

Ecological Integrity

A draft assessment measured against key management targets for Serengeti National Park



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Measuring ecological integrity in Serengeti National Park: a preliminary analysis

The proposed *General Management Plan (GMP)* for Serengeti National Park and World Heritage Centre is based around meeting eight targets relating to biodiversity and ecological integrity. Key ecological attributes have been identified for each of these. Following workshops in Serengeti in December 2004 and Arusha in February 2005, a draft set of indicators were developed for measuring each of the targets. These were further developed into a measurable set of attributes, using a methodology drawn together in association with Parks Canada, The Nature Conservancy and UNESCO.

The methodology aims to provide Serengeti National Park management with a tool to help periodic reporting against the *GMP*. Indicators are measured at variable intervals; for instance water flow in the Mara River is measured automatically every half hour whereas vegetation in kopjes and populations of lions are surveyed every five years. Given that five years is the maximum time between surveying any indicators, we suggest that this might also be a realistic period for issuing an occasional "State of Ecological Integrity" report for Serengeti. Such a report should include detailed information on each of the indicators but also a summary of status and trends for policy makers and the general public, who will not have time to read the whole document.

The document might therefore consist of:

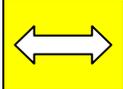
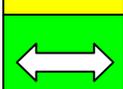
- ✓ Executive summary - status and trends of the eight indicators with brief assessment
- ✓ Overview of each target in term and a breakdown of status and trends of individual indicators
- ✓ Detailed section containing the data used in making the status and trend assessments
- ✓ Overview of other relevant research that has taken place in the park over the same period
- ✓ References and sources

The following document provides an initial attempt at the first two sections listed above, an executive summary and a breakdown of the indicators. It thus serves as a very preliminary baseline assessment to help put the *General Management Plan* into context.

It is hoped that a more detailed baseline assessment, with accompanying data, can be produced soon after completion of the *GMP* to serve as a baseline for continued monitoring.

Summary

Below is a summary of the biodiversity status and trends for the eight Conservation Targets developed which represent and capture the unique biodiversity of the Serengeti Ecosystem.

The Migration	
The Mara River	
Riverine Forest	
Acacia Woodland	
Terminalia Woodland	
Kopje Habitat	
Black Rhino	
Wild Dog	

The coloured boxes summarise the status, whilst the arrows summarise the trend (i.e. whether the condition is getting better or worse) and thus relates to the urgency of the management interventions.

Status

	Significant concern
	Caution: may be a developing concern
	Good: all appears to be fine

Trend

	Condition is improving
	Condition is unchanged
	Condition is deteriorating

Target 1: The Migration			
Indicator	Minimum integrity threshold	Status	Trend
Seasonal migratory movements	If there is a breakdown of traditional migratory routes	Concern	Unchanged
Population size of large ungulates	Major unexpected fluctuation	Good	Unchanged
Population size of key carnivores except lions	Major unnatural fluctuations	Good (But leopards not surveyed)	Unchanged
Population size of lions	Major fluctuations in populations	Good	Unchanged
Recruitment of key species	Declining juveniles	Good	Unchanged
Mortality of key species	Unexplained mortality	Good	Unchanged
Rainfall patterns and trends	Increased frequency and severity of droughts	Good (But more data analysis needed)	Unchanged
Fire patterns and extent of dry season fires	Any fires in fire refuge areas	Concern	Unchanged
Trend in poaching off-take	Increased trend in poaching off-take	Significant concern	No trend established
Continuing popl. pressure and extent of cultivation near migratory routes	If human popl. pressure has major impacts on ecosystem integrity	Significant concern	Deteriorating (but needs more monitoring)
Intact park boundary	If there was major damage to park boundary beacons	Concern (But beacons not yet complete)	(Too early to see trends)
Agricultural are in the NCA	Increasing trends in agriculture	(Monitoring to be carried out)	(Monitoring to be carried out)

Status in relation to thresholds: Status is generally good but there are significant concerns about poaching and population pressure and some smaller concerns about fire incidence and boundary intactness, leading to some future concerns about the migration itself. Status is generally unchanged, except in the case of population pressure while although data are missing the impression is that the trend may be getting worse. There are still some gaps in our knowledge that need to be addressed. Overall status for the migration is "caution, may be a developing concern", although trends are reasonably unchanged.

Target 2: The Mara River

Indicator	Minimum integrity threshold	Status	Trend
Water Quality	Trend in increasing pollution	Good	(Not long enough data series to give trend)
Minimum flow rates	Continual decline in flow rates	Good	(Not long enough data series to give trend)
Forest extent/size and cover (and width of Mara River)	Forest changes at an unnatural rate and/or extent	Not enough data	(Not long enough data series to give trend)

Status in relation to thresholds: there are some apparent trends but not enough information to be sure what the trends mean and further monitoring is needed.

Target 3: Riverine Forest

Indicator	Minimum integrity threshold	Status	Trend
Fire patterns and extent of dry season fires	Any fires in fire refuge area	Concern	(Not long enough data series to give trend)
Forest extent/size and cover	Forest changes at an unnatural rate and/or extent	Concern	(Not long enough data series to give trend)

Status in relation to thresholds: long term photo data gives some cause for concern but further studies are needed to verify this

Target 4: Acacia Woodland

Indicator	Minimum integrity threshold	Status	Trend
Fire patterns and extent of dry season fires	Any fires in fire refuge area	Concern	(Not long enough data series to give trend)
Forest extent/size and cover	Forest changes at an unnatural rate and/or extent	Concern	(Not long enough data series to give trend)
Resident ungulate species	Trend in decline	Good	Increasing

Status in relation to thresholds: populations of resident ungulates such as giraffe, elephants and buffalo are currently in good condition (in fact increasing), but further monitoring is needed on forest condition.

Target 5: <i>Terminalia</i> Woodland			
Indicator	Minimum integrity threshold	Status	Trend
Fire patterns and extent of dry season fires	Any fires in fire refuge area	Concern	(Not long enough data series to give trend)
Forest extent/size and cover	Forest changes at an unnatural rate and/or extent	Need more data	(Not long enough data series to give trend)
Resident ungulate species	Trend in decline	Concern Due to previous collapse of rhino	Unchanged
Oribi density	Trend in decline	Good (check with Simon Mduma)	Unchanged (check with Simon Mduma)
Status in relation to thresholds: some concern because of the past collapse of rhino and serious decline in buffalo, but more information needed on <i>Terminalia</i> woodland patterns over time.			

Target 6: Kopje Habitat			
Indicator	Minimum integrity threshold	Status	Trend
Fire patterns and extent of dry season fires	Any fires in fire refuge area	Good	Unchanged
Monitor selected sites	Major change in species composition	Good	Unchanged (but monitoring needed)
Status in relation to thresholds: overall status seems to be good but far more monitoring is needed.			

Target 7: Black Rhinos			
Indicator	Minimum integrity threshold	Status	Trend
Fire patterns and extent of dry season fires	Any fires in fire refuge area	More research needed	(Not long enough data series to give trend)
Population size	Decline in population	Significant concern	Increasing
Rhino sex ratio and proportion of young	Decline in population	Significant concern	Increasing
Increase in poaching mortality	Decline in population	Concern	Unchanged (but concern if popl. rises)
Number of visitors in the Rhino Conservation area	Evidence that visitor numbers are disturbing rhino	Concern	(Not enough data to give trend but concern if increase)
Status in relation to thresholds: After a disastrous decline, management activities have ensured that remaining population has been stabilised and is increasing; there are concerns about continuing protection if planned re-introduction activities resulted in a sudden increase in population.			

Target 8: Wild Dogs			
Indicator	Minimum integrity threshold	Status	Trend
Wild dog numbers	Decline in wild dog numbers	Serious concern	Currently not in SENAPA - plans for reintroduction
Wild dog recruitment	Decline in wild dog numbers		Currently not in SENAPA - plans for reintroduction
Incidence of human - wild dog conflict	Increase in conflict levels		Currently not in SENAPA - plans for reintroduction
Status in relation to thresholds: wild dog numbers is a target for restoration and wild dogs are not currently in SENAPA			