POLICY BRIEF

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ON THE EDGE OF AN ENVIRONMENTAL CATASTROPHE: TIME FOR INTEGRATING SCIENCE AND TECHNOLOGY IN NATURAL RESOURCES AND WASTE MANAGEMENT IN THE SADC REGION

Natural Resources and Waste Management are both considered engines of socio-economic development within the SADC Region of Africa. However, for long, this potential is yet to be fully exploited. Research shows that failure to adequately integrate science into these dual challenges is partly to blame.

WHAT IS AT STAKE?

Despite good intentions, the SADC region of Sub-Saharan Africa continue to face a complexity of deep-rooted obstacles related to Natural Resources Management (NR) and Waste Management (WM). While natural resources remain pivotal in supporting our own kind, their indiscriminate harvest is mounting. Likewise, the region is ill prepared to manage large amounts of waste that are generated annually leading to unprecedented pollution levels. Thus, lifestyles that are destructive to the very resources we firmly depend on have taken a stable course. Poaching, Illegal wildlife trade (IWT) and deforestation, for instance, have taken their toll while the rural populace continues to rely heavily on natural assets. These natural resources-waste management complexities are further exacerbated by climate-impacts and the expending human population.

Ideally, addressing these natural resources and waste management snags calls for the application of scientifically driven (evidence-based) solutions. However, such an approach have either been abandoned or only applied in fragmentary ways. As a result, natural resources and waste management interventions or policy initiatives, respectively, have remains weak or evolving independently with conflicting goals and responsibilities. Subsequently, natural resources degradation and indiscriminate waste disposal is commonplace, which has led to accelerated destruction of biodiversity and increased poverty.

The implications for sustainable natural resources and waste management within the region were analyzed through the 'Research and Innovation for Natural Resources and Waste Management' (RiNaWA) project'. The project is coordinated by SADC, supported by the European Union Organization of African, Caribbean and Pacific States Research and Innovation (OACP-RI) programme through its African,

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Caribbean and Pacific (ACP) Innovative Fund and implemented by The College of African Wildlife Management in Tanzania. This brief shares findings from the research with the aim to inform policy responses by decision- makers within the SADC region with regard to adoption and adaptation of science-driven solutions to NRM and WM challenges.

METHODS

A technical workshop of seasoned 39 scholars from the SADC region was held in early January 2024. Participants came from 12 research and tertiary education institutions from all the four target SADC countries (Malawi, Mozambique, Tanzania and Zambia). A series of 20 presentations detailing country-specific home-grown NRM and WM R&I solutions were first made. This was followed by in-depth discussions both in the plenary and in the working groups. This approach allowed for a deeper cross-fertilization of in-depth knowledge, practices and experiences on science-based solutions for NRM and WM challenges in SADC region. The presentations yielded a total of 46 initial solutions, later distilled down to eight each for NRM and WM following intensive group discussions.

Table I: Categories, criteria and ranking of R&I solutions

Category	Criteria	Priority Ranking (Score)
Product	Technological credibility	Low (1)
Service	Cost effective	Medium (2)
Process	Sustainability	High (3)
Technology	Scalability	
	Acceptability (Socio-political)	

KEY RESULTS

For NRM, the participants reconciled that the process or system of establishment of CBNRM conservation (Malawi), application of AI technology in NRM (Zambia) and use of SMART technologies in combating Illegal Wildlife Trade (IWT) were the three topmost ranked options. Other priorities include GIS-enabled community-based spatial mapping of Natural Resources and improved governance. For WM, Biogas production (Malawi), use of digital enabled sensors and production of biofertilizers and bio-feeds were the topmost three priorities. Circular economies - waste to energy, and waste to construction were also prioritized, together with application of Ex-producer Retention (EPR) systems.

Since the identified priority R&I options were subjected to a rigorous consultative round-table evidence-based expert debate, it is safe to assume that these are the topmost R&I options currently being practiced on the ground. They are thus the most feasible R&I solutions that are immediately available for consideration of uptake and upscaling – generated through professional opinion. However, it is clear that more options exist in the region and from elsewhere that may need to be considered as well.

KEY HIGHLIGHTS

1. Natural Resources and Waste Management are real and growing problems in the SADC region
2. Home-grown science-based solutions for these problems exist but have not been adequately identified domesticated, shared or scaled up
3. Their uptake should increase the efficiency in addressing these chronic problems

Table 4.1: Prioritized R&I following Expert consultations

(a) NRM

Existing R& I Identified	Category	Score	Rank	Country
Establishment of CBNRM	Service	15	1	Malawi
Application of AI in NRM	Technology	12	2	Zambia
SMART systems for IWT	Technology	11	3	Tanzania
Community-based habitat rehabilitation	Service	11	3	Malawi
GIS mapping of ecosystem services	Process	11	3	Mozambique
SMART warning for HWC	Technology	10	4	Zambia
Bio-pesticides for crops	Product	9	5	Tanzania
Improved CBNRM governance	Process	9	5	Mozambique

(b) WM

Existing R&I	Category	Score	Rank	Country
Biogas production	Product	14	1	Malawi
Digital alarms/sensors for WM	Technology	13	2	Malawi
Production of Bio-feeds/biofertilizers	Products	13	2	Tanzania
Production of Biofertilizers	Product	13	2	Mozambique
Ext-producer Retentions (EPR)	Service	13	2	Zambia
Waste to Energy	Product	13	2	Zambia
Plastics to fuel	Process	12	3	Mozambique
Waste to construction	Product	12	3	Tanzania

Further scrutiny of additional R&I options is warranted, based on wider criteria which should inform subsequent prioritizations depending on specific circumstances and requirements.

Policy Insights

The weak application of R&I solutions in resolving NRM and WM challenges within the SADC Region has surfaced some major policy implications. For instance, Human-Wildlife Conflict (HWC) and Illegal Wildlife Trade (IWT) some of the major NRM challenges of today Without adopting policies that encapsulate science and technology, efficiency at addressing these problems will definitely remain doomed. Similarly, application of science and technology in solving WM problems should feed positively into circular economies, thus improve efficiency at converting waste into marketable products through the fast-growing circular economy, creating jobs and revenue streams for socio-economic development.