

UGANDA WILDLIFE AUTHORITY



MONITORING AND RESEARCH PLAN

2003 - 2008

FOREWORD

Wildlife management world over continues to pose challenges to wildlife managers and policy makers. To confront such challenges, we need to base our management decision-making on valid and relevant information. Such information can be got from scientific research and continued monitoring of management activities and trends in issues that affect wildlife resources.

One of the main functions of Uganda Wildlife Authority (UWA) is to promote use of scientific researched information in wildlife management in the country. The framework to achieve this is provided in both the Uganda Wildlife Act (2000) and the Wildlife Monitoring and Research Policy (1999).

It is our desire to promote research and monitoring that is relevant to addressing conservation needs and threats to protected areas, thus contributing to meaningful wildlife conservation and management approach.

This Monitoring and Research Plan was developed based on the current and potential threats to Uganda's wildlife. It identifies monitoring parameters and management oriented research program based on the identified threats to measure management effectiveness in reducing or mitigating the identified threats. The actions are geared towards the reduction on the identified threats over the next five years.

Preparation of this plan was through a consultative approach involving UWA staff and various partners in areas of research and monitoring. We are indebted to the Wildlife Conservation Society (WCS) that significantly contributed technical and financial resources in production of the production this plan. It is my sincere belief that this plan, if implemented, will guide the conservation and management of our protected areas and I call upon all our stakeholders to support its implementation. I now call upon the Protected Area managers and entire UWA staff to commit themselves to the implementation of this Monitoring and Research Plan.

Dr. Arthur R. Mugisha
EXECUTIVE DIRECTOR
UGANDA WILDLIFE AUTHORITY

ABBREVIATIONS AND ACRONYMS

AOP	Annual Operations Plan
AWF	African Wildlife Foundation
BINP	Bwindi Impenetrable National Park
BMCA	Bwindi/Mgahinga Conservation Area
BMWR	Bokora-Matheniko Wildlife Reserves
CA	Conservation Area
CBDC	Community Based Data Collection
CPI	Community Protected Area Institution
CW	Chief Warden
DBH	Diameter at Breast Height
DFO	Director Field Operations
DTBDP	Director, Tourism, Business Development and Planning
ECOTRUST	Environmental Conservation Trust
ED	Executive Director
EIA	Environmental Impact Assessment
FACE	Forests Absorbing Carbon Dioxide Emissions
GIS	Geographic Information System
GPS	Global Positioning System
HEP	Hydro Electric Power
HQ	Headquarters
HUGO	Human Gorilla conflict resolution
ICDP	Integrated Conservation & Development Programme
IGCP	International Gorilla Conservation Programme
ITFC	Institute of Tropical Forest Conservation
KCA	Kibale Conservation Area
KNP	Kibale National Park
KVCA	Kidepo Valley Conservation Area
KVNP	Kidepo Valley National Park
KWS	Kenya Wildlife Service
LMCA	Lake Mburo Conservation Area
LMNP	Lake Mburo National Park
M & R	Monitoring and Research
MECA	Mount Elgon Conservation Area
MENP	Mount Elgon National Park
MFCA	Murchison Falls Conservation Area
MFNP	Murchison Falls National Park
MGNP	Mgahinga Gorilla National Park
MIKE	Monitoring Illegal Killing of Elephants
MIST	Management Information System
MOU	Memorandum of Understanding
MRU	Monitoring and Research Unit
MUBFS	Makerere University Biological Field Station
NEMA	National Environment Management Authority
NGO	Non Governmental Organisation
NTFP	Non Timber Forest Products
PA	Protected Area

PAMSU	Protected Area Management for Sustainable Use
PUWR	Pian Upe Wildlife Reserve
QECA	Queen Elizabeth Conservation Area
QENP	Queen Elizabeth National Park
QEPA	Queen Elizabeth Protected Area
RBDC	Ranger Based Data Collection
RMNP	Rwenzori Mountains National Park
RS	Resource Sharing
SNP	Semuliki National Park
SRF	Systematic Reconnaissance Survey
T/SWR	Toro/Semuliki Wildlife Reserve
TANAPA	Tanzania National Parks
TBDP	Tourism, Business Development & Planning
TRA	Threat Reduction Assessment
UPDF	Uganda Peoples Defence Forces
UWA	Uganda Wildlife Authority
WCC	Warden Community Conservation
WCS	Wildlife Conservation Society
WLE	Warden Law Enforcement
WMR	Warden Monitoring & Research
WR	Wildlife Reserves
WT	Warden Tourism

EXECUTIVE SUMMARY

This five-year plan has been developed as a practical document for enhancing implementation and application of monitoring and research in UWA's management actions with regard to wildlife conservation in Uganda. Since 1999, when the Monitoring and Research Policy for UWA was developed, a number of changes have taken place in wildlife conservation sector. Wildlife population status and distribution has changed, human population has been increasing leading to habitat encroachment/degradation and extensive dependency on wildlife products for both subsistence and economic gains. As a result the magnitude, the extent and nature/type of wildlife threats vary from time to time depending on the management approaches/interventions in place to address the threats. Ultimately a better understanding of the ecological and social economic dynamics that influence wildlife conservation in Uganda is very much needed for UWA to obtain information that would enable appropriate and relevant application of ecological and economical principles in wildlife management.

Notably, Uganda Wildlife Authority has a Strategic Plan that guides management of Uganda's protected areas and wildlife. Monitoring and Research is one of the strategic programmes in the strategic plan. The programme is aimed at supporting the organization in achieving its mission by providing broadly based, scientifically sound information on the state of the protected area system and the impact of management. UWA prepares Annual Operations Plans based on the Strategic Plan and General Management Plans. Implementation of the monitoring and research strategic programme follows the AOPs. UWA developed MIST to help in monitoring implementation of activities planned, budgeted for and scheduled in the AOP as well as monitoring and evaluating management performance through measuring indicators defined during the Annual Operations Planning. MIST, a management tool is meant to support implementation of the monitoring and research strategic programme. It is used to process, store and disseminate information. Therefore it facilitates provision of up-to-date information to the management needed for planning, decision making and evaluation of intervention measures in protected area management.

Wildlife conservation approaches need to be adaptive due to changes in the political and social economic sectors, which in turn influence/cause changes in policies leading to transformation of ecological systems. Information is necessary to be able to adapt to the changes and modify conservation strategies and as a result UWA embarked on developing this M&R plan. The plan is a component and product of a three year process aimed at supporting and enhancing conservation and management of wildlife in Uganda through improved and strengthened application of monitoring and research. The process benefits from technical and financial support of WCS where as implementation programmes developed through the process benefits from technical and financial support of a wide scope of partners namely; MIKE, IGCP, ITFC, AWF, ECOTRUST and many others.

This plan recognises the importance of UWA's management strategies aimed at reducing the threats to conservation targets. Its development used a process that focussed on developing monitoring parameters and research priorities that would help UWA address the major threats to conservation at each protected area. The approach used is called the Threat Reduction Assessment (TRA) technique, which is a tool used to determine the success/failure

of a PA management intervention. The process started with a workshop of key UWA personnel involved in implementation of the monitoring and research policy from the level of the Executive Director to the level of a warden together with some key partners at National and Regional level. The participants were introduced to TRA technique and its application in protected area management. The plan is divided into four parts namely; introduction, the process of developing the Monitoring and Research Plan, implementation of the plan and a series of annexes showing the actual monitoring plan table, research priority topics, training needs assessment and a list of equipment needed to implement this plan. Separate annexes showing monitoring and research plans for each protected area have been prepared as separate documents. The plan provides an overall description of the approach used and out lines the technical basis for management implementation. Much of the plan is devoted to profiling the identified threats, focusing on the specific parameters and indicators to measure, method of data collection and reviewing of use of the findings/reports. The most important element of the plan is that it is based on the information regarding current and potential threats in order of their importance to each area as presented by the field staff.

Implementation of this plan will follow the Annual Operations Planning Cycle used in UWA. Implementation will begin with a process of training and setting up MIST in all the seven CAs so that majority of the staff involved in implementation of monitoring and research programs are able to understand and use MIST. Evaluation of this plan will be done after three years using the TRA. There is some support from WCS to kick start implementation of some aspects of the plan. The plan will also benefit from the World Bank PAMSU support to UWA for some basic equipment in protected areas. Further funding support is expected from UWA partners like IGCP, AWF, MIKE and many others.

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1.0 INTRODUCTION.

1.1 Policy and Legislation

Uganda Wildlife Authority is mandated to manage wildlife in Uganda. Her mission statement is “To conserve and sustainably manage the wildlife and Protected Areas of Uganda in partnership with neighbouring communities and other stakeholders for the benefit of the people of Uganda and the global community”.

Uganda Wildlife Authority developed a Strategic Plan, which outlines a number of strategic programmes that were developed to enable UWA achieve its mission and address the major issues identified. Monitoring and Research is one of the strategic programmes identified in the Strategic Plan and one of its strategic objectives is to support the mission of the organisation by providing broad-based, scientifically sound information on the state of the Protected area system and the impact of management programmes. The implementation of this strategic programme is guided by the 1999 Monitoring and Research Policy

The 1999 Monitoring and Research policy overall goal is “To provide relevant, accurate and timely information that will improve the capacity of UWA to conserve and sustainably manage wildlife resources and biodiversity inside and outside Protected Areas under its jurisdiction for the benefit of the present and future generations of Ugandans and the global community”. The policy seeks recognition of the importance of monitoring and research in providing information to the wildlife managers and policy makers. As one of the strategies for implementation of the above policy statement, the monitoring and research policy highlights the need to support and undertake monitoring and research as identified and prioritised. The policy outlines the importance of data management, benefit and resource/information sharing and collaboration with partners in monitoring and research. The policy thus provides a framework for developing Monitoring and Research Plans.

1.2 The Need for Monitoring and Research

Monitoring and evaluation of progress are integral parts of the protected area management. If there is no monitoring of actions taken in conservation then it is very difficult to judge whether conservation strategies are really effective or not. Few protected area management authorities in the world have a monitoring system that aims to evaluate progress at all levels of management, although many have monitoring programmes in some of their protected areas. This plan outlines the strategy UWA will be using to monitor and research on threats affecting protected areas and wildlife in Uganda, and evaluate the progress in reducing the threats in any given period.

Due to years of civil war and insecurity, management of protected areas in Uganda was largely reduced to anti-poaching and policing measures. Wildlife population status and distribution has been changing, human population has been increasing leading to habitat encroachment and extensive dependency on wildlife products for both subsistence and economic gains. As a result, the magnitude, the extent and nature/type of wildlife threats vary from time to time depending on the management approaches/interventions in place to address the threats. Consequently

there has been changes in policies, ecological systems and size of habitat leading to changes in management approaches.

In view of the above mentioned circumstances, a better understanding of the ecological and social economic dynamics that influence wildlife conservation in Uganda is essential for UWA to obtain information that would enable appropriate management approaches in wildlife management.

Considering the above scenario, UWA embarked on developing a monitoring and research plan to support management in generating information for planning, decision making and evaluating management effectiveness. The plan is the first component and product of a three year process aimed at supporting and enhancing conservation and management of wildlife in Uganda through strengthened application of monitoring and research. The process benefits from technical and financial support of McArthur Foundation through the WCS where as implementation programmes developed through the process also benefit from technical and financial support of a wide scope of partners namely; MIKE, IGCP, ITFC, AWF, ECOTRUST and others.

Monitoring and Research is one of the strategic programmes in the UWA Strategic Plan (2002 - 2007). The programme is aimed at supporting the organization in achieving its mission by providing broadly based, scientifically sound information on the state of the protected area system and the impact of management. The Monitoring plan uses the premise that many of the activities that UWA undertakes involve reducing threats to the conservation of its protected areas and wildlife. In order to be able to assess whether conservation strategies are being effective there is a need to monitor the level and impacts of threats at a site level and subsequently adapt management strategies where they are less effective. UWA developed MIST, with support from GTZ, to enable and support implementation of the strategic programme within the Strategic Plan. MIST consists of three logical units: a database and database server software, application processing libraries and a graphical user interface and it provides information generated by processing data entered from the field. Fast and accurate data entry is guaranteed through data download and use of look up tables for data entry. Standardised data sheets were developed for recording of ecological data, data on illegal activities collected by rangers, air patrol data, visitor statistics data collected at park gates and data on resource harvest collected by local communities. Annual operations planning and monitoring and evaluation of implementation of plans are also handled by MIST. Much of the current monitoring plan aims at using MIST to store and analyse data collected in the field.

UWA now has wardens in charge of monitoring and research in all conservation areas in Uganda. The duties of these wardens among others are to identify monitoring and research priorities that address the main threats to the Protected Areas, and, develop and ensure implementation of monitoring and research programmes in PAs. In addition, they are responsible for the Management Information System (MIST) that has been developed in UWA and for undertaking analyses of the data coming into MIST and its dissemination to different users of information.

However, there has been lack of capacity of the UWA staff, to ensure that the monitoring and research undertaken in PAs addresses major threats to conservation

and can be effective at guiding and strengthening management actions aimed at controlling these threats. In order to fill the existing gaps UWA started a three year process aimed at supporting and enhancing conservation and management of wildlife in Uganda through strengthened application of monitoring and research. The process is meant to achieve the following objectives;

- Elevating the importance of monitoring and research within the management of UWA so that all staff are aware of its importance in wildlife conservation and ensuring that monitoring and research activities become integral parts of the management of protected areas in Uganda.
- Developing the capacity of UWA HQ M&R staff to develop and implement monitoring and research programmes.
- Developing and supporting implementation of monitoring and research programs for all Protected Areas.
- Supporting UWA's training programme for data entry into MIST and to undertake more complex analyses of these data. Developing the capacity of Wardens for M&R in using and handling data collection equipment, computers and data analyse and dissemination. Providing some basic equipment to enable staff to undertake activities in the field.
- Providing a summary of past research that has been undertaken in each of the wildlife PAs in Uganda in order to update the library at UWA HQ and ensure completion of data entry into the Research Project Management Database.

1.3 Process of developing the Monitoring and Research Plan

The process of developing the Monitoring Plan started with a stage setting workshop held at the Makerere University Biological Field Station (MUBFS) in Kibale Conservation Area in December 2002. The workshop brought together key UWA personnel involved in implementation of monitoring and research programmes including the UWA Executive Director, Directors, staff from the Department of Tourism, Business Development and Planning (TBDP), Chief Wardens, Wardens Monitoring & Research and Law Enforcement from all the seven CAs and partners from research institutions and NGOs like ITFC, MUBFS, IGCP & WCS. Representatives from sister organisations in East Africa (KWS & TANAPA) also attended the workshop. During the workshop, presentations on how and where findings from monitoring and research have been used to change management actions were made for the participants to appreciate the importance of monitoring and research.

The participants were also introduced to the Threat Reduction Analysis (TRA) technique as a tool used to determine the success/failure of a PA management intervention. Following this presentation, the workshop then identified key threats affecting each of the protected areas. Monitoring parameters/indicators and research topics to address each of the identified threats for each protected area were also identified. These were later finalised by field staff in the workshops held at individual CAs. At the end of the workshop, training needs for UWA staff involved in implementing the monitoring and research programmes at different levels were

identified. Proceedings of the workshop including papers presented were compiled into a report sent to all Chief Wardens.

The next step after the workshop was a process of refining the threats and developing concrete monitoring parameters and indicators that would form part of the UWA Ecological Monitoring Plan. Since there was limited representation of all PAs at the December Workshop, it was agreed that MRU staff with technical input from WCS should visit each CA to further refine and update threats for each PA in the Conservation Area. Consequently, workshops were held in all CAs between March and April 2003 at which all CA senior staff, selected members of junior staff involved in monitoring and research activities, researchers and other partners came together to identify real threats for each PA. They also prioritised these threats in terms of their overall impact, identified monitoring parameters and their indicators for each threat, and outlined possible research topics to address identified threats. Each CA also came up with a draft Monitoring Plan showing threats, monitoring parameters and their indicators, methods of data collection and who is responsible at the PA level to ensure that data is collected. Training needs for staff involved in implementing the monitoring and research activities in PAs were also identified including lists of equipment needed for the implementation of the monitoring plan. The threats, current UWA strategies, monitoring parameters and research topics for each PA are presented as a separate annexe to this Plan.

2.0 THE MONITORING PLAN

The plan provides an overall description of the approach used and outlines the technical basis for management implementation. Much of the plan is devoted to profiling the identified threats, focusing on the specific parameters and indicators to measure, method of data collection and reviewing use of the findings/reports. The most important element of the plan is that it is based on the information regarding current and potential threats in order of their importance to each area as presented by the field staff.

From the different monitoring plans for the different PAs, it was evident that there were some common threats which are crosscutting namely poaching, encroachment, wild fires, plant resource harvesting, human-wildlife conflicts, to mention but a few. Monitoring parameters and indicators for crosscutting threats that varied from Conservation Area to Conservation Area were standardised so as to come up with a general monitoring and research plan for UWA. Also monitoring parameters and indicators for threats specific to individual PAs appear in both the UWA general plan and plans for specific PAs. Plans for each CA are presented as a separate Annex to this Plan. The plan is divided into four parts namely; introduction, the Monitoring and Research Plans (including tables for monitoring plan and research topics), implementation of the plan and a series of annexes. Separate annexes showing monitoring and research plans for each protected area have been prepared as separate documents. The Monitoring Plan (Table 1) is structured in a table form to show the threat to be addressed, the current strategy UWA is using to address the threat, what should be monitored (parameter and indicator(s)) and the data collection and analysis methods to be used. It is divided into three parts. Part one is for the threats which are common to most of the PAs, part two is for the threats that

are specific to certain PAs while part three is for other parameters that will need to be monitored but which are not directly linked to specific threats. These include such parameters as key animal populations (large mammals, rare and endangered species and species of interest to management), visitors and visitor satisfaction, climate, habitat changes, use of migration corridors and regeneration of degraded areas where active restoration is taking place. It also includes a section on the review of findings in terms of when information is reported (how often) and who receives the report.

The plan identifies the roles of different staff from the Executive Director, through the Director Tourism, Business Development and Planning (DTBDP), Director Field Operations, the Chief Wardens and the different PA Wardens.

3.0 RESEARCH PRIORITIES

As for the Plan, research topics to address the identified threats for each protected area were identified and are presented in tabular form in Table 2. Similarly, research topics are divided into three categories; those that are for cross cutting threats and hence applicable to all or most protected areas, those that are specific to certain protected areas and those topics that are not necessarily tagged to specific threats but are of management significance such as Ecology of key animal species, biodiversity surveys and vegetation mapping.

Detailed research topics for each protected area have been included in the separate Annex of the Plans for each Conservation Area.

4.0 TRAINING NEEDS ASSESSMENT

To ensure that the plan being developed is implemented, current training needs for staff involved in the implementation of monitoring and research activities were assessed. Training need were identified for both rangers and wardens and these were found to be cross cutting for all protected areas. Generally, rangers need skills in using GPS, compass, knowledge of how to record data on standard data sheets, basic computer knowledge, basic data entry in MIST, knowledge in species identification and communication skills. For wardens, a questionnaire was designed on knowledge of computer and computer packages like Microsoft Word, Excel, PowerPoint and MIST. They were also asked about their knowledge in statistical analyses like how to calculate means, standard error of a mean, Chi²-Test, T-test, Mann Whitney U-test, Correlation and regressions.

For wardens, majority of them (about 80%) can use a computer and have used Microsoft Word though they would need further training in using advanced features of Word like inserting pictures, generating a table of contents and others. Very few wardens (less than 15%) can use Excel and PowerPoint. Training in both packages is essential for all wardens. All Wardens Monitoring and Research have been trained in the use of MIST and these are expected to train other wardens in the use of MIST. For statistical analyses, majority of the wardens can only calculate the mean. Training in all statistical analyses is also necessary for all wardens. A summary of training needs for both rangers and wardens involved in implementation of this plan is presented in Annex 1.

In addition to training needs for staff, it was noted that there is already some limited equipment in some protected areas. A list of what equipment is needed in each protected area for proper implementation of this plan is indicated in Annex 2. The cost of many of this equipment is not much since some PAs already have basic equipment for monitoring and research.

5.0 IMPLEMENTATION OF THE M&R PLAN

The UWA Strategic Plan (2002 –2007) is reviewed on an annual basis. Based on the strategic plan and management plans, UWA prepares AOPs to guide implementation of the strategic programmes. During the process of Annual Operation Planning, indicators are determined that would be measured to evaluate implementation and management performance. Implementation of the plan will follow AOPs as far as possible. Implementation of the plan by various categories of UWA staff and it's partners will be based on roles and responsibilities as identified and indicated in the plan. UWA has a staffing structure in place (Annex 4) to implement this plan as shown by the roles and responsibilities of various staff right from the Executive Director to the ranger. As far as implementation of this plan is concerned roles of various staff are clearly indicated in Table 1. For priority research topics, implementation will involve co-ordination and collaboration with partners like individual researchers or research institution or agencies at national, regional and international levels. The UWA Website and current independent researchers working in UWA's protected areas will be used to market the research priorities to a wider audience including sending priority research topics to universities abroad.

As already mentioned, implementation of this plan will follow the AOP cycle used in UWA. Specific activities will be picked out and included in the AOPs of PAs and MRU at UWA Headquarters. Implementation of the plan for the first three years will be as follows;

The first year will be devoted to the process of training and resource mobilisation for implementing specific activities. Training in use of MIST has already been done for all wardens of Monitoring and Research. A follow up training in use of MIST at PA level will be done for the different categories of staff. This is to ensure good data collection and quality control at PA level, which are crucial to producing quality outputs from MIST. Since MIST is still being upgraded, it is envisaged that by the end of the first year, all upgrades and problems with MIST will have been solved and MIST installed and working smoothly in all the seven CAs. CBDC will also be developed fully and integrated in MIST by the end of the first year of this plan implementation.

During the second year of plan implementation, all PAs will be generating reports as per the Monitoring Plan. Training in other forms of monitoring (such as ground and aerial surveys, forest census techniques and other specialised forms of monitoring) will be done and surveys done in selected protected areas.

In the third year of plan implementation, the first evaluation of the plan using the TRA will be done to ascertain whether this plan is having an impact in reducing the P threats. In light of the assessment, the monitoring parameters and indicators will be revised if it necessitates so.

It is worthwhile noting that there is some funding support from the John D. and Catherine T. McArthur Foundation through the Wildlife Conservation Society (WCS) to support implementation of certain aspects of this plan. IGCP and AWF are also funding some programmes in the plan particularly in the BMCA. This plan will also benefit from the World Bank PAMSU support to UWA for some basic equipment in protected areas. There are still big funding gaps and UWA wish to take advantage of collaboration and support of its partners to raise funds required to implementation the plan. Generally UWA's momentum is based on close collaboration and joint implementation of this plan with is partners and thus circulates the plan for information and consideration for technical and financial support.

TABLES

1 The Monitoring Plan

(a) Threats common to most or all protected areas

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
Poaching	<ul style="list-style-type: none"> • Patrols • Arrests and prosecution • Sensitization • Benefit sharing • Intelligence gathering 	<ul style="list-style-type: none"> • Frequency of poaching incidences • Large mammal population size • Extent of poaching • Origin of poachers 	<ul style="list-style-type: none"> • No. poachers arrested/month • No. prosecutions/month • No. of snares and carcasses /km walked/month/ sector of PA • No. armed exchanges with poachers/month • No. reports of poaching activities by local communities/month • Mammal density • GPS points of poaching activity 	<ul style="list-style-type: none"> • RBDC • Reports by WLE • RBDC • Reports by WLE • CBDC • Aerial/transect surveys • RBDC • Reports 	<ul style="list-style-type: none"> • Routine • Monthly • Routine • Monthly • 1/week • Every 2-5 years • Routine • Routine 	<ul style="list-style-type: none"> • MIST • Summary • MIST • Summary • MIST • DISTANCE analyses • MIST • Summary 	<ul style="list-style-type: none"> • WLE • WLE • WLE • WLE • WCC • MRU/WMR • WLE • WLE 	<ul style="list-style-type: none"> • Monthly at PA level • Quarterly to HQ • When completed • Monthly at PA level • Quarterly to HQ 	<ul style="list-style-type: none"> • Chief Warden • DFO • ED • Chief Warden • DFO

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
			<ul style="list-style-type: none"> Who poaches and where they come from 						
Encroachment	<ul style="list-style-type: none"> Mapping Boundary marking and maintenance Eviction where present Sensitization 	<ul style="list-style-type: none"> Extent of encroachment Incidences of boundary marker removal 	<ul style="list-style-type: none"> Area encroached/month/sector GPS locations of encroachment No. boundary markers removed 	<ul style="list-style-type: none"> WMR RBDC RBDC/CBDC 	<ul style="list-style-type: none"> When located Routine Daily/weekly 	<ul style="list-style-type: none"> MIST MIST Summary of incidences 	<ul style="list-style-type: none"> WMR WLE WLE 	<ul style="list-style-type: none"> Monthly at PA level Quarterly to HQ 	<ul style="list-style-type: none"> Chief Warden DFO
Fire	<ul style="list-style-type: none"> Fire fighting Fire breaks Early burning (savanna parks) Fire management plans Sensitization 	<ul style="list-style-type: none"> Incidences of fire Extent of fire Vegetation change Community response 	<ul style="list-style-type: none"> No. fires/month Area burnt/month and its location Habitat area on satellite/aerial images No. community members participating voluntarily/fire outbreak 	<ul style="list-style-type: none"> RBDC Mapping by eye and GPS Satellite image analysis WCC reports 	<ul style="list-style-type: none"> Routine When fires occur Every 10 years Monthly 	<ul style="list-style-type: none"> MIST MIST/ARCVIEW Image analysis Summary 	<ul style="list-style-type: none"> WLE WMR MRU WCC 	<ul style="list-style-type: none"> Monthly at PA level Quarterly to HQ When takes place Monthly at PA level Quarterly to HQ 	<ul style="list-style-type: none"> Chief Warden DFO ED Chief Warden DFO
Grazing	<ul style="list-style-type: none"> Patrols Arrests and prosecution Fines 	<ul style="list-style-type: none"> Incidences of grazing Extent of grazing 	<ul style="list-style-type: none"> Size and no. herds encountered/month 	<ul style="list-style-type: none"> RBDC Reports from communities 	<ul style="list-style-type: none"> Routine Ad hoc 	<ul style="list-style-type: none"> MIST Summary 	<ul style="list-style-type: none"> WLE WLE 	<ul style="list-style-type: none"> Monthly at PA level Quarterly 	<ul style="list-style-type: none"> Chief Warden DFO

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
	<ul style="list-style-type: none"> Sensitization Demarcation of corridors (L. Mburo) 		<ul style="list-style-type: none"> No. arrests and fines / month Location of grazing incidences / month 					to HQ	
Illegal Plant Resource Harvesting	<ul style="list-style-type: none"> Patrols Arrests and prosecution Fines Sensitization Resource sharing (CPI) On-farm substitution 	<ul style="list-style-type: none"> Resources harvested Frequency of harvesting Where harvested 	<ul style="list-style-type: none"> Type of resources harvested/ month/ sector No. of people encountered or arrested /km walked/month No. harvesting signs /km walked/month GPS locations of sites 	<ul style="list-style-type: none"> RBDC RBDC RBDC RBDC 	<ul style="list-style-type: none"> Routine 	<ul style="list-style-type: none"> MIST 	<ul style="list-style-type: none"> WLE 	<ul style="list-style-type: none"> Monthly at PA level Quarterly to HQ 	<ul style="list-style-type: none"> Chief Warden DFO
Legalised Resource harvesting	<ul style="list-style-type: none"> Multiple use programmes MOUs On farm substitution Patrols 	<ul style="list-style-type: none"> Quantities harvested Regeneration Incidences 	<ul style="list-style-type: none"> No. bundles (or whatever unit is appropriate)/ harvest day/ licensed person No. stems per hectare of each plant species harvested 	<ul style="list-style-type: none"> CBDC WMR collects plot data RBDC 	<ul style="list-style-type: none"> Weekly 1/year Routine 	<ul style="list-style-type: none"> MIST Summary MIST 	<ul style="list-style-type: none"> WCC WMR MLE 	<ul style="list-style-type: none"> Monthly at PA level Quarterly to HQ Annual report Monthly 	<ul style="list-style-type: none"> Chief Warden DFO MRU Chief Warden

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
		of illegal activity in Multiple use zone	<ul style="list-style-type: none"> No. illegal activities encountered/ km walked 					<ul style="list-style-type: none"> at PA level Quarterly to HQ 	<ul style="list-style-type: none"> DFO
Human-Wildlife Conflict	<ul style="list-style-type: none"> Conflict Resolution Sensitization Problem animal control measures (fencing, trenches, scaring, vermin) Community Protected area Institution policy - CPI 	<ul style="list-style-type: none"> Incidences of crop-raiding/ injuries or death for each species Community attitudes and behaviour towards the PA Sites where raiding/ injuries occur 	<ul style="list-style-type: none"> No. of crop-raiding events and which species involved / month No. animals or people injured or killed/ month No. of park - related projects that people have volunteered to participate in GPS locations 	<ul style="list-style-type: none"> CPI Reports Surveys/ questionnaires Special ranger deployment 	<ul style="list-style-type: none"> Monthly Monthly 1/year When occurs 	<ul style="list-style-type: none"> Summary Summary Analysed and reported on Summary 	<ul style="list-style-type: none"> WCC WCC WCC WLE 	<ul style="list-style-type: none"> Monthly at PA level Quarterly to HQ Annual report 	<ul style="list-style-type: none"> Chief Warden DFO Chief Warden
Charcoal burning	<ul style="list-style-type: none"> Patrols Arrests and prosecution Fines Sensitization 	<ul style="list-style-type: none"> Incidences of signs of charcoal making 	<ul style="list-style-type: none"> No. charcoal kilns/ km walked/ sector No. arrests made / month 	<ul style="list-style-type: none"> RBDC Reports 	<ul style="list-style-type: none"> Routine monthly 	<ul style="list-style-type: none"> MIST Summary 	<ul style="list-style-type: none"> WLE WLE 	<ul style="list-style-type: none"> Monthly at PA level Quarterly to HQ 	<ul style="list-style-type: none"> Chief Warden DFO
Invasive and exotic	<ul style="list-style-type: none"> Eradication 	<ul style="list-style-type: none"> Coverage and 	<ul style="list-style-type: none"> Boundary of area covered 	<ul style="list-style-type: none"> Inventory and mapping 	<ul style="list-style-type: none"> Annually 	<ul style="list-style-type: none"> Synthesis and GIS analysis 	<ul style="list-style-type: none"> WMR 	<ul style="list-style-type: none"> Annual report 	<ul style="list-style-type: none"> Chief Warden

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
species	<ul style="list-style-type: none"> • Sensitization • Law enforcement 	<ul style="list-style-type: none"> • distribution • Species 	<ul style="list-style-type: none"> • by exotic species/ year • GPS locations of invasive or exotic plants/ year • Species involved/ year 						
Pitsawing	<ul style="list-style-type: none"> • Patrols • Arrests and prosecution • Fines • Sensitization 	<ul style="list-style-type: none"> • Incidences of pitsawing • Extent of pitsawing • Species harvested 	<ul style="list-style-type: none"> • No. fresh stumps /km /sector • GPS points • Species recorded • Arrests made/month 	<ul style="list-style-type: none"> • RBDC • RBDC • RBDC • Reports 	<ul style="list-style-type: none"> • Routine • Routine • Routine • Monthly 	<ul style="list-style-type: none"> • MIST 	<ul style="list-style-type: none"> • WLE 	<ul style="list-style-type: none"> • Monthly at PA level • Quarterly to HQ 	<ul style="list-style-type: none"> • Chief Warden • DFO
Waste Management (tourism and parks staff)	<ul style="list-style-type: none"> • Provision of waste disposal systems • Sensitization • Moving park HQ to park edge 	<ul style="list-style-type: none"> • Incidences of injuries due to litter • Frequency of litter collection and burning 	<ul style="list-style-type: none"> • No. animals injured or dying/month • No. of times litter burnt / month • No. of bins collected /month 	<ul style="list-style-type: none"> • WCC and WT works with staff/lodges to compile data 	<ul style="list-style-type: none"> • Monthly 	<ul style="list-style-type: none"> • summarised 	<ul style="list-style-type: none"> • WCC/WT 	<ul style="list-style-type: none"> • Monthly at PA level • Quarterly to HQ 	<ul style="list-style-type: none"> • Chief Warden • DFO

(b) Threats specific to certain protected areas

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
Water access (Mgahinga, Bwindi, Lake Mburo, Katonga, Kibale, Kidepo, Semuliki WR)	<ul style="list-style-type: none"> • MOUs • Patrols • Construction of water tanks (MGNP) • Sensitisation 	<ul style="list-style-type: none"> • Incidences of illegal entry to access water • Number of people and quantity of water collected (legal - MGNP) 	<ul style="list-style-type: none"> • No. of people arrested /month • No. of herds encountered /month. • No. of people collecting water/month (MGNP) • Volume of water collected /person/month 	<ul style="list-style-type: none"> • RBDC • RBDC • CBDC • CBDC 	<ul style="list-style-type: none"> • Routine • Routine • Routine • Routine 	<ul style="list-style-type: none"> • MIST • MIST • MIST • Summary reports • MIST • Summary reports 	<ul style="list-style-type: none"> • WLE • WCC/WLE • WCC/WLE 	<ul style="list-style-type: none"> • Monthly at PA level • Quarterly to HQ 	<ul style="list-style-type: none"> • Chief Warden • DFO
Road Kills (Kibale, QENP, MFNP, Ajai, Kabwoya/Kaisotonya, Lake Mburo)	<ul style="list-style-type: none"> • Signage /Speed limits • Sensitisation • Arrests & prosecution • Fines 	<ul style="list-style-type: none"> • Frequency of road kills • Species killed and locations 	<ul style="list-style-type: none"> • No. of cases recorded /month • No. of reports received /month • GPS locations of cases of road kills 	<ul style="list-style-type: none"> • RBDC • Reports • RBDC 	<ul style="list-style-type: none"> • Routine • When occurs • Routine 	<ul style="list-style-type: none"> • MIST • Summaries • MIST 	<ul style="list-style-type: none"> • WLE • WMR 	<ul style="list-style-type: none"> • Monthly at PA level • Quarterly to HQ 	<ul style="list-style-type: none"> • Chief Warden • DFO
Fishing (MFNP,	<ul style="list-style-type: none"> • Patrols 	<ul style="list-style-type: none"> • Incidences 	<ul style="list-style-type: none"> • No. of 	<ul style="list-style-type: none"> • RBDC 	<ul style="list-style-type: none"> • Routine 	<ul style="list-style-type: none"> • MIST 	<ul style="list-style-type: none"> • WLE 	<ul style="list-style-type: none"> • Monthly 	<ul style="list-style-type: none"> • Chief

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
Kibale, L. Mburo, Bwindi, Semuliki)	<ul style="list-style-type: none"> • Sensitisation • Arrests & prosecution • Liaison with Fisheries Dept. 	<ul style="list-style-type: none"> • of illegal fishing • Types and sizes of fish caught • Illegal fishing gears 	<ul style="list-style-type: none"> • people arrested /month • No. of illegal boats confiscated /month • Types and sizes of fish impounded per month • No. & size of illegal fishing gears confiscated /month 	<ul style="list-style-type: none"> • RBDC • RBDC • RBDC 		<ul style="list-style-type: none"> • Summary reports • Summary reports • Summary reports 		<ul style="list-style-type: none"> • at PA level • Quarterly to HQ 	<ul style="list-style-type: none"> • Warden • DFO
Fishing Villages (QENP, Semuliki WR, Kabwoya/Kaisotonya)	<ul style="list-style-type: none"> • Community sensitisation • Clear boundary demarcation • Resource sharing 	<ul style="list-style-type: none"> • Incidences of illegal activities • Intensity of demand for PA resources • Human population size in fishing villages 	<ul style="list-style-type: none"> • No. of arrests /month arising from illegal activities • No. of reports on resource demand /month. • No. of people/ household /year • No. of houses/yr 	<ul style="list-style-type: none"> • RBDC • Reports • Census 	<ul style="list-style-type: none"> • Routine • When occurs • 1/year 	<ul style="list-style-type: none"> • MIST • Summary • Summary 	<ul style="list-style-type: none"> • WLE • WCC • WMR/ WCC 	<ul style="list-style-type: none"> • Monthly at PA level • Quarterly to HQ 	<ul style="list-style-type: none"> • Chief Warden • DFO

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
Pollution (Katonga, QENP, LMNP, Kabwoya/Kaisotonya)	<ul style="list-style-type: none"> • Sensitisation • Collaboration with other stakeholders like NEMA and Research Institutions 	<ul style="list-style-type: none"> • Extent of pollution • Types of pollution • Water quality 	<ul style="list-style-type: none"> • Area affected by pollution /year • Type of pollutants encountered/ assessment • Density of indicator species/ assessment period 	<ul style="list-style-type: none"> • Surveys • Occasional surveys • Occasional surveys 	<ul style="list-style-type: none"> • Biannual 	<ul style="list-style-type: none"> • GIS analysis • Summary reports • Laboratory analysis 	<ul style="list-style-type: none"> • WMR • WMR • WMR 	<ul style="list-style-type: none"> • Monthly at PA level • Quarterly to HQ 	<ul style="list-style-type: none"> • Chief Warden • DFO
Poisoning of animals (L. Mburo, QENP, MFNP)	<ul style="list-style-type: none"> • Sensitisation • Investigation and postmortems 	<ul style="list-style-type: none"> • Frequency of cases • Species poisoned and their distribution in PA 	<ul style="list-style-type: none"> • No. of cases and species encountered/reported /month • GPS location 	<ul style="list-style-type: none"> • RBDC Reports • RBDC 	<ul style="list-style-type: none"> • Routine • When occurs 	<ul style="list-style-type: none"> • MIST • MIST 	<ul style="list-style-type: none"> • WMR • WLE 	<ul style="list-style-type: none"> • Monthly at PA level • Quarterly to HQ 	<ul style="list-style-type: none"> • Chief Warden • DFO
Oil Exploration (MFNP, Kabwoya/Kaisotonya, Semuliki WR, QENP, Ajai)	<ul style="list-style-type: none"> • Participate in EIA process • Lobbying 	<ul style="list-style-type: none"> • Compliance with EIA recommendations • Impact of operations on the PA 	<ul style="list-style-type: none"> • No. & type of breaches in relation to EIA committed per year • Area damaged by operations 	<ul style="list-style-type: none"> • Occasional surveys 	<ul style="list-style-type: none"> • Quarterly 	<ul style="list-style-type: none"> • Summary reports 	<ul style="list-style-type: none"> • WMR • CW 	<ul style="list-style-type: none"> • Annually to HQ 	<ul style="list-style-type: none"> • DFO

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
			/year <ul style="list-style-type: none"> No. of leaking points seen/ month 						
Fencing (MFNP, QENP)	<ul style="list-style-type: none"> Enforce EIA guidelines Sensitisation 	<ul style="list-style-type: none"> Incidences of damage /injury to wild animals Crossing of the fence by wild animals 	<ul style="list-style-type: none"> No. of cases of animals injured as a result of fencing /month No. & species of animals seen inside the fence/ month 	<ul style="list-style-type: none"> RBDC Reports 	<ul style="list-style-type: none"> Routine 	<ul style="list-style-type: none"> MIST 	<ul style="list-style-type: none"> WLE 	<ul style="list-style-type: none"> Monthly at PA level Quarterly to HQ 	<ul style="list-style-type: none"> Chief Warden DFO
Hydroelectric power development (Kabwoya/Kaisotonya , MFNP)	<ul style="list-style-type: none"> Participate in EIA process Lobbying 	<ul style="list-style-type: none"> Compliance with EIA recommendations Impact of operations on the PA Water quality and flow below the dam 	<ul style="list-style-type: none"> No. & type of breaches in relation to EIA committed per year Area damaged by operations /year Water level Water 	<ul style="list-style-type: none"> Occasional surveys 	<ul style="list-style-type: none"> Quarterly 	<ul style="list-style-type: none"> Summary reports 	<ul style="list-style-type: none"> WMR CW 	<ul style="list-style-type: none"> Annually to HQ 	<ul style="list-style-type: none"> DFO

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
			quality						
Small population in small area (BINP, MGNP)	<ul style="list-style-type: none"> • Zoning 	<ul style="list-style-type: none"> • Population sizes of key species • Vegetation changes 	<ul style="list-style-type: none"> • Density of key species • Habitat size, density, distribution & diversity including gap distribution, tree density, species diversity, gap size 	<ul style="list-style-type: none"> • Census /RBDC • Vegetation mapping 	<ul style="list-style-type: none"> • Every 2-5 years • 10 years 	<ul style="list-style-type: none"> • MIST, DISTANCE • Image analysis 	<ul style="list-style-type: none"> • WMR /ITFC • ITFC 	<ul style="list-style-type: none"> • Annually to both PA and HQ • When done 	<ul style="list-style-type: none"> • Chief Warden at PA level and DFO at HQ
Lack of regeneration (BINP, KNP)	<ul style="list-style-type: none"> • Habitat restoration • Law enforcement 	<ul style="list-style-type: none"> • Regeneration • Vegetation changes 	<ul style="list-style-type: none"> • No. per unit area of trees, poles, saplings • See small populations above for vegetation changes 	<ul style="list-style-type: none"> • Permanent plots (PSP sampling) • See above for small populations 	<ul style="list-style-type: none"> • 1/year 	<ul style="list-style-type: none"> • PSP analysis 	<ul style="list-style-type: none"> • ITFC (for BINP) & MUBFS (for KNP) 	<ul style="list-style-type: none"> • Annually to both PA and HQ • When done 	<ul style="list-style-type: none"> • Chief Warden at PA level and DFO at HQ
Insecurity/military activities (MFNP, QENP, MGNP, BINP, RMNP)	<ul style="list-style-type: none"> • Coordination with security agencies • Joint patrols (rangers and UPDF) 	<ul style="list-style-type: none"> • Incidences of insecurity in PA 	<ul style="list-style-type: none"> • No. of cases of insecurity recorded /month • No. of consultation/co- 	<ul style="list-style-type: none"> • Reports • Reports 	<ul style="list-style-type: none"> • When occurs • When occurs 	<ul style="list-style-type: none"> • Summary reports 	<ul style="list-style-type: none"> • WLE 	<ul style="list-style-type: none"> • Monthly at PA level, Quarterly to HQ 	<ul style="list-style-type: none"> • Chief Warden • DFO

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
			<ul style="list-style-type: none"> ordination meetings held /month No. of times armed security officers are caught involved in poaching per month 						
Transboundary issues (RMNP, KVNP, QENP, BINP, MGNP, MENP)	<ul style="list-style-type: none"> Participation in regional ICCN /ORTPN /KWS meetings Regional agreements between Uganda, DR Congo, Rwanda & Kenya 	<ul style="list-style-type: none"> Freq. of workshops/ meetings Transboundary movement of wild animals Frequency of regional collaborative programmes 	<ul style="list-style-type: none"> No. of workshops/ meetings held /year Species & no. of animals recorded crossing borders/ month No. of joint patrols per year 	<ul style="list-style-type: none"> Workshop proceedings RBDC Reports 	<ul style="list-style-type: none"> When it occurs Routine When it occurs 	<ul style="list-style-type: none"> Summaries MIST 	<ul style="list-style-type: none"> CW WMR 	<ul style="list-style-type: none"> Quarterly to HQ Monthly at PA level, Quarterly to HQ 	<ul style="list-style-type: none"> DFO Chief Warden DFO
Cattle rustling/ trespassing (KVNP, Matheniko, Bokora, Pian Upe)	<ul style="list-style-type: none"> Patrols Arrests and prosecution Sensitisation 	<ul style="list-style-type: none"> Incidences of trespassing Extent of damage by 	<ul style="list-style-type: none"> No. of times footmarks are encountered 	<ul style="list-style-type: none"> RBDC Reports 	<ul style="list-style-type: none"> Routine When it occurs 	<ul style="list-style-type: none"> MIST 	<ul style="list-style-type: none"> WLE 	<ul style="list-style-type: none"> Monthly at PA level, Quarterly to HQ 	<ul style="list-style-type: none"> Chief Warden DFO

Threat	Strategy to address threat	What is measured		Data collection and analysis				Review of findings	
		Parameter	Indicator	Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
		trampling	<ul style="list-style-type: none"> ed per month No. of arrests per month GPS locations Average width of illegal routes seen /month 						
Mining (QENP, Kidepo)	<ul style="list-style-type: none"> Ensure EIA is done Restoration of areas 	<ul style="list-style-type: none"> Sites and their sizes Distribution of mining sites 	<ul style="list-style-type: none"> No. of sites encountered/month Area of each pit/site GPS locations 	<ul style="list-style-type: none"> RBDC Special deployments 	<ul style="list-style-type: none"> Routine 	<ul style="list-style-type: none"> MIST 	<ul style="list-style-type: none"> WLE 	<ul style="list-style-type: none"> Monthly at PA level, Quarterly to HQ 	<ul style="list-style-type: none"> Chief Warden DFO
Lion predation of rare species (KVNP)	<ul style="list-style-type: none"> Keep rare species in an enclosure (BOMA) 	<ul style="list-style-type: none"> Incidences of predation Performance of the BOMA 	<ul style="list-style-type: none"> No. of predation cases /reported /month No. of times lions seen inside BOMA 	<ul style="list-style-type: none"> RBDC Systematic monitoring of BOMA 	<ul style="list-style-type: none"> Routine Routine 	<ul style="list-style-type: none"> MIST MIST 	<ul style="list-style-type: none"> WLE WMR 	<ul style="list-style-type: none"> Monthly at PA level, Quarterly to HQ 	<ul style="list-style-type: none"> Chief Warden DFO

(c) Additional monitoring parameters

Parameter	What is measured Indicator	Data collection and analysis				Review of findings	
		Method of data collection	Frequency of Collection	Method of analysis	Who is responsible	When Reported on	Who receives report
Key animal populations	<ul style="list-style-type: none"> • Animal densities • Wildlife distribution 	<ul style="list-style-type: none"> • Aerial & ground census (Savanna PAs) & Transect (forest PAs) • RBDC 	<ul style="list-style-type: none"> • Every 2-5 years • Routine 	<ul style="list-style-type: none"> • GIS, DISTANCE • MIST 	<ul style="list-style-type: none"> • MRU • WMR/WLE 	<ul style="list-style-type: none"> • When occurs • Monthly 	<ul style="list-style-type: none"> • ED • CW
Visitors and visitor satisfaction	<ul style="list-style-type: none"> • No. of visitors /month • Visitor attitude surveys 	<ul style="list-style-type: none"> • Gate records • questionnaire 	<ul style="list-style-type: none"> • Monthly • quarterly 	<ul style="list-style-type: none"> • MIST • Summary 	<ul style="list-style-type: none"> • WT • WT/WMR 	<ul style="list-style-type: none"> • Monthly • annually 	<ul style="list-style-type: none"> • DTBDP (HQ)
Climate (Weather)	<ul style="list-style-type: none"> • Rainfall amounts, temperature 	<ul style="list-style-type: none"> • Direct readings 	<ul style="list-style-type: none"> • Daily 	<ul style="list-style-type: none"> • Summary 	<ul style="list-style-type: none"> • WMR 	<ul style="list-style-type: none"> • Monthly (PA) • Quarterly (HQ) 	<ul style="list-style-type: none"> • CW • DFO
Habitat changes	<ul style="list-style-type: none"> • Habitat types • Area of each habitat type/10 years 	<ul style="list-style-type: none"> • Vegetation mapping • Satellite images & aerial photos 	<ul style="list-style-type: none"> • 10 years 	<ul style="list-style-type: none"> • Image analysis 	<ul style="list-style-type: none"> • MRU 	<ul style="list-style-type: none"> • When done 	<ul style="list-style-type: none"> • ED
Biodiversity of PAs	<ul style="list-style-type: none"> • Key indicator species like birds, butterflies, amphibians 	<ul style="list-style-type: none"> • Species inventory 	<ul style="list-style-type: none"> • 10 years 	<ul style="list-style-type: none"> • Trends in guilds 	<ul style="list-style-type: none"> • MRU 	<ul style="list-style-type: none"> • When done 	<ul style="list-style-type: none"> • ED
Regeneration of formerly degraded areas	<ul style="list-style-type: none"> • Growth rates per year 	<ul style="list-style-type: none"> • DBH measurements 	<ul style="list-style-type: none"> • Annually 	<ul style="list-style-type: none"> • DBH increment 	<ul style="list-style-type: none"> • MRU /FACE 	<ul style="list-style-type: none"> • Annually 	<ul style="list-style-type: none"> • ED
Use of migration corridor by animals (KNP)	<ul style="list-style-type: none"> • No. & species of animals using corridors 	<ul style="list-style-type: none"> • RBDC • Reports 	<ul style="list-style-type: none"> • When encountered/reported 	<ul style="list-style-type: none"> • Summary 	<ul style="list-style-type: none"> • WMR 	<ul style="list-style-type: none"> • Quarterly 	<ul style="list-style-type: none"> • CW • DFO

2. UWA Research Priorities

(a) Research Topics applicable to most PAs

Threat	Research Topics	PA where research is needed
Poaching	<ul style="list-style-type: none"> • Comparative analysis of disincentives and incentive methods of controlling poaching. • Effectiveness of UWA strategies to tackle poaching • Analysis of markets and the trade in bushmeat 	<ul style="list-style-type: none"> • All PAs • All PAs • All PAs,
Encroachment	<ul style="list-style-type: none"> • Investigating the effectiveness of restoration mechanisms in formerly encroached areas. 	<ul style="list-style-type: none"> • MGNP, KNP, MENP, T/SWR, MFCA
Wild fires	<ul style="list-style-type: none"> • Analysis of strategies to tackle fires in forest and savanna ecosystems • Use of fire as a management tool in savanna ecosystems (for savanna PAs) • Long-term impacts of fire on forest ecosystem dynamics (forest parks) 	<ul style="list-style-type: none"> • All PAs • All savanna PAs • Forested PAs
Grazing	<ul style="list-style-type: none"> • Potential of integrating livestock and wildlife in certain savanna protected areas 	<ul style="list-style-type: none"> • LMCA, QECA, Katonga WR
Wildlife diseases	<ul style="list-style-type: none"> • Epidemiology of common wildlife/livestock zoonotic diseases in and around PAs. 	<ul style="list-style-type: none"> • ALL CAs
Plant resource harvesting (legal & illegal)	<ul style="list-style-type: none"> • Resource regeneration rates and calculation of sustainable offtake levels • Identification of alternative resources/sources outside protected areas and analysis of potential for on-farm substitution. • Ecology of specific target resources. 	<ul style="list-style-type: none"> • All PAs
Human-wildlife conflicts	<ul style="list-style-type: none"> • Effectiveness of ICDPs in reducing human-wildlife conflicts around protected areas. • Socio-economic analysis of the human-wildlife conflicts around protected areas. • Analysis of potential barriers that could reduce raiding 	<ul style="list-style-type: none"> • MECA, QECA, BMCA, KCA • All PAs
Invasive & exotic species	<ul style="list-style-type: none"> • Inventory of exotic/invasive species in PAs • Feasibility of controlling invasive/exotic species in protected areas and possible 	<ul style="list-style-type: none"> • QECA, LMNP, MFCA, BMCA, KCA

	<p>eradication methods.</p> <ul style="list-style-type: none"> • Distribution and regeneration of exotic species and their impact on indigenous species 	
Pit sawing	<ul style="list-style-type: none"> • Effects of pit sawing on species regeneration, diversity and richness. • Economics of the timber trade locally to specific protected areas and analysis of alternatives 	<ul style="list-style-type: none"> • All Forested PAs
Waste management	<ul style="list-style-type: none"> • Effects of refuse/waste disposal on wild animals in PAs. 	<ul style="list-style-type: none"> • All PAs
Charcoal burning	<ul style="list-style-type: none"> • Impact of charcoal burning on biodiversity • Economics of the charcoal trade 	<ul style="list-style-type: none"> • All PAs

(b) Research topics that are PA specific

Threat	Research topics
Fishing in LMCA	<ul style="list-style-type: none"> • Potential of small water bodies in Lake Mburu National Park to provide sustainable fish harvest for local communities
Heavy metal pollution in QENP	<ul style="list-style-type: none"> • Revegetation/restoration of pyrite trails (degraded by acid mine run off) in QENP
Oil exploration in MFCA, QENP, SWR, AJAI WR	<ul style="list-style-type: none"> • Economic analysis of oil exploration/extraction in protected areas within the Albertine Rift.
Hydro Electric Power development in MFNP	<ul style="list-style-type: none"> • Economic analysis of HEP development in a protected area and its environmental impacts
Geothermal development in KVNP, SNP	<ul style="list-style-type: none"> • Economic analysis of Geothermal development in a protected area and its environmental impacts

(c) Other areas for research

- Ecology of animal species of conservation concern (topi, elephant, crocodile, large carnivores, shoebill stork)
- Biodiversity surveys in protected areas
- Vegetation mapping.

ANNEXES

1. Training needs of staff to involved in implementing M&R Plan

Rangers

- Use of GPS, compass and other M&R equipment
- Recording of data on data sheets
- Basic computer knowledge
- Basic data entry
- Sample collection methods
- Species identification
- Care and maintenance of M&R equipment
- Communication skills
- Report writing skills

Wardens

Monitoring and research is a crosscutting programme and will not be left to one monitoring and research warden in each protected area. This is evident from the monitoring plan in Annex 1. Each of the wardens requires particular skills in order to implement this monitoring and research plan. During the planning sessions skills were identified for each of the wardens and these have been summarised in the following table.

Skill	CW	WLE	WMR	WCC	WT	Wacc.
Computer	+	+	+	+	+	+
GPS	+	+	+	+	+	
MIST (general analysis)		+	+	+	+	
MIST USERS	+	+	+	+	+	+
Research methods, wildlife surveys	+	+	+	+		
Statistical methods (sampling techniques, analysis)			+			
EIA procedures	+	+	+	+	+	
Communication skills	+	+	+	+	+	
Conflict resolution	+	+	+	+	+	
GIS		+	+	+	+	

2. List of equipment needed to implement the M&R Plan in PAs.

Note that there is already some equipment in certain PAs.

Equipment List	CA where needed
Computer and Printer	KCA, KVNP, Rwenzori Mountains NP, all WRs
GPS units + accessories (downloading cable)	KVCA, Rwenzori Mountains NP, Other CAs need downloading cables
Binoculars	All PAs
Compasses	All PAs
Topographic maps	All PAs
Range finders	All PAs
Tape measures	All PAs
Tags	All PAs
Guide books	All PAs
Raingauges	All PAs
Thermometers	All PAs
Cameras	All PAs

3. PRIORITISED LIST OF THREATS FOR EACH PROTECTED AREA

THREAT	PRIORITY IN PA															
	MGNP	BINP	QEPA	RMNP	LMNP	KNP	SNP	MFCA	MENP	KVNP	AJAI	TSWR	PUWR	BMWR	KWR	KABW OYA
Poaching	1	1	2	1	1	1	3	1	4	2	2	2	1	2	3	2
Fires	2	3	1	9	4	3	9	3	5	1	4	3	5	3	8	4
Encroachment	3	6	12	2	9	-	4	4	1	3	1	7	4	4	2	1
Grazing	9	13	11	10	3	12	10	5	7	3	-	1	6	1	1	1
Human-wildlife conflicts	9	9	6	7	5	2	5	7	10	14	-	-	-	-	5	-
Diseases and pests	5	9	6	-	7	-	-	6	-	9	8	-	-	-	-	8
Exotic/invasive species	3	7	11	-	2	7	2	18	-	-	-	10	-	-	7	-
Illegal harvesting of resources	5	4	8	5	10	-	1	17	8	6	6	5	9	5	-	9
Unsustainable resource harvesting	5	7	-	-	8	-	-	2	3	-	-	-	-	6	-	-
Water collection	5	-	-	-	-	-	-	-	-	11	-	-	-	-	3	-
Tourism activities	11	9	-	5	13	-	-	-	-	-	-	-	-	-	-	-
Effect of past disturbances	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Timber harvesting	-	2	7	-	17	9	1	10	2	-	-	-	10	-	-	-
Charcoal burning	-	-	-	-	-	-	-	17	5	12	3	5	7	7	-	-
Infrastructure development	-	-	9	-	-	-	-	9	-	-	-	11	-	-	-	-
Fishing villages/settlements	-	-	5	-	-	-	-	-	-	-	5	6	-	-	-	3
Oil exploration	-	-	-	-	-	-	-	15	-	-	10	12	-	-	-	10
Reduction of game corridor	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-
Siltation	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	5
Colonisation of grassland	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-
Pollution	-	-	4	-	16	-	-	-	-	-	-	-	-	-	10	5
Illegal fishing	-	-	-	-	5	5	7	12	-	-	-	-	11	-	-	-
Soil erosion	-	-	-	-	15	-	8	-	-	-	-	-	-	-	-	-
Rattan cane harvesting	-	-	-	-	-	5	6	-	-	-	-	-	-	-	-	-

THREAT	PRIORITY IN PA															
	MGNP	BINP	QEPA	RMNP	LMNP	KNP	SNP	MFCA	MENP	KVNP	AJAI	TSWR	PUWR	BMWR	KWR	KABW OYA
Road kills	-	-	-	-	14	13	-	13	-	-	9	-	-	-	-	6
Impact of increasing elephant pop.	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Loss of home range	-	12	-	-	-	10	-	-	-	-	-	-	-	-	-	-
Bamboo harvesting	-	-	-	4	-	-	-	-	8	-	-	-	-	-	-	-
Concessionnaires	-	-	9	13	-	-	-	-	-	-	-	-	-	-	-	-
Transboundary issues	-	-	-	10	-	-	-	-	-	12	-	-	-	-	-	-
Illegal trade in animal species	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-
Waste disposal	-	-	3	-	13	-	-	11	-	7	-	-	--	-	-	-
Mining	-	-	10	-	-	-	-	-	-	10	-	-	-	-	-	-
Animal poisoning	-	-	-	-	12	-	-	-	-	-	-	-	-	-	-	-
HEP development	-	-	-	-	-	-	-	16	-	-	-	-	-	-	-	7
Fencing	-	-	-	-	-	-	-	19	-	-	-	-	-	-	-	-
Decentralisation	-	-	-	-	-	-	-	14	-	-	-	-	-	-	-	-
Military activities	12	-	13	-	-	-	-	7	-	-	-	-	-	-	-	-
Local political pressure	-	-	-	-	-	-	-	-	-	-	6	-	3	-	6	-
Trespassing	-	-	-	-	-	-	-	-	9	7	-	-	2	8	-	-
Predation by lions	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-
Collection of wildlife products	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-
Small population in small area	-	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unclear boundaries	-	-	-	-	-	-	-	-	-	-	-	4	8	-	2	-

4. UWA ORGANISATION STAFF STRUCTURE

Proposed UWA HQ Structure



