TANZANIA WILDLIFE RESEARCH INSTITUTE (TAWIRI)

PRIORITY AREAS FOR RESEARCH FOR TANZANIA NATIONAL PARKS (TANAPA), NGORONGORO CONSERVATION AREA AUTHORITY (NCAA), WILDLIFE DIVISION (WD) AND TANZANIA FOREST SERVICE (TFS)

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PREFACE

This document presents priority areas for wildlife research in various protected areas in Tanzania that are under various management authorities, namely Tanzania National Parks (TANAPA), Ngorongoro Conservation Area Authority (NCAA), Wildlife Division and Tanzania Forest Service (TFS). The priority areas for wildlife research for each management authority were developed in a participatory manner involving stakeholders for each management authority or protected area. These priority areas for each management authority complement the Wildlife Research Agenda in Tanzania. Therefore, priorities areas are meant to guide wildlife researchers in selecting areas for wildlife research for each protected area in the country. During scrutinization of submitted project proposals by researchers at TAWIRI, among other criteria, the Joint Management Research Committee (JMRC) of the TAWIRI Board will check if submitted proposals in each protected area are in line with priority areas for wildlife research in the respective management authority. This will be in addition to the conservation and scientific merit of the submitted proposal. Therefore, researchers are encouraged to submit proposals that are a priority for the respective management authority. Researchers are also encouraged to contact the respective management authority or TAWIRI in case they need more information. We hope that this document will be very valuable to researchers interested in conducting wildlife research in Tanzania as well as other National and International stakeholders.

Dr. Julius D. Keyyu
Director of Research Development and Coordination
TAWIRI

TABLE OF CONTENT

PRIORITY AREAS FOR RESEARCH FOR TANZANIA NATIONAL PARKS (TANAPA)

Tanzania National Parks prioritizes 13 research areas identified in the Tanzania National Parks as highlighted below:

1. Monitoring of animal population-ecology including rare, endemic and keystone species of different taxa as indicators of ecosystem health
2. Water resources monitoring and sustainable utilization by both humans and wildlife given the increasing general scarcity of water amidst multiple users
3. Socio-economic profiles of human populations living adjacent to the National Parks as an indicator of present and future pressure of resource utilization within and adjacent to the Parks
4. Baseline terrestrial and aquatic biodiversity inventories as benchmarks for informed long-term ecosystem monitoring
5. Monitoring of wildlife corridors and dispersal areas including addressing their conservation threats given the increasing isolation of protected areas
6. Impact of fire on vegetation including prescribed and bushfires given that fires are very frequent in our parks
7. Status, impact and control of exotic plants given their ecological destruction of natural ecosystems
8. Human-Wildlife conflicts and mitigation options to address the increasing public outcry of destructive wildlife species
9. Climate change and its impact on ecosystem dynamics and human livelihoods and mitigation options to address the current global and local shifts in climatic profiles
10. Wildlife diseases and health including zoonotics and vector-parasite dynamics to address epidemics within and adjacent the parks' environment
11. Local community-Park relations to improve on the current Outreach Program
12. Sustainable tourism management in the Parks to improve on current tourism promotion initiatives
13. Poaching and sustainable control of bush meat trade given poaching is a major threat in all the National Parks

These areas are not arranged in priority order. Readers are advised to consult Park specific chapters below in order to ascertain topics prioritized per each park under these broader priority areas. In the subsequent sections, these broader research areas are qualified by specific research topics and titles. In addition, the titles are further ranked by priority and a note on justification given.

ARUSHA NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Exotic plants	Investigate the spatial extent & impacts of *Caesalpinia decapitala* infestation on indigenous plant species	About half of the park area is infested with exotic plants. They destroy the pristine nature of the Park.	Very high
		Changes in vegetation cover and impact of bush & tussock grasses on grazing by plains game in Small Serengeti, Tulusia and Uwanja wa Ndege	Tourism activities are highly potential in Small Serengeti plain, Uwanja wa Ndege and Tulusia plains	High
		Impact of illegal logging and deforestation on the Montane forest	The Mt. Meru natural system forms the fundamental catchment forest in the region.	High
		Mt. Meru forest regeneration dynamics	To assist in the reforestation process	High
2	Sustainable conservation of water resources	Assessment of the hydrological patterns and flow status of rivers in Mt. Meru catchment forest.	High demand of water by the adjacent local and urban human populations	Very high
		Establish the water balance in both Big & Small Momella Lakes in relation to quality	Increased pollution in the Momella lakes hampers flamingo ecology	Very high
		Assess the sources of nutrient (N and P) concentrations in the Momella lakes.	Poor human land use activities in the Mt. Meru catchment accelerated by climate change vulnerability	High
		Assess the socio-economic influence on the hydrological regime of Mt. Meru forest		Medium
3	Population status and grazing dynamics of key wildlife species	Long-term monitoring of the buffalo's population dynamics	Most icon large mammal species for tourism activities in the park	Medium
		Assessment of the impacts of buffalo grazing on grassland vegetation (e.g. Small	Buffalo is the most heavy grazer in the park plains	Medium

	Issue	Topic	Justification	Priority
		Serengeti glade)		
		Assessment of buffalo anti-predatory adaptations		Low
4	Fire ecology	Assessment of the effects of fire on grasslands open plains (habitats)	To monitor vegetation changes due to frequent destructive (hot) fires initiated from outside the Park	High
		Impact of fire on forest regeneration		
5	Avifauna Status and diversity	The breeding success of *Maccoa* ducks in Momella lakes	Momella Lakes are the only breeding sites for *Maccoa* ducks in Tanzania	Very High
		Assessment of population dynamics of *Maccoa* ducks in Momella Lakes		High
		Assessment of Flamingo (Lesser & Greater) feeding ecology in Momella lakes	There have been frequent massive deaths of flamingoes in Momella Lakes due to *Cyanobacteria* toxicology	High
6	Status of wildlife migratory corridors	Impact of anthropogenic factors on the status of Ngasurai and Ngabobo wildlife corridors	Vital corridors for connecting Arusha with Kilimanjaro and Amboseli National Parks	High
		Human-wildlife conflicts in Ngasurai plains		High
7	Wildlife diseases	Assessment of the Epidemiology and control of important diseases (Rabies, Anthrax, FMD and internal parasites)	Zoonotics are potentially a major problem	Very high
		Investigate the Diversity & Distribution of disease vectors (ticks, tsetse fly, etc) and internal parasites in wildlife and domestic animals	Lack of baseline information	
			To better understand the zoonotics	
		Impacts of climate change on diversity and distribution of	To model climate changes	

	Issue	Topic	Justification	Priority
		wildlife, pathogens and vectors	as a factor in disease dynamics	
8	Fish ecology	Investigate the fish species composition and feeding ecology in Longil freshwater lake	Longil lake is the only freshwater lake in the park, the others are saline lakes.	High
		Assess the ecological role of *Oreochromis spirulus niger* in the lake	Food chain is highly paramount to understanding trophic status of the lake.	Medium
9	Primate Ecology	Assessment of the abundance and spatial distribution of *Colobus* monkeys in Mt Meru forest. Investigate the population of duikers in Mt Meru forest	*Colobus* is the most abundant primate on Mt Meru forest	Low

GOMBE NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Chimpanzee Respiratory Diseases	Effects of respiratory disease outbreaks on the chimpanzee population Relationship between weather changes and chimpanzee respiratory infection outbreaks	Respiratory disease epidemics can cause mass mortalities of chimpanzees	Very High
2	Sexually Transmitted Disease (STD) in Yellow Baboons	Characterization of the STD and control measures Impact of STD's on baboons reproduction	The STD is likely to affect the reproduction of baboon population	Very High
3	Park Employees Health Program (EHP)	Evaluation and adoption of effective EHP	To control human-primates (mainly chimpanzee) disease transmission	High
4	Fire Impacts (cool & hot fires)	Effects of fire on vegetation dynamics (species composition, regeneration etc.)	Hot dry season fires as well as cool early burning fires can affect the natural vegetation dynamics	High
5	Tourism-related chimpanzee stress	Investigation of human-proximity related chimpanzee stress Anthropogenic factors in relation to change of chimpanzee behavior Investigate on the optimal chimpanzee viewing regimes by tourists	Human proximity is a major stress factor for chimpanzees	High High High
6	Human pressures adjacent to the Park	Conduct human socio-economic surveys around	Increased demand on Park resources due to increasing human population	High

	Issue	Topic	Justification	Priority
7	Human-Wildlife Conflicts	Study on wildlife crop raiding and other conflicts and their mitigation	Complains by adjacent human populations	Medium
8	Biodiversity Inventory	Inventory of small animals taxa	Status of small animals taxa in the park is t known	Medium
9	Wildlife census	Population monitoring of primates and other mammal species	Update on population trends of key species	Medium
10	Primate feeding Ecology	Feeding competition between chimpanzees and baboons, and its impact on forest regeneration and welfare of both populations	Evidence of strong feeding competition	Medium
11	Sustainable water utilization	Assessment of water flow and quality in 3 streams (Mitumba, Kasakela and Bwavi).	Most obstructed/harvested streams by humans, hence need to ensure sustainable flows and healthy quality	Medium
12	Wildlife Population Dynamics	Assess population dynamics of red-tailed monkeys	Chimpanzees prey mainly on red tailed monkeys	Medium
13	Human-wildlife zoonotic diseases	Epidemiology of human Trypanosomiasis and Schistosomiasis (Bilhazia)	Adverse impact on human health Long-term monitoring needed	Medium Medium

KATAVI NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Lower Taxa Biodiversity	Inventory of Amphibian and Reptiles in the parks	No comprehensive inventory so far on these animals	Very High
		Inventory of fish species and their population status in Lakes Katavi, Chada and Rivers Katuma, Kapapa and Kavuu	Unsustainable fishing outside the park has affected fish population dynamics	Very High
2	Ecohydrology	Assess the extent and long-term impacts of upstream water diversion on park resources and integrity

Assess the level and effects of siltation on Lakes Katavi and Chada | Several anthropogenic factors are threatening the hydrology of the park

Impact of siltation on these lakes is unknown | Very High

Very High |
| 3 | Large Carnivore populations | The behavior and population dynamics of lions

Population status of wild dogs, Hyenas and Leopards | There seem to be very few lions in KNP and most of them are sighted around the seasonal Lakes

Little is known on these large carnivores | Very High |
| 4 | Buffer Zones | Land use patterns in the buffer zones of the park | There is increasing resource use demands by humans in the Buffer zones | Very High |
| 5 | Elephant Movements | Elephant movement patterns and resource utilization outside the park not known | Large herds of elephants have been observed in unprotected areas outside the park, and there are allegations they go as far as Ruaha & Mahale National Parks. | High |

	Issue	Topic	Justification	Priority
6	Threatened Species	Population status of endangered species in Katavi (Puku, Sable and Roan antelopes, and Greater and Lesser Kudu)	Their status is unknown and their habitat is increasingly threatened	High
		Population status of the Chimpanzee in unprotected areas of Mwese and Lubalisi located north west of Katavi	There are confirmed reports of chimpanzees in Wansis Hills, Lubalisi and Mwese Forests North West of the Katavi NP, however human encroachment in these area is increasing rapidly thus posing a threat to Chimps	Very High (but far outside the park)
7	Public roads in the Park	Ecological impact of two transit public roads through the park	Traffic volume will increase as one of the roads will be tarmacked but their impact is not known	High
8	Red Locust Control	Ecological impact of insecticide/biological control of Red Locust in some areas in the park (Katisunga plains).	Red locusts (*Nomadacris septemfasciata* serville) have been controlled by spraying insecticides using low flying aircrafts over the Katisunga Plains inside the park. However, no ecological impact assessment has been undertaken to determine the potential effects of this exercise on the environment.	High
9	Ecosystem Functions and Dynamics	Climate change and weather change patterns and their effect on hydrology and park resources	Poorly understood	High
10	Tourism Promotion	Document the tourism potentials of Katavi Ecosystem	Poor resource information for Investors & tour operators	Medium

KITULO NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Fire Ecology and Management	Impact of fire and burning regimes on the ecology of plateau vegetation (grasslands, flowers, orchids and forests)	Flowers is the principal attraction for the Park	Very High
		Impact of fire and burning regimes on Montane marshlands	Marshlands are the principal source of water for Kitulo catchment	Very High
		Impact of exotic vegetation on bush fires	Understanding the role of exotic plants in fueling bush fires	Medium
2	Biodiversity inventory	Animals (duikers, small mammals, primates, reptiles & amphibians)	This is a new Park and no baseline data are in place	Very High
		Plants (species composition, diversity and phenology)	Baseline data needed to facilitate management decisions and monitoring	
		Avifauna (general, Denham's Bustard, Blue Swallows, endemic spp.)		
		Invertebrates (mainly butterflies and moths)		
3	Animal Dispersal	Status of corridors and their threats (i.e. Bujingijila and Kitulo- Mpanga/Kipengere GR)	Status of migratory corridors unknown	Medium
3	Grazing ecology	Impact of lack of grazing on Montane grassland vegetation	The area had some elands, antelopes and zebras in the past and later on dairy cattle as grazers. After extinction of elands and zebras and removal of cattle, fuel load has led to frequent hot fires.

GMP stresses the importance of having grazers to shape the grassland to what it used to be. Information is | Very High |

	Issue	Topic	Justification	Priority
		Study of the rationale and feasibility of re-introducing grazers on the plateau.	therefore needed to guide this exercise.	
4	Invasive Species	Invasion level and impact of invasions on natural Park vegetation Trial of invasive species control/eradication options	Control/Eradication of invasive plants is a high priority according to TANAPA policy	Very High
5	Socio-economic status of local communities	Assessment of community attitudes towards the Park Comparing tourism-related income generating alternative schemes for local communities	To better orient the Park Outreach Program To use the Park tourism potential to boost local economies	Very High High
7	Orchid Poaching	Causes of ground orchid (chikanda) poaching and effective intervention strategies Assessment of the impact of foot tracks in relation to poaching of Park resources	Orchids are endemic to the Park There are extensive foot tracks from Uwanji and Kikondo to Mwakaleli with unknown impacts	High Medium
8	Eco-hydrological studies	Assessment of water quality and quantity in key water bodies Study on Kihansi Gorge suitability as a Kihansi toad alternative habitat	Sustainable management of water resources is a priority (E.g. Ndhambwe crater Lake & Numbe Waterfall) There are many efforts geared towards rescuing this rare species from extinction and to boost the Park's environmental role and tourism potential. The misty waterfall could suit as an alternative habitat	Very High Very High

	Issue	Topic	Justification	Priority
		The impact of agricultural land use practices in adjacent community land on water quality and quantity	Kitulo Plateau is an important Water Catchment for Usangu Basin and Great Ruaha River, hence information about quantity and quality of the water is an important matter.	High
		Detailed assessment of the Hydrological contribution of Kitulo to Usangu (Ihefu), Great Ruaha River and Lake Nyasa Basin.	This information will enhance the rationale for conserving Kitulo for water catchment	Very High

KILIMANJARO NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Climate Change	Monitor weather parameters on the mountain Studies on ice extent and depth on the Mountain peak Monitor changes in montane vegetation cover	Ice field shrinking indicates major shifts in global climate dynamics	Very High
2	Fire Management	Impact of fires on Montane vegetation and effective fire management options	Need to better understand the problem of fires and explore effective management alternatives	Very High
3	Water catchment value	Monitoring of water quantity and quality	Mount Kilimanjaro has regional water catchment values, and thence the need to maintain these values by ensuring sustainable flows of clean water	Very High
4	Elephant population	Elephant population dynamics and ecology Human-Elephant conflicts and possible mitigations	Elephants are the largest migratory mammal on the mountain facing multiple threats Urgent need on mitigation measures	High
5	Large mammal population status	Population status of buffalo, eland, lion, abbot's duiker, black and white colobus and blue monkey	Status is poorly understood	High
6.	Insects biodiversity	Insects altitudinal diversity as a bio-indicator of climate changes	A cheaper method for assessing climate change dynamics	High
7.	Vegetation studies	Monitoring forest biodiversity, structure and functioning	As an indicator of anthropogenic disturbances on the mountain	Very high
8.	Animal health and diseases	Epidemiology and control of important diseases (Rabies, Anthrax, FMD, internal parasites, etc)	Wildlife disease can lead to mass mortalities Presence of disease reservoirs in wildlife and	Medium

	Issue	Topic	Justification	Priority
			surrounding domestic animals	Very high
		Diversity & distribution of disease vectors (ticks, etc)	Scanty information is available	Medium
		Impacts of climate change on the epidemiology of wildlife diseases including zoonotics		

LAKE MANYARA NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Sustainable use of water resources	Establish water budgets for Lake Manyara	There is lack of data on the hydrological cycle of the lake. Water budgets will ensure equitable shares of water for the lake and other users.	Very High
		Establish the sedimentation budgets for Lake Manyara	To determine sedimentation sources and help reduce sediment loads into the lake	Very High
		Evaluate the role of Lake Manyara to the socio-economic status of the surrounding community	Communities need to understand the importance of the lake so as to participate in its conservation	Medium
2	Catchment processes and status	Assess the eco-hydrological conditions of the river basins that contribute water to Lake Manyara (water quality (including pollution) / quantity and points of extraction, seasonality, etc)	There is speculation on unsustainable catchment water use patterns that is thought to contribute significantly to dry outs of the lake and potential health problems on organisms due to water pollution	High
		Conduct a cost-benefit analysis of agriculture vs conservation in L Manyara basin in relation to water allocation trends	There is lack of enough data to facilitate equitable allocation of water between conservation and other uses	Low
		Assess the impacts of tourist facilities on water resources near LMNP	It is feared that the many tourist facilities around the park are increasing pressure on the surface water resources. This needs confirmation	Medium
3	Unsustainable land use patterns around Lake Manyara National Park	Mapping and evaluation of land use patterns in the upper catchments of Lake Manyara (Karatu & Mbulu)	Siltation of Lake Manyara originates on the upper catchments due to soil erosion. Need to promote conservation friendly land	Very high

	Issue	Topic	Justification	Priority
			uses	
		Research on the impact of unplanned settlements at Mto wa Mbu on ground water of LMNP	The water table is high on the area and it is feared that during floods there is contamination of water from sewage	Low
		Evaluate the role of the Community Outreach Program towards minimizing adverse environmental impacts that originate from the communities	Despite a good effort and cost by the park to involve the communities in conservation benefits, the response of communities towards promoting environmental conservation has not been evaluated	Medium
4	Migratory routes and buffer zones	The use by animals of the buffer zone around the park, and migratory routes to assess their potential threats to the migrating wildlife	Buffer zones and migratory routes are rapidly been impacted by human activities, so data are needed to validate the viability of buffer zones	High
5	Biodiversity Status	Conduct biodiversity inventory of the newly annexed area to LMNP (Marang forest and Maji moto farms)	The data is needed as a baseline for future monitoring and management actions	High
		Conduct an inventory of small mammals, reptiles and amphibians in the park	Data on these taxa is lacking. The information will potentially help to diversify tourism activities	Low
		Assess the cultural-historical values in L Manyara National Park and adjacent communities	Needed to diversify tourism activities	Low
6	Animal Populations and Ecology	Assessment of declines in male lion population within Lake Manyara National Park	Male lions are scarcely sighted in the park in recent times. Females on heat often sighted for several days without any male around.	Very High
		The feeding behaviour of Lesser flamingos in Lake Manyara	There is lack of such information	Medium

	Issue	Topic	Justification	Priority
		Study on the population dynamics of Ostriches in LMNP	There is lack of such information	Low
		Studies on re-introduction of locally extinct animal species into LMNP (gerenuk, Thompson gazelle, wild dog, Lesser kudu, rhino, cheetah, reedbuck and eland)	It is not well known why these animals disappeared from the park and which conditions are favourable for them if re-introduced	High
7	Wildlife diseases	Assess the effect of baboon genital disease on their population dynamics and ability to reproduce effectively	It is a new disease whose epidemiology and effects are not known	Very high
		Map disease vectors species (tsetse flies, ticks, etc) and their distribution	Despite of existence of various disease vectors, scanty information is available	High
		Surveillance of plaque in the nearby villages	A cause of public heath concern	Medium
		Investigate causes and epidemiology of the Giraffe skin disease (GSD)	A new disease whose cause and epidemiology are unknown	High
		Prevalence of important diseases (rabies, anthrax, rift valley fever, tuberculosis and brucellosis) in wildlife and domestic animals	No information is available	Medium
8	Wildfires	Study on the impacts of using fire to control bush encroachment in order to enhance tourist viewing in LMNP	Bush encroachment is an issue in the southern area of the park hindering tourist viewing	Medium
9	Mining in the park	Evaluate the impacts of mining in the Marang Forest (to the water resources of LMNP)	It is feared that opening-up of the earth crust for mining may be contributing to water pollution among other impacts	High

MAHALE NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Zoonotic Diseases	Study on transmission of common zoonotic diseases in the park	To characterize the regular epidemic diseases affecting chimpanzees and other primates	Very high
2	Wildfires	Study on the destructive impacts of wildfires on environment in the park	Fires destroy vegetation and affects biodiversity	High
3	Exotic species	Assess effectiveness of ongoing and alternative *Senna spectabilis* control options	Eradication of exotic plants is highly desirable as it kills native plants	High
4	Biodiversity status	Inventory of plants, particularly medicinal plants within the Park	Some of these are consumed by Chimpanzees	High
5	Large mammal populations	Assessment of population trends of red *Colobus* monkeys	They are preyed upon by Chimpanzees	Medium
6	Wildlife corridors	Study on the status of two corridors found in the northern and southern parts of the park	These corridors are said to be important for elephant movements between Katavi to Mahale	Medium

MIKUMI NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Public Roads traversing the Park	Long-term impact of TAZAMA highway on animal road kills	Frequent animal road kills by highway traffic. Long-term data needed for informed decisions	Very High
		Impact of sound and vehicle emissions on TAZAMA highway on wildlife ecology	Data of 1999 indicated that there were 1172 vehicles per day leading to significant impact of exhaust gases and noise. Emission particles are deposited on the forage along the road verge and consumed by grazers. These impacts are not quantified.	High
		Assess the Impacts of wildlife feeding on food remains thrown alongside the TAZAMA highway	Litter throwing by TAZAMA highway users is a major problem. This exposes the animals to various health risks	High
2	TAZAMA crude oil pipeline Traversing the Park	Impact of crude oil spills on wildlife and ecosystem rd the n general	TAZAMA pipeline is 40 years old resulting to frequent breakdowns and oil spills in the Park environment. The impacts need to be quantified to facilitate informed decisions.	High
3	Conservation of rare and endangered species	Assessment African wild dog ecology and population dynamics	There are *ad-hoc* sightings of wild dog packs in the Park but their population structure and dynamics is unknown. This poses difficulty in planning for their sustainable management.	Very High
		The ecology and reproductive success of Kudus	Sightings of Kudu are rare. This rarity is suspected to be due to poor reproductive performance.	

	Issue	Topic	Justification	Priority
		A study on morphometrics of Elephants in the Park	Mikumi elephants appear small in size compared to those from other areas. Studies are needed to ascertain this assumption. Tourists often ask for the reasons.	Medium
		Assessment of lion population structure and dynamics in the Park with particular focus on males		Very High
4	Human-wildlife conflicts	Magnitude and consequences of human-wildlife conflicts with a Focus on Elephants	Mikumi is surrounded by 19 villages with ever increasing human-wildlife conflicts. A study to quantify the magnitude of the problem and determine the root causes and mitigation options is highly desirable	
5	Resources Inventory	Baseline inventories of various small animals taxa (e.g. reptiles, amphibians, butterflies and moths)	Species lists of the Park are benchmarks for facilitating monitoring and management. Urgently needed before some species become extinct	Very High
6	Vegetation Monitoring	Assessment of bush encroachment as an indicator of habitat change	Grassland to bush conversion appears to be advancing fast in various parts of the Park. Studies needed to monitor this trend and its consequences	Medium
		Regeneration dynamics of the African Black Wood tree *Dalbergia melanoxylon*	Population structure appears skewed with die-backs of mature trees and slow regeneration	Medium
7	Fire Management	Impact of frequent fires on soil and biodiversity of the Park	Areas along the Park boundary burn on annual basis with possible adverse ecosystem impacts	
		Impact of Prescribed and late burning to the Park resources	Continuous burning of the Park during the prescribed	

	Issue	Topic	Justification	Priority
			burning and late burn has impact to the Park resources. Studies to identify and characterize these impacts are needed	
8	Sustainable utilization of water resources	Monitoring of water quality in the man-made waterholes	Man-made waterholes are common at Mikumi. The quality of the water in these artificial water bodies need monitoring	High
		Assessment of quality of water flowing into or through the Park from nearby cultivated fields	Water discharged into the Park passes through cultivated fields with possible contamination	High
9	Wildlife corridors and migratory Routes	The conservation status of traditional wildlife corridors at Mikumi	These corridors are thought to exist (e.g. Mikumi-Twatwatwa – Wami-Mbiki and Mikumi-Rubeho-Udzungwa-Ruaha) but with unknown status	High
10	Archaeology	Conduct an archaeological study on the artifact-rich Shabaha mountain	Source of a clay pot estimated to age 500 yrs and a human skull. The information is needed for developing new tourism products	Low
11	Protection of Park Resources	Cultural and Socio-economic drivers of poaching and their consequences on the Park resources	Poaching which is carried out by the nearby communities is a threat to Park resources. A study is needed to identify the drivers of poaching and possible control options	High
12	Community-Park relations	An evaluation of community perceptions and attitudes on outreach activities from the Park	Park supports the development effort of the community through SCIP. This program has been undertaken for many years without a thorough evaluation to guide future directions	High
13	Tourism Development	Assessment of visitor satisfaction from tourist attractions and services	Needed to facilitate better tourism planning	High

MKOMAZI NATIONAL PARK

	Issue	Topic	Justification	Ranking
1	Park hydrology	Surface and ground water quality, quantity and seasonal dynamics	Water scarcity is an acute problem for both wildlife and humans. This information is essential for proper water resources management planning	Very High
2	Vegetation studies	Status of key vegetation habitats: *Acacia-Commiphora bushlands and* dry mountain forests	These habitats are subjected to frequent fires, and there is also poaching of plants for subsistence and commercial uses	High
3	Rare, threatened and endangered species	Ecology & population dynamics of rare and endangered species	Gerenuk and Oryx are very rare. The population of lions and hyena is also low. Information needed to guide their management	High
4	Resources Inventory	Conduct plants and animals biodiversity inventories	To form baselines for management and monitoring purposes	High
5	Animal populations dynamics	Population ecology and dynamics of key wildlife species	To monitor trends over time as indicator of ecosystem health	Medium
6	Artificial water sources	Impact of man-made water sources on animal behavior and adjacent vegetation	The information will help Management to address any possible adverse impacts	High
7	Wildlife diseases	Epidemiology and control of important diseases (Rabies, Anthrax, Trypanosomoses, FMD and internal parasites) Diversity & Distribution of disease vectors (ticks, tse-tse flies, etc)	Large interaction of wildlife and livestock can spearhead disease transmission. Data on disease levels and trends are necessary for managing possible outbreaks	High

RUAHA NATIONAL

	Issue	Topic	Justification	Priority
1	Ecohydrology	Impact of the drying of Great Ruaha River on wildlife and human socio-economic activities	Drying of the river affects the basin's ecology and other socio-economic values such as Power generation at Kidatu and Mtera dams	High
2	Animal Population dynamics and Ecology	Elephant population and their impact on the vegetation	There is increased Elephant population that damages vegetation communities especially trees within the Park	High
		Buffalo population dynamics and possible explanations of their decline	Large buffaloes herds are rarely seen nowadays and the causes of their decline are not known	High
3	Wildlife diseases prevalence and management	Epidemiology of Giraffe Skin Disease	Little is known of this disease	High
		Zoonotic diseases (Rabies, BTB, trypanosomosis, ect)	Information needed for their management and prevention	
4	Fire ecology	Effect of frequent fires on vegetation dynamics (e.g. regeneration of Miombo and *Drypetes* forests)	These forests support a large and diverse biomass of wildlife	High
		Assessment of the impact of routine prescribed burning	The impacts of such routine burning are unknown. Findings will facilitate proper management decisions	High
5	Elephant migratory and movement patterns	Mapping of elephant migratory corridors and dispersal areas	Elephant movements are not well known

The study is needed to establish movement patterns, associated conflicts and impacts | Medium |
| 6 | Human-wildlife conflicts | Assessment of human wildlife conflicts including economic losses and community attitudes and perceptions | There is an increasing public outcry on damage of crops and predation of livestock by wildlife | Medium |

	Issue	Topic	Justification	Priority
7	Rare and endangered species	Assessing the population status & dynamics of Wild dogs and Grant's gazelle	Wild dogs and Grant's gazelle are rarely seen in the Park	High
8	Carnivore population dynamics	Assessment of status of the lion population and their main prey (buffaloes).	Lion population in the park is considered to be on the increase while that of their pray (buffalo) is on the decline. There is lack of data to confirm this.	High
9	Poaching	Bush meat poaching dynamics and evaluation of control methods	There is a need for exploring the most effective methods for controlling poaching	Medium
10	Migratory birds	Assessment of populations of migratory birds focusing on Usangu wetlands	Usangu wetland is newly annexed to the Park and one of the IBA's of Tanzania. The basic birds inventory checklist exists but the status of migratory birds is unknown	High

RUBONDO ISLAND NATIONAL PARK

	Issues	Topic	Justification	Priority
1	Elephant Ecology and behavior	Elephant population ecology and the Island's carrying capacity	The size of the island is fixed despite increasing number of the introduced elephants. Information needed for proper interventions	High
2	Population dynamics of introduced wildlife species	Assessment of population trends of the introduced species in Rubondo Island National Park (e.g. Suni, Giraffes, Black and white colobus monkey and Grey parrots)	Status of these species unknown despite many years of being introduced	High
3	Chimpanzee habituation	Habituation of chimpanzees for tourism	To boost the tourism potential of the Park	Very high
4	Wildlife diseases	Assessment and Monitoring of Sitatunga and bushbuck health dynamics	There is periodic deaths of sitatunga and bushbuck but the causes are not known	Very high
5	Biotic inventories	Biotic inventory of low taxa fauna (small mammals, reptiles, and amphibians)	Status of small mammals, amphibian and reptiles in the Park is unknown	High
6	Fire as an ecological management tool	Assessment of possible use of fire as a tick management tool	Tick load on the Island is disproportionately high; but a major part of the park is intact tropical forest where fires are undesirable	Very high

SAADANI NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Wami River and Estuary conservation	Assessment of water quantity (flow rate) and quality of Wami River Assessment of the status of the Wami River estuary Mangrove forest	Need to monitor these parameters due to unsustainable farming systems upstream. There are indications of forest degeneration and increased sedimentation	Very High
2	Population dynamics of indigenous, introduced and locally rare wildlife species	Population status of introduced species: Wildebeest, Greater and Lesser kudu, eland and Zebra Population status of key species: Elephant, Hartebeest and Buffaloes Population status of rare species: Sable antelope, and Caracal	Lack of such information undermines their conservation planning. Population status of these species are unknown Population status of these species are unknown	Very high
3	Green turtle breeding ecology	Best options for protecting Green Turtle nesting grounds in the Park (Madete beach) Assess the influence of climate change on breeding success in the Park extremes	Breeding sites along the Indian ocean are not well protected Possible impact of climate change on breeding success is suspected	Very high
4	Ecology of Coral reefs	Assess the ecological status of corals at Mafui area	They are endangered species No information is available regarding the coral species Current fishing practices threaten the corals	Very high

	Issue	Topic	Justification	Priority
5	Vegetation studies	Assessment of plant diversity and fragmentation of the Zaraninge and Kwamsisi forests	These forests are rich in rare and endangered plant species but have been highly degraded	High
		Assessment of the potential impacts of forest fragments to small animals dispersal and movement	Threats for pineapple farms expansion from Gongo and Matipwili village	High
		The impact of invasive exotic plants introduced in parts used for livestock ranching on the natural vegetation is not well known	The information is needed to inform decision on whether or not to eradicate the exotic plants	High
6	Ecological threat from exotic plants	Assessment of the status of exotic plant species and possible control measures	There are many species of exotic plants in the Park due to past human activities	High
7	Fire ecology and management	Impact of fire on coastal and riverine forests	Need to know the destructive impact of fires on the vegetation so as to better management the ecosystem	Medium
8	Wildlife diseases and health	Tsetse flies control options	Adverse impact on human, livestock and wildlife health (compromises tourism). Long-term monitoring needed	Medium
		Epidemiology of human trypanosomiasis not known		Medium
		Prevalence of zoonotic diseases in and around the Park not known		Medium
9	Public infrastructure in the Park	Impact of public roads (on animal kills and littering) in the park not well known	Long-term monitoring	Medium
10	Animal population ecology	Assessment of the population ecology of Zebra	Casual observations suggest decline of Zebra population	Medium
		Population dynamics of Carnivores (Lions, Cheetah, Hyena, Leopard and	The populations status are not known	Medium

	Issue	Topic	Justification	Priority
		Caracal)		
11	Wildlife corridors	Identification of wildlife corridors around the Park	Lack of information on the conservation status of the corridors	Medium
12	Social-economics of adjacent communities	Community attitudes and perceptions on the Park	There is increased poaching, park-community boundary conflicts and encroachment	Medium
		Identification of potential areas for establishing WMA around the Park	Alternative income generating schemes will reduce pressure on Park resources	Medium
13	Aquatic biodiversity inventory	Assessment of shrimp abundance and biodiversity in Wami River estuary	Shrimps is one of the major sources of income for Saadani local communities	Medium

SAANANE ISLAND PROPOSED NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Population of rare species	Assessment of the population status and dynamics of Spotted Necked Otter and African Clawless Otter	These are rare species with unknown population status	Very High
2	Status of Fisheries resources	Types, distribution and abundance of fisheries resources	As a basis for introducing sport fishing tourism The draft GMP (2009-2019) earmarked sport fishing as an important tourist activity therefore, detailed scientific information is critical	Very High
3	Status of key wildlife species	Habituation of De-Brazas Monkey for Tourism	The species is very shy and habituation will provide additional tourism activities	High
		Assessing population dynamics of De-brazas Monkey	Data on population status is lacking	High
4	Status of introduced species	Population genetics (Inbreeding?) of Impala, Rock Hyrax and Monkeys	There is a long-term interaction of small populations in a very small habitat	High
		Food constraints and its impacts on animal health	There is a proposed animal re-introduction program Saanane Island NP is a small isolated Park and therefore, animals may face health constraints and inbreeding problems	High
5	Water studies	Assessment of water pollution and mitigation measures	Saanane Island NP is located within the city of Mwanza, and therefore suffers from intensive human and development activities The Park is in close proximity	Medium

	Issue	Topic	Justification	Priority
			to a myriad of industries and growing urban population that discharges effluents to Lake Victoria Applied research needed to find the best mitigation measures	
6	Biodiversity surveys	Inventories on small mammals, hepertofauna and invertebrates	There is scanty information on the abundance of small mammals, amphibians, reptiles and invertebrates	Medium
7	Waterbirds seasonal dynamics	Seasonal abundance of key waterbirds	The study seeks to generate information critical for tourism	Low
8	Animal health and diseases	Assess status of ticks and other disease vectors and their impact on wildlife	The Park is small so it is important to generate baseline data on disease risk factors present in the park to facilitate subsequent monitoring	Medium

SERENGETI NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Human-Wildlife Conflicts	Socio-economic impacts of human-wildlife conflicts in adjacent villages	Increasing local community outcry on the problem	High
		Control options for human-wildlife conflicts	Innovative and effective control measures urgently needed.	High
2	Water resources conservation and sustainable utilization	Eco-hydrological studies of the (major) rivers (Mara, Grumeti, Mbalageti)	Long-term data needed for informed decision making on water management	High
		Surveying of underground water availability and quality for human use	Water scarcity for human consumption is a major management issue including improving Tourism conditions	Very High
3	Sustainable conservation of flagship wildlife species	Monitoring the population dynamics & migration patterns of Wildebeests and elephants	Flagship species are key indicators of the ecosystem health. Long-term continuous studies are necessary	Medium
		Assessment of the population ecology of resident wildebeests in western corridor	Resident wildebeests in the park are poorly studied	Medium
		Assessment of the status of Elephants & wildebeests outside protected areas	They spend considerable time outside protected areas where they are potentially threatened	Medium
4	Conservation of rare animal species	Assessment of the population status & dynamics of (selected) rare animal species: (Roan Antelope, Oryx, stripped hyena, Patas monkeys, Black & white colobus, Oribi, Caracal)	Status of these rare animal species is poorly understood	Low
5	Rhino conservation	Assessment of the population Genetics of Moru Black Rhinos (Inbreeding?)	Small isolated Rhino population may potentially result into inbreeding leading to genetic	High

	Issue	Topic	Justification	Priority
			depression	Medium
		Assessment of the population ecology of re-introduced rhinos	Re-introduction program ongoing, & needs updated information	
6	Poaching	Long-term monitoring of poaching dynamics & trend	Poaching is a major budgetary expenditure activity (>40%) for the Park. Poaching levels are stable over the past 15 years. Monitoring will assist in informed decision making.	Medium
		Research on effective poaching control options	Applied research needed to address the problem of poaching	High
7	Tourism service provision	Study on visitor satisfaction and attitudes	Enhancing visitor service quality is a high priority for the Park	High
		The status and potential contribution of tourism to the economy of local communities	Need to engage & link local communities to tourism benefits of the Park	High
		Estimating the Tourism carrying capacity for Serengeti National Park	An issue of international community concern (UNESCO/IUCN)	Very high
		Long term monitoring of the impact of Tourism facilities on park resource values	Tourism is growing. Data needed for informed tourism management decisions	Medium
8	Fire ecology	Impact of fire on vegetation (grassland/woodland)	Regular prescribed and unprescribed (hot) burning may destroy the natural plant biodiversity Priority: riverine forests, hilltop thickets, wetland	Medium
9	Animal health and diseases	Evaluation of control options for tsetse flies	Adverse impact on human health (compromises tourism)	Very High
		Epidemiology of human trypanosomiasis	Long-term monitoring needed	Medium

	Issue	Topic	Justification	Priority
		Prevalence and dynamics of zoonotic diseases in and around the Park	Incidents of rabies and other diseases re-occur frequently	Low
		Prevalence and dynamics of trypanosome rhodesiense in large ruminants	Visitors and park staff confirmed with HAT A need to establish hosts for the causative agent.	Low
		Impact of selected diseases (Anthrax, Foot and mouth disease, Rift Valley fever, Malignant Cattarrhal Fever, Skin disease, Rabies, baboon genital disease, Mange etc.) to key animal species (wildebeest, zebra, giraffes, baboons)	Significant mortalities due to outbreaks and other incidences reported each year. Important to establish seasonal occurrence. Short and long-term monitoring needed	Medium
10	Animal road kills	Monitoring of road kills and littering on public roads traversing the Park	Data necessary for better management of public transportation through the Park	Medium
11	Climate change	Impacts of global warming on park resources & values	New area of global interest	Low
		Studies on possibilities of Carbon exchange and trading	Possibilities for the role of the Park as a major carbon-sinking platform. A new area of global interest and collaboration	Low
12	Biodiversity status of key taxa	Inventories for amphibians, fish, reptiles and insects	Low taxa biodiversity status poorly understood. Needed for taxa specific tourism guide books	Medium
13	Socio-economic issues	Long-term monitoring of the socio-economic status and trends for local communities adjacent to the Park	Needed to monitor adjacent human population pressure on Park resources	Medium
14	Species specific studies	Carnivores (Lions, Cheetah, Hyena, Wild dogs, Giraffe)	Ongoing	Low-Medium

TARANGIRE NATIONAL PARK

	Issue	Topic	Justification	Priority
1	Wetland dynamics	Impacts of human water harvesting upstream on the dynamics of the Tarangire river flow	Tarangire River is a vital dry season refuge for wildlife	Very High
2	Wildlife corridors and dispersal areas	Status of wildlife migratory corridors and dispersal areas outside the Park Appropriate Land Use Planning in protecting the corridors and dispersal areas Impact of loss of corridors and dispersal areas to the Tarangire-Manyara ecosystem	The majority of animals seasonally move outside of the park to unprotected community land. Their status need to be understood, and safeguarded with proper Land Use Plans Some of the dispersal areas and corridors are crucial as calving grounds	High
4	Climate change and the Environment	Studies on animal populations, migration & reproductive biology in relation to climate change Impact of climate change on the economy of communities adjacent to Tarangire National Park Sustainable livelihood strategies in relation to climate change	Climate change poses an environmental risks to human and wildlife populations including biodiversity	High
5	Status of locally rare, threatened and Endangered Species	Population ecology of Greater and Lesser kudu, Oryx, Gerenuk and Wild dog	Their status is not well known. Information will assist their better management	Medium
6	Bush meat Trafficking	Assess magnitude of the problem and market segment profile of bush meat trade Options for sustainable control of bush meat trade(Roan Antelope, Oryx,	Illegal bush meat trafficking is a major threat to wildlife. Need for a deep understanding of the problem and effective control options	High

	Issue	Topic	Justification	Priority
		stripped hyena, Patas monkeys, Black & white colobus, Oribi, Caracal)		
7	Wildlife diseases and health	Epidemiology of and control of Giraffe skin disease, Rabies, Anthrax, Trypanosomoses, Malignant catarrhal fever and FMD	Seasonal migration and dispersal of wildlife to village land and sharing of grazing and water resources can promote disease transmission	High
		Diversity & Distribution of disease vectors: ticks, tsetse flies, mosquito, and internal parasites in wildlife and domestic animals	Scanty information is available	High
		Impacts of climate change on pathogens and vector adaptation diversity and distribution	Climate change is likely to spread speed-up disease transmission including zoonotics	Very high
8	Fire	Impact of fire on vegetation dynamics and integrity	Fire is an annual problem in TNP damaging vegetation and environment in general. Need to document these impacts for better management decisions	Medium

UDZUNGWA NATIONAL PARK

	ISSUE	TOPIC	Justification	PRIORITY
1	Human-Wildlife Conflicts	Impacts of human wildlife conflicts on local village economies & control measures Community altitudes on wildlife impacts	Increasing community concerns over the losses of their crops and livestock to wildlife raids	Very High
2	Sustainable water resources utilization	Monitoring of water quantity and quality and current levels of water utilization in rivers and major streams	There is increasing and competing water demand for domestic and commercial use - irrigation schemes and tourism. Data will assist better planning	Very High
3	Ecology of rare and endemic primate species	Monitoring of population dynamics and reproductive behavior of the Sanje Mangabey Abundance and distribution of key primate species: Udzungwa Red colobus, Black and White colobus, Sanje Mangabey, Sykes Monkeys	Flagship species for the ecosystem health Long term data needed for their sustainable management Role in seed dispersal and forest regeneration?	Very High Very High
4	Forest avifauna	Assessment of habitat requirements of forest birds with special focus on Rufous Winged Sunbird	This bird is rare and endemic rare and endemic but with unknown ecological status	Medium
5	Medicinal plants	Assessment of the medicinal values of selected plant species	The park is thought to be rich in these plants but there is no documentation	Very High
6	Invasive species	Assessment of exotic plants dispersal and their ecological impacts Study on effective control options for invasive plants	Need data on impact of invasive plants in the Park and their effective control options	Very High

	ISSUE	TOPIC	Justification	PRIORITY
7	Tourism and local economy	Assessment of impacts and potentials of tourism on the local economy	Need to explore better utilization of tourism opportunities by the local community	Medium
8	Fire ecology	Impact of fire on vegetation and biodiversity in general Forest woodland and cover	There is reduced forest cover due to fires. Data needed to facilitate proper fire management	High
14	Status of medium and large animals	Seasonal distribution and abundance of elephants, forest buffaloes, antelopes, and carnivores	These are poorly understood	Medium
15	Long Term Impacts of Community Based Conservation initiatives	Evaluation of the effectiveness, opportunities, challenges and Policy Implications of Outreach Programme (CBC)	Information needed to improve TANAPA's outreach program	High

RESEARCH PRIORITY AREAS FOR THE WILDLIFE DIVISION (WD)

1. Assessment of best practices in combating poaching in Tanzania

2. Assessment of the potential significant impact of mining (Oil, gas, uranium) to the conservation of wildlife resources in Selous Game Reserve.

3. Mitigation measures of problem and dangerous wildlife animals in adjacent areas

4. Impact of revenue (25%) contribution ploughed back to the communities

5. Assessment of potential wildlife corridors in Tanzania

6. Population status of sitatunga in western Tanzania

7. Impact of invasive alien plant species to the game reserves in Tanzania.

RESEARCH PRIORITY AREAS FOR NGORONGORO CONSERVATION AREA (NCAA)

1) Wildlife-livestock interaction with emphasis on animal diseases.

2) Crop production as an integral part of NCA resident's economy and its impact on the ecosystem integrity.

3) Population ecology of hippos and their grazing impacts in the Ngorongoro crater.

4) Human-induced impacts on the environment (both tourists and local inhabitants).

5) Possibilities and consequences of wildlife translocations, in particular elephants, rhinos and lions.

6) The socio-economic and ecological effects of increasing trend of tourists accommodation facilities in and around NCA.

7) The ecology and control measures of unpalatable grass species such as *Eleusine jaegeri*.

8) The ecology and control measures of alien and invasive plant species in the NCA.

9) The use of fire in the rangeland management.

10) Assessment of the quantity and quality of pasture in NCA in order to determine the optimal stocking rates for sustainable livestock production.

11) Identification of species and livestock breeds most suited to NCA local conditions.

12) Studies of disease resistance, immunity development and economics of mixed production.

13) Cost-benefit analysis and the ecological implications of hardening (i.e. tarmac versus gravel pavement) of major roads in the NCA.

14) Tourist satisfaction, views and attitudes on services provided by NCA.

15) Sustainability and livelihood diversification among the Maasai of NCA.

16) Demographic and socio-economic factors influencing the welfare of the Maasai communities in the NCA.

17) The socio-economic and ecological impacts of restocking in NCA.

18) The ecology and conservation aspects of Lerai *Acacia xanthoploea* Forest in the Ngorongoro Crater.

19) Documentation of indigenous knowledge that supports the management of NCAA objectives.

20) The quantity, quality, requirements and sustainable utilization of water resources in NCA.

21) The impact of climate change on the biodiversity

22) Human-elephant conflicts in agricultural communities neighbouring NCA.

RESEARCH PRIORITY AREAS FOR BEEKEEPING

A: Beekeeping Development Programme

1) Assess markets and marketing of bee products.
2) Assess productivity and quality of bee products in terms of ecological zones, tree species, bee species and hives as a basis for setting national standards.
3) Identify uses of different bee products (honey, beeswax, royal jelly, propolis etc).
4) Estimate the value of bee products and beekeeping resources lost through illegal activities.
5) Identify ex-situ bee forage systems (monoculture or beekeeping/agroforestry arrangements).
6) Assess gender roles in beekeeping.
7) Survey of indigenous knowledge on beekeeping.
8) Assess private sector involvement in beekeeping.
9) Identify and design appropriate beekeeping equipment.
10) Assess best beekeeping practices in different ecological zones.
11) Assess the value of various land-use and land suitability options for beekeeping.
12) Survey biodiversity of bees and bee plants.
13) Assess bee behavior, breeding and morphology (stingless and stinging bees).
14) Assess impact of disease, pest/pesticides and predators on bee products productivity.
15) Assess the effects of climate change on Beekeeping activities and the environment in general and mitigations recommended for various scenarios,
16) Intergrate Beekeeping activities in REDD and identify mechanism to access carbon credit and trade for different stakeholder groups

B: Legal and Regulatory Framework Programme

1) Survey, analyze and develop criteria and indicators for sustainable bee resource management.
2) Survey, analyze and develop national sector specific guidelines for environmental impact assessment.
3) Setting quality standards and guidelines for Bee products

C: Institution and Human Resources Programme

1. Evaluate Beekeeping contribution to the livelihood of communities, food security, GDP and their incorporation into the national accounting system,
2. Assess population densities or abundance of honeybee colonies and bee fodder plants in Tanzania,
3. Identify appropriate and efficient extension services.
4. Identification of human resource need in the sector.