr. Itai Meque, Vice Minister of Education, Prof. Orlando Quilambo, Rector of UEM, Dr. Roda N. Luis, MCT.

4.1.4 Introductory talk: Prof. Reza Ardakanian

The following introductory talk briefed all participants about the state of the art of establishing UNU-FLORES in Dresden and its twin in Maputo.

After explaining the conceptual background of UNU-FLORES and basic facts about UNU in general and UNU-FLORES in particular (see Section 1), in this presentation the history and the major milestones of the establishment of UNU-FLORES as mentioned in Section 2 were elaborated on. It was emphasized that the planned twin institute of UNU-FLORES is envisioned to act as a hub for integrated management of water, soil and waste in the region. Establishing a good network to perform joint research, but also to collaborate in education and capacity-building therefore is essential for the success of the institute to be established.

Many areas of joint research are feasible and have been mentioned in the pre-workshop questionnaire. Now it is about the group to define projects and target areas to start working, develop project proposals, etc. Concerning education and capacity development the situation is similar: many opportunities for collaboration have been mentioned, partly building on existing networks. Now it is essential to define those areas where the network of UNU-FLORES can add value and provide specific aspects of unique curricula targeting various stakeholders involved in management of environmental resources.



Group picture of stakeholders

4.2 Introductory session

Facilitator: Prof. Karl-Heinz Feger, TU Dresden.

Before actually starting with working sessions, in an introductory session the goals of the workshop were explained in detail. Participants were then briefed about the results of the questionnaire, which had been circulated to the participants prior to the workshop. The resulting research network spreads over the whole of Africa.

The summary presentation of the research network was followed by a brief introduction to all regional partners and stakeholders (including UEM and TUD). All stakeholders briefly presented their profiles and the areas of cooperation in research and teaching they envision for the network with UNU-FLORES. In Table 1 only research topics and areas of cooperation besides education are reported. Information on available postgraduate programmes related to the management of water, soil and waste are given in Table 4, Section 4.4.

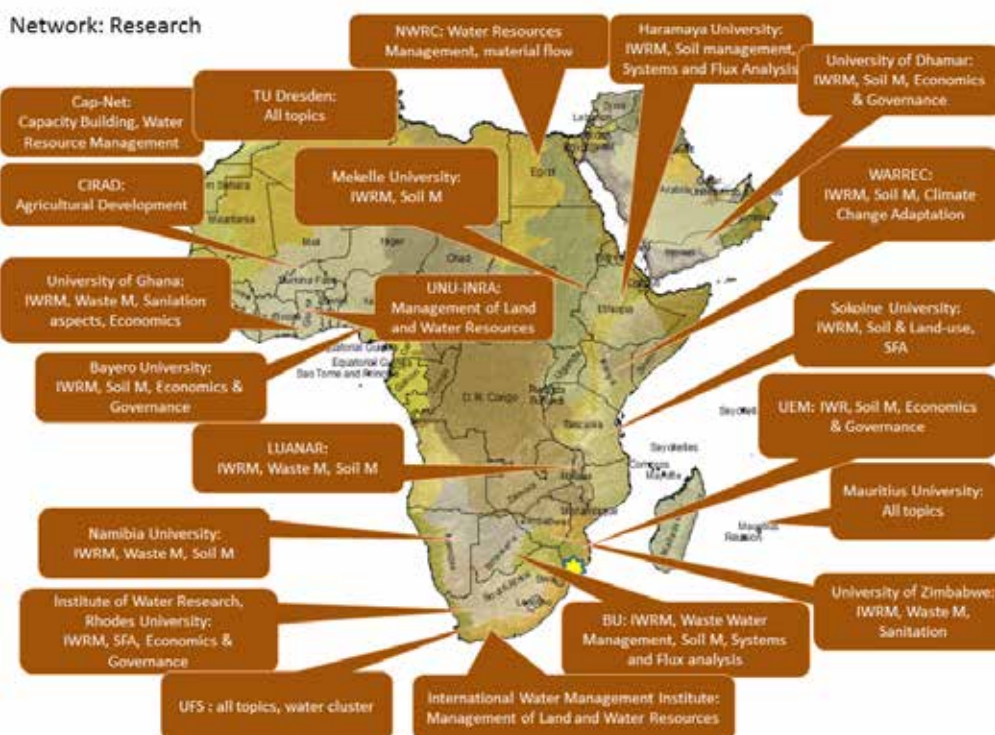


Figure 1: research network and research topics of stakeholders represented in the regional workshop.

Table 1: Research network by country

No.	Country	Institution	Area of research	Representative
1.	Botswana	Botswana University	1. Integrated water resources management; 2. Waste water management and sanitation; 3. Soil–land management (catchment management); 4. System flux analysis.	Prof. Bhagabat P. Parida
Prof. Parida also mentioned possible areas for further cooperation, which included joint initiatives in student research supervision, organization of regional workshops, writing of joint project proposals for external funding, conducting joint research and writing joint articles, conducting short courses on topical issues of the region such as: climate change, flood and drought studies particularly with reference to data scarce or ungauged areas and other activities for capacity-building in the areas of water resources. Management, land management, waste management.				

No.	Country	Institution	Area of research	Representative
2.	Egypt	National Water Research Centre (NWRC)	1. Long-term policies for WRM; 2. General policies for irrigation, drainage; 3. Research in agricultural extension.	Prof. Ahmed Hassan Fahmi
	Further areas for cooperation include knowledge consultancy(to bridge the gap between research and practice), transboundary water resources management (surface water and groundwater), and cooperation for integrated solutions related to water issues(socio-economic, environmental)			
3.	Ethiopia	Mekelle University	1. Climate modelling and crop and food security modelling; 2. Water resources management; 3. Remote sensing and GIS.	Dr. Araya Alemie Berhe
	Dr. Berhe also mentioned that the further areas for cooperation may include application of computer tools in agriculture that includes: modelling food security conditions, modelling future climate, spatial analysis, geospatialstatistics, statistical analysis, remote sensing.			
	Ethiopia	Haramaya University	1. Integrated water resources management; 2. Soil and land management; 3. Systems and flux analysis (industry water processing, cleaning water; 4. Climate change, adaptation and mitigation.	Dr. Lisanework Nigatu
	Further areas for possible cooperation include staff exchange programmes, postgraduate student supervision and joint project development.			
4.	Ghana	University of Ghana (Institute for Environment and Sanitation Studies – IESS)	1. Integrated water resources management; 2. Waste management and sanitation; 3. Systems and flux analysis; 4. Monitoring ecological, economic, social and institutional developments.	Dr. Adelina Mensah
	Dr. Mensah also presented possible areas for further cooperation, which included: Short courses (two days to two months) for senior professionals and/or policymakers, run as part of training and outreach programmes to cover: bio-safety and risk management, conservation of natural resources, diagnostics and monitoring, environmental governance, integrated land and water management ecosystem restoration and sustainable development.			

No.	Country	Institution	Area of research	Representative
5.	Kenya	Jomo Kenyatta University of Agriculture and Technology (JKUAT) Water Research and Resource Center (WARREC)	<p>1. Water and environment</p> <p>Land use change and WRM, climate change/climate variability and WRM, environmental flows, IWRM, water and ecosystems, erosion, sedimentation and nutrient transport and flood risk assessment and management</p> <p>2. Water supply and sanitation</p> <p>Water supplies – design, planning and management, sanitation– design, planning and development, hygiene and water quality issues, wastewater management and reuse, dam design and construction, and storm water management in urban and rural areas</p>	Prof. Bancy M. Mati
<p>Areas for further cooperation:</p> <p>Multilateral problem-solving research on water resources management, environmental conservation and water for agriculture.</p>				
6.	Malawi	Lilongwe University of Agriculture and Natural Resources	<p>1. Integrated water resources management;</p> <p>2. Waste management and sanitation (including drinking water);</p> <p>3. Soil and land management;</p> <p>4. Water economics and governance.</p>	Prof. Charles B.L. Jumbe
<p>Suggested areas for further cooperation included:</p> <ul style="list-style-type: none"> • Short course in quantitative policy analysis in areas identified for cooperation; • Collaborative research in the areas of agriculture natural resources, climate change and the environment; • Collaborative research in ICT and development. 				
7.	Mauritius	University of Mauritius	<p>1. Integrated water resources management – Namibia's new IWRM plan;</p> <p>2. Disaster and risk management;</p> <p>3. Waste management;</p> <p>4. Sanitation – recycling and reuse of water;</p> <p>5. Soil and land management.</p>	Dr. Vikram Seebaluck

No.	Country	Institution	Area of research	Representative
	<p>Suggested areas for further cooperation:</p> <ul style="list-style-type: none"> • As a partner/collaborator in undertaking regional/international multidisciplinary projects; • Use/optimization of specific resources available at UNU-FLORES; • Capitalization of know-how/experiences acquired by UNU-FLORES (north–south and south–south cooperation); • Use/development of specific models/tools for the identified areas of research; • Developing/supervising MPhil/PhD research studies (collaborative projects); • Popularization of projects/knowledge (publications and workshops); • Development/offer of short professional courses. 			
8.	Namibia	University of Namibia	<ul style="list-style-type: none"> • Integrated water resources management – Namibia's new IWRM plan; • Disaster and risk management; • Waste management; • Sanitation – recycling and reuse of water; • Soil and land management. 	Dr. Elsabe M. Julies
	<p>Possible areas for further cooperation mentioned include capacity-building for academic staff through facilitating and sponsoring the exchange of academics among the various participating universities.</p>			
9.	Nigeria	Bayero University, Kano, Nigeria	<ol style="list-style-type: none"> 1. Participatory development of demand-driven, productivity-enhancing and natural resource-friendly agricultural technological options; 2. Holistic and multidisciplinary research; 3. Promotion of end user-preferred technological options; 4. To address research programme that address those areas receiving little or no attention by other national and regional organizations. 	Prof. A.I. Tanko

No.	Country	Institution	Area of research	Representative
	<p>Further areas for cooperation:</p> <ul style="list-style-type: none"> • Awareness creation/sensitization especially among government officials and politicians towards IWRM, waste management and sanitation and soil and land management; • Capacity-building initiatives to address the changing demands of the different planning and implementation stages in all areas of focus; • Information sharing and working together to understand local experience across different regions; • Formation of stakeholders' forums for proper integration and coordination; • Development of financing and funding strategies; • Research and community development with a view to develop and strengthen capacities of governments, NGOs/CBOs and individual stakeholders. This is also another area where we can cooperate. 			
10.	South Africa	University of the Free State (UFS water cluster)	<ol style="list-style-type: none"> 1. Biomonitoring of rivers and water sources; 2. Flood-related research; 3. Water supply and sanitation; 4. Water loss management; 5. Groundwater management; 6. Water management in water scarce areas with focus on food production; 7. Water economics. 	Dr. Andries Jordaan
	<p>Suggested areas for further cooperation include:</p> <ul style="list-style-type: none"> • Short learning programmes; • Joint research projects; • Exchange of lecturers; • Study leading; • External examination; • Joint conferences; • Networking for joint consultancies. 			
11.	South Africa	Rhodes University	<ol style="list-style-type: none"> 1. Integrated water resources management: Efficient use of water in agriculture, interaction of surface and groundwater and recycling, water productivity and food security, shared water for sector use, and water harvesting; 2. Systems and flux analysis: analysis of water uses and pollution; 3. Water economics and governance: monitoring, assessment, education and training. 	Dr. Sukhmani Mantel

No.	Country	Institution	Area of research	Representative
	<p>Further areas for possible cooperation:</p> <ul style="list-style-type: none"> • Postgraduate supervision and teaching; • Comparative studies across the region; • Cooperative studies across disciplines; • Curriculum design for MSc coursework degrees; • Student exchange; • Short courses in professional development; 			
12.	Tanzania	Sokoine University of Agriculture, Tanzania	<ol style="list-style-type: none"> 1. Efficient use of water in agriculture ; 2. Water productivity and food security ; 3. Water harvesting; 4. Soil contamination; 5. Soil erosion and degradation; 6. Soil conservation; 7. Nutrient recycling ; 8. Carbon inventory . 	Prof. Abel K. Kaaya
	<p>Areas for further cooperation:</p> <ul style="list-style-type: none"> • Development/review of curriculum • Participation in development of teaching modules • Provide for students research attachment at SUA,co-supervision of students' research • SUA staff participation in UNU-FLORES academic activities (training and research) including part-time teaching of some courses • Offering tailor-made training courses 			
13.	Yemen	Dhamar University	<ol style="list-style-type: none"> 1. Integrated water resources management; 2. Soil and land management; 3. Water economics and governance; 4. Community-based natural resources management planning. 	Dr. Mohamed Ali Hassan Farea
	<p>Further areas for cooperation:</p> <ul style="list-style-type: none"> • Exchange knowledge; • Postdoctoral programme; • Equipping the faculty laboratory; • Developing programme for education and research; • Research on conservation of agricultural land in the Yemeni Terraces. 			

No.	Country	Institution	Area of research	Representative
14.	Zimbabwe	University of Zimbabwe	<ol style="list-style-type: none"> 1. Integrated water resources management; 2. Wastewater treatment and reuse; 3. Water treatment; 4. Water and sewage sludge management and reuse; 5. Solid waste management; 6. Application of GIS and remote sensing in water management. 	Zvikomborero Hoko
	<p>Further areas for cooperation:</p> <ul style="list-style-type: none"> • Postgraduate programmes (teaching); • Staff exchange and staff development. 			
15.	International Organization	CapNet/UNDP	CapNet has little focus on research, but may provide support for specific case studies	Dr. Bekithemba Gumbo
	<p>Further areas for cooperation:</p> <p>Training tools and materials</p> <ul style="list-style-type: none"> • Professional short course training; • Network management; • General knowledge management. 			
16.	International Organization	International Water Management Institute (IWMI-SA)	Water availability and access Productive water use Water quality, health and environment Water and society.	Dr. Luxon Nhamo

No.	Country	Institution	Area of research	Representative
	Further areas for cooperation: <ul style="list-style-type: none"> • Capacity-building; • Collaboration in research; • Students can come to IWMI-SA as interns. 			
17.	International Organization	United Nations University Institute for Natural Resources in Africa (UNU-INRA)	Research and training workshops in: <ol style="list-style-type: none"> 1. Land and water resources; 2. Bioconservation and green economy; 3. Extractives industry management; 4. Soil and land management; 5. System and flux analysis ; 6. Integrated water resources management. 	Dr. Effiom Oku
	Further areas for cooperation may include sharing of materials and exchange of researchers.			
18.	Mozambique	Universidade Eduardo Mondlane	<ol style="list-style-type: none"> 1. Environmental engineering; integration of water, soil and waste; 2. Management of cross-border rivers: governance, institutional and legal frameworks; 3. Risk management of extreme events; 4. Pollution (mining activities); 5. Salination and waste management; 6. IWRM. 	Dr. Carlos Lucas
	Further areas for cooperation: <ul style="list-style-type: none"> • Institutional/individual capacity development • Climate change and land use management • Ecosystem services as overarching topic • Irrigation • Biomonitoring • Integrated urban water management 			

No.	Country	Institution	Area of research	Representative
19.	Mozambique	International Center for Water Economics and Governance in Africa (IWEGA)	<ol style="list-style-type: none"> 1. Water economics and management; 2. Governance ; 3. Environmental economics; 4. Irrigation; 5. Flood control; 6. Vulnerability, resilience. 	Dr. Bruno Barbier
	IWEGA is wellconnected to regional networks and projects and may provide input with respect to social and economic aspects.			
20.	Germany	Technische Universität Dresden	<ul style="list-style-type: none"> • Meteorology: downscaling of climate projections; • Urban water management; • Land use as driver of water management; • Nutrient fluxes; • Environmental development and risk management; • Remote sensing and geo-data analysis; • Irrigation; • Waste management. 	Prof. Christian Bernhofer
	TUD may collaborate in short courses in environmental management (CIPSEM), graduate schools, and provides opportunities via an interdisciplinary research platform (water, soil, waste).			

This introductory session was ended by putting forward an African proverb: "If you want to go fast, go alone. If you want to go far, go together", proposing to go together, but not too slowly.

4.3 Working session: Research on integrated management of environmental resources: needs and opportunities in the region

Facilitator: Prof. Christian Bernhofer, TU Dresden

This session of the workshop succeeded in identifying four research projects and the respective research consortia in Africa and in defining the required contribution of involved partners. The projects areas were defined as:

1. Productivity in low-fertility areas and climate change;
2. Risk management (floods and droughts);
3. Integrated water and waste management;
4. Soil functioning and food production.

For each project areas some topics to be addressed and a first brief description of objectives were listed.

Joint Research Project (JRP) 1 Objectives

1. Country profiles and gap analysis on the topics
 - soil erosion, desertification;
 - dryland issues;
 - land use change causing decrease of fertility;
 - biofuels/food production;
 - soil characteristics and degradation;
 - irrigation;
 - climate variability and dry spells;
 - droughts and floods and their frequency/duration;
 - population changes, urbanization;
 - salt water intrusion in river basin areas.
2. Developing/specifying requirements for
 - monitoring programmes;
 - modelling tools.

Joint Research Project (JRP) 2 Objectives:

- Gap analysis (case studies)
 - identification of the gaps (public awareness);
 - identification of country-specific issues and general issues.

- Drought risk assessment -> drought risk plan, risk mapping (definition of term drought, data collection and analysis, phenomena)
 - hazard assessment;
 - vulnerability analyses (env, soc, econ), resilience analysis.
- Same with flood risk

Joint Research Project (JRP) 3 Objectives

Assessment of

- Water supply/demand/loss (considering catchment scale);
- Solid waste (incl. agricultural waste);
- Sources and potential usage of waste water (treatment and recycling);
- Potential use of dry sanitation in informal settlements.

Country profiles (available for sanitation):

- Current practice;
- Legislative framework;
- Institutional capacity;
- Human resources;
- Based on country profiles;
- Problem identification, gap analysis;
- Strategy, policy development/recommendations.

Joint Research Project (JRP) 4 Objectives:

1. Analyse and manage soils for sustainable food production;
2. Optimize the carbon balance (soil fertility);
3. Combined fertilizing and irrigation management;
4. Improving database to support the quantifications of soil functions, e.g. for modelling of crop production.

In order to follow these initiatives immediately and to establish research consortia, a questionnaire was developed and distributed to stakeholders. In their responses they indicated those topics in which they are interested (See Annex 7.3) and the contribution they may add to it. The discussion on required follow-ups was continued during the last day of the regional workshop after briefly summarizing the questionnaires (see Section 4.9).

4.4 Session on capacity development, including postgraduate study programmes

Facilitator: Prof. Natasha Ribeiro, UEM

Among other activities on capacity development, the concept for a joint MSc programme on integrated management of water, soil and waste was discussed. A currently worked-out concept of a joint programme of UNU-FLORES, Dresden and TUD on integrated management of water, soil and waste may serve as a blueprint that can be modified according to the needs and the legislative and administrative framework of the region. Available postgraduate study programmes of UEM and regional partners related to the topic of UNU-FLORES were introduced and may cover various aspects of the required curriculum. A working group will be established to work out the details.

4.4.1 Tentative postgraduate study programme of UNU-FLORES, Maputo

As one area of its activities, promoting research and being one element of capacity development Draft general outline (referring to the planned joint MSc programme of UNU-FLORES, Dresden and TU Dresden, confirmed by Academic Committee of UNU).

Background and overall goal

Recently, the water, energy and food security nexus has been acknowledged internationally as an approach that builds synergies across sectors and may facilitate integrated management and governance strategies, overall promoting sustainability and the transition to a green economy. The nexus approach is based on the firm belief that vital environmental resources are strongly interconnected and require a nexus perspective to sustainably manage them. However, as there are still considerable knowledge gaps in the nexus, it has yet to find its way into the curriculum of relevant study programmes and examples of good and improved governance that result from adopting a nexus perspective are rare.

The proposed study programme shall address the urgent need to educate a new generation of environmental managers with a holistic view and an integrated mindset, capable of applying novel tools and approaches to the sustainable management of environmental resources. The close linkage of the study programme with research activities within the research network of UNU-FLORES will ensure that students have access to cutting-edge scientific results, methods and approaches. Besides, they will benefit from the international network of UNU-FLORES. Best-practice examples and case studies resulting from research projects will immediately be included in the curriculum to inspire and encourage students with respect to areas of potential work after graduation.

Involving the students in ongoing research activities for their project and thesis work and discussing the latest results and approaches of ongoing research in institute seminars (which students will attend) will ensure the direct transfer of knowledge. Vice versa, planning and conceptualizing of the teaching modules along with the direct feedback and requests from students will inspire and shape research questions and projects.

Mission context

The proposed programme addresses and serves the mission of UNU through human capacity development in the area of integrated management and sustainable use of environmental resources (water, soil and waste), which are pressing global problems of concern to the United Nations. It will contribute to teaching new elites that are necessary to help solve the pressing need to foster and implement sustainable resource management, especially in developing countries. This is in line with the general mission of UNU to foster sustainable development and in particular with the mission of UNU-FLORES, which is to contribute, through research, teaching, advanced training, capacity development and dissemination of knowledge, to the resolution of pressing challenges in the area of sustainable use and integrated management of the environmental resources water, soil and waste that are of concern to the United Nations and its Member States, particularly the developing and transitional countries (Statute of UNU-FLORES, Dresden). UNU-FLORES will address these issues by considering the impacts of global change on resources management and its nexus with the green economy. Postgraduate programmes will enrich the suite of approaches in (individual) capacity-development activities. They are also expected to facilitate research projects and to catalyse cooperation within UNU and with UN agencies (such as WHO, FAO, UNEP, etc.), since internships at other UNU institutes or UN agencies will be an integral part of the curriculum. Students and alumni will act as a multiplier and increase the overall awareness of UNU as think-tank for the UN system, thereby also increasing the scientific reputation of partner universities.

Implementing exchange programmes, both for students and lecturers, between UNU-FLORES in Dresden and the planned twin institute in Maputo will be an effective tool to achieve multiplier effects via training the trainers, researchers and other stakeholders involved in resource management in Southern Africa and even beyond. Given that the twin institute in Maputo is envisioned to act as a hub for sustainable resources management in the region, the planned cooperation with partners from other African countries in the teaching programme will enhance the outreach of UNU as a whole and also provide opportunities for the research and capacity development of other UNU institutes.

Added value

The proposed study programme is expected to fill a real niche, in particular concerning the integrative approach with regard to water, soil and waste management and the global perspective, with a special focus on developing countries. UNU, UEM and other involved partners would profit from the programme by being recognized as universities providing a timely programme that addresses a real need. The integrative nature of the programme, particularly the integral internships, offer many opportunities for cooperation within UNU and with other UN agencies (e.g. UNESCO-IHE, FAO, UNEP, UNCCD), strengthening UNU's position as a UN think-tank. The internships (duration of two months, to work within specific programmes or projects) will serve as a primer to establish and strengthen cooperation with other UNU institutes and UN agencies.

Future students will profit from receiving up-to-date interdisciplinary education in a highly relevant area, with opportunities to collaborate in international research projects and familiarize themselves with the work of UN agencies in their field of study.

Basic structure of curriculum (based on proposed joint programme with TUD)

The programme shall be designed as a two-year programme (four semesters) with a total of 120 ECTs (equivalent to leading to a Master of Science (MSc) in 'Integrated Management of Water, Soil and Waste' (tentative title). It aims to provide students with a solid background in the basic concepts, approaches and methodologies (including up-to-date technologies such as remote sensing, GIS, modelling approaches) of resources management concerning water, soil and land use and waste – which by itself is a unique, but very relevant and timely combination related to the green economy. Importantly, the programme aims to stimulate an integrative and interdisciplinary mindset of the students from the very beginning and explicitly addresses nexus approaches between sectors as well the implementation of management strategies, rarely realized in current curricula. Moreover, it offers the possibility of familiarization with the UN system and places a special focus on the needs of developing and emerging countries and on sustainable development goals (SDGs).

The **first semester** will consist of compulsory modules that cover the key areas of UNU-FLORES, water, soil and land use management and waste management, as well as the more general areas of systems and flux analysis, and climatology and hydrology. Based on the background of the students (engineering or natural sciences) they may have to take additional modules, engineers receiving some background in ecology and ecosystem services, and natural scientists receiving some background in engineering.

Table 2: Structure of the proposed MSc programme 'Integrated Management of Water, Soil and Waste'.

Courses								Term
Basic	Systems and flux analysis UNU-FLORES	Climatology and hydrology TUD	Soil and land use UNU-FLORES/ TUD	Waste management UNU-FLORES/ TUD	Water resources management UNU-FLORES/ TUD	Ecology TUD		1
						Hydraulic engineering TUD		
Advanced	Internship		Optional	Optional	Optional	Optional	Water cooperation and governance	2
	Study project UNU-FLORES/TUD		Nexus Lab	Optional	Optional	Optional		3
	Master thesis							
Credits	5	5	5	5	5	5		

The **second and third semester** will consist of advanced courses (electives) of which students have to choose about 3 or 4 in each semester (typically 5 ECTs, but some may have a smaller workload: seminars on specific topics). One compulsory module on governance and economic aspects of resources management maybe spread over both semesters. In addition, in the second semester a mandatory two-month internship is foreseen (at another UNU institute or

UN agency related to the topics of UNU-FLORES). In the third semester students are envisioned to attend a 'Nexus Lab' and work out a study project, which might already be related to the topic of the thesis. Both modules will stress the integrative and interdisciplinary nature of the programme, the Nexus Lab providing a format that includes a variety of approaches (literature seminars, excursions, stakeholder forums – role plays of stakeholder negotiations, etc.).

Optional modules may consist of modules already offered by associated partners in the framework of thematically related MSc programmes (in English), but also include seminar series at UNU-FLORES.

In the **fourth semester** students will work out a thesis on a topic to be defined by the supervisor (usually under joint supervision of UNU-FLORES/partner university). After successfully passing all of the required examinations, review of the thesis and its defence, the students shall receive a joint degree of the UNU and UEM.

Implementing exchange programmes, both for students and lecturers, between the UNU-FLORES in Dresden and the planned twin institute in Maputo, will be an effective tool to achieve multiplier effects via training the trainers, researchers and other stakeholders involved in resource management in Southern Africa and even beyond.

Summarizing, the specific and unique features of the proposed programme comprise:

- an integrated coverage of the resources water, soil and waste;
- explicitly address the nexus approach;
- focus on governance and implementation;
- introduction to the UN system;
- focus on developing and emerging countries;
- synergies with the twin institute.

Student profile

Students at BSc level interested in –and having a study background related to –water, soil and waste management will be eligible. Places are limited and will be filled based on strict selection criteria.

The future graduates shall be suited to work in academia, in international organizations, in the public sector, governmental bodies and agencies, NGOs as well as the private sector dealing with or requiring integrated management of environmental resources.

4.4.2 Study programmes of UEM in the field of integrated management of environmental resources

UEM, founded in 1962, is the oldest and largest higher education institution in Mozambique. Until 2000 UEM mainly focused on undergraduate education, but since then has engaged actively in developing postgraduate programmes. Presently, UEM has 31,000 students

attending several undergraduate and postgraduate programmes offered by 12 faculties and five schools. The introduction of Masters and PhD programmes is gaining ground at UEM, thanks to its growing scientific capacity. Presently there are around 47 approved master programmes and three PhD programmes at UEM.

Table 3: Postgraduate programmes offered by UEM.

Unity name	Number of courses	
	Master	PhD
Faculty of Sciences	08	01
Faculty of Arts and Social Sciences	04	01
Faculty of Law	07	01
Faculty of Agronomy and Forest Engineering	10	0
Faculty of Education	05	0
Faculty of Engineering	04	0
Faculty of Veterinary	02	0
Faculty of Economics	03	0
Faculty of Medicine	01	0
School of Communication and Arts	01	0

Within the areas related to UNU-FLORES there are in particular the following MSc courses to be mentioned, covering the listed topics/modules:

- ▶ MSc Hydraulics and Water Resources (Faculty of Engineering)
 - Hydraulic flow;
 - Integrated Management of Water Resources;
 - Hydrology and Hydrological Modelling;
 - Sub-surface Flow;
 - Urban Drainage;
 - Drinking and Waste Water Treatment;
 - Hydraulic Infrastructures;
 - Research and Development of Groundwater Resources.

- ▶ MSc Soil and Water Management (Faculty of Agronomy and Forestry Engineering)
 - Integrated Management of Water Resources;

- Land Use Planning;
- Hydrology;
- Water Quality;
- Hydraulics;
- Irrigation Projects.

► MSc Geohydrology (Faculty of Sciences)

- Applied Hydrogeology;
- Geographic Information Systems Applied to Water Resources;
- Applied Statistics to Water Resources;
- Research and Development of Groundwater Resources;
- Integrated Water Resources Management.

In particular these courses might serve as starting points for joint MSc programmes from the UEM side.

The further development of postgraduate programmes at UEM faces various challenges, in particular limited qualified academic staff, limited resources and weak research infrastructure (access to scientific literature, labs, etc.). Still, UEM is devoted to further increase the number of programmes and the number of postgraduate students in order to increase research capacities. Cooperation with UNU and other international universities should be a means to address these challenges.

4.4.3 Mapping of study programmes on management of water, soil and waste in the region

The postgraduate programmes in areas related to UNU-FLORES were mentioned by the stakeholders in their responses to the pre-workshop questionnaire. Results are summarized in figure 2.

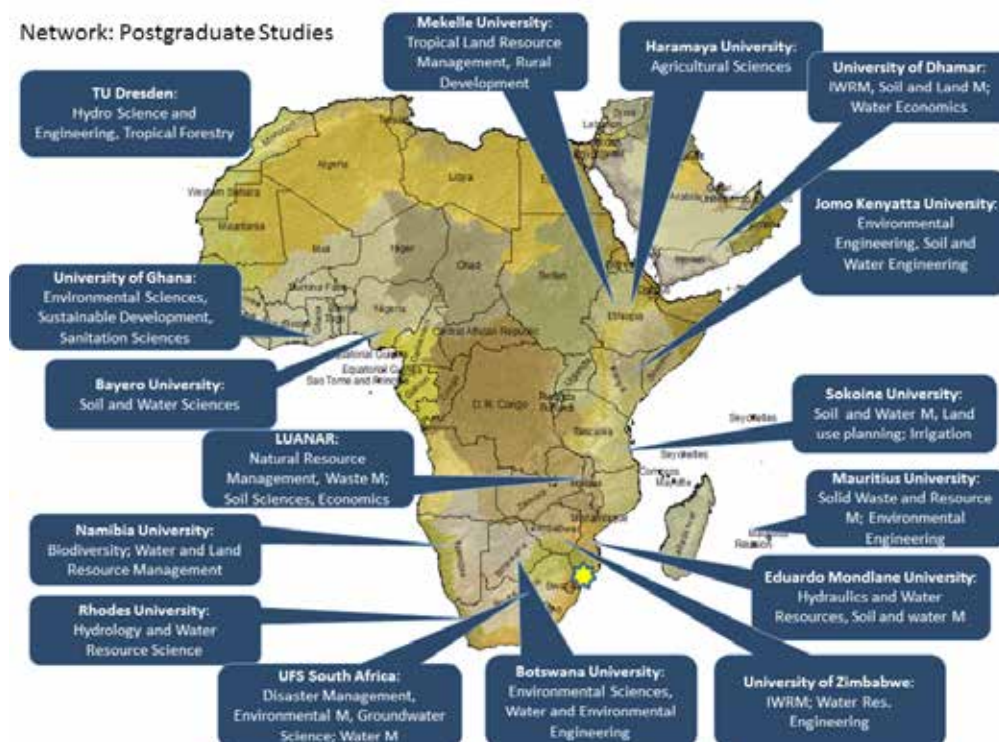


Figure 2: Education network and offered postgraduate programmes in universities represented in the regional workshop.

Almost all of the institutions (if active in postgraduate education at all) offer programmes on water management; programmes on soil and land use management are also well represented. Waste management is less well covered in ongoing programmes.

Table 4 provides information on offered study programmes related to water, soil and waste in more detail. It is based on the information provided by stakeholders in the introductory session of day 1 of the workshop:

Table 4: Postgraduate programmes offered by institutions represented in the regional workshop.

Country	Institution	Study programmes
Botswana	Botswana University Department of Civil Engineering	Faculty of Engineering and Technology: <ul style="list-style-type: none"> • Postgraduate programmes in Water and Environmental Engineering (MEng, MPhil, PhD); • Faculty of Science; • Postgraduate programme in Environmental Science (MSc, MPhil, PhD).
Egypt	Ministry of Water Resources and Irrigation, Egypt National Water Research Centre (NWRC)	N/A (NWRC is a research institute but cooperates with universities in postgraduate education)
Ethiopia	Mekelle University Institute of Climate and Society, College of Agriculture and Natural Resources	<ul style="list-style-type: none"> • MSc in Dryland Agronomy • MSc in Tropical Land Resource Management • MSC in Climate and Society
Ethiopia	Haramaya University	Various programmes
Ghana	University of Ghana Institute for Environment and Sanitation Studies –IESS	<ul style="list-style-type: none"> • Environmental science programme • Climate change and sustainable development programme • Short courses
Kenya	Jomo Kenyatta University of Agriculture and Technology (JKUAT) Water Research and Resource Center (WARREC)	<ul style="list-style-type: none"> • Master of Science in Environmental Engineering • Master of Science in Soil and Water Engineering • PhD in any field related to water and environment

Country	Institution	Study programmes
Malawi	Lilongwe University of Agriculture and Natural Resources Centre for Agricultural Research and Development	Ongoing programmes; <ul style="list-style-type: none"> • PhD and MSc in Agricultural and Applied Economics; • PhD and MSc in Aquacultural Sciences; • MSc in Agribusiness Management; • MSc in Agricultural Extension; • MSc in Animal Sciences. Planned programmes <ul style="list-style-type: none"> • MSc in Environmental Science
Mauritius	University of Mauritius Department of Chemical and Environmental Engineering	<ul style="list-style-type: none"> • MSc Solid Waste and Resource Management • MSc Environmental Engineering • MSc Sustainable Environmental Management (joint with UTM) • MSc Sustainable Energy Engineering (joint with KTH, Sweden) • MSc Energy Engineering with Sustainable Environmental Management (under development)
Namibia	University of Namibia Department of Biological Sciences	<ul style="list-style-type: none"> • MSc in Biodiversity, Management • Bachelor of Science in Integrated Environmental Science, but so far no follow-up MSc
Nigeria	Bayero University, Kano, Nigeria Centre for Dryland Agriculture	No MSc, but postgraduate training programmes in: <ul style="list-style-type: none"> • Natural Resource Management and Climate Change • Crops and Cropping Systems –Soil and Land Management • Range and Livestock Management • Livelihoods and Natural Resource Economics • Power and Machinery/Soil and Water Conservation Engineering

Country	Institution	Study programmes
South Africa	<p>University of the Free State (UFS water cluster)</p> <p>Disaster Management Training and Education Centre for Africa (DiMTEC)</p>	<p>Masters and PhD in:</p> <ul style="list-style-type: none"> • Environmental Management; • Disaster Management; • Groundwater Science; • Integrated Water Management. <p>BSc Honours, MSc, PhD in:</p> <ul style="list-style-type: none"> • Soil Sciences; • Water Economics (Agricultural Economics); • Agricultural Engineering (Irrigation).
South Africa	<p>Rhodes University</p> <p>Institute for Water Research</p>	<ul style="list-style-type: none"> • Research-based MSc and PhD training (Carnegie RISE Sub-Saharan Africa Water Resources Network SSAWRN) • Coursework-based MSc degrees in Hydrology, Water Resources Science and Trans-disciplinary Water Science from 2014
Tanzania	<p>Sokoine University of Agriculture, Tanzania</p> <p>Department of Soil Science</p>	<ul style="list-style-type: none"> • Regional PhD (Soil and Water Management) • MSc (Soil and Land Management) • MSc (Irrigation Engineering and Management) • MSc (Land Use Planning and Management)
Yemen	<p>Dhamar University</p> <p>Faculty of Agriculture and Veterinary Medicine</p>	<ul style="list-style-type: none"> • Integrated Water Resource Management • Soil and Land Management • Water Economics and Governance
Zimbabwe	<p>University of Zimbabwe</p> <p>Civil Engineering Department</p>	<ul style="list-style-type: none"> • Master of Science in Integrated Water Resources Management (draws students from SADC and East Africa) • Master of Science in Water Resources Engineering and Management

Country	Institution	Study programmes
International organizations	CapNet/UNDP	CapNet and partners have a suite of more than 20 modules covering a wide range of topics on sustainable water management.
International organizations	International Water Management Institute (IWMI-SA)	N/A (research institute)
International organizations	United Nations University Institute for Natural Resources in Africa	<ul style="list-style-type: none"> • Joint geospatial training at UNU-INRA GIS Resource Centre • Geospatial research support services • Operating Units (OUs) and College of Research Associates (CRAs) across Africa
Mozambique	Universidade Eduardo Mondlane	<p>Postgraduate based on coursework and research work such as:</p> <ul style="list-style-type: none"> • Hydraulics and water resources; • Soil and water management; • Geohydrology.
Mozambique	International Center for Water Economics and Governance in Africa (IWEGA)	<p>IWEGA contributes to the regional MSc (WaterNet) in IWRM providing yearly a full module (20h) in water economics and governance at the universities of Zimbabwe (Harare) and Dar es Salaam.</p> <p>Also short courses and involved in SANWATCE</p>
Germany	<p>Technische Universität Dresden</p> <p>Faculty of Environmental Sciences</p>	<ul style="list-style-type: none"> • Msc Hydro Science and Engineering • Msc Tropical Forestry and Management

4.5 Working sessions on student profile and required components of a curriculum on integrated management of environmental resources

Facilitator: Prof. Christian Bernhofer, TUD

In this session the postgraduate programmes introduced before were discussed, proposed components were clarified and partly amended. Although based in Maputo, UEM being the major local partner, the intended MSc programme will be designed to serve the region, not just Mozambique. Therefore all cooperating universities and institutions should have some ownership and take on an active role in the establishment of the institute and its research and education programmes. The programme will be offered in English.

Conceptually, it should be highlighted that the proposed MSc programme shall deal with integrated management, which has a different focus than engineering. For sure there will be a 'test period': after 2–3 years the curriculum should be evaluated and amended if considered necessary. Compared to the joint proposal of UNU-FLORES and TUD a programme to be offered in Maputo should place more emphasis on

- Research methodology, including statistics
- Governance issues
- Economic aspects
- Thesis work; only one semester was considered too short to work out a research topic.

Care has to be taken to emphasize the interdisciplinary aspects integrating the sectors water, soil, waste. It will have to be decided how to implement, e.g. water governance and economics (and the respective aspects related to land use and waste management): as separate course/module or integrated into a comprehensive module on IWRM.

There was a general agreement that there is a need for distance learning, however it cannot replace face-to-face teaching. This holds true in particular since the infrastructure for e-learning is often poor. Therefore blended learning may be the best solution, mainly addressing advanced semesters.

Organizational and legal issues should rather be left to a working group/committee to be established. Although desirable, it will be difficult to offer a full MSc programme in part-time mode.

Costs for scholarships, travel, teaching materials, etc. is an issue that needs to be addressed. An intake of about 15 students might be a good starting point.

Concerning student acceptance, there was a general agreement that due to the broad nature of the programme, students from various backgrounds (natural sciences, engineering, but also social sciences) should be eligible. Acceptance could be defined according to the number of hours (credits) spent on required issues. The first semester would then be needed to achieve a harmonization of these different backgrounds. The requirements for students need to be clearly defined, e.g. concerning basic statistics (as it is the case with English).

4.6 Working session on balancing required components and available modules

Facilitator: Prof. Karl-Heinz Feger, TUD

In general, the modules proposed for the joint MSc programme of UNU-FLORES and TUD, together with available modules offered by UEM (e.g. on water economics and governance, hydrology, IWRM, soil and land use) and other universities in the region should provide a good basis to establish a comprehensive study programme on integrative management of water, soil and waste.

The following challenges were identified:

- Procedure and duration of thesis;
- Timing of coursework and research;
- Timing of courses between Dresden/Germany and Maputo/Africa; the academic years are structured differently and not easy to reconcile;
- Integrating an internship into the curriculum (could also be renamed 'study project' or similar).

Aspects which are not, at least not explicitly, addressed in the UNU-FLORES/TUD proposal, but which will be important for a regionally adapted programme include: GIS application, drought management and water quality issues. Also waste might be under-represented.

The issue of internships was controversially discussed. In general, the idea of including into the curriculum a project working, e.g. in a UN agency such as FAO within a specific project, was supported. Such a project may also be integrated in the thesis. Timing is critical, however, in particular in the academic year as it is in Africa (January to November, long break over Christmas).

These timing issues will be a major topic for a working group to be established.

4.7 Working session on the role of partners in capacity-development activities

Facilitator: Prof. Alsácia Atanásio, MCT

Besides postgraduate programmes for students (MSc, PhD), other areas of capacity development should be considered, such as short courses and e-learning modules addressing specific stakeholders. CapNet may play a significant role here and is already offering many courses and materials on its website.

The network of partners participating in the workshop could be a platform to identify case studies that may also serve as a model for other countries and to identify topics and projects for students to work on.

From a UNU-FLORES perspective all CD activities should promote the nexus approach: why it is important and how to implement it. The activities should be developed according to the mandate of UNU-FLORES and according to the needs of the region or a specific country. These activities may involve UN agencies. Institutional capacity development is surely an issue to be addressed, e.g. via policy briefs. It will also be important to follow up on CD activities by monitoring the results and the sustainability of measures.

Several areas/topics were listed to be addressed in short courses or other CD activities:

- Waste management;
- Safe use of wastewater;
- Urban management (including water, soil, waste);
- Mitigating adverse effects of mining.

When asking for specific contributions from stakeholders, a more detailed description of the curriculum is initially required. Only then can it be decided to what extent existing modules (provided by UEM/TUD) cover the needs and which gaps need to be filled. A suggestion put forward was that each stakeholder should define a module that from his/her perspective is needed in a curriculum on integrated management of water, soil and waste. It should address a specific aspect of the nexus and have a defined workload.

4.8 Student seminar

Facilitators: Marco Leidel (TUD), Cesaltina Tchamo (UEM)

The student seminar took place in parallel with the regional workshop, dealing with similar topics from a student perspective. Two groups of MSc students were involved: one group from UEM, enrolled in several programmes related to environmental resources management and one group from TUD, mostly enrolled in the international study programme Hydro Science and Engineering. These students came from several African countries, from Iran and Germany. All students had also received a questionnaire in advance of the workshop and had started working on a status quo analysis of ongoing programmes in environmental resources management before the workshop. Results of the students seminar were presented during the last day of the regional workshop to all stakeholders. Basically, the seminar confirmed and complemented the identified required components (concerning content, organizational and technical aspects) of a curriculum on integrated management of environmental resources.

Goals of the seminar: To find out the students' perspective towards a new study programme

Approach:

1. Analysis of status of postgraduate programmes related to management of environmental resources (UEM, TUD);
2. Required components of a curriculum on integrated management of environmental resources (students' perspective);
3. SWOT analysis.

Table 5: List of participants in student seminar

Country	Participant	University/study programme
Mozambique	Manuel Langa	UEM
	Tamara Sande	UEM
	Paulino Sandramo	UEM
	Helio Armazia	UEM
	Sabado Deixa	UEM
	Mabui Vancia	UEM
Eritrea	Tesfu Hadera Tesfay	TUD, Hydro Science and Engineering
	Filmon Mengisteab	TUD, Hydro Science and Engineering
Sudan	Mohammed Abdallah	TUD, PhD student
Iran	Elham Moayedi	TUD, Hydro Science and Engineering
Germany	Robert Reinschmidt	TUD, Hydro Science and Engineering

4.8.1 Analysis and comparison of ongoing programmes at UEM and TUD

Analysis of the status of postgraduate programmes related to management of environmental resources at Universidade Eduardo Mondlane

The courses represented from this university include the following:

- Soil and Water Management (Faculty of Agronomy and Forest Engineering);
- Environmental Physics (Faculty of Science): Natural disasters related to climate change (floods, cyclones);
- Chemistry (Faculty of Science): Chemistry lectures.

The contents of the course, Soil and Water Management include the following modules:

- Water quality (irrigation water, lakes and rivers, 4 CR);
- Advanced hydrology (4 CR);
- Integrated water resources management (basic concepts, stakeholder interactions, sectoral perspectives, water regulation, river basin management) (4 CR);
- Planning the use of water and land (4 CR);
- Hydraulics (5 CR);
- Irrigation project (lecture, modelling irrigation; irrigation systems) (4 CR);
- Agricultural drainage (4 CR);
- Project simulation (case study, problem-based learning, field work) (9CR);
- Water in agriculture (4 CR).

Teaching methods in offered modules vary; some of them rely 100% on lectures, while others take more participatory approaches.

Analysis of the status of postgraduate programmes related to management of environmental resources at TU Dresden

Only one study course was considered from TUD: Hydro Science and Engineering, under the Faculty of Environmental Sciences, which is structured as given in the figure 3 below:

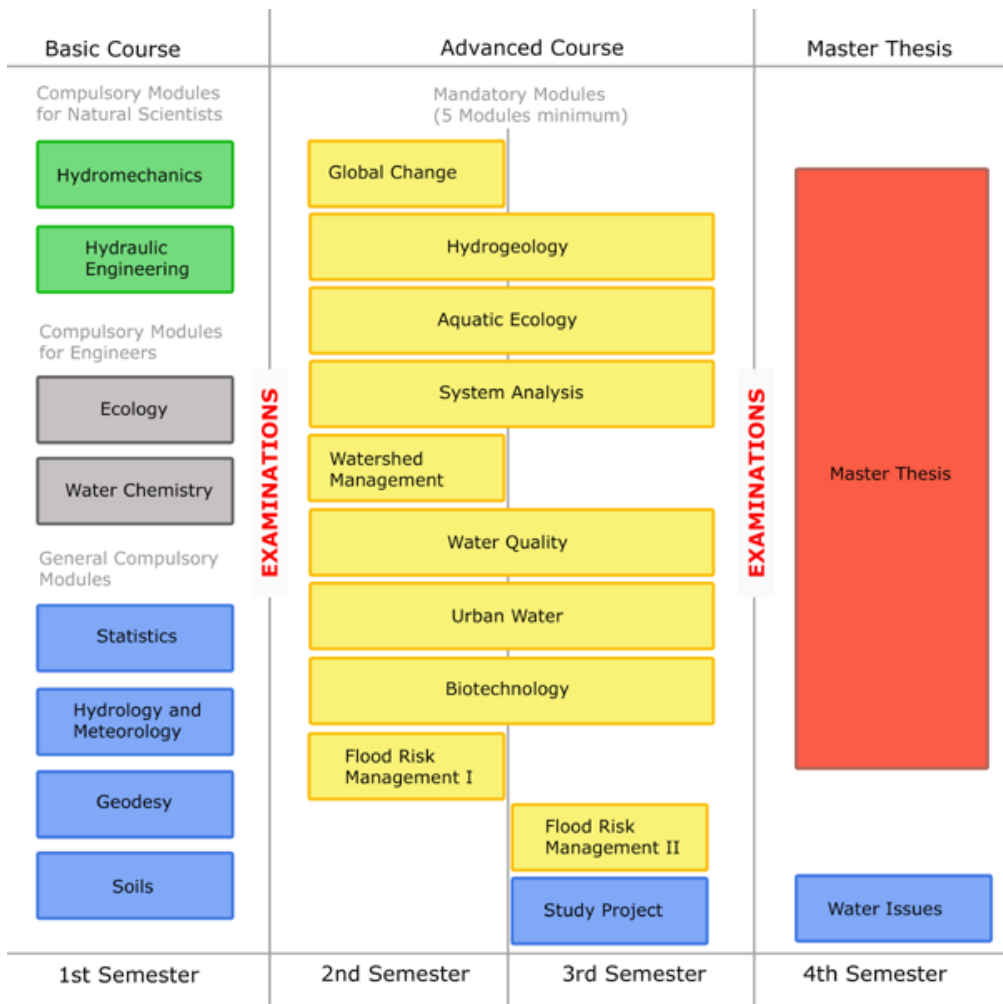


Figure 3: Structure of MSc programme Hydro Science and Engineering (TUD)

Comparing the current programmes offered by UEM and TUD considered here, there are some overlaps in key topics (IWRM, hydrology, and hydraulics). Programmes at UEM more strongly cover the agricultural aspects (drainage, irrigation, land use), while TUD has a stronger focus on flood risk management, climate change and international aspects (see Table 6).

Table 6: Comparison of study programmes offered by UEM and TUD

Discussion/comparison of postgraduate programmes related to management of environmental resources at UEM and TUD	
<p>Similarities:</p> <ul style="list-style-type: none"> • IWRM; hydrology; • Hydraulics; • Water quality lectures; • Good connection to professors; • Good access to papers; • Study project/project simulation; • Software learning. 	<p>Differences:</p> <ul style="list-style-type: none"> • International water issues (TUD); • Agricultural drainage (UEM); • Flooding (TUD); • Land use/agricultural focus (UEM); • Access to e-learning resources (TUD); • Climate change, biotechnologies (TUD); • Irrigation modules (UEM); • Excursions (TUD); • UEM: 1 year master thesis, TUD 5 months.

4.8.2 Proposed curriculum on integrated management of water, soil and waste

The course curriculum and content must be complimentary/in line with the structure of UNU-FLORES, which includes sections on:

1. Water resources management;
2. Soil and land use management;
3. Waste management;
4. Systems and flux analysis considering global change assessment;
5. Capacity development and governance.

(see flores.unu.edu).

BASIC COURSES (20 CR, compulsory, 1st semester):

Each module should shed light on the topic (introduction) and provide an outlook to global issue and advanced courses.

- Introduction to resources management;
- Computational skills course (statistics,);
- Introduction to waste (waste treatment and management);
- Introduction to water (hydrology, meteorology, water quality, etc.);

- Introduction to soil (principles of soil science and soil mechanics);
- Research methodology (skills development).

To catch up with various backgrounds of students (engineering or natural sciences), additional **Basic courses for engineers (10 CR)** should cover environmental chemistry and ecology; an additional **Basic course for natural scientists (10 CR)** could address introduction to hydraulics (open channel hydraulics, river and groundwater hydraulics).

Building upon the basic courses, during the 2nd and 3rd semesters various advanced courses should be offered, from which a defined minimum number has to be chosen. Advanced aspects of water management (irrigation, water quality, IWRM, flood management, etc.), of soil and land use management (e.g. connecting to irrigation, desertification, drought management) and waste management (cycle economy) have to be included, but also governance and economic aspects, climatology and advanced computational skills.

With respect to required structure/means of teaching of the new study programme, it should follow a trans-disciplinary approach and the teaching methods include the following:

- lectures, practical training/tutorials;
- problem-based learning;
- blended learning/e-learning modules, webinars, setting up learning management system;
- short courses for vocational training (if necessary);
- excursions;
- internships (oriented) after 3rd semester;
- exchange programmes of students (1–4 months; either courses or lab, thesis research);
- exchange programmes of lecturers (additional to e-learning modules).

The proposed study programme should include the following technical aspects:

- good internet connection;
- learning management system;
- access to lab facilities and matching to programme objectives =>improving lab facilities;
- more PCs needed;
- focal point for supporting study programme (building/room including library).

Further recommendations for the proposed course include:

- coordinating office; one person in Germany, one in Mozambique =>responsible for exchange programme, internships;
- internships should be provided;
- language centre needed (English);
- same system (credit points).

Student requirements for admission to the proposed courses should include a related background, for example in the fields of natural resource management and/or engineering and also proven financial support for fieldwork and thesis research (sampling, etc.).

4.8.3 SWOT analysis

As **strengths** (unique benefits, internal) of the proposed MSc programme, one surely has to mention knowledge transfer, enhancing regional development through capacity development, close interaction with regional partners, combining expertise of TUD, UEM, UNU and further universities in the region and its basis in well-established study programmes.

Weaknesses (what remains unfulfilled/difficult, internal) might be related to difficulties of bringing students from different backgrounds to the same level, getting lost because of too many topics covered, limited teaching and learning facilities and teaching staff and financial constraints.

Opportunities (add value, external): it is assumed/hoped that these proposed courses will contribute to the strengthening of water-related institutions in sub-Saharan Africa in terms of capacity development and that this study programme will be a hub that will facilitate experts in the region, raise awareness and provide the best opportunities for applied research in the region.

The **threats** (external) so far envisaged include institutional constraints due to bureaucracy and organizational inefficiencies, inappropriate technology, inadequate funding, limited expertise, language barriers, brain drain and also questions pertaining to the sustainability of the project.

Overall, opportunities seem to prevail, especially since the planned programme is based on an innovative concept (nexus) with lots of cooperation potential.

4.9 Synthesis and outlook

Facilitator: Prof. Reza Ardakanian, UNU-FLORES

4.9.1 Research

The summary of the discussion on research topics during the first day, resulting in the definition of four Joint Research Projects (JRPs), was complemented by a summary of the outcome of the questionnaire that had been distributed among the stakeholders during the workshop. In this questionnaire, all stakeholders had proposed specific contributions they would make to single projects. It was agreed that a detailed analysis of the questionnaire would be provided by UNU-FLORES and distributed to all stakeholders involved in the respective JRP (see annex 7.3). For each of the projects regional focal points were nominated:

1. JRP 1: Productivity in Low-Fertility Areas and Climate Change. Regional focal point: Dr. Effiom Oku, UNU-INRA.
2. JRP 2: Risk Management (Floods and Droughts). Regional focal point: Dr. Andries Jordaan, UFS-DiMTEC.
3. JRP 3: Integrated Water and Waste Management. Regional focal point: Dr. Vikram Seebaluck, University of Mauritius.
4. JRP 4: Soil Functioning and Food Production. Regional focal point: Prof. Abel Kaaya, Sokoine University of Agriculture, Tanzania.

The projects will be coordinated by UNU-FLORES in cooperation with regional focal points. Newly recruited academic officers, joining UNU-FLORES during summer 2013 will be involved. For each project there shall also be a focal point nominated at TU Dresden and UEM, being the main partner universities of UNU-FLORES. To support the establishment of the twin institute of UNU-FLORES in Mozambique in scientific terms, UEM will establish a scientific committee, which will then nominate focal points for the JRPs.

It was agreed that the first step in each of the projects will consist of performing a mapping of the current situation in involved countries with respect to the topics addressed. This mapping will rely on existing data and recently finalized or ongoing projects, considering also the status of implementation of respective management strategies. The amount of funding needed for the mapping will be limited. Based on the mapping and the respective gap analysis, research proposals shall be worked for external donor support. Funding in general is certainly a critical issue for the research work to be done. Various sources of funding will be considered, including funding from industry partners.

4.9.2 Education

The MSc programme on 'Integrated management of water, soil and waste', proposed jointly by UNU-FLORES and TUD, may provide a blueprint for a MSc programme in Maputo. Research areas/projects defined should be reflected in the curriculum. More specification is required with regard to topics to be covered under socio-economics. It would also be useful to have content on desertification and introduction to research methodology. In particular some discussion on research approaches, frameworks, concepts, survey, case studies and use of quantitative, qualitative and hybrid approaches to data collection, analysis and dissemination is required.

The structure of the programmes in Dresden and Maputo is not the same. In particular the duration of thesis work needs to be clarified. Student intake should take a broad approach, covering participants from different backgrounds and disciplines. The structure and content of specific courses may differ between Dresden and Maputo. It is to be decided whether aspects such as socio-economy should be treated in a separate module or within courses on, for example, water management. Courses provided by UEM may cover some basic aspects, to be complemented in cooperation with other partners. Specific contents of proposed modules need to be clearly defined before clarifying specific contributions from partners. E-learning has to be considered as part of the academic strategy. Where possible, a blended learning approach should be encouraged that combines face-to-face classroom learning with online distance learning. Working group(s) need to follow up on this issue as a matter of priority.

In the discussion about the envisioned MSc programme the question of its sustainability was raised. Besides continued funding, including scholarships for students, it will be essential to build up educational capacities by training the trainers and also to invest in technical facilities (including IT), laboratories, etc. With a problem-oriented approach it should be ensured that students can continue working. With respect to language barriers (courses will be in English), it should be ensured that appropriate courses are offered and specific partnerships might be sought to address this issue. Concerning the timeline, given the institute can start in 2014, starting a MSc programme in 2015 could be targeted.

4.9.3 Capacity development

There is an acknowledged need for other activities such as short courses and training modules. Policy briefs that identify important best practice guidance are also important. In addition to developing individual capacity it was felt there is a need to address the issue of institutional capacity development. By this is meant building capacity of ministries and departments to undertake planning and decision-making that facilitates integrated management of soil, water and waste resources.

Organizing a workshop for stakeholders from ministries and governmental agencies to promote and introduce the nexus approach will be considered. This might be a joint undertaking with UNU-INRA, CapNet and other interested partners.

4.9.4 Required follow-ups

Keeping the momentum for the established network and the establishment of the twin institute will be important for the near future. All stakeholders should act as multipliers and raise awareness within their institutions. At UEM the Scientific Committee to be established will coordinate the scientific support and cooperation with the twin institute. Both with respect to research activities and education and capacity development it is important to start activities soon to demonstrate results of the initiative, which has already been running for two years. While things get started, some fine-tuning of programmes can still be done 'en route'.

It was recognized that an online platform should be established to facilitate easy connections between stakeholders, in addition to making it possible for data to be shared. All stakeholders were requested to identify or design one module they really would like to see in the curriculum of a programme on integrated management of water, soil and waste and which focuses on the needs of the region in terms of capacity development and training.

4.10 Closing remarks

Prof. Orlando Quilambo, the Rector of the UEM, on behalf of the university and the Minister of Science and Technology, reiterated the commitment of both the Government and the University to support with all the means available the establishment of the twin institute of UNU-FLORES in Maputo.

He said the deliberations and conclusions reached during the course of the workshop were vital for the materialization of the project, whose journey began in 2010. The presentations and discussions during the workshop gave the project new momentum towards achieving its goals.

He mentioned that the partnership addresses issues that are cross-cutting and which transcend national boundaries across Southern Africa, Africa and the world in general. The opportunities availed by this partnership through research, training and knowledge transfer would help provide solutions to the challenges that are a priority for most of the participating countries and beyond.

Prof. Quilambo further pointed out that there was growing interest from the Mozambican government to associate with academia, aiming at fostering the welfare and well-being of the people. He emphasized the need for a qualified workforce, and this, he said, could only be achieved through embracing new approaches, wide research networks and institutional collaboration. Prof. Quilambo also promised that there would be more efforts made to include in UEM study programmes modules that addressed the issues discussed in the workshop.

He said the workshop goes down in history as a step by the African and European partnership to solve challenges to humanity and the management of natural resources.

He called upon the participating institutions to move ahead and begin implementation of the projects that had been identified ahead of the cooperation/partnership commencement, through the already existing networks.

And finally, he thanked all the participants for the hard work and commitment showed during the 3 days of sessions and declared the workshop closed at 12:05, local time.

5. Next steps and perspectives

Immediately after the workshop a brief summary was compiled. It was distributed among the stakeholders and sent also to supporting institutions: MCT in Mozambique and German Ministries (BMBF and SMWK).

With respect to the partnership to be established in Maputo, significant progress was made. The strong commitment of UEM and MCT expressed during the regional workshop was materialized in the offer of UEM to provide premises as part of in-kind support of Mozambique and a proposal of MCT concerning financial arrangements for the start-up phase. In addition, a scientific committee was established at UEM to coordinate the scientific input and cooperation of UEM for the partnership. Necessary agreements building on the signed MoU to establish the partnership will be worked out in due course, while the involved parties will at the same time continue working on the funding issue.

The four JRPs that had been defined during the workshop were taken up and carried forward jointly by UNU-FLORES and the nominated regional focal points. Several meetings were organized to work out and coordinate the objectives of the projects. As discussed already during the regional workshop, the first step in each of the projects would be a mapping study as a status quo analysis in all involved countries. All stakeholders were asked to confirm/amend/specify their proposed contributions to the JRPs. A work plan and terms of reference for the mapping study were developed and distributed. Focal points for each of the projects were nominated at TUD and UEM. The current status (September 2013) is such that the mapping activities have started. Based on the results, research proposals will be worked out for external donor support, while the mapping study itself will be published. The start of research activities is targeted for 2014. These initiatives represent the main outcome of the regional workshop to be followed up and hopefully will be the starting point for fruitful and long-term cooperation in the region.

6. References

Ardakanian, R.; Hülsmann, S.; Johmann, J. (2011): Proceedings –1st International Scoping Workshop on the establishment of the United Nations University Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES) and its Twin in Mozambique. UNU-ViE, Bonn.

Ardakanian, R.; Hülsmann, S.; Johmann, J. (2012): Proceedings –2nd International Scoping Workshop on the establishment of the United Nations University Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES) and its Twin in Mozambique. UNU-ViE, Bonn.

Ardakanian, R.; Hülsmann, S.; Krebs, P. (2012): The new UNU Institute for Integrated Management of Material Fluxes and of Resources (UNU-FLORES) in Dresden (Germany) and Maputo: core areas of focus and twinning concept. In: Proceedings, Special Session at 12th WaterNet Symposium, UNW-DPC, Bonn.

7. Annex

7.1 Stakeholder list

(Sorting order: country/organization, name)

Name	Function	Organization	Country
<i>Regional partners (including TU Dresden), sorted by country/name</i>			
Prof. Bhagabat P. Parida	Coordinator, NEPAD Southern African Centres of Excellence on Water	Botswana University	Botswana
Prof. Ahmed Hassan Fahmi Bayoumi Ibrahim	Vice Chairperson and the Coordinator of the National Water Resources Plan	National Water Research Center (NWRC)	Egypt
Dr. Araya Alemie Berhe	Senior Lecturer, Rangeland Ecology	Mekelle University	Ethiopia
Dr. Lisanework Nigatu	Senior Lecturer, Meteorology	Haramaya University	Ethiopia
Dr. Adelina Mensah	Senior researcher	IESS, University of Ghana	Ghana
Prof. Christian Bernhofer	Director, Institute of Meteorology and Hydrology	TU Dresden	Germany
Prof. Karl-Heinz Feger	Dean, Faculty of Environmental Sciences	TU Dresden	Germany
Dr. Niels Schütze	Chair of Hydrology	TU Dresden	Germany

Name	Function	Organization	Country
Prof. Bancy M. Mati	Director	Jomo Kenyatta University; Water Research and Resource Center (WARREC)	Kenya
Dr. Charles B. L. Jumbe	Associate Research Professor of Economics	Bunda College of Agriculture, Lilongwe University of Agriculture and Natural Resources (LUANAR)	Malawi
Dr. Vikram Seebaluck	Head of Chemical and Environmental Engineering Department	Mauritius University	Mauritius
Dr. Elsabe Julies	Head of Department of Biological Sciences	University of Namibia	Namibia
Prof. A.I. Tanko	Dean, Faculty of Social and Management Sciences	Centre for Dryland Agriculture, Bayero University	Nigeria
Dr. Andries Jordaan	Director	UFS-Disaster Risk Management Training and Education Centre for Africa (DiMTEC)	South Africa
Dr. Sukhmani Mantel	Research Officer	Institute for Water Research, Rhodes University	South Africa
Prof. Abel Kaaya	Senior Lecturer; Regional PhD (Soil and Water Management) Programme Coordinator	Sokoine University of Agriculture	Tanzania
Dr. Mohamed Ali Hassan Farea	Senior Lecturer	University of Dhamar, Faculty of Agriculture	Yemen
Eng. Zvikomborero Hoko	Deputy Dean, Coordinator of MSc programme	University of Zimbabwe	Zimbabwe

Name	Function	Organization	Country
<i>Organizations</i>			
Dr. Bruno Barbier	Senior researcher	CIRAD/IWEGA	France/Burkina Faso/ Mozambique
Dr. Susanne Jahn	Lecturer, Regional Representative	German Academic Exchange Service, DAAD	Mozambique
Dr. Bekithemba Gumbo	Director	CapNet/UNDP	South Africa
Dr. Luxon T. Nhamo	Research Officer	International Water Management Institute (IWMI) – South Africa	South Africa
<i>UNU</i>			
Prof. Reza Ardakanian	Director	UNU-FLORES	Germany
Dr. Stephan Hülsmann	Project Officer	UNU-FLORES	Germany
Dr. Effiom Oku	Land and Water Management Fellow	UNU-INRA	Ghana
<i>Mozambique</i>			
H.E. Prof. Louis Augusto Pelembe	Minister	Ministry of Science and Technology (MCT)	
H.E. Dr. Itaí Meque	Vice-Minister	Ministry of Education	
Marcelo Chaquisse	Deputy National Director	Ministry of Agriculture	
Eng. João Ribeiro	Director	National Institute for Natural Disasters Management	
Hon. Jennifer Topping	Representative	UNDP	
Prof. Doutor Rogéri Uthui	Rector	Rector, Pedagogical University of Mozambique	
Prof. Doutora Samaria Tovele	Rector	High Institute of Technology and Management (ISTEG)	

Name	Function	Organization	Country
Prof. Orlando António Quilambo	Rector	University of Eduardo Mondlane (UEM)	
Prof. Ana Maria Graça Mondjana	Vice Rector	University of Eduardo Mondlane (UEM)	
Dr. Evaristo Baquete	Permanent Secretary	Ministry of Science and Technology (MCT)	
Prof. Emilio Tostão	Dean	Faculty of Agronomy and Forestry Engineering/UEM	
Dr. Roda Nuvunga Luis	Director	National Institute for Water Research/MCT	
Prof. Alsácia Atanásio	Executive Director	Ministry of Science and Technology (MCT)	
Prof. Maida Khan	Director	Pedagogical Directorate/UEM	
Prof. Bettencourt Capece	Director	Scientific Directorate/UEM	
Prof. Carlos Lucas	Director	Office of Cooperation/UEM	
Prof. Amália Uamusse	Director	Faculty of Sciences/UEM	
Prof. Sebastião Famba	Deputy Dean	Faculty of Agronomy and Forestry Engineering/UEM	
Prof. Elonio Muiuane	Professor	Faculty of Sciences/UEM	
Prof. Natasha Ribeiro	Head of Department	Scientific Directorate/UEM	
Prof. Lucrécio Biquiza	Head of Department	Faculty of Engineering/UEM	
Prof. Nelson Matsinhe	Deputy Dean	Faculty of Engineering/UEM	
Prof. João Munembe	Deputy Dean	Faculty of Sciences/UEM	

Name	Function	Organization	Country
Prof. Arão Manhique	Professor	Faculty of Sciences/ UEM	
Prof. Doutor Rui Brito	Course Director	Faculty of Agronomy and Forestry Engineering/UEM	
Prof. Dinis Juizo	Professor	Faculty of Engineering/UEM	
Prof. Alvaro Carmo Vaz	Professor	Faculty of Engineering/UEM	
Eng. Susartino Pelege	Head of Division	National Institute of Irrigation	
Hernane Filimone	Deputy National Director	Laboratório de Engenharia de Moçambique	
Eng. Manuel Alvarinho	President	Conselho Regulador da Água (CRA)	
Professor Catedrático Boaventura Cuamba	Professor	Faculty of Sciences/ UEM	
Prof. Doutor Alberto Mavume	Head of Division	Faculty of Sciences/ UEM	
Prof. Lucrécio Biquisa	Head of Department	Faculty of Sciences/ UEM	
Dr Amino Ussene Naran	Lecturer	Faculty of Sciences/ UEM	
Dra. Verónica Micas José	Lecturer	Faculty of Sciences/ UEM	
Prof. Dr Antonio Cumbana	Professor	Faculty of Sciences/ UEM	
Tatiana J. Marrufo		MCT – CIDE (Ethnobotany)	
Suzana Saranga	Deputy National Director	Direcção Nacional de Águas (MOPH)	

7.2 Programme of the regional workshop

	Programme 06 May 2013
8:00–8:30	Workshop registration at hospitality desk
	Opening session Master of ceremonies: Dr Vitória Langa de Jesus, Ministry of Science and Technology Facilitator: Prof. Reza Ardakanian, UNU-FLORES
8:30 – 9:15	Welcome notes <ul style="list-style-type: none"> • His Magnificence Orlando Quilambo Rector of the Eduardo Mondlane University • Video message: H.E. Dr David M. Malone, Under-Secretary-General of the United Nations, Rector of United Nations University • Honourable Louis Augusto Pelembe, Minister of Science and Technology, Mozambique
9:15 – 09:30	Introductory talk: Prof. Reza Ardakanian, UNU-FLORES 'Establishing UNU-FLORES in Dresden and its twin in Maputo: State-of-the-art, and outline of ways ahead
09:30 – 09:45	Group photo
09:45 – 10:15	Coffee break Press conference
	Introductory session (Facilitator: Prof. Karl-Heinz Feger, TUD) UNU-FLORES as regional hub for integrated management of environmental resources
10:15 – 10:30	Outline of the workshop and announcements: Prof. Reza Ardakanian, UNU-FLORES
10:30 – 10:45	Brief outline of research network (results of workshop questionnaire): Dr Stephan Hülsmann, UNU-FLORES
10:45 – 12:30	Brief introduction of regional partners: areas of cooperation: all stakeholders
12:30 – 13:30	Luncheon
	Working session: Research on integrated management of environmental resources: needs and opportunities in the region Facilitator: Prof. Natascha Ribeiro, UEM

13:30 – 14:00	Summary of outcomes of 2nd ISW (areas of research) and of workshop questionnaire (Section 1: research areas):
14:00 – 15:00	Prof. Christian Bernhofer, TUD Discussion
15:00–15:30	Coffee break
15:30–17:00	Final discussion on research programme (Facilitator: Prof. Christian Bernhofer, TUD): Defining the role of partners, establishing consortia
18:00	Welcome reception (hosted by UEM)

	Programme 07 May 2013
	Session on capacity development, including postgraduate study programmes Master of ceremonies: Dr. Vitória Langa de Jesus, Ministry of Science and Technology Facilitator: Dr Luis Helder, UEM
8:30–8:45	Introduction and outline of the second day: Prof. Reza Ardakanian, UNU-FLORES
8:45–9:15	Draft postgraduate study programme of UNU-FLORES in Dresden: Dr Stephan Hülsmann, UNU-FLORES
9:15–09:45	Study programmes at UEM in the field of integrated management of environmental resources: starting points for joint programmes; Prof. Bettencourt Capece, UEM
09:45–10:00	Mapping capacity development activities, including postgraduate study programmes in the region (results of workshop questionnaire): Dr. Niels Schütze, TUD
10:00–10:30	Coffee break
10:30–12:00	Working session (Facilitator: Prof. Christian Bernhofer, TUD) Student profile and required components of a curriculum on integrated management of environmental resources
12:00–13:30	Luncheon
13:30–15:00	Working session (Facilitator: Prof. Karl-Heinz Feger, TUD) Balancing required components and available modules, identifying gaps to be filled
15:00–15:30	Coffee break

15:30–17:00	<p>Working session (Facilitator: Dr Luis Helder, UEM)</p> <p>Defining the role of partners in capacity-development activities, including postgraduate study programmes</p>
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	Programme 08 May 2013
	<p>Synthesis and outlook</p> <p>Master of ceremonies: Dr. Vitória Langa de Jesus, Ministry of Science and Technology</p> <p>Facilitator: Prof. Reza Ardakanian, UNU-FLORES</p> <p>A group of students from TUD and UEM who have worked on the covered topics from a student's perspective will join the workshop.</p>
8:30–8:40	Introduction and outline of the third day: Prof. Reza Ardakanian, UNU-FLORES
8:40–9:10	Presentation of results from student's seminar: Mr Marco Leidel, TUD
09:10–09:30	Discussion
09:30–10:00	Coffee break
10:00–11:00	How to advance a nexus approach to environmental resources management? Research needs and curricula requirements: Wrap-up of results from first two days
11:00–12:15	Final discussion: Defining ways ahead, establishing regional working groups for follow-ups
12:15–12:30	Closing of workshop: His Magnificence Orlando Quilambo Rector of the Eduardo Mondlane University
12:30–13:30	Luncheon

7.3 Contributors to mapping study for Joint Research Projects

All stakeholders had been asked during the workshop to propose their specific contribution to single projects. Regional focal points were nominated during the regional workshop. UNU-FLORES coordinators were partly assigned after the workshop.

7.3.1 Research Project 1: Productivity in Low-Fertility Areas and Climate Change

Regional focal point: Dr Effiom Oku, UNU-INRA

UNU-FLORES coordinator: Dr Stephan Hülsmann, Academic Officer Systems and Flux Analysis considering Global Change Assessment

Contributing stakeholders

Name	Organization	Country
Prof. Bhagabat P. Parida	Botswana University	Botswana
Prof. Ahmed Hassan Fahmi Bayoumi Ibrahim	National Water Research Center (NWRC)	Egypt
Dr. Araya Alemie Berhe	Mekelle University	Ethiopia
Dr. Lisanework Nigatu	Haramaya University	Ethiopia
Dr. Adelina Mensah	IESS, University of Ghana	Ghana
Prof. Dr. Bancy M. Mati	Jomo Kenyatta University; Water Research and Resource Center (WARREC)	Kenya
Dr. Charles B. L. Jumbe	Bunda College of Agriculture, Lilongwe University of Agriculture and Natural Resources (LUANAR)	Malawi
Dr. Vikram Seebaluck	Mauritius University	Mauritius
Prof. A.I. Tanko	Centre for Dryland Agriculture, Bayero University	Nigeria
Dr. Andries Jordaan	UFS-Disaster Risk Management Training and Education Centre for Africa (DiMTEC)	South Africa
Dr. Sukhmani Mantel	Institute for Water Research, Rhodes University	South Africa
Prof. Abel Kaaya	Sokoine University of Agriculture	Tanzania
Dr. Mohamed Ali Hassan Farea	University of Dhamar, Faculty of Agriculture	Yemen
Eng. Zvikomborero Hoko	University of Zimbabwe	Zimbabwe

Dr. Bruno Barbier	CIRAD/IWEGA	France/ Burkina Faso/ Mozambique
Dr. Bekithemba Gumbo	CapNet/UNDP	
Prof. Christian Bernhofer	TU Dresden	Germany
Prof. Sebastião Famba	Faculty of Agronomy and Forestry Engineering/UEM	Mozambique
Prof. Elonio Muiuane	Faculty of Sciences/UEM	Mozambique
Prof. Natasha Ribeiro	Scientific Directorate/UEM	Mozambique
Prof. João Munembe	Faculty of Sciences/UEM	Mozambique
Tatiana J. Marrufo	MCT – CIDE (Ethnobotany)	Mozambique

7.3.2 Research Project 2: Drought and Flood Risk Management

Regional focal point: Dr. Andries Jordaan, UFS-DiMTEC

UNU-FLORES coordinator: Dr Mathew Kurian, Academic Officer Capacity Development and Governance

Contributing stakeholders

Name	Organization	Country
Prof. Bhagabat P. Parida	Botswana University	Botswana
Prof. Ahmed Hassan Fahmi Bayoumi Ibrahim	National Water Research Center (NWRC)	Egypt
Dr. Araya Alemie Berhe	Mekelle University	Ethiopia
Dr. Lisanework Nigatu	Haramaya University	Ethiopia
Dr. Adelina Mensah	IESS, University of Ghana	Ghana
Prof. Dr. Bancy M. Mati	Jomo Kenyatta University; Water Research and Resource Center (WARREC)	Kenya
Dr. Charles B. L. Jumbe	Bunda College of Agriculture, Lilongwe University of Agriculture and Natural Resources (LUANAR)	Malawi
Dr. Elsabe Julies	University of Namibia	Namibia
Prof. A.I. Tanko	Centre for Dryland Agriculture, Bayero University	Nigeria
Dr. Sukhmani Mantel	Institute for Water Research, Rhodes University	South Africa
Eng. Zvikomborero Hoko	University of Zimbabwe	Zimbabwe
Dr. Bruno Barbier	CIRAD/IWEGA	France/ Burkina Faso/ Mozambique
Dr. Luxon T. Nhamo	IWMI-SA	South Africa
Dr. Effiom Oku	UNU-INRA	Ghana
Prof. Christian Bernhofer	TU Dresden	Germany
Prof. Natasha Ribeiro	Scientific Directorate/UEM	Mozambique

7.3.3 Research Project 3: Integrated Water and Waste Management

Regional focal point: Dr Vikram Seebaluck, University of Mauritius

UNU-FLORES coordinator: Dr Mari Ito, Academic Officer Water Resources Management

Contributing stakeholders

Name	Organization	Country
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7.3.4 Research Project 4: Soil Functioning and Food Production

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