SADC-EU STRENGTHENING RESEARCH AND INNOVATION (R&I) IN NATURAL RESOURCES MANAGEMENT (NRM) AND WASTE MANAGEMENT (WM) IN MALAWI, MOZAMBIQUE, TANZANIA AND ZAMBIA

PART 1

SITUATIONAL ANALYSIS REPORT FOR DEVELOPING THE GUIDELINES FOR RESEARCH AND TERTIARY EDUCATION INSTITUTIONS

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Table of Contents

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List of Acronyms

CAWM	College of African Wildlife Management
CBOs	Community Based Organizations
CBE	Competence Based Education
CBNRM	Community Based Natural Resources Management
EU	European Union
CBWMR	Community-Based Waste Management Research
CSOs	Civil Society Organizations
GIS	Geographic Information Systems
HWC	Human Wildlife Conflict
ILK	Integration of Indigenous and Local Knowledge
IPLCs	Indigenous Peoples and Local Communities
IWT	Illegal Wildlife Trade
NGO	Non-governmental organization
NRM	Natural Resource Management
OACPS RI	Organization of African, Caribbean and Pacific States, Research and Innovation
PAR	Participatory Action Research
PTR	Participatory Traditional Research
PPP	Polluter Pays Principle (or Private Public Partnership)
RINaWa	Research and Innovation in Natural Resources and Waste Management
RISDP	Regional Indicative Strategic Development Plan
R&D	Research and Development

R&I	Research and Innovation
SADC	Southern African Development Community
SAWC	Southern African Wildlife College
SES	Social-Ecological Systems
SO	Strategic Objective
WM	Waste Management

1. EXECUTIVE SUMMARY

The guidelines for guiding of research and tertiary education institutions, more especially, on financial, technical, and managerial topics, in executing research and innovation (R&I) projects on Natural Resource Management (NRM) and Waste Management (WM) were developed by the Southern African Development Community (SADC) through the Southern African Wildlife College (SAWC) to address the key NRM and WM issues in SADC countries. This is part of the Research and Innovation in Natural Resource and Waste Management (RINaWa) Project's objective on the capacity strengthening of research and tertiary education institutions in delivering research and training in WM and NRM. The development of these guidelines involved experts from different SADC countries. During the process several RiNaWa documents were reviewed, such as the Baseline Report.

The guidelines aim to focus on mentoring researchers in NRM and WM. They have been developed in the sense that they take into consideration the researchers in various research and tertiary institutions, in the SADC countries. There is a strong emphasis on making sure that they are equipped with research skills, knowledge, and attitudes whereas, the innovations are embedded alongside.

Empirically, there have been several challenges, facing the strengthening of research and tertiary education institutions, that need to be addressed by the guidelines. For example, some of these include limited human resources capacity to conduct high-quality research by researchers in research and tertiary institutions which often leads to low research publication outputs. Limited uptake of existing research results by NRM and WM policymakers, managers, practitioners, and affected communities also contribute to the challenges.

However, the guidelines also identify opportunities that can help in addressing the identified challenges. Some of these opportunities include attracting research funds from both domestic and international funders, co-development, and co-designing of research proposals with local government, non-governmental organizations, community-based organization, and civil society organizations.

For easy and practical use, the Guidelines have been split into two parts. Part 1, this document, provides context and the approach to developing the Guidelines. Part 2, (a separate document), focuses purely on the Guidelines developed.

Each of the main topics, technical, managerial, and financial, has specified objectives and associated guidelines recommended. There are four technical objectives, three managerial objectives, and two financial objectives.

2. BACKGROUND INFORMATION

The RINaWa project is about 'Strengthening Research and Innovation (R&I) in Natural Resources Management (NRM) and Waste Management (WM). It is being implemented in four target countries namely: Malawi, Mozambique, Tanzania, and Zambia, however, the findings will benefit the entire SADC region. The overall objective of the project is to have: Improved sustainable waste and natural resources management in the targeted countries of Southern Africa. This is indicated by: Natural resource extraction, use, and waste disposal policies that exist, are sustainable, have enforceable regulations, and implementation incentives and penalties are enforced. Societal commitment is measured by improved status of WM and NRM, with reduced use of penalties. In attempting to arrive at that objective, RiNaWa has used various platforms where stakeholders, including professionals from research and tertiary education institutions, meet to deliberate on the same.

The first RiNaWa capacity strengthening workshop, held at the Southern African Wildlife College in South Africa, identified several research and development challenges within tertiary institutions in the SADC region. As a result, research and innovation on key economic sectors, notably Natural Resources Management and Waste Management are underdeveloped. Among the key challenges of this under-development include a lack of financial resources to develop applied research projects, limited technical abilities, and weak pathways for research management and dissemination of research findings and innovations. The workshop further noted that the lack of funding is largely because of limited technical capacity to write fundable proposals due to limited expertise within research and tertiary educational institutions in most SADC countries.

In addition, the Baseline Report of the project indicates that the collection of solid waste in the four SADC countries of Malawi, Mozambique, Tanzania, and Zambia is about 25-32% of the volume generated per annum. This situation reflects the weak waste management capacities of these countries, including budgetary constraints. The report further indicates that the research and tertiary education institutions in these countries are generally not well prepared in terms of curricula for effective training in sustainable Waste Management, and that their institutional synergies, linkages, and even collaborations with other partners toward promoting sustainable WM remain weak as well.

Meanwhile, most universities do not have robust research agendas and appropriate and implementable research strategies to guide their research and development agendas. For those who have well-developed strategies, there is always persistent budget limitations. Consequently, research at most tertiary institutions is limited to postgraduate students' research which is often inadequate considering that it is conducted by trainees who are still learning the research processes.

As a result, the research outputs in the key areas such as NRM and WM in most tertiary institutions of the SADC region and Africa at large are low. The low research outputs and the associated challenges are largely due to the weak or lack of comprehensive research management guidelines for NRM and WM research in those tertiary institutions within the SADC region.

This being the case, the challenges related to NRM and WM are still upsetting most SADC countries. Some of these challenges in which research and tertiary education institutions have to continue working on includes: For NRM: Human-wildlife conflict, poaching and illegal wildlife trade, issues of habitat restoration, encroachment of wildlife corridors, and poor adoption of community-based natural resource conservation. And for WM: ineffective engagement of local communities, weak emphasis on the reuse, recycle and recovery of waste, limited and weak wastewater treatment (stabilization ponds and oxidation ditches), unplanned housing and settlements, unsustainable financing of WM, weak coordination among the public, private sector and NGOs, weak adoption of appropriate policies, and weak enforcement mechanism of local by-laws and regulations when dealing with WM.

Therefore, the proposed guidelines play significant roles in addressing the key challenges ranging from technical, managerial, and financial by using the available opportunities in research and tertiary education institutions.

3. OBJECTIVES OF THE ASSIGNMENT

The assignment of developing the guidelines on mentoring research and tertiary education institutions aimed at addressing the technical, managerial, and financial challenges when executing research and innovation projects on natural resource management and waste management.

The specific objectives of the assignment are as follows:

i. To identify the technical, managerial, and financial challenges impeding the undertaking of research in the research and tertiary education institutions.
ii. To examine the possible opportunities for unlocking the challenges in research and tertiary education institutions.
iii. Determine the opportunities for collaboration and partnerships among NRM and WM researchers and the industries.
iv. To indicate and encourage multidisciplinary and cutting-edge research in NRM and WM for social and economic development.
v. To devise knowledge management systems of the NRM and WM research outputs in the respective research and tertiary education institutions.

4. THE AUDIENCE AND APPROACH FOR DEVELOPING THE GUIDELINES

4.1. Target Audience

The target audience for the Guidelines includes research and tertiary education institutions in the SADC countries, specifically, but not limited to the four RiNaWa Project focus countries, namely, Malawi, Mozambique, Tanzania, and Zambia. The target entities are the research and tertiary education institutions, government entities, local and national groupings, value chain actors, and the public-private sector as players and/or beneficiaries for promoting sustainable WM and NRM practices. As an example, some of the universities include Lilongwe University of Agriculture and Natural Resources, Universidade Eduardo Mondlane, Sokoine University of Agriculture, and The University of Zambia. Because waste management is relevant across several disciplines such as engineering, tourism, health etc., it is recommended that associated tertiary educational institutions also be included in the list if the target audience. For example, other local and national groupings include Tanzania Association of Cultural Tourism, Tanzania Association of Environmental Engineers, Zambia Institute of Environmental Management, Water, Waste and Environment Consultants, and Mozambique - Environmental and Social Safeguard Specialist group. Besides, the examples from value chain actors include Capital City Cleaners, Chilambo General Trade Company Limited, Nipe Fagio, Repensar Environmental Education Cooperative, and Waste mat Zambia Ltd.

4.2. Approach

The development of the Guidelines for Mentoring Research and Tertiary Institutions adopted several approaches and it engaged several stakeholders from academic institutions, practitioners, local governments, non-governmental organizations, community-based organizations, private sectors, and public institutions, just to mention the salient ones. The adopted methodological approaches in the development of the guidelines were implemented in phases namely inception, scoping, and review of relevant documents, validation workshops, and meetings (both online and physical). Other information was collected in Science Café held in Malawi, Mozambique, Tanzania, and Zambia. Empirically, the development of these guidelines was done in three phases as stipulated hereunder.

i. Inception Phase

Inception was the first stage in the development of the guidelines. The SAWC team members, comprised of four short-term contracted specialists, are involved in the Guideline development. Two of them were NRM professionals (from Botswana and South Africa), and two specialized in WM (from

Tanzania and South Africa). The team was made of three academics involved in research and lecturing hailing from tertiary institutions, and an expert in waste management from the government sector. Collectively, all experts had a wide range of experience.

During the Inception phase, the team members engaged one another to appreciate and harmonize their understanding of the Guideline's deliverables. A series of virtual meetings were held to discuss various aspects regarding the approach to be employed in the process. SAWC personnel coordinated the team. The outcome of the *Inception Phase* was a common understanding of the assignment by all team members and an agreement on the adopted methodological approach with clear timelines and outputs.

ii. Scoping Phase

The scoping phase included the identification of stakeholders and conducting literature reviews. The guidelines were underpinned by an analysis of the information in the documents to determine the area for improvements to reflect the objective of RiNaWa project and the SADC RISDP Strategic Objectives. This was also implied in the theory of change to determine the relevance, effectiveness, efficiency, sustainability, outcome, and impacts. The analysis of these key aspects was a basis for further recommendations and development of the Guidelines.

iii. Desk Review of RINaWa Reports

In undertaking the assignment, a rigorous desk review was done to gather relevant information. Here, several RiNaWa project documents, including the Baseline Report, and the RiNaWa – SAWC Capacity Strengthening Workshop Report, were used to identify the key gaps or issues that need to be addressed by the guidelines. The gaps were tabularized and then categorized according to financial, technical, and managerial issues. Matters to do with institutional arrangements such as policies and strategies were also considered in the development of the Guidelines. Other important documents reviewed include the Report on Prioritized Innovations by CAWM, the OACPS Research and Innovation Programme, SADC RISDP 2020–2030, and the Environmental policies and Acts of the participating countries.

In addition, the RiNaWa Project reports from other components of the project were consulted. For example, Guidelines for developing and conducting Action Research for NRM and WM which were produced by Skyberry Botswana, were also consulted.

iv. Developing an Outline of the Guidelines

After identifying and prioritizing gaps / issues that need to be addressed by the guidelines, an outline/framework of the guidelines was jointly developed by the team. Once the outline was adopted by all the team members, the process of drafting the guidelines began based on that established framework.

v. Drafting of the Guidelines and Review

In this phase, the Guidelines were drafted. Using the gaps and challenges identified in the initial phases, objectives were then formulated. Once the objectives were clear for each of the main topics (technical, managerial and financial aspects of research and innovation), specific guidelines were established.

vi. Stakeholder Consultations

After drafting the guidelines, the key stakeholders of the RiNaWa project were consulted through a meeting. Here, the guideline document was shared with the RINaWa implementing partners for comments and review. During this meeting, the guidelines for both NRM and WM were presented by the team for comments. All comments were then incorporated in the draft to produce a final draft of the

guidelines for validation. Then, a final validation workshop was held with RINaWa partners in both physical and online formats (hybrid). The validation workshop was an opportunity for stakeholders to provide final inputs and validate the final product. After that, a final document was produced for submission. In addition, the Guidelines formed part of the content that was shared at the Science Cafés. The science cafes, held in the participating countries, were important avenues that aired relevant information for the betterment of the guidelines.

5. OUTCOME OF THE SITUATIONAL ANALYSIS

There have been several issues identified by the team and participants (Annex 1, 2 & 3), mainly by researchers from tertiary institutions, in several RiNaWa workshops as key issues to be addressed at SADC level. These issues are aggravated by population growth, urbanization, climate change and increased economic activities. The following are the NRM and WM issues commonly identified during the SAWC Workshop, the Arusha workshop, and in the RiNaWa baseline survey report. These issues need to be addressed in the respective research and tertiary institutions in SADC countries. In most cases, these issues focus on the following categories.

5.1. Technical Challenges affecting research performance

Technical aspects of research management include capacitating researchers of various aspects including technical ability to write fundable proposals and write manuscripts for publication in reputable journals (Annex 1). Therefore, the identified key aspects include;

i. Lack of awareness in enforcing natural resources and waste management policies, limited resources to implement innovative solutions, overlaps during implementation, and a lack of awareness of governance strategies.
ii. Inadequate knowledge and skills in drafting, implementing, and monitoring policies based on scientifically developed evidence.
iii. Limited capacity to address NRM and WM issues in society at both local and national levels.
iv. Modules trained on NRM and WM are not based on Competence Based Education training (CBE).

5.2. Management Challenges Affecting Research Performance

Managerial and institutional arrangements are significant in ensuring that research results generated from tertiary and research institutions have the desired impact. There should be institutional mechanisms, in universities and tertiary institutions, that guide researcher in developing meaningful pathways to impact their research findings and innovations. The following key challenges were identified (Annex 2).

i. Limited stakeholder participation.
ii. Limited availability of resources, government support, and community engagement for strengthening their active role in and participation.
iii. Most policies involved in addressing the NRM and WM issues are not harmonized.
iv. Poor infrastructural systems for enforcement of the issues related to NRM and WM.

5.3. Financial Challenges affecting research performance

Financial resource limitations have been identified as one of the key constraints to research productivity within research and tertiary education institutions in the SADC region. This is caused by several factors

emanating from both locally and globally. Possibly, this is also coupled by less prioritization from the funders on some R&I aspects, more especially WM. The following aspects have herein realized so far (Annex 3).

i. Weak fundraising capacity and expertise within educational institutes to source funding.
ii. Research funding is reliant on grants, students' government loans, and scholarships (donors).

Therefore, it is anticipated that the Guidelines on mentoring of research and tertiary education institutions on financial, technical, and managerial topics should guide how to capacitate resource mobilization through responses to call for proposals and meaningful partnership formation. The guidelines also guide grant management approaches that can be adopted by tertiary and research institutions. Overall, the guidelines help to address numerous issues related to both NRM and WM in the SADC region.

6. DEVELOPMENT OF THE GUIDELINES

6.1. Alignment of the Guidelines to the SADC Region

The guidelines respond to the SADC Regional Development Agenda and the SADC Regional Indicative Strategic Development Plan (RISDP 2020 - 2030). With research and innovation at the heart, RINaWa, promotes best practice scientific applications to solve the critical challenges related to WM and NRM within the region. Therefore, these guidelines focus on several challenges which SADC wants to address including the key issues impeding the NRM and the increasing challenges related to the management of solid and liquid waste.

6.2 Outline of the Guidelines

The guidelines consist of the major components related to technical, managerial, and financial challenges. In addition, the opportunities for addressing the challenges also formed an important part of the guidelines. In terms of approach; the methods, phases, and other technicalities employed in developing the guidelines formed an important section of the guidelines. All these were relevant components in the guidelines.

6.3 Conclusions and Recommendations

This report indicates how the assignment was attempted, especially on the approaches and the identified key issues. For the development of R&I, in SADC countries, it is quite imperative to strengthen capacity building, especially for researchers when addressing the key challenges related to both NRM and WM. This can explicitly be done by deploying thorough mentoring of the researchers in SADC countries. Overall, there is a need to have strong R&I in research and tertiary institutions to address various challenges ranging from NRM to WM in SADC countries.

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ANNEX 1: ANALYSIS OF TECHNICAL CHALLENGES AFFECTING RESEARCH PERFORMANCE IN RESEARCH AND TERTIARY EDUCATION INSTITUTIONS

Technical issues	Strategic Objectives	Interventions
1. Limited human resources capacity and ability to conduct high-quality NRM and WM research among researchers in research and tertiary institutions in the SADC Region, leading to low scientific rigor.	To improve technical and scientific capacity to conduct high-quality NRM and WM research of desired scientific rigor in tertiary education institutions	i. Ensure that all research staff members in tertiary education institutions and research institutions researching and teaching NRM and WM are trained to PhD level and trained in various aspects of research methodology. ii. Establish a robust methodological framework and adhere to rigorous scientific principles of NRM and WM research. iii. Provide NRM and WM researchers with in-house technical support which includes laboratory analysis, data handling and analysis, statistical analysis, modelling, and use of earth observation techniques to assess and monitor biodiversity in terrestrial and aquatic ecosystems. iv. Establish functional and sustainable Post Doc and programmes in NRM and WM in tertiary education institutions. v. Establish M.Phil./PhD Programmes in NRM and WM in tertiary education institutions. vi. Introduce BSc Honors Degrees in NRM and WM in tertiary education institutions, where possible to strengthen research capacity at undergraduate level

2. Limited technical capacity to write NRM and WM manuscript publishable in reputable international journals resulting in low NRM and WM research output amongst research and tertiary institutions	To improve and increase NRM and WM research output through enhanced technical capacity to write scientific manuscript publishable in reputable national and international journals.	i. Regular training of tertiary institution researchers on technics and skills of writing NRM and WM scientific manuscripts for publication in high-impact factor national and international journals ii. Develop a comprehensive research mentoring programme for junior researchers led by senior researchers through internal and external collaboration and exchange programmes. To conduct short courses and refresh trainings for the WM and NRM practitioners to build/improve their capacities. iii. Facilitate meaningful NRM and WM research collaboration at national and international levels among tertiary education institutions which will encourage co-authorship iv. Encourage and capacitate tertiary education institutions to adopt PhD thesis based on publications to increase the pathways for dissemination of research output.

3. Low uptake NRM and WM results by waste managers, natural resources managers, water management policy maker and practitioners, and natural resources policymakers and practitioners.	To improve and increase research uptake by waste managers, natural resources managers, water management policymakers and practitioners, and natural resources policy makers and practitioners.	i. To train WM and NRM researchers and practitioners in research and tertiary institutions, policy makers and resources managers in private and public institutions on basic and advanced traditional research methodologies and methods. ii. Introduce participatory traditional and action research, and systems research approaches for NRM and WM in tertiary education institutions which encourage co-creation of knowledge by researchers, policymakers, waste managers and natural resources managers. iii. Improve accessibility of NRM and WM research information through the development of research knowledge management systems and science communication strategies and systems, plans and activities with strong potential to enhance effective knowledge transfer and translation between researchers, policy makers, practitioners, private sector and community-based organisations.
4. Low impact of NRM and WM research results on NRM and WM policy and practice	To improve the impact NRM and WM research results on NRM and WM policy formulation and management practices.	i. Capacitate NRM and WM researchers within tertiary education institutions with skills to develop research pathways to impact and research impact plans for their research and development projects. ii. Capacitate NRM and WM researchers in tertiary education institutions with skills to develop and implement participatory and systems research projects. iii. Develop NRM and WM research programmes and project with clear pathways to impact using systems research approaches and participatory research approaches to ensure co-creation of knowledge by

		researchers, policy makers, practitioners, and managers. iv. Promote science – based initiatives by research and tertiary institutions towards innovations, adoption, and dissemination. v. Incorporation of sustainable NRM and WM innovations in research and tertiary institutions curricula. vi. Promote collaboration between academia, industry, and government to drive innovation while ensuring that their academic standards are maintained, and government priorities are addressed conclusively. vii. Promote collaboration for scientific knowledge production, development of new procedures, collaboration for the development of service organizations, professional practice, and practitioners, collaboration for the implementation of a specific practice, and collaboration for the support of political decision-making.

ANNEX 2: ANALYSIS OF MANAGERIAL CHALLENGES AFFECTING RESEARCH PERFORMANCE IN RESEARCH AND TERTIARY EDUCATION INSTITUTIONS

Managerial issues	Strategic Objectives	Intervention
1. Research strategies and policies on NRM and WM at tertiary education institutions are not well linked with national research policies, strategies, plans and priorities.	To improve linkages between research strategies, policies, and practices on NRM and WM at tertiary education institutions to national research policies, strategies, and plans and priorities of national government and private sector.	i. Develop research strategies and priorities based on in-depth consultations with key NRM and WM stakeholders to appreciate and incorporate national priorities and ensure the relevancy and applicability of research results. ii. Co-development of research objectives that involve a wide range of stakeholders and thorough involvement of these stakeholders in the implementations of research activities as well as in the dissemination process.
2. Limited capacity to manage NRM and WM research and development initiatives within tertiary institutions due to weak institutional arrangements	To improve NRM and WM research management capacity within tertiary research institutions through enhanced institutional capacity to manage research by establishing functional research management structures and sustainable partnerships	i. Strengthening NRM and WM research management capacity with tertiary education institutions through targeted training on various aspects of research management which include but are not limited to grant development and management, knowledge management, monitoring and evaluation, and research ethics. ii. Establish NRM and WM Research Chairs who will work collaboratively with managers of graduate programmes and graduate student supervisors within tertiary education institutions to strengthen the capacity of the students in designing and executing interdisciplinary research in line with the key thematic research areas of in NRM and WM. iii. Strengthen the links between the NRM and WM research and capacity building activities with key stakeholders such as CBOs, private sector/ industry,

		local organisations, local authorities, and other partners.
3. Limited capacity and competency to manage research due to inadequate faculty awareness, poor control of research funds, inability to generate wealth by tertiary education institution due to lack of entrepreneurship missions, a lack of current and effective tertiary education-based think tanks.	To strengthen institutional capacity to manage research funds and research and development initiatives in tertiary education institutions	i. Establish functional research and development offices in tertiary education where they do not exist and strengthen existing offices to ensure the availability of requisite research management systems manned by qualified personnel. ii. Develop effective and efficient resource management strategies that enable researchers and research managers to make the best use of available resources. iii. Monitor and evaluate resource consumption and performance regularly and report any issues or deviations. iv. Develop strong project management skills among researchers and administrative staff. v. Create a culture of continuous learning and innovation.

ANNEX 3: ANALYSIS OF FINANCIAL CHALLENGES AFFECTING RESEARCH PERFORMANCE IN RESEARCH AND TERTIARY EDUCATION INSTITUTIONS

Financial Issue	Objective	Intervention
1. Inadequate financial resources to support and facilitate high-quality NRM and WM research in tertiary institutions in the SADC Region	To increase financial resources for supporting and facilitating high-quality NRM and WM research in tertiary institutions in the SADC Region	i. Strengthen the capacity of research and tertiary education institutions to raise research funds by responding to calls for proposals by training academic staff. ii. Encourage adjustments in faculty workload in accordance with external funding to create further incentives for the faculty to seek external research. iii. Employ data analytic and technical assistance strategies to support and encourage faculty to expand

		and diversify their funding portfolios to include new sources and more high-value opportunities. iv. Develop and implement new programming and outreach strategies to convene and engage groups of researchers in large proposal writing. v. Expand proposal development support to NRM and WM researchers by providing staffing and financial resources for the planning, organizing, and writing of large proposals. vi. Explore investing in an online tool to help identify new funding opportunities and potential collaborators within the region and beyond.
2. Ineffective/inadequate fund-raising strategy for tertiary education institutions	To enhance existing fund-raising strategies and adopt new fund-raising approaches	i. Explore a variety of new fund-raising approaches which include individuals, cooperatives, environmental funds, foundations, and alumni. ii. Establish effective fund-raising institutional arrangements which include qualified personnel and cooperation with industry. iii. Establish NRM and WM resource mobilization structures within the relevant faculties and departments supported by the office of research and development where it exists. iv. Diversify funding sources v. Develop skills in financial management and grant writing among research teams.