

Challenges Facing Ruaha National Park Conservation and Management: A Review Paper

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Abstract: *The efforts to achieve sustainable wildlife management are confronted with severe challenges. Many wildlife species are under threat, and some have become extinct, due to a variety of causes. This paper presents a review of the challenges facing Ruaha National Park in Tanzania and provides key considerations towards sustainable wildlife management of the park. Review of literature was conducted focusing on all publications discussing about the park. Central focus of the review was the challenges facing the park. Document analysis was performed based on categorizing challenges. Results indicate that main challenges facing the park include habitat loss, water scarcity, poaching, human encroachment and poor accessibility. Given the nature and diversity of challenges, cross-sectoral approaches need to be adopted in order to attain sustainable wildlife management by involving all land-user groups in the wildlife habitat to be aware of their activities and actions, and the impacts they generate.*

Keywords: wildlife management, conservation challenges, Ruaha national park

1. Introduction

Protected areas are considered a cornerstone of biodiversity conservation around the globe, and have expanded rapidly worldwide. There are currently 114,000 PAs worldwide, covering 13% of the world's land area, which exceeds the total area of permanent crops and arable land on the planet (Chape et al., 2008). Protected areas provide many essential ecosystem services to human beings, however, most of these protected areas across countries face various challenges that impact on their primary objective, (i. e. biodiversity conservation), especially in developing countries where household income depends on resources from these areas (Chao et al., 2018; Hammill & Brown, 2006; Hampson et al., 2015; Hoban & Vernesi, 2012; Wittemyer et al., 2008).

Wildlife Management before and after independence

Wildlife conservation and resource management in Tanzania started before the arrival of Arabs and Europeans in the East African Coast. Due to low population numbers, communities used to hunt game animals for subsistence (Balduš, 2001). Some forest, on the other hand, were regarded as 'sacred' places, in which only traditional ritual activities were allowed (Gregg, 2005). In essence, wildlife management during pre-colonial time relied on the tradition and culture (informal rules) of the adjacent communities, and was in line with their day-to-day life practices (Kideghesho and Mtoni, 2008).

Despite the existence of informal rules, conservation challenges existed. Hence, the informal rules that governed wildlife management were replaced by the first Wildlife Ordinance in 1896 when the Imperial governor during the German colonial time placed an ordinance to conserve wildlife species to avoid their extinction. First hunting reserves were established out of the decree. The ordinance introduced formal hunting regulations which required hunters to secure permit from the Imperial Government before they were allowed to hunt wildlife game (Balduš, 2001). More regulations that restricted access to wildlife resources were enacted and enforced since then. It is also

during the colonial time when reserves and wildlife parks were established in different parts of Tanzania. After independence, the government of Tanzania inherited wildlife laws and regulations that existed during the colonial time, and introduced even stringiest and sometimes contradicting rules and regulations.

The total numbers of protected areas in Tanzania is increasing; there are 22 national parks, 29 game reserves, 23 game-controlled areas, and 22 wildlife management areas (MNRT 2023). Some of these Protected areas face pressure from the human population. Majority of local communities (more than 80%) live in rural areas, mostly around these protected areas. The existence of large population size in and around PAs creates serious challenges over natural resources in general and wild animals in particular because their life is directly linked with natural resources. Studies indicate that some of the most common human effects over protected areas include livestock grazing, deforestation, encroachment by agricultural and settlement expansion, illegal hunting, disease transmission (mainly from domestic animals to wild animals), lack of community participation and habitat fragmentation and loss (Kideghesho et al., 2013; Mengist, 2020). The problem is worsened in areas lacking a strong network between protected areas. This paper intends to explore challenges facing Ruaha national park in Tanzania, with the view to endeavouring for sustainable wildlife management. Specifically, the paper intends to look at (i) major challenges facing Ruaha National Park (ii) way forward to sustain wildlife in the park.

Contextualizing sustainable wildlife management

Sustainable Wildlife Management (SWM) is the sound management of wildlife species to sustain their populations and habitat over time, taking into account the socio-economic needs of human populations. This requires that all land-users within the wildlife habitats are aware of and consider the effects of their activities on the wildlife resources and habitat, and those of other user groups (FAO, 2014).

Sustainable Wildlife Management supports biodiversity conservation by emphasizing the need for humans to benefit from biodiversity resources as a way of encouraging them to safeguard and value wildlife as an important asset for their livelihood (FAO, 2014). Increased human population, urbanization and changing of lifestyle have increased the importance of striking a balance between the development needs of people and those of wildlife conservation. Sustainable Wildlife Management builds partly upon an understanding of species' habitats, population sizes, migration routes, education and public awareness, and population demographics.

Furthermore, it calls for integrated conservation efforts and equitable benefit sharing with local communities. An understanding of all these attributes is pertinent to sustain Ruaha National Park and its surrounding habitats. This is not only because Ruaha is currently the largest national park in Tanzania, but with the understanding that it is from Ruaha ecosystem that water flows to the 660 square kilometres Mtera dam to produce hydro - electric power for Tanzania (80 MW at full capacity); as well as a site where some of the major paddy irrigation schemes are carried out at the upstream. Essentially, Ruaha National Park cannot be managed in isolation from the surrounding conserved areas or the socio - economic activities going on in its borders.

Ruaha National Park: History, ecological importance and ethnography

Ruaha National Park (RUNAPA), came known as the - "Dream of Africa", is the largest National Park in Tanzania and East Africa, covering an area of 20, 226 km² within four regions of Mbeya, Iringa, Dodoma and Singida. It is part of the Rungwa - Ruaha ecosystem, which covers an area of 45, 000 km². The whole park is located within the Great Ruaha sub - basin of the Rufiji River basin, which is the largest water basin in Tanzania. The park derives its name from the Great Ruaha River (GRR), which is the main tributary of the Rufiji River and the lifeline of the RUNAPA's wildlife. The word "Ruaha" originates from Hehe tribe word "Ruvaha" meaning "River".

The park was first gazetted during German colonial rule as Saba River Game Reserve in 1910, and later regazetted during British colonial rule as Rungwa Game Reserve in 1946. In 1964, the southern portion of Rungwa Game Reserve was declared a National Park, and in 1974 a smaller section to southeast of the GRR was added to complete the boundaries that existed until 2008 when the park was extended to include Usangu Game Reserve and associated wetlands (TANAPA, 2009).

The Park was part of the important trade routes during colonial times in the 19th century. The route passed through the GRR into Ukimbu and Southern Unyamwezi crossing the Dodoma in the centre of Tanzania. This route was mostly preferred by Coastal traders and was also used by Burton and Speke in 1857 (Rockel, 1997).

The Hehe people led by the famous Chief Mkwawa were the dominant tribe in the area. The Chief Mkwawa had many battles with the Germans. However, in 1894 he was forced into hiding while continuing with the battle before he shot

himself in 1898 to avoid being captured by the Germans (Redmayne, 1968). Many of his hiding places are still recognized in the park.

The major ethnic groups are Hehe, Sangu, and Bena. Other small ethnic groups that migrated from the Northern and Southern part of the country in search for pasture, water and arable land, include Gogo, Sukuma, Kinga, Maasai, Barbaig and Nyamwezi. The main economic activities are crop production, livestock rearing, fishing and small - scale businesses. Crop production is mainly done through rain - fed and irrigated farming practices. The main crops are rice maize, beans and potatoes. The livelihood activities of these ethnic groups, especially farming and pastoralism pose a significant threat to the park in terms of habitat degradation and encroachment (Dickman, 2009; Kiwango, 2017).

Generally, weather in the park is hot and humid with unimodal rainfall pattern. The rain season begins from November to April and dry season from May to October. Mean annual rainfall ranges from 450mm to 1000 mm across the park. The park is famous for its high diversity of plants and animals. The interface between the two ecoregions (i. e the Southern Acacia - Commiphora Bushlands and Thickets ecoregion and the Central Zambezi Miombo Woodlands ecoregion) and high variation of altitude and topography contribute to the high diversity of the park (TANAPA, 2009). The park boasts large populations of both large and small animals. Large herbivores include Elephant, Hippopotamus, Buffalo, Giraffe, Greater Kudu, Lesser Kudu, Roan and Sable antelopes, Eland, Zebra and Grant's gazelle (SPANEST, 2016). Species such as the Buffalo, Impala, Elephant and Baboons are the most abundant.

According to the Park's General Management Plan (2009), there are twelve Exceptional Resource Values (ERVs) that point to the Parks ecological, social and economic importance. They include the GRR, Mzombe River, Usangu plains and their life supporting functions, intertwined with unique and exceptional biodiversity from two major vegetation communities. Other ERVs, include vast wilderness and undisturbed areas, rare, threatened and endangered species, the largest elephant population in any East African National Park, populations of greater and lesser kudu, roan, and sable antelopes existing in a combination not found elsewhere in Tanzanian National Parks, Riparian woodland and other riverine vegetation that forms a significant resource for a large proportion of the park's wildlife and contributes to scenic value and visitor experience.

Moreover, the park is important for its high birdlife diversity, including migratory and resident species in Usangu plains and the limitless landscape of rolling hills, inselbergs, mbugas, baobab trees and sand rivers. Economically, the park is important for its direct economic benefits to surrounding communities and contribution to national revenue through tourism. Socially, the park conserves important historical and cultural sites such as Mkwawa springs, Nyanywa ritual site, Huisman's bridge and Ng'iriama.

Ruaha National Park, like other national parks in Tanzania is a protected area where consumptive utilization of resources is prohibited. Working under TANAPA guidelines and policies, the park is supposed to generate sufficient income to run on its own, and ensure good relation with its neighbors through the Outreach Programme. However, located in the southern circuit tourist zone, Ruaha National Park has not attracted many tourists to fully exploit its potentials and, therefore, it still relies on financial support from other parks, particularly those located in the northern tourist circuit.

The expansion of the park in 2006 has fomented conflicts with local communities bordering the park. Essentially, park's contribution to the livelihood of communities of Mbarali District is yet to be realized. Poor accessibility of the newly expanded area, lack of clearly defined tourist activities to be conducted and lack of tourism related investments to cater for tourists have contributed to inadequate contribution of the park to local economy and emerging conflicts (Sirima 2016).

2. Methodology

The paper is based on secondary sources of information. The review includes mainly internet searches for online reports, manuals, and scholarly articles provided by reputable organizations and databases. Relevant pieces of literature were reviewed on concepts of protected areas and challenges of protected areas in Tanzania, focusing on Ruaha National Park. Search terms and keywords such as "protected areas", "challenges of protected areas", and "National Parks" were used, with the results further refined with the keyword "Ruaha National Park". The inclusion and exclusion criteria used during the review were: (i) English - language publications and (ii) Published in peer - reviewed scientific journals. However, the size of published literature in peer - reviewed journals was too small and thus, the search was extended to cover grey literature such as scientific reports, proceedings, and unpublished data. All the selected literature was examined to extract meaningful information to achieve the review objectives. Reference list of the reviewed literature was examined to find related information regarding the research topic. Content analysis was used to analyse the literature collected. Results were grouped into different challenges as emerged during sorting and synthesis of the literature.

Wildlife management challenges in the Ruaha National Park

There is a number of challenges facing the Ruaha National Park. Some of the major challenges include, but not limited to, scarcity of dry season surface water sources, siltation in water bodies, resource - use conflicts (reflected in demands for land and poaching), human - wildlife conflicts (reflected in wildlife diseases and damages inflicted by wildlife), and conflicts related to encroachment and blockage of wildlife corridors.

i) Scarcity of dry season surface water sources

Most rivers in Ruaha National Park are sand rivers, only flow on the surface during the rainy season (mid - December through mid - May) and cease flowing on the surface during

dry season (Mtahiko, 2004). The Great Ruaha River (the once perennial river in the past), which flows through the Ruaha National Park has ceased flowing during the dry season, with extended periods of zero flow since early 1990s. The river is the main supplier of water into the Park, and any alterations in its flows has major impacts on the biodiversity and the general ecological integrity of the Park. However, during dry season animals obtain water from available natural springs in the park or are forced to move to the nearby villages in search of water and in so doing human - wildlife conflicts emerge.

The cessation of flows has caused the death for many wild animals (i. e., hippopotami, fish and freshwater invertebrates) in the Park and disrupted the lives of many others that depend on the River for drinking water (Kashaigili et al., 2005). The drying up of the Great Ruaha River has resulted in, not only social conflicts between upstream and downstream users, but also a denial of adequate water to maintain the fragile ecosystem of the Park (Kadigi, 2004). It has disrupted the lives of animals that depend on it for their survival by causing widespread mortality of fish and hippopotami in the Park. Past studies (e. g., Kashaigili et al., 2005) indicate that 5, 000 fish and 49 hippos (30 males and 19 females) died in 2003 following drying up of the Great Ruaha River. The death was a result of increase in temperature and level of contamination in the pools. Ideally, when the river dries up, few portions in the river remain with stagnant water as isolated pools or ponds that continue decreasing in size as the dry period heightens (Kashaigili et al., 2005).

During hot weather conditions the water heats up, animals become congested in the pools, drinking contaminated water full of excreta. Such condition results into outbreak of diseases such as Anthrax, leading to deaths of different animals including fish (Kashaigili et al., 2005). The prolonged drying of the rivers in the Ruaha National Park (the GRR and the Mzombe River) in 2017 resulted to an outbreak of anthrax whereby 66 hippopotami were reported dead (Ruaha Ecological Monitoring Unit, unpublished data). When most fishes die, ecosystem imbalances occur (disruption of the food chain); as a result, some of the lives of secondary and tertiary consumers are affected and they normally migrate to other favourable areas (Kadigi, 2004). Since the river, as a habitat, gets reduced into several small ponds, competition among aquatic creatures occurs resulting into overcrowding in aquatic habitats, starvation and disease infections. During such situations elimination of some species may occur. There also growing concern that the loss of animals and reduction in the aesthetic appeal of the River will reduce the number of tourists visiting the Park (Mtahiko et al., 2006).

The decline in river flows could be attributable to climate change but more largely increased upstream water diversions for irrigation. This has also been revealed by the past studies in the Usangu area (e. g., SMUWC, 2001; Kadigi, 2004; Kashaigili et al, 2005). It is evident that the rivers flowing into the Usangu plains from the high rainfall zone in the upland catchment are flowing relatively well and statistics do not show significant changes in annual flows except for the dry season flows. This therefore indicate that

the Usangu wetland (the Ihefu) should be saturated and flowing over the GRR, but due to poor on farm water management and uncontrolled expansion of agriculture, the water is not finding its way back into the Ihefu and into the GRR. There is no common paddy growing calendar, and paddy growers in the upstream areas start flooding their seedling beds between November and January the following year, diverting all the flow away from the GRR and its tributaries. In essence, this is the critical time corresponding to the peaking of the dry, normally October/November depending on the location within the catchment.

On the other hand, the situation is worsened by poor rainfall in the Park, as a result the springs in the sand - rivers and surrounding areas are mostly dry. Therefore, the animals face a big problem later on in the season. Due to drying of the River, visibility of different wildlife species has deteriorated during the end of September through to December, thus lowering the quality of the area for photographic tourism. Previously, when the River was in better shape, these dry months were Ruahas' prime game viewing period. It is therefore, imperative that controlled use of surface water in the upstream is maintained to allow the flow, which is important for existing biodiversity.

Previous studies (e. g., Kashaigili et al., 2006) have shown that a flow of 0.5–1.0 m³/s at the exit of the Usangu wetland to the Ruaha National Park would be required to sustain the environment in the park during the dry season and that an inflow of at - least 6.5 m³/s into the Usangu wetland (Ihefu) should be maintained during the dry season.

ii) *Persisting conflicts between wildlife and surrounding communities*

Wildlife in RUNAPA, and Tanzania as a whole, is conserved in a network system that allows wild animals to move freely in search for food and habitat at different times of the year. This implies that wildlife areas are not fenced from human settlements and other land use categories. Increasing pressure towards terrestrial ecosystems as a result of human activities has led to loss and fragmentation of habitats for large numbers of wildlife species (Hill, 1998). This has brought the wildlife and humans in close proximity, intensifying human - wildlife conflict (HWC), especially

with elephants and carnivores (Dickman, 2009). Because of close proximity, there has been reportedly crop raiding by elephants in the neighbouring villages.

Also, there are other socio - economic costs associated with elephant besides the direct costs of agricultural damage. The extreme example of this is human death, but other examples, include restrictions of human movement, competition for water sources, loss of time and energy forced by a need to guard property, reduced school attendance (through loss of sleep, or fear of travel), increased exposure to malaria, and psychological stress (Sukumar, 1991; Hoare, 1999). The cumulative effects from these contribute to increased poverty and affect local economy.

iii) *Poaching*

Poaching is still a challenge in the Rungwa - Ruaha ecosystem. Elephants are the main victims of poaching for their ivory. For other wildlife species, there is paucity data to substantiate this, but it is not as high as for elephants. According to TAWIRI (2015), the elephant populations rapidly declined by 37% in the ecosystem from 2009 to 2013. Despite the complexities of interpreting the census results, TAWIRI (2015) indicates that the current population of elephants in the ecosystem is around 15, 000 (+/- 5000) and the rate of decreasing is not as high as in previous years in 1980, where over 60% of elephant population declined in Ruaha National Park (Barnes and Kapela, 1991). Currently, Ruaha National Park has inadequate patrol gears, limited number of park rangers, who can patrol and combat the growing threat of poaching in the large area of the park. However, TANAPA has been making efforts to employ more rangers and support them in terms of providing modern anti - poaching facilities and advanced skills in combating poaching.

According to SPANEST project (2011 - 2017) a series of anti - poaching activities (training, patrol, innovations and installation of facilities for combating poaching and infrastructure development for both tourism and biodiversity conservation) in RUNAPA were implemented with a fair level of efficiency. However, a more focus on equipment support for anti - poaching activities is encouraged to ensure biodiversity conservation in the area.

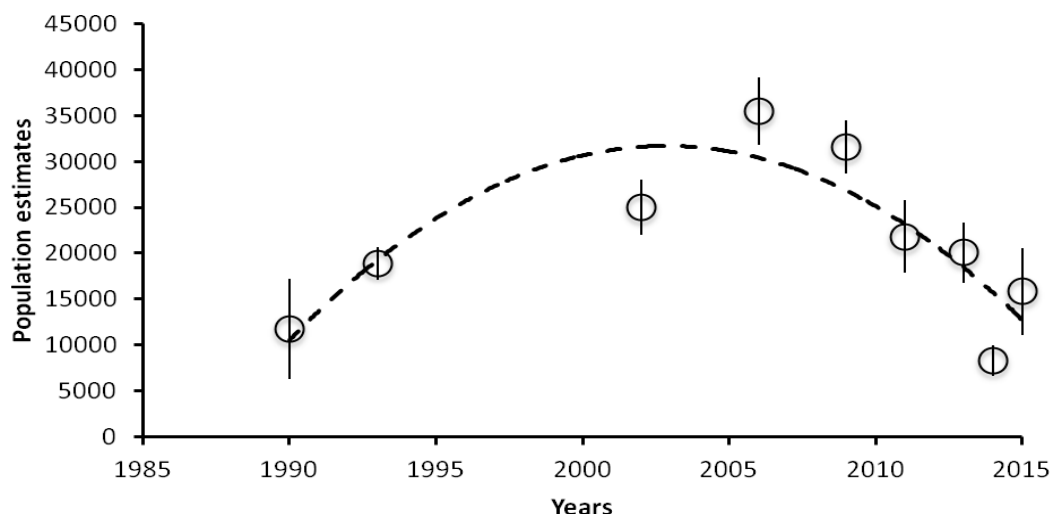


Figure 1: The Ruaha - Rungwa elephant population trend from year 1990 to 2015

Source: TAWIRI, (2015)

iv) Wildlife diseases

The interface of human, wildlife and livestock populations in the Rungwa - Ruaha ecosystem contribute to prevalence of wildlife diseases in the park. Currently, the main disease threatening the wildlife population in the Ruaha National Park is Giraffe Skin Disease (GSD) whereby, more than 86% of the Giraffe population has been affected (Muneza et al., 2017). The preliminary investigations indicate that a spirurid nematode could be a main causative agent of the disease (Mpanduji et al., 2011). However, studies are still conducted to find out the epidemiology of the disease and possible management measures. Other major wildlife diseases include anthrax, canine distemper, rabies and bovine tuberculosis, although their prevalence is not severe (Clifford et al., 2013). Rabies is still a problem in adjacent communities around the park and the park collaborates with relevant District Veterinary Officers to support anti - rabies vaccination campaigns and minimize the impacts (SPANEST, 2016). Anthrax occurs sporadically especially during the dry season and when there is prolonged drying up of GRR.

v) Erosion along the GRR and other water sources

High concentration of animals in water sources during the dry season leads to overgrazing, weakening of river banks and other water sources, increasing siltation in water bodies and increase chances of disease transmission among wildlife. Efforts have been taken by the Ruaha National Park management in collaboration with other stakeholders to reduce these impacts by constructing dams along the rivers and in other areas in the park, monitor human activities that cause declining water flows in the GRR as well as providing conservation education and awards to adjacent communities.

vi) Fewer number of tourism facilities and poor visitor access to the park

Tourist visiting the park increased from 9000 in 2020/2021 to 13, 000 in 2021/2022. Despite increase in number of visitors, park facilities remains the same. With about 300 bed capacity, Ruaha national park cannot accommodate all its visitors, forcing some of them to opt for a day trip or stay overnight outside the park. Similarly, accessibility is key to destination growth. The condition of the road heading to the park is very poor, making the park accessible mostly during dry season. It is therefore important to improve road infrastructure as well as other modes of transport so as to ensure Ruaha national park becomes a destination that accommodate all visitors regardless of their physical ability.

3. Conclusion

The Ruaha National Park is experiencing a number of challenges that are impacting on the ecological integrity and management of the park. Among the challenges, the scarcity of dry season surface water sources especially in the GRR is very prominent. The wild animals in the park depend largely on the run - of - the river for their water needs and temperature regulations to water dependent species such as hippopotamus. Consequently, limiting the rate of human encroachments, and habitat fragmentation is important. All these calls for formulation of strong leadership and effective management strategies. Stand - alone sectoral approaches to may be insufficient and may result in unintended adverse

effects on other land - based sectors and the relevant ecosystems. Sustainable wildlife management may be an appropriate strategy since it calls for holistic approach in management of natural resources by involving all user groups in the wildlife habitat to be aware of their activities and actions, and the impacts they generate.

The way forward

Achieving sustainable wildlife management in the Ruaha National Park will require concerted efforts to combat the challenges. The required environmental flows in the GRR through the Park cannot be realized in isolation of the upstream irrigation activities. Irrigation efficiency in the Usangu area should be improved by enhancing on - farm water management and water distribution efficiency through improved infrastructures. Through improved irrigation efficiency, it is expected that some water will be saved to meet the downstream environmental water needs through the Ruaha National Park. Further, land transport network is important and need to be designed to meet the need of the movements that tourism requires. Lastly, sharing of conservation benefits with neighbouring communities is vital towards realization of sustainable wildlife management. Benefits are supposed to be used as an alternative income source to support livelihoods of the surrounding communities in the fight against poverty.

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