

## **Katavi – A Landscape Crying For Science**

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### **Summary**

Katavi National Park which is part of the extensive Katavi-Rukwa Ecosystem in southwestern Tanzania is one of the least known parks for its scientific and tourist potential. Its potential is hinged from a combination of factors including its extensive size, diversity of habitats, abundant number and variety of mammal and floral species. However, lack of basic infrastructure and technical support for scientific work in the Park for long time has derailed its attractiveness for research work. Recent establishment of a Veterinary Unit and strengthening of the Ecology Department has lead to identification of research priority for the Ecosystem. This paper intends to stimulate potential research scientists to focus and develop proposals on numerous research topics in the area.

### **Introduction**

Katavi National Park lies at the core of sprawling complex of protected and semi-protected areas in Western Tanzania, including Mahale Mountains National Park in the west. It is generally grouped in the Katavi-Rukwa-Lukwati Landscape encompassing an area of about 25 000 km<sup>2</sup>. Apart from the national parks – Katavi and Mahale, Luafi, Rukwa, Lukwati and Ugalla Game Reserves are part of the landscape. Also present is a series of Game Controlled Areas, Wildlife Open Areas and Forest Reserves, which are used for trophy hunting, bee keeping and timber harvesting.

With a size of 4 471 km<sup>2</sup> Katavi is the third largest park in Tanzania after Ruaha and Serengeti. The Park is entirely located in Mpanda District of Rukwa Region. The landscape expanse includes 7 administrative districts (Mpanda, Nkasi, Sumbawanga, Chunya, Sikonge, Urambo and Kigoma) within four administrative regions (Rukwa, Mbeya, Tabora and Kigoma). Being located in the least developed tourist circuit and most remote, Katavi is a rarely visited Park, and therefore remaining natural and one of the most pristine parks in Africa. As such a safari in Katavi is a true wild experience.

The landscape of Katavi is comprised of seasonally flooded grassland plains interspersed with brachystegia (miombo) woodland on the well drained hill sides, mixed woodlands, small lakes and swampy wetlands. The Park expanse is mainly within the basin of the Rift Valley that tapers eastwards to the steep escarpment, Mlele, which evolved from the parallel arm of the Eastern African Rift Valley, called Rukwa Rift Valley. Other major geophysical features include the two seasonal lakes, Katavi in the north and Chada in the center. River Katuma, which flows across the floodplains connecting the lakes, is the lifeline for the park and the landscape. Mixed woodlands along with miombo woodlands, grass plains, riverine vegetation, the waterfalls of Chorangwa, Lukima and Ndido characterise much of the landscape. The altitude ranges from 820 m in the Valley floor to 1560 m on adjacent mountains of the Escarpment surrounding the Park. This mosaic of habitats enables the area to harbor abundant wildlife populations.

A kaleidoscope of birds flits across the riverbanks, swamps and palm groves while flotillas of pelican cruise the lakes. There are over 400 bird species, with some notable 'specials' like the Angolan pitta, black-faced barbet and blue swallow. Birdlife at Lake Katavi, particularly in the wet season, is just incredible. Animals such as elephants, buffalos, waterbucks, southern reedbucks and even giraffes depend on these marshes to graze waist-deep in the marshlands.

Mammal biomass in Katavi is estimated at over 23 000 kg per km<sup>2</sup> (TANAPA, 2002). With the exception of Lake Manyara NP this is higher than any other PA in East Africa. Katavi boasts Tanzania's greatest concentrations of African buffalo (*Syncerus caffer*), Nile crocodiles (*Crocodilus niloticus*) and hippopotamus (*Hippopotamus amphibius*). Huge herds of elephants, roan antelope, topi, zebras, impalas, eland, common waterbuck and many more, make Katavi able to sustain undetermined numbers of predators like lion, leopard, wild dogs and other small carnivores. The rare, honey-coloured puku antelope is one of the park's richest biodiversity rewards. Signs of presence of black rhinoceros in the area have also been reported.

The rainfall pattern is slightly bimodal, with short rains in November to January, and longer rains in March through April. However, the average annual rainfall is 927 mm. The park is open throughout the year and with development of new roads it can be visited at any time of the year.

Named after a legendary chief of the Wabende called Katabi, Katavi was established in 1974 and extended later in 1996 to the present size. Despite being Tanzania's third-largest park, Katavi is hardly known and hence receives relatively few visitors. The situation is even worse on the science aspect where there is currently no ongoing research project. This means there are difficulties in assessing and monitoring of the resources therein and hence inability for the Park Management to implement properly planned conservation programmes.

## **Research needs and priorities**

### **1. Resource inventory**

A detailed plants inventory in Katavi-Rukwa ecosystem was conducted by Mwangulango (2003). However, the ecosystem lacks inventories on reptiles, small mammals, fish and invertebrates. Also the plant communities are only briefly described (Meyer & Mwangulango, 2004). Butterflies of Miombo woodlands are a subject of interest but generally there is dire for baseline biodiversity data. Fish species in Lakes, Rukwa and Katavi, and the rivers Kapapa, Kavuu and Katuma needs to be studied. It is suspected that unsustainable fishing results in continuously smaller and younger fish being caught. Even for large mammals: population numbers and age and sex structure are not known. Status of critically endangered black rhinoceros needs to be urgently ascertained.

### **2. Ecosystem function and dynamics**

Although some of the key factors determining the functioning of the ecosystem have been identified (TANAPA, 2002) the operating patterns need to be established. For instance, the inter-annual rainfall pattern and its effect on the hydrology need to be analyzed. The crust movement, faults in the rift valley of Rukwa/Katavi and connection between soil developments – geology – water availability – vegetation communities and habitats of such important landscape need to be documented. Migration patterns of wildlife in KNP and RGR plus surrounding areas and corridors: Ruaha/Rungwa – Katavi/Rukwa – Mahale NP – surrounding forest reserves and game reserves need to be determined for proper conservation strategies of the unprotected and less protected areas.

### **3. Ecohydrology study**

Katavi contains two seasonal lakes: Chada and Katavi, and an extensive network of floodplains, rivers and wetlands. These hydrological features all drain southward into Lake Rukwa with the exception of Nkamba river in the west that drains into Lake Tanganyika. Seasons define much of

the park's ecohydrology: Chada and Katavi are reduced to grasslands during the dry season, swelling into shallow lakes with the onset of heavy rains. This pattern in combination with similar major fluctuations of Lake Rukwa impacts movement, presence and health of many wildlife species. A water quality studies across seasons of the year is therefore very important.

Further need for the study is augmented by the presence of goldmines: Ibindi, Mutisi, Kasakalawe, Msaginya, Mlele and Sikitiko, in the vicinity of the Park which use mercury in the extraction of the gold. Kabenga River which drains its water into Katuma River, runs along Mutisi where large scale gold mining is conducted. These metals plus agrochemicals (insecticides, pesticides and artificial nutrients) used in the catchment area are washed into the hydrological system of the KNP and landscape.

Also the intensive damming and irrigation systems in many villages in the catchment area are resulting in reduction of quantity and duration of water flow and hence affecting directly the availability of water for the animals and plants. The quantity and quality of fish catch, essential as source of protein and income for the people, is also affected. Inadequate availability of water has a devastating effect to the health and well-being of the people and their livestock downstream, wild animals, fish populations and riverine vegetation of the Park and whole ecosystem. Poor agricultural practices upstream are resulting in increased siltation of River Katuma and other rivers and lakes. Slopes are deforested for agriculture. This means the top layers of soil are exposed without any vegetation cover to the first rains and are washed away. These particles are carried as suspension by the rivers and deposited when the speed of the river flow is reduced in the floodplains of the Rukwa Valley. The extent and effects of siltation on the hydrological system and levels of possible long-term filling up are not known. A need to assess the extent and long-term impact of these human activities is indeed urgent so as to be able to advise administrative authorities on the best way to utilize water resources in the area and how to reduce the erosion on slopes due to agriculture.

Viewed under this aspect it's also very interesting to assess the past of the Rukwa Rift Valley. Delvaux *et al.* (1998) found strong hints that Lake Rukwa expanded up to Lake Katavi 10 000 years ago and thus water covered most of the current Katavi National Park. The climatic and tectonic changes in the past resulting in major ecosystem changes must be assessed and taken into consideration when analyzing current structure, function and dynamics of the whole ecosystem.

Nile cabbage (*Pistia stratiotes*) flowing into the rivers and lakes of the Park has recently been a cause for alarm. The plants cover water surfaces, utilize large quantities of water, change the oxygen level in the water and as a consequence interfere with the ecology of fauna and flora in the waters. Experience from Mikumi National Park has shown the destruction of a critical hippo habitat (personal observation). Although the plant is a wide spread problem in Tanzania no study has been conducted to assess the effects of these plants on the Katavi ecosystem.

#### **4. Fire Ecology**

Wild and managed fires are common phenomenon in the landscape. However, no systematic study has been made to determine the effect of fire on the vegetation, on seedling regeneration in the park, the game reserves, forest reserves and open areas. KNP lacks fire management plan but also there is limited information on fires in semi-dry deciduous woodlands in the tropics. Vegetation and fire plots could be established to achieve this. The advantages of this will be

direct implications for a fire management policy within the Park that could span for at least 5 years. As the case with Serengeti, it is equally important to understand the interaction of tree and grass species in combination with fires and herbivory.

### **5. Large carnivore dynamics**

Despite the availability of documented status of lions and hyenas in Katavi (Kiffner *et al.*, 2005), their behavior, interaction and population dynamics are not well known. Other large carnivore species such as leopards and cheetahs have never been assessed at all. This includes their numbers, distribution, and sex and age structure. The behavioral ecology of large carnivore in semi-dry deciduous woodlands needs to be understood and compared to that in savannas such as Serengeti and Tarangire. It is also suspected that there is prey-predator imbalance in Katavi/Rukwa eco-system. Whether this suspicion is true or false and the reason for this is not elucidated.

### **6. Wild dog population dynamics**

Katavi-Rukwa-Mahale is one of the areas considered to harbor significant populations of the wild dogs. However, their sitings, dynamics and present status is not well known. There are confirmed reports that these animals range far away from the PA boundaries in the community areas or in unprotected areas. As such they risk contracting diseases from domestic dogs and suffer persecution from humans. There is therefore a need to undertake a systematic monitoring to understand the ranges of various packs at different times of the year so a proper protection strategy can be instituted.

In view of the conservation status of wild dogs and consistent to the measures undertaken by the Tanzania Wildlife Research Institute (TAWIRI) and the Tanzania Carnivore Conservation Project, it is imperative that a systematic monitoring programme is established in Katavi. The presence of TANAPA Veterinary Unit in the Zone is an ideal starting point.

### **7. Elephant and other species migration patterns**

The elephant is a keystone species in the Park. However, inadequate baseline data is available, especially regarding population dynamics and movement. Large herds have been recorded in unprotected Kabwe area, further west towards Lake Tanganyika. There are unconfirmed reports that the Katavi elephants migrate seasonally up to Zambia and Ruaha NP. Assessment of their migration patterns and utilization of areas outside the protected areas can help in determining which areas should be given additional protection.

In addition, it is generally known that other large herbivores such as buffalo and zebra are also migratory with undetermined seasonal patterns. Information on their migratory routes, temporal and spatial distribution and driving force has not been studied. However, seasonal distribution of the animals is an important input in the land use planning for the animals by the Wildlife Authorities. It is only with adequate baseline information proper assessment of the resource and management plan can be made in order to protect the important wildlife corridors and dispersal areas.

### **9. Threatened species status**

The Landscape is a home for some rare antelopes including puku, sable and roan antelopes and greater and lesser kudu. The status of these animals is not properly known and documented.

## **10. Chimpanzee population status and dynamics**

There are confirmed reports of chimpanzees been observed just north of Ugalla Game Reserve and signs of their presence in Lubalisi, Nsisi and Mwese Forests north west of the Katavi NP. The latter two areas have no protection status. Chimpanzee is an important and endangered primate species whose status needs to be established in the country. Tanzania is considered one of the important range countries for this species.

## **11. Wildlife – livestock interface**

Over the last few years there has been migration of big herds of livestock from north and north-western Tanzania into the area. Cattle population in Mpanda District has increased from less than 50 000 herds of cattle in 1980 to 350 000 in 1995 (Mpanda District Livestock Office, 2006). However, the number declined to an estimated 225 402 in 2006 (Kimera, 2006) following outbreak of Contagious Bovine Pleuropneumonia (CBPP) which apart from killing masses of cattle also forced many keepers to flee from the area. Presence of large herds of livestock has immensely increased the interaction between wildlife and livestock in which diseases is just one facet. While naturally occurring disease processes have always played a role in wildlife population dynamics, the considerable increase in the number of humans and their domestic livestock that now comes into close contact with wild animals has tipped the balance and made the risk of anthropogenic impacts a much greater danger (Woodford *et al.*, 2004). Major diseases of livestock reported at the District are tick borne diseases and trypanosomosis – all of which depend on wildlife species acting as reservoir hosts.

Human induced changes in the habitats, alteration in species composition and interspecies contacts around Katavi NP and within the ecosystem can result in incidental movement of infectious agents that can cause catastrophic impacts to the wild animals and local economy. A strong collaborative wildlife-livestock health monitoring program, therefore, needs to be developed in the area.

## **12. Human – wildlife conflicts**

There is a need to assess the levels and long-term impacts of the wildlife – human conflicts to the surrounding communities and the ecosystem respectively. There are reports on crop raiding, preying on livestock and loss of human lives. Therefore, the effects of problem animals to communities need to be monitored, quantified and appropriate mitigation measures initiated.

## **13. Impact of control of Red Locust**

Red locusts (*Nomadacris septemfasciata* Serville) are controlled by spraying insecticides using low flying aircrafts over the Katisunga Plains at the middle of the Park. The exercise formerly used Deltamethrin, a non selective insecticide. Currently, a fungus known as Green Muscle, which acts biologically is being used. However, no ecological impact assessment has been undertaken to determine the potential effects of the exercise to the environment and its inhabitants. Wetlands are generally sensitive areas to poisoning and have the ability to accumulate wastes that can have devastating effects in the future. There is therefore a need to develop a systematic monitoring of the ecological impact of this activity in the Park.

## **14. Socio-economics studies**

Bees of Katavi/Rukwa, their ecology, species, but also their impact on the local economy and ways of improving output and sales can help to raise the income of the people.

The history of Katabi, Wamweru and the Sitalike fishing village and how they can be utilized for tourism should be considered. The economic importance of the Park to adjacent communities and to their household economies is of importance and therefore should be studied.

### **15. The impact of zoonotic diseases and control**

Katavi and the surrounding areas are one of the important foci for sleeping sickness in western Tanzania. In the year 2004/05, an estimate of 60 people died from sleeping sickness outbreak that occurred in Mpanda District (Mpanda District Livestock Office, 2006). Equally important is the threat of river blindness especially around the fast flowing waters along the Mlele Escarpment. These diseases and possibly others need to be assessed and their impacts to employees of Katavi-Rukwa Ecosystem and adjacent communities need to be undertaken so that appropriate mitigation measures can be instituted.

Rabies which is endemic in many areas of Tanzania has been incriminated to be the cause for extermination of endangered wild carnivores such as African hunting dog in many PAs (Mlengeya & Mlengeya, 2000; Laurenson *et al.*, 2005). The disease is also important as a public health concern due to loss of human lives (Cleaveland *et al.*, 2005). It has also been argued that rabies surveillance and diagnosis in developing countries is severely constrained (Lembo *et al.*, 2006). Consequently the true public health impact of the disease has been greatly underestimated (Cleaveland *et al.*, 2002) and as such political commitment for its control has been lacking. A study of the prevalence of rabies in domestic dogs in the neighboring villages and possible interaction or transmission to wild carnivores needs to be conducted and appropriate diagnosis technique introduced. This could enable the development of a proper control programme.

### **16. Exploitation of forest surrounding KNP**

There is ongoing exploitation of hard wood like *Mninga*, *Msawala*, *Marula* and other woody plants in the forests around Katavi National Park. Recovery circle of these species and long-term impact to animal species, climate and hydrological cycles has not been determined.

### **17. Creating Western Tourist Circuit along the Lake Tanganyika Zone**

The tourism potential of Katavi Ecosystem is unexploited despite the presence of diverse attractions and possible activities, such as wildlife viewing and photography in National Parks, tourist hunting in Game Reserves, Game Controlled Areas, Wildlife Management Areas and Open Areas, sport fishing in Lakes Tanganyika and Rukwa, hiking in the Park and appreciate the beautiful sceneries; Kalambo Falls and cultural tourism. However, there is no adequate information on these potentials to investors and tour operators. There is therefore a need for collection of information on tourism potential of the area for promotion. Tourism is essential to get revenue and support conservation activities.

There is need to undertake study on how tourism can contribute towards poverty alleviation to the local communities.

### **Conclusion**

It is undoubtedly that Katavi is one of Africa's greatest secrets; this Park has game in greater concentrations than almost anywhere else. An incredibly small number of people visiting this park each year make it a less known park in Tanzania and the world at large. However, the opportunities for scientific research as well as tourism are as rich and equally competitive. Katavi has been described as a "jewel in the rough", a remote and near pristine wilderness with great

potential for tourism, community outreach, and inter-agency cooperation, while retaining its ecological integrity and wild character (TANAPA, 2002).

Due to presence of an Ecological Monitoring and Veterinary Unit functioning in the Park, it makes an easy entry point for scientific studies on short term basis, long-term Masters or PhD programmes.

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