

The Challenges of Using Indigenous and Local Knowledges in the Management of the Malagarasi-Muyovozi Wetland Resources

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Abstract

The use of knowledges of localities is increasingly being upheld in addressing challenges of the management of wetland resources. Indigenous knowledges have become important today following the insufficiency of foreign knowledge imposed in societies from the modern natural resource management initiatives. Informed by the study which was conducted in the Malagarasi-Muyovozi wetlands in north-western Tanzania, this paper presents findings on the challenges of using indigenous and local knowledges in the management of wetland resources. Through a case study design, a mixed methods approach was used—involving in-depth interviews and survey—to collect data from 1148 local community members from five villages in the study area. The findings revealed that indigenous and local knowledges are used in the management of wetlands in the area, but some of their uses are limited because they are accorded less status when compared with western-based knowledge. The paper concludes that indigenous and local knowledges are useful and thus needed, but their effective use requires measures to address the challenges found in their use. Hence, awareness creation efforts need to be made to strengthen indigenous and local knowledge institutions so as to enhance effective use and sharing of the knowledges to ensure, among others, sustainable management of natural resources.

Keywords: *indigenous knowledge, local knowledge, wetland management, Malagarasi-Muyovozi wetlands*

1. Introduction

The knowledge, values, and practices of indigenous peoples and local communities offer ways to understand and better address environmental problems and natural resource management issues (Brondízio et al., 2021; Rosli et al., 2018; Oviedo & Ali, 2018; Hoagland, 2017). Different studies—such as those by Williams et al. (2020) and Brondízio et al. (2021)—attest that, towards the end of the 20th century, the world witnessed increasing emphasis on the utilization of indigenous knowledge in addressing natural resource management and environmental issues. The United Nations Conference on Environment and Development in 1992 (including the Convention on Biological Diversity), the Sustainable Development Goals (SDGs), the Ramsar Convention on Wetlands, and other international and national policies and

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enactments capitalize on the importance of ensuring the participation of local communities and their knowledges in ensuring sustainable management of resources (Ayaa & Waswa, 2016; Oviedo & Ali, 2018). In developing countries, such as those in Africa, indigenous and local knowledge systems form the necessary options to successful management of natural resources (Asmamaw et al., 2020; Oviedo & Ali, 2018; Rosli et al., 2018; Nawe & Hambati, 2014).

While literatures conceptualize indigenous knowledge differently from local knowledge, some scholars use the two concepts interchangeably. Towards the close of the 20th century, for example, scholars such as Warren (1991) defined the term indigenous knowledge as local knowledge that is unique to a given culture or society. Later, scholars such as Kiggundu (2007) and Shizha (2017) defined indigenous knowledge as the local knowledge that is unique to a culture or society, which is passed from generation to generation, usually by word of mouth and cultural rituals. They show that indigenous knowledge is locally-based. Brondízio et al. (2021) summarize the term indigenous and local knowledge as a cumulative body of intergenerational knowledge, practices, values, and worldviews embedded in the relationships between local people and nature. Buying the same view of Brondízio et al. (2021), this paper's conceptualizes indigenous and local knowledge as that knowledge which is rooted in a particular place, and with a set of experiences generated by people living in the place, and gained through practical engagement in everyday life, be it indigenous or not. The simple rule in defining the scope of the term is set by Williams et al. (2020): that indigenous and local knowledge comprises of local people's knowledges that are outside of the mainstream of modern scientific knowledge, or conventional scientific knowledge.

Knowledge is a collective term; it does not carry plural form. However, in this paper the word is, in some contexts, used (as largely used in literature) in the plural form, not with intention of showing its plurality, but of showing varieties or systems the same way one can talk of winds or waters. Such a use is employed to denote varieties of knowledge based on societies or knowledge systems. UNESCO, for example, uses the term indigenous knowledges to refer to different understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings (Moore & Nesterova, 2020). In this paper, the term 'indigenous and local knowledges' denotes varieties of knowledge held and used by local communities in their living, including in the management practices of wetland resources.

Being lands which are transitional between terrestrial and aquatic systems—where the land is usually covered by shallow water (Iyango et al., 2005; Rosli et al., 2018)—wetlands are very fragile resources that require great management attention. They are biodiversity 'hotspots' ascribed to be 'the kidneys of the landscape' and 'biological supermarkets' (Raburu et al., 2012;

Challenges of Using Indigenous and Local Knowledges in the Management of Wetlands

Hamisi et al., 2012). Their services and functions generate direct and indirect values and uses among communities around them too (Raburu et al., 2012; Rosli et al., 2018). Due to their importance, efforts are increasingly being made towards involving different actors in conserving them. Such efforts are likely to include the utilization of local people's knowledge systems.

Literature attests that the use of indigenous and local knowledge is faced by challenges. Wu (2017) argues that the use of indigenous and local knowledge, along with conventional scientific knowledge, is a complex process; and poses a core of challenges. Diawuo and Issifu (2015), Nguyen and Ross (2017), and Ross et al. (2011) argue that indigenous and local knowledge cannot work together with modern western knowledge mainly because of the barriers of epistemological and institutional differences. They find them not to be easily combined because they are in antagonistic relations as they belong to different world views with unequal political power base. Bohensky et al. (2013) and Nguyen and Ross (2017) contend that the two knowledge systems are not compatible; and that governments grant modern science greater power through which (according to Mazzocchi (2018)) it controls local people and their knowledge. Furthermore, Mercer et al. (2010), Briggs (2013), Diawuo and Issifu (2015), Ayaa and Waswa (2016), and Asmamaw et al. (2020) argue that indigenous and local knowledge systems have often been experiencing segregation and side-lining. Usually, government institutions and agencies are composed of officials who are guided by western-based knowledge, and who are not rooted in local people's knowledge (Mercer, 2010). Thus, they fail to translate local knowledge into scientific language, ending up with considering it irrelevant and superstitious (Nguyen & Ross, 2017).

The conception that traditional and indigenous knowledge is opposed to, and entirely separate from, conventional western-based sciences is, however, not accepted by other scholars such as Watson and Huntington (2008), Rathwell et al. (2015), and somehow by Nguyen and Ross (2017). Watson and Huntington (2008) argue that modern western knowledge and indigenous knowledge are not entirely separable, but are of the same origin and function; differing only in a matter of time and space as both natural and social sciences rely upon local knowledge and local informants (Watson & Huntington, 2008; Nguyen & Ross, 2017).

In Tanzania, the use of indigenous and local knowledge is recognized and valued in the management of wetlands, which occupy about 10% of its surface (Wilson et al., 2017; URT, 2014). The wetlands include major river networks, deltaic mangrove areas, inland drainage systems, and the great lake system (URT, 2014). Claims by scholars that indigenous and local knowledge cannot be successfully used together because of being challenged by modern scientific knowledge poses a question mark that pushes one to find out whether these claims are true; and that is the purpose of this paper.

Challenges of Using Indigenous and Local Knowledges in the Management of Wetlands

The Malagarasi-Muyovozi wetlands form the largest Ramsar wetland site ecosystem in the country (URT 2022). Being the first to be designated in Tanzania as wetlands of international importance under the Ramsar Convention (URT, 2014, URT 2022), the wetlands were selected for this study because they are likely to have communities that have long time experiences in recognizing and utilising indigenous and local knowledge in wetland management.

The area around Lake Nyamagoma and Lake Sagara was selected for the study because these two largest lakes in the Malagarasi-Muyovozi wetlands offered the best representation of the uses of wetlands. It was also preferred because it is more easily accessible than the other areas in the site; most of which are in remote areas. The area is in the administrative area of Uvinza district in Kigoma region. Although the area is reported to be under constant degradation, there is scanty evidence on the use of indigenous and local knowledge to conserve the wetlands, and/or its challenges.

2.2 Study Design

The study employed a case study design. Usually, a case study is employed when there is a need of obtaining in-depth information on an issue, event or phenomenon in its natural real-life context (Crowe et al., 2011), and in a specific small geographical area (Zainal, 2007). Hence, as a research approach that is usually employed to generate multi-faceted in-depth understanding of a complex issue (Crowe et al., 2011), it was deemed suitable in identifying indigenous and local knowledge in the area, and the challenges of using it.

2.3 Sampling

The population of the study was composed of all members of the communities surrounding or bordering any of the two lakes. Five villages are bordered with either of the lakes in the region. All the five villages surrounding the lakes— Itebula village around Lake Sagara; and Kasisi, Mtegowanoti, Ilalanguru and Chagu villages around Lake Nyamagoma—were involved in the study. All the villages were involved because they were manageable. Each of the five villages had one sub-village purposefully selected based on a criterion of neighbouring with any of the lakes. The five sub-villages had 1129 households.

Data were obtained from 19 key informants constituting of 14 community members who held identified indigenous and local knowledge, and who were obtained through snowball sampling; and 5 local government officials at village and ward levels, who were obtained through purposeful sampling. Other data were collected from the 1129 households, from each of which the head, or an informed representative, was involved as a respondent. Thus, the study had a total of 1148 respondents/participants.

2.4 Data Collection

Data were collected through in-depth interviews, survey and observation. The data collection process started with a preliminary study aimed at collecting general information on existing or used indigenous and local knowledge, which informed the preparation of an interview guide and a questionnaire. The administration of in-depth interviews to the 19 key informants and filling of the questionnaire by the 1129 heads and representatives of households followed concurrently. Questionnaires were distributed to every household, the head/representative filled it, and then it was collected from the household on the other day. Direct contacts during the filling of the questionnaires and organization of FGDs were not opted for because they were shunned during the time due to the Covid 19 problem of the time. Direct observation was used to collect data about practices of the local community members in making use of wetland resources. When interviews and questionnaires revealed anything requiring verification, observation was used. Observation was carried out through transect walk around to collect data that could add on, and confirm, the data collected through the other methods. The data obtained through this method were such as the posters promoting local people's participation in the management of wetland resources, and the direct observable activities and products of the local community members.

2.5 Data Analysis

Thematic data analysis was used to process qualitative data where systematic data familiarization and organization were done. Responses were read several times, filtered and organized. The data were categorized into specific themes of similar information, and then divided into sub-categories/slices. Descriptive analysis was done on the quantitative data; which were organized, coded and entered into SPSS (IBM), version 16, which was used to compute frequencies and percentages. Case studies are often analysed only as descriptive statistics (Dawidowic, 2011), as was the case for this study.

3. Results and Discussion

3.1 Indigenous and Local Knowledge Used in Wetland Management

The study explored the existing indigenous and local knowledge used in the management of the Malagarasi-Muyovozi Wetland resources. The results of the household survey on knowledge held and used are shown in Table 1. The results show that indigenous and local knowledge is used in managing wetlands in the community. All the listed uses prevail in the communities. The differences in percentages represent variations of the uses of the knowledge throughout the communities. For example, knowledge of using plants for hand crafts scored the highest frequency of 96% of all the respondents. Knowledge of making boats ranked the second (95%); and below this is knowledge on conserving forests (86%), and knowledge on conserving water (85%).

Challenges of Using Indigenous and Local Knowledges in the Management of Wetlands

Table 1: Indigenous and Local Knowledge Used in Wetland Management

Indigenous and Local Knowledge Used	Freq.	%
Knowledge of using plants for hand crafts	1,081	96
Knowledge of boat making	1,069	95
Knowledge of conserving forests	985	87
Knowledge of conserving water	961	85
Knowledge of weather forecasting	961	85
Knowledge of using agricultural activities techniques	829	73
Knowledge of animal grazing	793	70
Knowledge of harvesting insects for food	721	64
Knowledge of bee keeping	721	64
Knowledge of fishing through local methods	721	64
Knowledge of conserving wild animals	697	62
Knowledge of using wetlands for traditional religious activities	697	62
Knowledge of using irrigation techniques	589	52
Knowledge of draining water in fields	480	43
Knowledge of storing water for future use	360	32
Knowledge of pottery	264	23
Knowledge of hunting wild animals	252	22
Knowledge of keeping away rainfall	228	20
Knowledge of causing rain	144	13
Knowledge of preventing flooding	24	2

Notes: $n=1129$

The results further indicate that there is less use of indigenous and local knowledge in preventing floods (2%), causing rain (13%), and in keeping away rain (20%). Very few cases were reported about using knowledge of building muddy dikes to prevent floods from getting into homes. Knowledge on causing and prevention of rainfall was reported to be held and practised secretly because it is regarded as superstition, and thus it is shunned.

Through observation, different facets of indigenous and local knowledge were observed. Knowledge of using plant leaves in making mats and baskets (Photo 1) was entirely observed in all the five villages. Men and women harvest plant leaves—locally known as *ukindu* and *bukama*—which are weaved to produce mats and baskets. Knowledge of using wetland trees to obtain wood for making fishing boats was also observed (Photo 2). Home-based workshops in which wood is chopped to produce canoes were found at Itebula, Mtegowanoti and Chagu villages. Some boats at Mtegowanoti were found to be constructed of timber. Due to these uses, specific trees and other kinds of plants are strictly preserved so as to make them available for use.

Other facets of knowledge that were observed are those of using wetland medicinal plants, insects and animals for healing, using wetland clay in making of pots and bricks, knowledge of conserving water for irrigation, knowledge of draining water in the field by digging canals, and knowledge of tapping or harvesting insects for food.



Photo 1: *Ukindu* and Mats Being Sold at Nguruka Town Market
Source: Author (17/3/2020)



Photo 2: Dugout Canoes at a Park Along Lake Sagara at Mumbara (Itebula Village)
Source: Author (20/3/2020)

For example, a home of a community member who holds traditional healing knowledge was visited at Itebula Village. It was observed and witnessed by neighbours and patients (who were found at his home) that he successfully heals broken bones. An example of using wetland clay in making bricks is also shown in Photo 3. To sustain the use, it was reported that community members preserve termite-built mounds to let them increase in number and size so as to provide large mounds of clay used for making pots and bricks.

The findings in this section match with those of other scholars who studied the use of indigenous and local knowledges. For example, the uses of the knowledge in agriculture confirms the findings by Nawe and Hambati (2014), and Hambati (2021): who all found that indigenous knowledges (IKs) are used in farming practices and agricultural techniques and methods in Tanzania. Also, other findings agree with those of UNEP (2008), who found that the communities that live around wetlands in Kenya, South Africa, Swaziland and Tanzania have certain practices for the management of water, forests, shrines, species of flora and fauna, as well as farming practices focused on the production of indigenous food crops.



Photo 3: Termite Mounds from Which Clay for Brick-making is Found at Itebula Village
Source: Author (22/3/2020)

Another finding conforms to that of Ayaa and Waswa (2016), who found that Teso community members, in Busia County in Kenya, use their local knowledge to manage wetlands for religious uses (totems and protection of sacred places); Hoagland (2017), who found that local knowledge is used in Canada and the US; and Rosli et al. (2018), who found the same in Malaysia.

3.2 Challenges in Using Indigenous and Local Knowledge

The study was also interested in exploring challenges of using indigenous and local knowledge in the management of the Malagarasi-Muyovozi Wetland resources. The challenges found are categorized in two parts. The first category is based on the acceptability of indigenous and local knowledge. The second one is manifested in the dichotomous relationship between indigenous and local knowledges, and conventional scientific knowledge.

3.2.1 Acceptability of Indigenous and Local Knowledge Use

A household survey was used to examine the perceptions of community members on the comparative degree of acceptability of the use of a variety of knowledge in wetland resource use and conservation. The knowledge varieties involved were indigenous and local knowledge, modern western knowledge, or both. The results are presented in Table 2.

Table 2: Acceptability of Using Different Knowledges

S/N Wetland Use	Percentage of Acceptance of Knowledge Use				
	<i>Indigenous/ Local Knowledge</i>	<i>Modern Western Knowledge</i>	<i>Both Local and Modern Western Knowledge</i>	<i>Neither Local nor Modern Western Knowledge</i>	<i>No Response</i>
1. Irrigation	41	82	90	1	11
2. Hunting	1	27	3	2	55
3. Hand crafts	98	1	0	0	18
4. Using wetlands for worshipping	80	46	2	0	48
5. Agriculture	44	52	99	0	0
6. Livestock grazing	37	51	84	0	0
7. Bee keeping	18	82	90		11
8. Making of boats/canoes	11	11	1	0	66
9. Making of local fishing net	3	3	3	38	11
10. Local methods of fishing	6	5	3	42	35
11. Local medicine and healing	98	1	81	0	8
12. Weather forecasting	10	43	47	0	11
13. Rain making	1	2	2	9	53
14. Preventing rainfall	5	2	0	38	62
15. Magic powers to prevent crime such as theft	16	0	0	47	37

Notes: n=1129

The results in Table 2 further indicate that different kinds of knowledge are permitted in different wetland uses. Also, some knowledge is highly accepted, while another is least accepted. The use of indigenous and local knowledges is highly allowed or accepted in handcrafts and local healing (which scored 98% each). The use of indigenous and local knowledge in worshipping follows next (scoring 80%); while its use in hunting and rain making, on the other end, seem to be allowed at a very small extent (1% each).

Interviews generated the same responses on the said situation. Hunting by local community members was reported to be forbidden by the government unless one was licensed to do so. This is why it scored 1%. Rain-making was reported to be in the realms of what many community members perceive to be superstition: the practice of it is considered to be witchcraft. Permission or freedom of using indigenous and local knowledge in the rest of the uses are distributed in between those ends.

Challenges of Using Indigenous and Local Knowledges in the Management of Wetlands

The use of modern western knowledge is almost generally equally permitted and free to be used in many practises. However, it scores less permission or freedom in some uses such as in magic power to prevent crime (0), hand crafts (1%), local healing (1%), rain-making (2%), preventing rainfall (2), making of local fishing nets (3), and using local methods of fishing (5%).

The results indicate that indigenous and local knowledge is accepted and allowed to be used in the community. Besides being indicated for use on its own, it is also indicated for use in combination with modern western knowledge in the third column of the responses in Table 2. It thus commands some degree of acceptance. These results agree with Vinyeta and Lynn (2013), who argue that local communities' knowledge is recognized by communities.

The interviewees were also asked to give their comments on the acceptability of indigenous and local knowledge in the management of wetlands. They were required to give brief explanation on whether the government and the communities themselves allow the use of local and indigenous knowledge in the different uses of wetlands.

Commenting on suitability of either local knowledge, modern knowledge or both, one of the interviewees reported:

Some local and traditional practices are good and are promoted. An example is the use of local fertilizers (manure) in agriculture. But they are used even if they are not promoted. Knowledge of activities that tend to harm the environment, resources and other people is not permitted. Such knowledge is that which is about the cultivation of land that is less than 60m closer to water sources, use of chemical fertilizers near water sources, and killing of wild animals. Also, community members are not permitted to cut down trees in the reserve forests. We are only permitted to collect dead wood and fruits for our use. We are also allowed to keep bees. We also have experts in healing. One of them is a specialist in healing broken bones. He admits victims as in-patients. We can visit his home and see this [we visited the home, saw patients, and talked to some]. Some referred themselves to this service from Bugando Hospital after seeing that their healing was not successful there (Mumbara Community Leader).

A fisherman, who is also a member of a beach management unit (BMU) from Itebula village, was asked the same during an in-depth interview, and he had the following to say:

We receive directives from the government on how to ensure popular participation. We have records of village leaders and members of various committees. The practice of knowledge that tend to harm the environment, resources and other people is not permitted. Such practices include using unpermitted fishing nets, cultivating closer than 60m from water sources, use of chemical fertilizers near water sources, and killing of wild animals. Also, community members are not permitted to cultivate or cut down trees in the reserve forests. We are only permitted to collect dead trees and fruits for our own use. We are also allowed to keep bees. (Member, Beach Management Unit).

Onesmo Emmanuel

An interviewee at Chagu village had the following responses:

Local knowledge is very rarely recognized by the government, and by the local community members themselves. The local people themselves despise their knowledge. Some people who hold some forms of local knowledge hide it and practice it secretly. Practising the knowledge secretly is dangerous because the community is prevented from controlling its use, and/or benefiting from it. Some knowledge forms seem to be associated with magic powers and witchcraft. For example, we know that some people have the magic power of flying by night. Some use their magic powers to make others cultivate farms for them, or harvest from other people's while unawares. Others keep crocodiles and snakes. (Chagu Village Wetland Resource User)

These statements show that there are different practices of traditional knowledge in the community that can be useful but their holders hide them. This means that such people are not willing to expose such knowledge. The interviewee says that this is because the holders themselves despise the knowledge they hold, and this is why they practice it secretly. One can interpret this situation as that the holders of the knowledge see it useful and important, but there is a feeling that the community might not accept or permit its use.

The same interview participant from Chagu village added the following on the use and strength of indigenous and local knowledge:

Some traditional knowledge which is thought of as bad is very useful and strong. Imagine: such knowledge is not taught/shared in schools; it is not advertised in markets or in the streets; it has not been publicly banned and declared as unwanted: but it is still working. Ancestors passed away and new generations came, but the knowledge is still working! The knowledge is very powerful on its own. It is not bad. People may decide to use it with bad intentions the same way a doctor at a hospital might decide to use their knowledge with a bad intention of killing instead of healing. If it were bad, why should holders of modern Western knowledge seek assistance from the people they call superstitious! Why are the leaders of modern foreign religions said to seek help of healing from these people they call witches! Why are politicians said to seek assistance from traditional witch doctors for success in securing their political positions! (Interview Participant, Chagu Village)

These responses mean that knowledge that involves magic powers—or what the community refers to as witchcraft—is shunned and banned in the society. It is perceived to be harmful. Holders of such knowledge are not accepted in the community. Although the use of the knowledge is decreasing, it has withstood all those oppositions as it still exists and works. People do not acknowledge it but they still use it! These results concur with the findings by Asmamaw et al. (2020), who—using interviews, FGDs, and a household survey to study Dinki watershed, in Ethiopia—found that the majority (62.9%) of respondents were aware of the usefulness of local knowledge systems in their locality, but their use was decreasing because the community members tended to shun them by regarding them primitive.

Challenges of Using Indigenous and Local Knowledges in the Management of Wetlands

3.2.2 Dichotomous Relationship Between Local Community's Knowledge and Modern Western Sciences

Participants were asked to indicate their preferences in using indigenous and local knowledge in comparison with conventional scientific knowledge, or a combination of the two knowledge systems. The question was intended to establish the position where community members place indigenous and local knowledge in comparison to conventional scientific knowledge. The responses indicated that there is dichotomous relationship between the two. In the continuum, preference of indigenous and local knowledge stands at 4%, while the preference of conventional scientific knowledge stands at 37%. The complete summary of responses is shown in Figure 1.

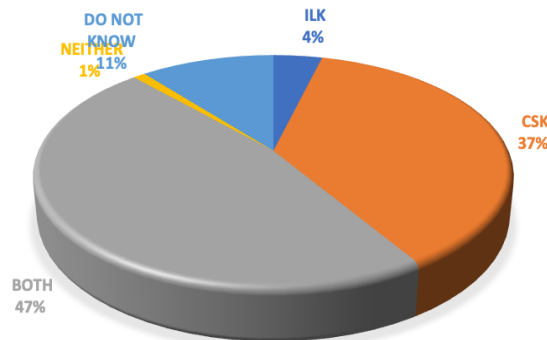


Figure 1: Community's Preferences of Using Different Kinds of Knowledge

Source: Field data

This disparity between the two knowledge systems indicates a dichotomy. The same view is confirmed by interview responses. It was reported that participants think that the two knowledge systems do not easily integrate, and they do not rank them equally. Indigenous and local knowledge is viewed as inferior to conventional scientific knowledge. An interviewee from Mumbara (a fisherman and a member of BMU committee) had the following to comment on the relationship between the two knowledge systems:

I do not know whether local knowledge of people is in line with the modern scientific knowledge because we do not know the two. People who went to school (people who got educated in the formal education systems) can help to verify that. We greatly listen to what government officials direct us to do. (Member, BMU Committee)

The participant indicates that what they recognize more is the knowledge of people who went to school (people who got formal education in schools and colleges). Also, they listen to government officials because these have authority and went to school. It is in this regard that western-based sciences get opportunity to prevail over local or indigenous knowledge.

Onesmo Emmanuel

These responses indicate that indigenous and local knowledge is not perceived by the community members as valuable as conventional scientific knowledge. The participants indicated that the community members pay respect to people who acquired their knowledge in western-based educational institutions. Their responses show that they regard the knowledge accumulated through local experiences as not a knowledge to rely on.

Through observation, some indications of the stigmatization/dishonour of useful traditional knowledge were observed. One example that was observed is the situation that, while the government (based on modern western sciences) has licensed medical doctors and other health service officials in hospitals, and in health centres and dispensaries, it has not recognized or licensed the reported traditional healer at Itebula who also provides bone-healing services. The healer provides his services in a sort of secrecy; under a sense of illegality. This situation implies that the officials trained in modern western-based sciences do not easily recognize locally and traditionally obtained knowledge.

The findings in this section affirm Wu's (2017) argument that the use of indigenous knowledge along with conventional scientific knowledge is difficult and complex. The findings also resonate with the argument by Nguyen and Ross (2017), and Ross et al. (2011): that indigenous and local knowledge cannot work together with modern western knowledge because of some barriers. They are also seen in the findings by Bohensky et al. (2013), who argue that the two knowledge kinds are located at the two ends of the continuum greatly influenced by power relations; and in the arguments by Diawuo and Issifu (2015) and Briggs (2013): that western modern science and traditional and indigenous knowledge are in antagonistic relations as they belong to different world views with unequal political powers.

4. Conclusion and Recommendations

This paper shared the challenges of using indigenous and local knowledges in the management of wetland resources. It sought to discern the dilemma caused by the ongoing advocacy on the necessity of employing different knowledge systems in the management of natural resources, and the scholarly debate on the possibility of successfully using indigenous and local knowledge along with western-based scientific knowledge. The findings of the study show that indigenous and local knowledges are useful, and that they are applicable in managing wetland resources. However, the degree of their use is affected by the challenges they are facing. The challenges identified are wrapped up in two key areas: knowledge use acceptance, and the position of the knowledge system compared to another. This paper concludes that, although indigenous and local knowledges are held and used by community members, their value and credibility are still questioned by community members, including their holders. Both

Challenges of Using Indigenous and Local Knowledges in the Management of Wetlands

government officials and local community members perceive some local-based knowledge as unfit, out-dated and superstitious. Local community members are oriented to despise their own knowledge, which they have had for generations.

The unequal positions accorded to the two knowledge systems is manifested in their locations at the two ends of the continuum, which indicate that while the knowledge systems can work together, they do not belong to one home due to their contrasting attributes and philosophical bases. To address the challenges, we recommend that different natural resource management stakeholders need to continuously create awareness among community members on the necessity of respecting, using and sharing available local-based knowledges for sustainable management of natural resources, including wetlands. There is also a need for government agents and natural resource management stakeholders to realise the potentials of local people's knowledges in the management of wetland resources by seeking to strengthen community institutions responsible for the promotion, development, sharing and conservation of indigenous and local knowledges for their sustainable use.

References

- Asmamaw M., Mereta S. & Ambelu A. (2020). The Role of Local Knowledge in Enhancing the Resilience of Dinki Watershed Social-Ecological System, Central Highlands of Ethiopia. *PLoS ONE* 15(9).
- Ayaa, D. & Waswa, F. (2016). Role of Indigenous Knowledge Systems in the Conservation of the Bio-physical Environment Among the Teso Community in Busia County-Kenya. *African Journal of Environmental Science and Technology*, 10(12): 467–475.
- Briggs, J. (2013). Indigenous Knowledge: A False Dawn for Development Theory and Practice? *Progress in Development Studies* 13(3): 231–243.
- Bohensky, E., Butler, J. & Davies, J. (2013). Integrating Indigenous Ecological Knowledge and Science in Natural Resource Management: Perspectives from Australia. *Ecology and Society*, 18(3): 20.
- Brondízio, E., Aumeeruddy-Thomas, Y., Bates, P., Carino, J., Fernández-Llamazares, Á., Ferrari, M. F., ... & Shrestha, U. B. (2021). Locally Based, Regionally Manifested, and Globally Relevant: Indigenous and Local Knowledge, Values, and Practices for Nature. *Annual Review of Environment and Resources*, 46(1): 481–509.
- Crowe, S., Cresswell, K., Robertson, A. Huby, G., Avery, A. & Sheikh, A. (2011). The Case Study Approach. *BMC Medical Research Methodology*, 11: 100.
- Dawidowicz, P. (2011). With Scholarship and Practice in Mind: The Case Study as Research Method. *The Journal of Applied Instructional Design*, 1(2): 5–12.
- Diawuo, F. & Issifu, A. (2015). Exploring the African Traditional Belief Systems in Natural Resource Conservation and Management in Ghana. *The Journal of Pan African Studies*, 8(9): 115–131.

Onesmo Emmanuel

- Hambati, H. (2021). The Role of Indigenous Knowledge Systems (IKS) in Improving Farm Productivity in Kainam Village, Mbulu District –Tanzania. *University of Dar es Salaam Library Journal*, 16(2): 34–52.
- Hamisi, H., Tumbo, M., Kalumanga, E. & Yanda, P. (2012). Crisis in the Wetlands: Combined Stresses in a Changing Climate–Experience from Tanzania. *Climate and development*, 4(1): 5–15.
- Hoagland, S. J. (2017). Integrating Traditional Ecological Knowledge With Western Science for Optimal Natural Resource Management. *IK: Other Ways of Knowing*, 3(1): 1–15.
- Iyango L., Kiwazi F., Tindamanyire, T., Kaganzi E., Busulwa H. & Mafabi P. (2005). *Traditional Wetland Practices in Rural Communities in Uganda*. The East African Community IRC Repository.
- Kashaigili, J. J., & Majaliwa A. M. (2013). Implications of Land Use and Land Cover Changes on Hydrological Regimes of the Malagarasi River, Tanzania. *Journal of Agricultural Science and Applications*, 2(1): 45–50.
- Kiggundu, J. (2007). Intellectual Property Law and the Protection of Indigenous Knowledge. In Mazonde, L., Thomas, P. (eds). *Indigenous Knowledge Systems and Intellectual Property in the Twenty-First Century; Perspectives from Southern Africa*. Dakar Codesria, pp. 26–47.
- Mazzocchi, F. (2018). Why “Integrating” Western Science and Indigenous Knowledge Is Not an Easy Task: What Lessons Could Be Learned for the Future of Knowledge? *Journal of Futures Studies*, 22(3): 19–34.
- Mercer, J., Kelman, I., Taranis, L. & Suchet-Pearson, S. (2010). Framework for Integrating Indigenous and Scientific Knowledge for Disaster Risk Reduction. *Disasters*, 34(1): 214–239.
- Moore, S. J. & Nesterova, Y. (2020). Indigenous Knowledges and Ways of Knowing for a Sustainable Living. Paper commissioned for the UNESCO Futures of Education report (forthcoming, 2021).
- Nawe, J. & Hambati, H. (2014). *Integrating Traditional and Modern Knowledge Systems in Improving Agricultural Productivity in Upper-Kitete Village, Tanzania*. Research Report 14/3, Dar es Salaam, REPOA.
- Nguyen, T.H. & Ross, A. (2017). Barriers and Opportunities for the Involvement of Indigenous Knowledge in Water Resources Management in the Gam River Basin in North-east Vietnam. *Water Alternatives*, 10(1): 134–159.
- Oviedo, G. & Kenza, M. (2018). *Indigenous Peoples, Local Communities and Wetland Conservation*. Ramsar Convention Secretariat.
- Raburu P., Onyango F. & Obiero K. (2012). The Value of Consumptive Goods and Services of Nyando Wetland. In Raburu, P. O., Okeyo-Owuor, J.B. & Kwena, F. (eds.) *Community Based Approach to the Management of Nyando Wetland, Lake Victoria Basin, Kenya*. KDC - VIRED–UNDP.
- Ramsar Secretariat. (2020). Ramsar Wetlands of International Importance. [https:// www.protectedplanet.net/220068](https://www.protectedplanet.net/220068)

Challenges of Using Indigenous and Local Knowledges in the Management of Wetlands

- Rathwell, K., Armitage, D. & Berkes, F. (2015). Bridging Knowledge Systems to Enhance Governance of the Environmental Commons: A Typology of Settings. *International Journal of the Commons*, 9(2): 851–880.
- Rosli, F., Salleh, A., Fadhlullah, W., Ibrahim, M. & Esa, N. (2018). Tropical Wetland Valuation: An Influence of Local Knowledge in Malay Traditional Ecosystem for Human Well-being. *SHS Web of Conferences* 45, 03002 (2018).
- Ross, A., Sherman, K., Snodgrass, J., Delcore, H. & Sherman, R. (2011). *Indigenous People and the Collaborative Stewardship of Nature: Knowledge Binds and Institutional Conflicts*. Walnut Creek, Canada: Left Coast Press.
- Shizha, E. (2017). Indigenous Knowledges and Knowledge Codification in the Knowledge Economy. *Handbook of Research on Theoretical Perspectives of Indigenous Knowledge Systems in Developing Countries*. SCOPUS: 22.
- United Nations Environment Programme (UNEP). (2008). *Indigenous Knowledge in Disaster Management in Africa*. UNEP.
- United Republic of Tanzania (URT). (2014). *Guidelines for Sustainable Management of Wetlands in Tanzania*. Vice President's Office.
- URT. (2022). Performance Audit Report on the Management of Conservation and Protection of Wetland Ecosystems in Tanzania. National Audit Office.
- Vinyeta, K. & Lynn, K. (2013). Exploring the role of traditional ecological knowledge in climate change initiatives. Gen. Tech. Rep. PNW-GTR-879. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 37 p.
- Warren, D. M. (1991). "The Role of Indigenous Knowledge in Facilitating the Agricultural Extension Process". Paper presented at International Workshop on Agricultural Knowledge Systems and the Role of Extension. Bad Boll, Germany, May 21–24.
- Watson, A. & Huntington, O. (2008). 'They're Here - I Can Feel Them: The Epistemic Spaces of Indigenous and Western Knowledges'. *Social & Cultural Geography*, 9(3): 257–281.
- Williams, P., Sikutshwa, L. & Shackleton, S. (2020). Acknowledging Indigenous and Local Knowledge to Facilitate Collaboration in Landscape Approaches — Lessons from a Systematic Review. *Land*, 9: 331.
- Wilson, E., McInnes, R., Mbagi, D. & Ouedraogo, P. (2017). *Kilombero Valley, United Republic of Tanzania, Ramsar Site No. 1173*. Ramsar Advisory Mission Report April 2017.
- Wu, H. (2017). The Process, Capability and Mechanism of Knowledge Integration. 2017 3rd International Conference on E-commerce and Contemporary Economic Development (ECED 2017).
- Zaidah, Z. (2007). Case Study as a Research Method. *Jurnal Kemanusiaan*, 9: 1–6.