

## PART 2

### RESEARCH & INNOVATION GUIDELINES FOR RESEARCH AND TERTIARY EDUCATION INSTITUTIONS EXECUTING RESEARCH & INNOVATION PROJECTS ON NATURAL RESOURCE MANAGEMENT AND WASTE MANAGEMENT (RINAWA)

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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. INTRODUCTION**

## **1.1 Background Information**

Natural Resource Management (NRM) and Waste Management (WM) have remained a major challenge in Southern Africa over decades despite various efforts to improve sustainable NRM and WM in Southern Africa. The Southern African Development Community (SADC) is among the key institutions within the region committed to improving NRM and WM at the regional level. SADC noted that one of the factors contributing to unsustainable NRM and WM in the SADC region is the limited scientific research on key NRM and WM topics. As a result, NRM and WM policies, strategies, and practices within the SADC region remain largely uninformed. For those few universities and research institutions with well-developed strategies, there are always persistent budget limitations.

A recent situational analysis by SADC revealed that most universities in the region cannot develop and implement high-quality research due to a lack of guidelines to guide their research and development agendas, particularly in NRM and WM. Consequently, the research output on critical NRM and WM topics remains low due to various reasons, among them the limited technical capacity of researchers within the SADC institutions, to generate high-profile scientific publications in NRM and WM. In the few institutions with reasonable research capacity, financial resources are always a limiting factor, mostly due to the limited institutional ability to mobilize research funds through the development of bankable research proposals. While funding sources are available through global and in some cases, regional and national calls for proposals, the capacity to write fundable research proposals is still limited in most institutions.

In addition to financial challenges, SADC situational analysis further revealed that most research and tertiary education institutions within the SADC lack the technical ability to manage research. The inability to develop an effective knowledge management system with efficient knowledge transfer and translation systems that enable decent access to NRM and WM research-based knowledge products by research and academic institutions is glaring. It is against this background that SADC recognizes that research and tertiary institutions need effective processes of organizing, creating, using, and sharing collective knowledge within an organization; a process referred to as Knowledge Management. Knowledge Management includes maintaining information in a place where it is easy to access, like the internet and the employee intranet.

To address these technical, financial, and managerial research challenges, which manifest themselves at different levels and scales within different institutions in the SADC region, SADC proposed guidelines for research and innovation (R&I) projects on NRM and WM as part of an EU funded project that aims at strengthening R&I in NRM and WM in the SADC region. These guidelines inform the development of impactful research projects by research and tertiary institutions in the SADC region.

## **2 PURPOSE OF THE GUIDELINES**

The purpose of these guidelines is to guide researchers in research and tertiary institutions in the SADC region on technical, financial, and management issues about NRM and WM research and research management. While the guidelines are applicable throughout the SADC region, primary target countries are Malawi, Mozambique, Tanzania, and Zambia.

## **3 TARGET AUDIENCE AND PATHWAYS TO IMPACTS**

The target entities are the research and tertiary education institutions, government entities, local and national groupings, value chain actors, and the public-private sector which are key players in promoting sustainable NRM and WM practices in Malawi, Mozambique, Tanzania, and Zambia. Specific target universities include Lilongwe University of Agriculture and Natural Resources in Malawi, Universidade

Eduardo Mondlane in Mozambique, Sokoine University of Agriculture in Tanzania, and University of Zambia. Other local and national groupings include Tanzania Association of Cultural Tourism, Tanzania Association of Environmental Engineers, Zambia Institute of Environmental Management, Waste and Environment Consultants, Mozambique - Environmental and Social Safeguard Specialist group. On the other hand, value chain actors such as Capital City Cleaners, Chilambo General Trade Company Limited, Nipe Fagio, Repensar Environmental Education Cooperative, and Waste mat Zambia Ltd are also crucial targets.

## **4 MAIN TOPICS**

### **4.1 Technical Research Challenges**

Technical challenges refer limited understanding of a specific art or science, or training for a particular job. It also refers to a lack of practical skills with a particular subject or principle. In other ways, it may refer to limitations on specializing in industrial, practical, or mechanical arts and applied sciences.

#### **4.1.1 Technical Challenges of Research and Innovation in Research and Tertiary Education Institutions**

NRM and WM research in tertiary education institutions in the SADC region are undermined by various technical challenges and often lack the desired scientific rigor. Key technical issues 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. In some cases, NRM and WM researchers are not able to publish in high-impact national, regional, and international journals of high Impact Factor. Meanwhile, there is limited uptake of existing research results by NRM and WM policy makers, managers and practitioners and affected communities. Community-based NRM and Community Based WM initiatives in the SADC region often fail to deliver the desired results due to a lack of relevant scientific information to inform management practices, policy, and management decision making.

#### **4.1.2 Objectives and Action to address Technical Challenges**

**Technical Objective 1:** To improve technical and scientific capacity to conduct high quality NRM and WM research of desired scientific rigor in research and tertiary education institutions.

##### **Guidelines:**

- i. Research and tertiary education institutions who are researching and teaching NRM and WM are advised to work towards ensuring that staff are trained to PhD level in these disciplines.
- 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 the application of indigenous knowledge in NRM and WM policy and practices.
- iv. Establish functional and sustainable Post Doctorate and other postgraduate programmes in NRM and WM in research and tertiary education institutions.
- v. Establish M.Phil. / PhD Programmes in NRM and WM in research and tertiary education institutions.
- vi. Facilitate exchange programmes, among researchers, in various SADC countries.

**Technical Objective 2:** To improve the quality and increase the quantity of NRM and WM research outputs in tertiary education institutions through enhanced technical capacity to write scientific manuscript publishable in reputable national and international journals.

**Guidelines:**

- i. Regular training of research and tertiary education institutions researchers on techniques and skills of writing NRM and WM scientific manuscripts for publication in high-impact factor journals.
- ii. Develop a comprehensive research mentoring programme.
- iii. Facilitate meaningful NRM and WM research collaboration at national and international levels among research and tertiary education institutions which will encourage co-authorship.
- iv. Encourage and capacitate tertiary education institutions to adopt PhD theses based on publications to increase publication output.

**Technical Objective 3:** To improve and increase research uptake by waste managers, natural resources managers, water management policy makers and practitioners, and natural resources policy makers and practitioners.

**Guidelines:**

- i. To train WM and NRM researchers and practitioners in research and tertiary education 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 research and tertiary education institutions.
- iii. Improve accessibility of NRM and WM research information through development of research knowledge management systems and science communication strategies.

**Technical Objective 4:** To improve the impact of NRM and WM research results on policy formulation and management practices.

**Guidelines:**

- i. Capacitate NRM and WM researchers within research and 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 projects with clear pathways to impact
- iv. Incorporate sustainable NRM and WM innovations in research and tertiary institutions curricula.
- v. Promote collaboration between academia, industry, and government to drive innovations.
- vi. Promote collaboration for scientific knowledge production.
- vii. Embed Participatory Action Research principles into coursework, research projects, and field-based practicums.

## 4.2 Managerial Research Challenges

Managerial research challenges refer to administrative difficulties in managing research at the university and research institution levels. Challenges in managing research are often associated with lack of qualified personnel and inadequate research management systems. In this context of the guidelines, the management aspect involves strategic administration, including the flow of knowledge sharing and dissemination, in executing the NRM and WM issues in the SADC countries.

### 4.2.1 Management Challenges of Research & Innovation in Research and Tertiary Education Institutions

Research performance in research and tertiary education institutions worldwide is often underpinned by the availability of effective functional research management structures and appropriate institutional arrangements supported by desirable policy frameworks and qualified human resources. Research Management, an emerging and growing discipline in recent decades, defined as a broad field involving the coordination of numerous processes to move research efforts forward within research and tertiary education institutions, remains underdeveloped in some institutions in the SADC region. As a result, most research and tertiary education institutions in the SADC region have limited capacity to manage NRM and WM research and development due to weak institutional arrangements. This is further exacerbated by limited capacity and limited competency to manage research due to inadequate faculty awareness, insufficient control of research funds, and inability to generate wealth by research and tertiary education institutions.

### 4.2.2 Objectives and Action to Address Managerial Challenges for Research

**Managerial Objective 1:** To improve linkages between research strategies, policies, and practices on NRM and WM in research and tertiary education institutions to national research policies, strategies, and plans and priorities of national government and private

#### Guidelines:

- 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.

**Managerial Objective 2:** To improve NRM and WM research management capacity within research and tertiary institutions.

#### Guidelines:

- i. Strengthen NRM and WM research management capacity in research and tertiary education institutions through targeted training.
- ii. Establish NRM and WM Chairs to strengthen the capacity of interdisciplinary in research and tertiary education institutions.
- iii. Strengthen the links between the NRM and WM research and capacity-building activities with key stakeholders.

**Managerial Objective 3:** To strengthen institutional capacity to manage research funds and research and development initiatives in research and tertiary education institutions

**Guidelines:**

- 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.

**4.3 Financial Research Challenges**

This refers to monetary resources and to the study and discipline of money, currency, assets, and liabilities. As a subject of study, it is related to but distinct from economics, which is the study of the production, distribution, and consumption of goods and services. Based on the scope of financial activities in financial systems, the discipline can be divided into personal, corporate, and public finance. In this context, the financial aspect involves the search and use of financial resources in NRM and WM.

**4.3.1 Financial Challenges of Research and Innovation in Research and Tertiary Education Institutions**

Research funding remains a major challenge for research and tertiary education institutions within the SADC region, especially public institutions wholly funded by the government. Internal funds allocated for research and development initiatives within tertiary education institutions are often inadequate to drive the research agenda due to competing priorities. While most tertiary education institutions within the SADC region have comprehensive fund-raising strategies with clearly defined fund-raising mechanisms, funds raised through the implementation of such strategies are often not adequate to support fully fledged research agendas in specific disciplines such as NRM and WM. Meanwhile, numerous fund-raising opportunities presenting themselves through various environmental research calls for proposals are not adequately harnessed by research and tertiary education institutions due to limited capacity to respond to those calls effectively and efficiently for proposals.

**Financial Objective 1:** To increase financial resources for supporting and facilitating high quality NRM and WM research in research and tertiary education institutions in the SADC Region

**Guidelines:**

- 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.

**Financial Objective 2:** To enhance existing fund-raising strategies and adopt new fund-raising approaches

**Guidelines:**

- 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.

## **5 OPPORTUNITIES FOR RESEARCH AND INNOVATION FOR RESEARCH AND TERTIARY EDUCATION INSTITUTIONS**

There are several opportunities in which research and tertiary education institutions can benefit. These include.

- i. Attract research funds from both domestic and international funders
- ii. Capacity building to young researchers
- iii. Co-development and co-designing research proposals with local government, non-governmental organizations, community-based organizations, and civil society organizations.
- iv. Co-design curricula for various specialties including NRM and WM.
- v. Recommend the amendment of policies as output from various research findings.
- vi. Facilitate internationalization of researchers through various categories of exchange programs.

## 5.1. Opportunities for Research and Innovation for research and tertiary education institutions: CBNRM context

CBNRM offers various opportunities for research and innovation for tertiary institutions in the SADC region. With a potential focus on sustainable practices relating to conservation, community livelihoods, and development. Research and tertiary institutions can play a vital role in leveraging CBNRM initiatives. The following are examples of opportunities for research and innovation:

- i. **Biodiversity Conservation and Ecosystem Services:** Research focuses on *Investigating the impact of CBNRM practices on biodiversity and ecosystem health*. This particular focus could yield innovative opportunities which include but are not limited to, developing tools for monitoring and technologies (e.g., GIS mapping, drone monitoring, remote sensing) to track biodiversity and ecosystem changes. It could be achieved through collaborative projects that seek to engage with local communities to co-design sustainable conservation models that enhance biodiversity while improving livelihoods through participatory and/or action research.
- ii. **Climate Change Adaptation and Mitigation:** A handful of community-led projects in the SADC region have the potential to mitigate against climate change and reduce the carbon footprint by restoring rangeland, for example, Herding 4 Health programmes – a typical CBNRM practice. Here research may focus on assessing the role of CBNR in climate resilience, including carbon sequestration potential in community-managed rangelands. Innovative opportunities on this research focus should include designing and evaluating community-led climate adaptation strategies such as sustainable rangeland practices and livelihoods.
- iii. **Community Livelihoods and Economic Development:** This research topic focuses on the analysis of the socioeconomic impact of CBNRM programs on local communities, in particular their contribution to alleviating poverty and diversifying income. Innovative opportunities would be to leverage existing enterprises and scale up the activities or approaches. This includes those enterprises that are considered sustainable, for example, sustainable fishing, eco-tourism / responsible tourism, and non-timber utilization products. On this topic, research could also focus on policy development, wherein policymakers may co-design strategic frameworks that encourage economic benefit and improvement of livelihoods through CBNRM for local communities.
- iv. **Governance and Policy Research:** Assess the governance structures of CBNRM projects and their successes in promoting community participation. This could be done by comparing processes and governance structures of other countries through peer-to-peer learning exchange programmes. Develop innovative tools including evidence-based recommendations to improve policies at the national level.
- V. **Education, Training, and Capacity Building:** Investigate the effectiveness of current education programs capacitating trainees with skills relevant to CBNRM. Here innovative opportunities would include designing specific training curricula and products focusing on CBNRM. The use of digital platforms for distance learning could be considered. Education programs should focus on the integration of indigenous knowledge with new management practices.

## **How tertiary and research institutions can engage:**

Engagement could be established in three ways:

- Collaborative research hubs – create CBNRM research center which will enforce collaboration between students and researchers.
- Funding and partnerships – Establish mechanisms of sustainable financing by partnering with international organizations, the private sector, and the government to support innovative research in CBNRM.
- Entrepreneurship programs – Support and establish youth entrepreneurship opportunities that focus on sustainable utilization.

## **5.2. Opportunities for Research and Innovation: Waste Management:**

### **i. Sustainable waste management practices**

Research projects:

- Investigate new methods for reducing waste generation *and* methods to reduce the impacts of waste on human health and the environment.
- Investigate opportunities to maximize the diversion of waste from landfills in a manner that contributes towards job creation and the growth of the waste economy.

### **ii. Waste Beneficiation technologies including Waste-to-energy technologies**

Research projects:

- Explore technologies that convert waste into energy and investigate the feasibility and effectiveness.
- Explore technologies that extract value from waste materials e.g. nutrients/ chemicals from organics waste etc.

### **iii. Policy research**

Research projects:

- Investigate the effectiveness of local and national waste management policies.

## **6 CONCLUSIONS**

For the development of R&I in SADC countries, it is quite imperative to strengthen the capacity building, especially for researchers when addressing the key challenges related to both NRM and WM. This can explicitly be done by deploying rigorous mentoring programs of the researchers in SADC countries.