Management, Prospects and Challenges of Akagera Wetland Management in the north-western Tanzania

Msafiri Yusuph Mkonda (✉ msamkonda81@yahoo.co.uk)

Sokoine University of Agriculture

Abstract

Akagera is among the trans-boundary wetland ecosystems found in east Africa. Since the ecosystem serves the livelihoods of majority communities, it needs sustainable management to ensure its continued life support. This qualitative study serves to inform policy makers, socio-economic practitioners, development partners, and the communities at large on the prospects and challenges related to management of Akagera wetland. This establishment is particularly important in advancing on the existing body of knowledge. To execute such objective, the study identified some important resources found in the area, their socio-economic potentials, and challenges related to their management. Key informant interview and theme content analysis were the major methods for data collection and analysis, respectively. Here, the study exhibits that River Kagera, wildlife in national parks, wetlands, fertile soils and forests are among the most important resources found in the landscape. These resources serve as sources of water for domestic and agricultural production, energy, tourism, and meat, just to mention a few. Currently, the Tanzania National Parks which is a government institution manages the national parks and associated environmental resources in the landscape. Other resources such as water are managed by the respective sectoral ministries or in integration. However, some of the salient challenges associated with the management of Akagera wetland ecosystem include; financial constraint, poaching, forest deforestation, impacts of climate change, encroachment to wetland and national parks, cultural barriers, political instability, and unharmonized wildlife polices among the east African countries. Therefore, it is important to impose harmonized policies related to the management of this wetland ecosystem among the benefiting countries, strengthen joint patrols, and raise awareness among the people on the management of all trans-boundary resources in east African region. This study proposes further researches in the landscape especially on the political and social cultural barriers related to the management.

1. Introduction

Wetlands are among the useful ecosystems in the globe as they determine livelihoods of millions of people and other living organisms including wildlife (URT 1998; Mlengeya and Lyaruu 2005). The impacts of climate change have consistently been affecting the management of these ecosystems (Kashaigili et al. 2009; Pardoe et al. 2020). This has in turn increased the needs of sustainable management of the wetland ecosystems in both globe and local levels (MEA 2005; Amponin et al. 2007; Lalika et al. 2017). Several studies indicate that the vulnerability of wetland ecosystems depend on various ecological factors such as climatic region, nature of the vegetation, abundance and resilience of the organisms, and level of awareness among the managing communities (Kideghesho et al. 2013; Amare 2015).

Globally, there are several major wetlands in various continents and countries. According to the Global Environment Outlook published by the United Nations Environment Programme (UNEP 2021), there are major ten wetlands in the world, namely; the Pantanal (Brazil, Bolivia and Paraguay), Río Negro (Brazil), Ngiri-Tumba-Maindombe (Democratic Republic of the Congo),Queen Maud Gulf (Canada), Grands affluents (Congo), Sudd (South Sudan), Okavango Delta (Botswana), Gueltas et Oasis de l'Aïr (Niger),

Plaines d'inondation des Bahr Aouk et Salamat (Chad), and Esteros del Iberá (Argentina). These ecosystems play significant ecological and economic functions.

Most of these globe wetlands are good in the provision of environmental services such as water, carbon sequestration, and agro-ecology, just to mention a few. They equally support livelihoods to majority people living around them or in the upstream and downstream areas of the rivers found in the area (Mwamfupe 1999; Mbeyale and Songorwa 2008). This support is more pronounced in developing countries where the livelihood reliance on nature is more pronounced (i.e. especially sub-Sahara Africa).

The management of wetland ecosystems has been a global agenda adopted as among the strategies of conserving the most vulnerable ecosystems (McNeely et al. 2001; AfDB 2021). In countries with diverse climatic regions such as China, North America, South Africa, and other Mediterranean countries the management of these wetlands has been more pronounced (Heider et al. 2021; UNEP 2021; Eric et al. 2022).

However, in areas with high dependency on wetlands, the management has been more difficult compared to the areas with little dependency on the ecosystem. In this aspect, the level of economic development of the country (i.e. developed and poor) is among the major cause of this management diversity (Baldus 2001; Brockington et al. 2006). This means, the countries with weak economies is likely to have poor management of wetland ecosystems compared to the developed ones.

In Tanzania, there are numerous potential wetland ecosystems found in various zones (Lalika et al. 2014). Most of them are in river catchments, lake or swampy areas (Brockington et al. 2008; IUCN 2008). The most interested ones are those with plenty ecosystems such as Selous Game Reserves, and water basins like Rufiji, Wami-Ruvu, and Pangani. Lake Victoria, Nyasa and Rukwa have also potential wetland ecosystems. As part of these ecosystems, this study has focused on the Akagera landscape in the north-western part of Tanzania.

Although there are numerous studies conducted to inform about the management, prospects and challenges facing wetlands, this study aims to advance from that by assessing the fore mentioned aspects on the changed management status of the landscape resources from game reserves to national parks (i.e. Ibanda and Rumanyika National Parks). Formerly, they were game reserves and currently are game reserves. Obviously, this status change has affected the institutional structure, policies and regulations associated with the landscape management.

2. Materials And Methods

2.1 Locations and biophysical characteristics of the area

The Akagera wetland landscape is within the trans-boundary and one of the largest wetland systems in the basins surrounding Lake Victoria. Parts of this wetland system are protected in Burundi and Rwanda. Akagera National Park is one of the largest protected wetlands in East Africa. In Rwandan side, these

wetlands are reportedly to be the second richest habitat for mammals outside of national parks. Geographically, Kagera River Basin covers an area of 59,700 km^2 with a population of over 16.5 million people whose main livelihood is agriculture (Mkonda 2021). The wetland also contributes 33.5% of the water inflow to Lake Victoria.

This wetland ecosystem is able to remove large quantities of the nutrients that enter in water bodies as a result of human activities in catchment areas. These nutrients would otherwise reach Lake Victoria and subsequently causing eutrophication in the lake. Therefore, since the impacts extensively go beyond the boundaries of each country, there is a need for trans-boundary collaboration in the management of the wetland ecosystems.

Although the entire landscape including Rweru (Burundi), Mugesera (Rwanda), and Akagera (Tanzania) is potential, this study focuses on the Tanzanian side despite the fact that the implications of the study are applicable in all wetlands of the three countries.

Insert here Fig. 1

Figure 1

Akagera wetland (Tanzania)

2.2 Sampling and data collection procedures

This qualitative study used both primary and secondary data sources. Primary data in the study area were collected from the communities (i.e. especially elders) while secondary data especially those from policies were collected from the government authorities and reliable documents. In the study area, we consulted a wide range of stakeholders including the district agricultural and livestock officers, wildlife officers from both the study area and the minister (Mkonda 2022). We also considerably consulted the communities and more especially the elders, non-governmental organization, and private groups. From these sources, we empirically collected sufficient data for analysis (Cramb et al. 2004; Brown 2006).

To be more precise, we purposively sampled Kyerwa District, Murongo Ward, and three villages (i.e. Mikinga, Murongo and Rwenkende) for the study. The main guiding reason for this sampling was the proximity to the Kagera River, Ibanda and Rumanyika national parks, and other important points of potential environmental resources found in the landscape. We also used the same approach in sampling the respondents (e.g. agricultural officers, elders, and other community members etc.). Despite of engaging several qualitative approaches, we mainly used key informant interview as a main method of data collection although focus group discussion and direct field observations were also applied.

A total of 15 key informant interviews with elders, agricultural experts, farmers and village government leaders were convened in the three sampled villages (Saunders 2011). For similar purpose, we conducted one group discussion in each village (i.e. each group comprised of 5 members), making a total of 15 members involved in the discussion. Practically, every interview involved both structured and semi-

structured questions. The conversations were then recorded for memory and simplification of analysis. Field observation was equally important as it helped in crosschecking the authenticity of the collected data before subjecting them into analysis. Afterward, the collected data were cleaned to eliminate those with less importance before subjecting them into in-depth analyses.

2.3 Data analyses

Since the major the major data collection method was interview, theme content analysis became the main method of analyzing the collected qualitative data. As part of analysis, the audio and video recorded interviews were further analyzed into transcripts. These transcripts were inserted in the discussion section of this paper.

3. Results

The study exhibits that Akagera wetland ecosystem has significant potentials resources such as fertile soils, wetlands, wildlife in Ibanda and Rumanyika national parks, River Kagera and its distributaries, and natural forest, just to mention the major ones. These resources serve the livelihoods of most people in the area, at national level and the entire east African region at large. Specifically, this ecosystem is a major source of energy (i.e. more especially wood fire and charcoal), water for domestic use and agriculture, meat from wild animals, tourism in Rumanyika and Ibanda national parks, and cultural practices, just to mention a few (Loibooki et al. 2002).

For instance, River Kagera is a source of hydro-electric power in Tanzania, Uganda and Rwanda. There is a big shared Hydro Electric Power (HEP) project between Tanzania and Uganda along River Kagera. In Tanzanian side, this newly established HEP is located at Murongo Ward at the Cascade center. The produced energy serves several purposes in the landscape and the neighboring regions. One elder living near the Hydro-electric power asserted that "*we will enjoy the electricity from this source, and this is quite important as most part of our district has no electricity*"

In addition, River Kagera provides water for domestic and agricultural activities. The people living near this river have opportunities to enjoy from this benefit. This finding was supported by the Kyerwa District Agricultural and Livestock Development Officer who asserted that "*about half of the vegetables and other horticultural products in the district are produced around the river catchment*".

Likewise, the river has been serving as a major source of fishes consumed in the landscape. According to community elders, the people have been enjoying protein from fishes harvested in the river. This is evidenced by the local market in Kaisho Village (in Kyerwa District) where fishes are sold. However, some of these fishes are allegedly been obtained from illegal fishing.

Generally, the management of the resources in the ecosystem is managed by a number of countries namely: Tanzania, Rwanda and Uganda. However, although the landscape has numerous resources with a wide range of diversity, this paper focuses on the involvement of Tanzania in that management. To be

more precise, the most important resources in the area include wildlife in national parks, River Kagera, and wetland ecosystem, just to mention a few.

In this aspect, the community elders asserted that the management of resources in the landscape is mainly controlled by the government with some community involvements. For instance, the national park is under Tanzania National Parks (TANAPA) while the management of wildlife in game reserves and open areas is under Tanzania Wildlife Management Authority (TAWA). On other hand, the elders further asserted that Kagera River is managed by three countries, as it is a trans-boundary resource among Tanzania, Rwanda and Uganda. For example, an elder in Murongo Ward, an area near river Kagera asserted that "*we are always told to avoid the encroachment to the river reserves in order to conserve the wetlands*"

Private sector has also been equally involved in the management. More especially, this has been through investments in natural capital such as in tourism industry, hotels and camping. This sector has significant socio-economic contributions to the communities and national level as a result of investment in natural capital in the landscape. Therefore, the sector can boost the economic and social development of the area and the country at large.

In addition, the Director of Planning and Policy from the Ministry of Natural Resources and Tourism asserted that; *"The government has proper plan to involve private sector to invest in different sectors including natural capital. This is done through Public Private Partnership (PPP) which insists the collaboration between public and private sector in boosting socio-economic development"*. As result, many private investors including tour operators such as Leopard Tour Safaris, and Rangers Safaris (interviewed), just to mention a few, have invested in tourism sector in the landscape.

However, in the Akagera Landscape, the change from Ibanda and Rumanyika game reserves to national parks has significantly affected the involvement of private sector in wildlife management in the area. Previously, there was a Big Game Safari; a private investor that was considerably involved in the management of wild animals in the area. The company invested in hunting and management of wildlife when the area was still a reserve.

An elder living adjacent Ibanda National Park and River Kagera said that *"The Big Game Safari was closely working with the communities and it was helping the communities especially in building classes for schools etc."*

This statement was seconded by another elder (female*)* "living near Rumanyika National Park who asserted that: *"Private sector has great importance to our lives as it contributes to development of our communities"*. It is obvious that the Big Game Safari paid taxes to government and had commitment to helping the neighbouring communities. However, after the change to national parks, the Big Game Safari is no longer operational as it was not allowed to do the activities in the then protected area.

On that basis, the community elders asserted that, currently there are limited private sectors which are involved in the management of wildlife and River Kagera catchment although there are some short term donor funded projects which are carried in the area. These projects propose some best management approaches of the resources.

On the other hands, the government of Tanzania has been receiving income from private sectors which have invested in renewable resources especially timber (Milledge et al. 2007; Duvail et al. 2014). The officer from treasury asserted that billions of Tanzanian shillings have been collected as taxes or levies from the exploitation and transportation of timber.

However, this business has been more pronounced in the southern circuit of Tanzania than in the northern circuit where Akagera Landscape bases. Statistically, the officer asserted that an average of 20 billion Tanzanian shillings is collected annually in each Tanzanian region from timber exploitation and transportation. In this aspect, hardwoods timber is more preferable in the exportation business.

On the other hand, the government anticipates generating income from non-renewable exploitation in the landscape from private investment. In most game reserves, there are non-renewable resources which are potential for exploitation. Basically, these resources include oil, gas and uranium. For example, one of the top officers of TAWA asserted that; "*for the past five years; a Russian Based Company has invested in the exploration and mining of uranium in Selous Game Reserves.*

The company has considerably complied with the investment procedures of Tanzania. Many other international companies are in exploration stages for non-renewable resources in various protected areas and are finding the best ways of exploration.

In terms of institutions responsible for conservation matters, there is clarity over the roles and responsibilities for wildlife protection and conservation between and among different government institutions.

Overall, the management and conservation activities in game reserves, national parks or wildlife management areas include; strengthening law enforcement at entry and exit points, anti-poaching, problem animal control and investigation and prosecution.

One of the senior officers of TAWA asserted that; *"our department is responsible for the management of wild animals in game reserves, game controlled areas, open areas, WMAs and wildlife farms while Tanzania National Parks (TANAPA) is responsible in managing animals and other organisms (both fauna and flora) in national parks including the Ibanda and Rumanyika, and the Ngorongoro Conservation Area Authority (NCCA) is responsible in managing the life of animals and people in Ngorongoro Conservation Area".*

However, these organs are supported by local government authorities and local communities in the respective districts. Since national parks allow only non-consumptive tourism, investment by private

sector is not fully engaged because most of them especially foreign companies prefer consumptive tourism like trophy hunting.

While national parks are the totally protected area; their management is mainly controlled by the government and does not allow consumptive tourism (URT 1999). In Game reserves and game controlled areas, consumptive tourism is allowed through the provision of hunting permits and other related guidelines. Here, there are several hunting companies that work in various game reserves in Tanzania. The Selous Game Reserve (whose lifeblood is the mighty River Rufiji and network of interconnected lakes) is a good example of this as many foreign companies are doing trophy hunting. To a certain extent, hunting permits reduces poaching especially among the local communities.

Alongside, there is significant cooperation between and among institutions responsible for management of natural resources (i.e. wild animals). The Director of Tourism from the Ministry of Natural Resources and Tourism confirmed that there are joint patrols among the national parks in the country and this has brought significant achievement in controlling poaching. Through this strategy, about 50% of the poaching cases have been controlled. TANAPA which is a top authority has been cooperating with other conservation groups and WMAs to manage the mentioned resources.

Therefore, the management of the available natural resources base is done under the guidelines of the government ministries and responsible institutions falling under those ministries, and the people living around the resource. However, despite of the significant measures taken by the authorities, the management of the ecosystem has been suffering from serious challenges. These challenges are hereby stipulated in the subsequent section as follows:

There have been serious cases of illegal fishing in the River Kagera. People from different communities have been engaging in this malpractice as their livelihood strategy. The community elders revealed that this situation has been more serious especially during rainy season because during this season there are plenty of fishes. It is obvious that the government through the designated institution has been prohibiting the encroachment and fishing practices in the reserved area (Moreau and Garaway 2021).

Encroachment to wetland reserves for cultivation is another serious challenge in the landscape. This involves unpermitted invasion into the restricted areas. In the landscape, entering in wetlands for any economic or social activity has been restricted by the national environmental policy and other environmental guidelines (URT 2021). However, the community elders from Murongo Ward asserted that *"there have been some people who are actually or potentially invading the wetlands for agricultural activities".*

The major reason for this encroachment is that most wetlands are fertile and can effectively support agricultural production. Since this encroachment happens at the midst of restrictions by the authority, there is a need to increase enforcement of the existing bylaws and regulations that restrict this malpractice.

Deforestation is another threat in the landscape. Deforestation has been more pronounced in the area as most people are using firewood and wood charcoal as their major source of energy. Explicitly, most people cannot afford the use of alternative sources of energy or energy serving sources like gas, electric etc. Therefore, if they cannot afford that, it is obvious that they will rely on firewood from the forest and thus, deforestation in areas around the reserve will increase significantly. An elder from Mikinga Village asserted that; "*we have no other source of energy apart from fire woods and wood charcoal. We are appealing to the government and other environmental donors to provide subsidized solar energy and other cheap sources of energy which we can afford*".

In addition, this deforestation has caused the disappearance of some plants species which were previously used as medicines. Without giving specific examples, the community elders asserted that, "*there were numerous plant species that were used as medicines but presently it has been difficult to get them in the forest*".

As well, there has been a raised concern on the mismanagement of resources due to cultural beliefs. In this aspect, the community elders proclaimed that there are several cultural beliefs that limit the management of the area. For example, there are some cultural experiences that affect the management or conservation of water resources. They further asserted that in some seasons there has been temporal change in water colour (i.e. mainly from red, white and blue). This situation keeps most people to distance themselves from conservation of the river and its catchment because they are afraid to get near with water. However, this situation can bring both positive and negative impacts.

Similarly, another cultural barrier that prohibits people from involving in the management is locally called "*mugasha*". This is a situation whereby the communities hear some sounds of invisible people who seem to be singing and dancing or calling people but are not openly seen, and this mostly happens at night. A female elder from Rwenkende village asserted that "in some situation, a beautiful girl can be seen slightly and then quickly disappear".

According to her views, these miracles imply that a certain bad event can happen (i.e. more especially the death of among the community members). Therefore, during this occasion, people are afraid and they detach from managing the river.

In terms of wild life, the elder further asserted that: "*There has been a taboo that when wild animal like wild dogs come around the community homes and cry in a certain unusual way, there will be misfortune in the area*". This also increases the detachment in the management of wild animals as they attempt to kill such animal which is allegedly to bring misfortunes in the community.

Besides, the wetland is threatened by non-plant invasive species, such as *Protopterus aethiopicus* (lung fish), and *Clarias gariepinus*. These are predators to fish species, particularly the *Tilapia* in the wetlands. There is also a threat from the plant species in the area. The interventions against invasive plant species include uprooting the water hyacinth from the wetlands.

However, this is being hindered by lack of appropriate equipment's to use in the uprooting process, and inadequate commitment among the local communities. The management of invasive species will require adaptive and participatory approaches to allow stakeholders gain an understanding of the invasive species-related problems and contribute to solutions.

Besides, political instability is among the serious threats to the landscape. Political instability in the neighbouring countries has equally affected the management of the ecosystem. For example, the 1994 genocide massacre in Rwanda posed some serious post war disorders in the landscape. The elders in the area asserted that the impacts associated with this genocide have prevailed for so long. During that time, some wild animals were displaced in national parks.

Also, there was increased immigration in the areas which eventually increased resource utilizations. In addition, water pollution in River Kagera was another consequence of the genocide. These impacts posed serious constraints towards the conservation and management of the ecosystem (Goldman 2003; Mkonda and He 2017a).

In addition, political instability has direct impacts to tourism as the country with insecurity (i.e. civil war) affect the security of the neighbouring country and thus, imposing fears to tourists who eventually refrain from visiting the nonviolent country. Moreover, political instability generates refuges to the neighbouring countries and thus, affecting the tourism welfare. An elder living near Rumanyika National Park asserted that *"In 1994 during genocide in Rwanda, there were no tourist in this border as the whole area was under insecurity"*.

In addition, the Covid-19 pandemic brought significant effects to tourism sector. According to the information from both private sector and government institutions responsible for tourism, there has been a significant decline (over 50%) of tourism revenues at national level. This has also affected the local livelihoods through various aspects. Tour operators have been jobless for a long time more especially from March to July 2020.

According to the directorate of tourism, the government also experienced drastic decline of revenues in various national park and thus, affecting the contribution of the sector to national economy and GDP. Before the outbreak of Covid-19, tourism sector contributed to about 30% of the GDP but during and after this pandemic, the sector contributes less than 20% of the GDP. This verdict was equally supported by all interviewees in the study area.

For instance, the representative from private sector asserted that *"we have not healed from the impacts of COVID-19 pandemic. We are trying to adapt with it but the situation is still worse as we don't have tourists"*. Thus, the pandemic has posed significant impacts to the conservation and management of wildlife as it reduced the number of tourists who are coming for spot hunting, game viewing etc. This has subsequently affected the income generated from the sector and consequently, reducing the budget allocated for the management of natural capitals.

Another important aspect is the existing controversy in the legal frameworks among the countries sharing the trans-boundary resources. In some countries, hunting wild animals is illegal while in other countries is legal. For example, in Tanzania the hunting of wild animals in game reserves, WMA, open areas is legal (under permission) while in Kenya and some other countries it is quite illegal. Since each country is autonomous, this has been left unchecked although it affects the management patterns of wildlife in the entire region (east Africa).

However, this discrepancy is potentially resolved through dialogues and no major problem is caused afterward. The senior officer of TAWA revealed that; *"despite the fact that most wildlife laws in East African regions are almost similar, there is a need to harmonize them in order to best fit in managing trans-boundary resources"*. On embarking to this, a series of meetings between and among the wildlife authorities (e.g. TAWA and Kenya Wildlife Services (KWS) in the trans-boundary countries have been progressing to resolve the existing discrepancies. He further, insisted that harmonization is important to be done in all trans-boundary policies and regulations (i.e. Rwanda, Burundi etc.).

In order to improve the legal enforcements, he further asserted that there have been several initiatives which are underway. For instance, the Law Enforcement Strategy for SADC, East African Strategy, and the National Anti-poaching Strategy of Tanzania have been progressively amended to cater for the emerging challenges related to management of natural resources. The east African strategy will adequately improve the management of River Kagera, Ibanda and Rumanyika national parks, Minziro forest ecosystem, and Serengeti and Masai Mara national parks, just to mention a few".

More so, there has been some budget constrains (not enough) allocated in the conservation and management of these natural capitals. It should be kept in mind that; conservation of natural resources takes lots of money from the government and funders from both local and international levels. For instance, in the year 2020 over 100 billion Tanzanian shillings were used for conservation of various game reserves and national parks.

However, this amount was not sufficient to fund important activities more especially the law enforcement, and the payments (especially consolations) to the people affected by wild animals especially elephants. As well, the implementation of this budget is not satisfactory as funds are not disbursed timely to the respective actors. Generally, this affects the smooth implementations of the assigned activities.

4. Discussion

The main focus of this study was to inform the people (stakeholders) on the potentials, prospect and challenges related to the management of Akagera wetland ecosystem. It has been revealed that despite of numerous policy amendments and the change of Rumanyika and Ibanda game reserves to national parks, there has been increased challenges in the ground regarding the management of natural resources in the landscape.

This study has revealed that the Akagera wetland is regarded as the greatest wetland ecosystems around Lake Victoria basin. In addition, its economic and ecological potentials are also numerous. The national parks (Ibanda and Rumanyika) serve as major source of tourism, thus increasing income in the area and the national at large. Twenty five percent of the total revenue collected from tourism is sent back to the respective district council (i.e. Kyerwa District). This income helps in supporting developmental projects such as building classrooms, dispensaries, and laboratory, just to mention a few.

Similarly, the landscape has River Kagera which serves as major source of water for domestic use, agriculture and hydro-electric power (Quanz et al. 2021). On this basis, the river serves multiple economic and ecological functions within and beyond the landscape. These findings are in agreement with that of Lalika et al (2017) on the Pangani basin ecosystem. The river also supports the life of wildlife in the national parks where animals and plants enjoy from it.

Specifically, the landscape is potential for agricultural production. Fertile soil and favorable rains provides suitable agro-ecology for banana, beans, sugarcane and coffee (Mkonda 2022). The production from these crops is useful in intensifying food security and household income (Glaser et al. 2001; Dessai et al. 2004). Coffee is sold in various cooperative unions. A good example of the cooperative union is Kyerwa District Development Cooperative (KDDC).

The findings from private sector representative also revealed that any government reform (e.g. policy) related to the management of ecosystem should consider a wide range of stakeholders that can be affected (Mkonda 2022). This kind of involvement is also advocated by several studies such as Ndayisaba et al. (2017), Pardoe et al. (2020), and Thomas et al. (2021), just to mention a few.

The study has also exhibited some challenges on the management of the resources in the landscape. The change from Ibanda and Rumanyika game reserves to national parks has increased some restrictions over the resource use (Mkonda and He 2017b). Previously, there were fewer restrictions on the use of the wild resources but due to the change into national parks; there has been increased protection over the resources found in the established national parks.

The study by Ndayisaba et al. (2017) revealed similar findings on the management of national parks in Rwanda. Therefore, it is advised that there should be a thorough assessment of the livelihoods that are potentially by affected by the change of game reserves to national parks. On this basis, there should be a systematic involvement of the communities to enable effective management of the particular ecosystem.

Shortage of funds has also seriously affected the implementation of various socio-economic projects in the area. These projects are mainly those based on the provision of social services such as road constructions, and building of hospitals etc. These services would further stimulate the development of tourism sector. Thus, the existing financial deficit has exceedingly affected the provision of various social services. This challenge is more pronounced in most developing countries.

Poaching is another challenge facing the management of wildlife in the area. From 2010 onwards, there have been increased cases of poaching in the area (Gibson 1999; Ficken et al. 2022). The most vulnerable animals in this perspective include giraffe, buffalos, antelopes and zebras, just to mention some. This illegal hunting has negative impacts to the population of animals in the particular ecosystem. This illegal practice also involves unpermitted fishing in River Kagera. Although these malpractices are not recommended, they have increased the level of nutrients (i.e. protein) in the area, more especially that from fish.

Based on the findings, this study poses some significant recommendations. Firstly, there should be a deliberate strategy to control poaching in the national parks and other wildlife ecosystems. Here, TANAPA officers should make good arrangement of providing wild meat to the people at least once a year, more especially during religious holidays. This provision should be specifically directed to communities surronding national parks and game reserves. This is quite important because these communities are also involved controlling poaching. In addition, TANAPA officers should arrive immediately at the points of poaching incidences after being notified by the authority or any other community member. This would enable timely and consistent control of poaching in the area.

Beside, there should be sustainable water management in the ecosystem. Here, there should be sustainable and equitable distribution of water resource among the up-streams and downmstream (Lalika et al 2017; Richards et al. 2020). Currently, there is no such effective considerations. Upstreams communities are strictly prohibited to use water while the down stream users have such opportunity.

In addition, there should be consistent pastrol around river Kagera to control pollution and related degradation around the river. Then, there should be sufficient control towards the encroachment to river reserves for agricultural production or for any other reasons. This patrol should be more emphasized in the down-stream areas where it is ineffective.

More so, there should be provision of incentives to the communities. Most community members including elders asserted that the current status of providing economic and social incentives is not sufficient. Despite of collecting revenue from tourism, TANAPA has less contribution to the communities whereas, the 25 percent of the allocated royalties is not sufficient for developmental projects, and it does not trickle down well. Most of these community members had opinion that TANAPA's contribution to the surrounding communities should be increased significantly.

Another sustaainable recommendation is that there should be effective involvement of communities and other stakeholders. Here, the community elders asserted that presently there is very little involvement in the management of water and wildlife resources. Despite of convening some meetings with the communities, it appears that most decisions were already made by the authorities.

Therefore, they requested for more and effective community involvement in the management of various resources in the land scape. Besides, the conserving authorities such as TANAPA, TAWA and Ngorongoro Conservation Authority should consistently cooperate with other sectors or actors especially those related

to livestock and agriculture in order to have an integrative approach in the management and conservation of the natural capital.

5. Conclusions

This study has reached the following conclusions. There have been some moderate achievements in the management of Akagera wetland ecosystems. This has been possible due to efficient institutional management such as TANAPA, TAWA etc. However, the management of the ecosystem has suffered serious challenges which affect the sustainability of the available resources. Among these includes unharmonized policies among the countries involved in the management. Others are political instability in some countries, financial constraints, climate change and poaching, less involvement of the key stakeholders, just to mention some. This study therefore, recommends some efficient and sustainable measures that would stabilize the management of the ecosystems. These measures include; effective joint patrol among the member countries in controlling poaching, increased investment for management (budget), harmonization of policies related to the management of the trans-boundary resources, involvement of stakeholders in the management, proper conservation of water sources, effective enforcement of regulations and laws to protect poaching and encroachment over the wetland ecosystems, and lastly, maintenance of peace and security in the entire east African region.

Declarations

Conflict of interest

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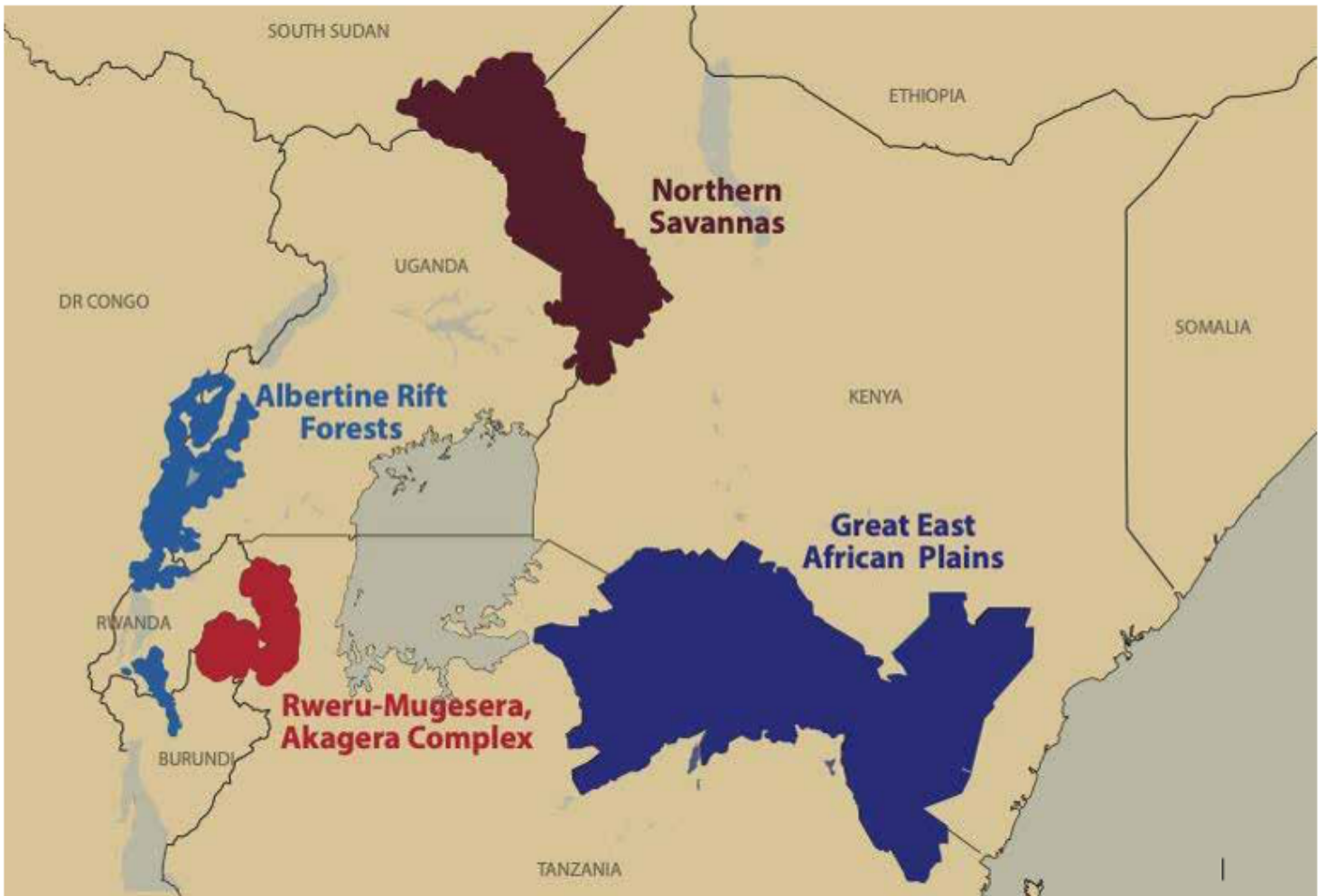45. URT (1998). *The Wildlife Policy of Tanzania*; Government Publishing Press: Dar es Salaam.

Figures

Figure 1

Study area (Akagera wetland, Tanzania)