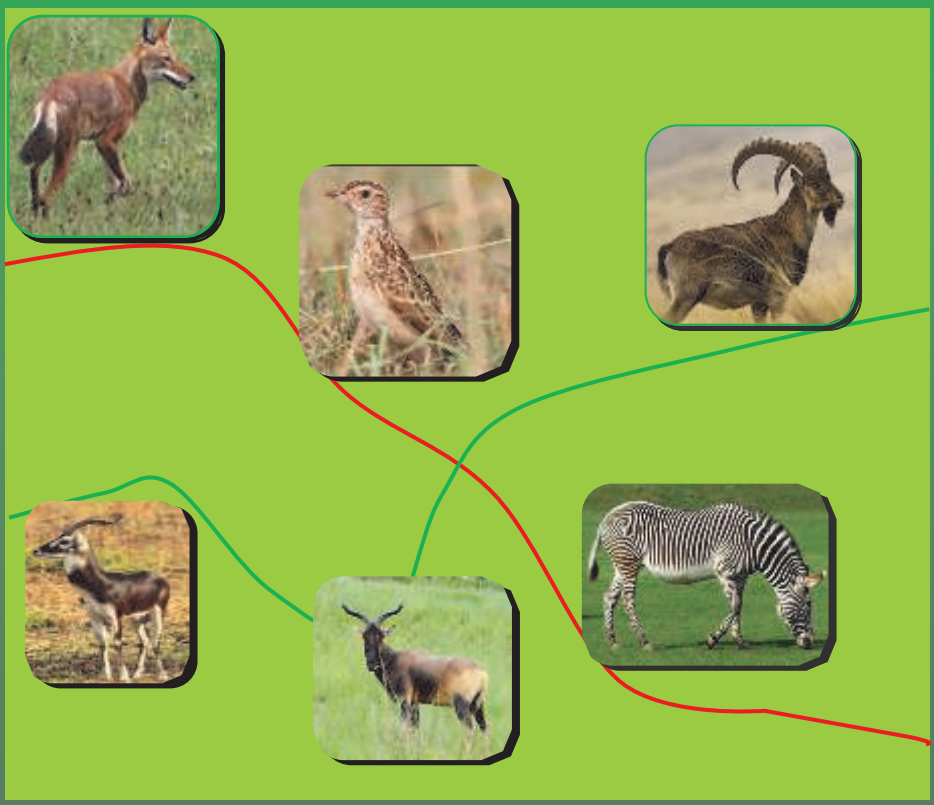
E T H I O P I A

Overview of Selected Biodiversity Indicators



Addis Ababa, 2010


... Biodiversity Indicators are integral Parts of
their Ecosystem ...

ETHIOPIA:

Overview of Selected Biodiversity Indicators

Addis Ababa, 2010

Disclaimer:

The opinions expressed in this book do not necessarily reflect the views of the institutions involved in the National Taskforce, but only that of the experts involved in the task force representing the institutions.

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Acronyms

AWR -	Allideghe Wildlife Reserve
BICSAfrica -	Biodiversity Indicator Capacity Strengthening in Africa
BMNP -	Bale Mountains National Park
CBD -	Convention on Biological Diversity
CBWR -	Chew Bahir Wildlife Reserve
COP6 -	Sixth Conference of the Parties
CSA -	Central Statistical Agency
EWCA -	Ethiopian Wildlife Conservation Authority
EWNHS -	Ethiopian Wildlife and Natural History Society
FAO -	Food and Agriculture Organization
GEF -	Global Environmental Facility
GNP -	Gambella National Park
IBC -	Institute of Biodiversity Conservation
IUCN -	International Union for Conservation of Nature
MDGs -	Millennium Development Goals
NGOs -	Non Governmental Organizations
NP -	National Park
NSNP -	Nechsar National Park
PAs -	Protected Areas
SMNP -	Simien Mountains National Park
SSHS -	Senkele Swayne's Hartebeest Sanctuary
SSHS -	Sinkele Swayne's Hartebeest Sanctuary
TFCI -	Trans-frontier Conservation Initiative
UNEP -	United Nations Environmental Programme
WCMC -	World Conservation Monitoring Center

1. Introduction

1.1 Background

This book is a national report developed by the Ethiopian National Taskforce drawn from three government institutions (CSA, EWCA and IBC) and a local conservation NGO (EWNHS). The book presents examples of biodiversity indicators developed for selected threatened species and extent of area coverage of protected areas (PAs) in Ethiopia. It is intended to be used by protected area managers, educational and research institutions, conservation based institutions and others.

When producing biodiversity indicators, improving capacity of all partners of the process is crucial task. To this end, Biodiversity Indicators Capacity Strengthening in Africa Project (BICSAfrica) was designed by UNEP-WCMC to build on existing work and assist the eastern and southern Africa countries, of which Ethiopia is a part, to develop biodiversity indicators of their choice on a sustainable basis. The BICSAfrica Project, which is aimed at building capacity for development of national biodiversity indicators, has been implemented by the UNEP World Conservation Monitoring Center (UNEP-WCMC) and UNEP, with funding from the UN Development Account, and is conducted as part of the 2010 Biodiversity Indicators Partnership (2010 BIP: www.twentyten.net) and the UNEP capacity building project in Africa. More information about this project is available at www.bipnational.net.

The project was implemented in Ethiopia through national workshops and a series of consultative meetings to develop a few biodiversity indicators that meet national needs and for which there is some appropriate data. Data were collected from relevant institutions (e.g. CSA, EWCA, EWNHS, IBC) and online sources (e.g. IUCN). The draft reports were discussed at national workshops and consultative meetings.

1.2 Overview of Ethiopia's Biodiversity

Ethiopia is a relatively vast country with a land area of 1.12 million square kilometers and wide variety of topography and climate. There is a great variation in altitude, ranging from 116 meters below sea level in the Danakil depression to 4620 masl at the top of Mt Ras Dashen. The great plains of Ethiopia sit atop two massive highland plateaus, cloven in the middle by the Great Rift Valley. Although much of the interior of Ethiopia is dominated by highland plateaus, all of which are home to numerous endemic species of flora and fauna, these are interrupted by deep gorges and 12 major river valleys.

The differences in altitude, coupled with topographic variations, has resulted in wide variations in rainfall, humidity and temperature and thus, the country comprises of nine ecosystems that range from afroalpine at the highest elevations to desert and semi-desert ecosystems at the lowest elevations. As a result, Ethiopia is endowed with a wide variety of fauna and flora and the extreme ranges have resulted in unique and diverse suite of its biological resources. However, the rich biodiversity of the country is under serious threat from overexploitation, overgrazing, expansion of cultivation and settlements that are accompanied by excessive deforestations, invasions of alien species and pollution. Despite some cases of improvements, serious degradation is threatening much of the wild lands of the country. Thus, the distribution and population of many mammals and birds is dramatically declining.

Given the vastness of the country and its rich biodiversity resources, the extent of protected areas in the country is negligible. Even the existing protected area networks are not being intensively monitored to see trends and most of them lack management plans. Furthermore, due to limited understanding of the topic of biodiversity amongst many sectors of society and insufficient use of science-based information in decision-making, it seems that there are big challenges in producing national biodiversity indicators in the country. Other factors that have limited the development of

biodiversity indicators include lack of basic data that can be converted into useful indicators, inadequate skills on development of indicators, absence of monitoring systems designed to support priority decision-making issues and constraints of finance. Thus, capacity building assistance is vital to curb the fundamental constraints seen in this area.

Therefore, the publishing of this book is timely and the indicators considered in the report are believed to be of vital importance as an eye-opening venture to assist as model to develop sustainable biodiversity indicators towards reducing the potential threats and strategize management interventions for the ecosystems in which the indicators exist.

1.3 Overview of Biodiversity Indicators

An indicator is a measure based on verifiable data that conveys information about more than itself. Indicators are purpose-dependent and thus the interpretation or meaning given to the data depends on the purpose or issue of concern. Indicators can lead on to other things and may convey their own messages but they are not ends in themselves. Generally, a successful indicator is scientifically valid; based on easily available data; responsive to change in the issue of interest; easily understandable; relevant to user's needs; and it is used for measuring progress, early warning, setting targets, awareness-raising, etc.

Biodiversity indicators are tools that summarize and simplify information, to help understand the status of biodiversity and threats to it, and to evaluate progress towards its conservation and sustainable use. The process of biodiversity indicators development stems from the 2010 target of the CBD that states:

" . .. to achieve a significant reduction of the current rate of biodiversity loss at global, national and regional levels as a contribution to poverty alleviation and to the benefit of all life on Earth." This was adopted at CoP6 and incorporated as a new target under MDG7.

The motivations for global-scale biodiversity indicators are usually to

provide information and understanding for reporting on global targets such as CBD and MDGs; as a communication tool to raise awareness of important issues (e.g. IUCN Red List Index for threatened species) and to support global-scale strategic planning and prioritisation (eg. GEF).

Indicators are central to effective decision-making and adaptive management processes at national level. The long-term investment in the production of biodiversity indicators can only be sustained if they are seen to be useful and in demand to meet national priorities. The aims of national-scale priorities for which biodiversity indicators are required commonly include:

- reporting on international agreements (e.g. CBD and MDGs),
- to communicate and raise understanding on how biodiversity is important in addressing and sustaining priority development issues such as poverty reduction and climate change,
- to aid the design and monitoring of conservation strategies (e.g. NBSAPs),
- to put in place a sound and sustainable management mechanism for protected area systems,
- to put a system in place for effective conservation, sustainable use and equitable sharing of biodiversity resources
- to raise awareness and actions for topics of importance to interest groups, including NGOs and academia, (e.g. threatened species or sites, pollution problems, compliance with international agreements).
- to assist the development of policies and management plans for commercially important biodiversity (e.g. timber production, fisheries, wildlife tourism);
- for inclusion of biodiversity concerns in land use policies for investment in biofuels, sustainable fisheries management, and land degradation,
- to design and monitor national policies on biodiversity, the environment and sustainable development

1.4 Methods and Indicator Development Framework

This section explains the different steps of the biodiversity indicator development framework, which has three main thematic areas, including: defining the purpose in consultation with key stakeholders; producing and making use of indicators to meet objectives; and making indicators work in

sustainable manner. Experience sharing at sub-regional workshops, group and peer-to-peer discussions and capacity-building exercises were the main approaches used to dealing with the framework. Besides, some publications of case studies and reports were also used.

The biodiversity indicators development process is structured around a "Biodiversity Indicator Development Framework" presented in Fig. 1, which contains key steps for producing successful biodiversity indicators. It is highly recommended that the steps in the framework are followed up when selecting and developing biodiversity indicators.

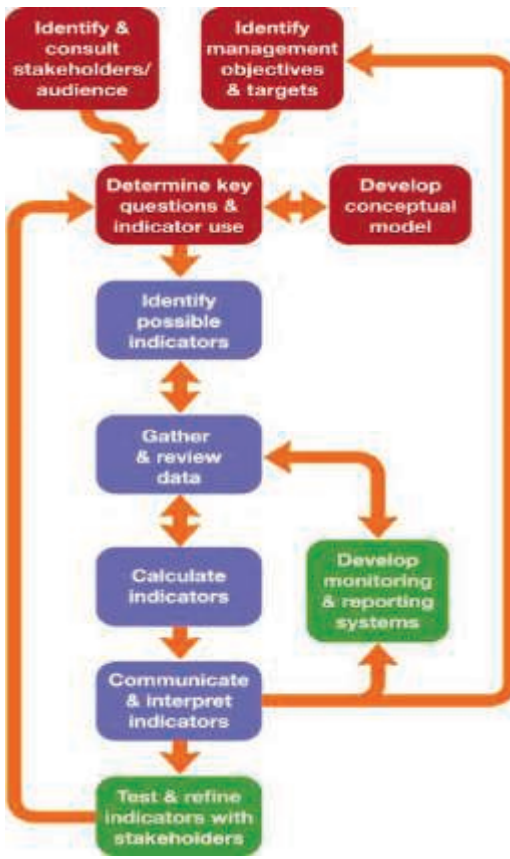


Figure 1. Indicator development steps

2. Identification of Key Questions and Selection of Indicators

The National Taskforce identified biodiversity indicators for Ethiopia, guided by key questions, from which the indicators stemmed (Table 1). The selected indicators represent five threatened mammals and one critically endangered endemic bird and extent of coverage of protected areas (PAs). The PAs networks and ecosystems represented by the indicators have been depicted in Table 2. The subsequent sections of the book provide detailed interpretations about each of the indicator and what it implies in terms of required conservation and policy measures.

The information contained in the developed indicators will be of vital importance for achieving protected area objectives and to report on the status of biodiversity and health of ecosystems, of which the indicators are the integral part. Such information can also be used by almost any sector of society within the country. As typical examples, national and regional governments can use these indicators to help make policies for biodiversity conservation and sustainable use and to seek support and justification for their decisions, and to report on the impact of their policies.

Table 1. Key questions and selected indicators

Key question	Selected Indicators
1. What is the resource base (population, range and diversity) of protected areas in Ethiopia?	Trends in abundance and distribution of selected species (key species of protected areas): • Ethiopian wolf • Walia ibex • Swayne's hartebeest • White-eared kob • Liben lark • Grevy's zebra
2. What is the extent of the designated protected areas (PAs) and the trend of land use in general in Ethiopia?	Trend of land use vs extent of designated protected areas and existing threats • Land use & extent of designated PAs in terms of area coverage

Table 2. Selected indicators and represented PAs and Ecosystems

Indicators	PAs	Ecosystems
• Ethiopian wolf • Walia ibex	SMNP, BMNP	Afroalpine and Subafroalpine Ecosystem
• Swayne's hartebeest • Grevy's zebra • Liben lark	SSHS, NSNP, AWR, CWR, Liben Plains	*Savanna grassland and Acacia-Comiphora* woodland Ecosystems
• White-eared kob	GNP	*Combretum·Terminalia* woodland and wetland Ecosystems

2.1 Trend in Abundance and Distribution of Ethiopian Wolf

Identification

The Ethiopian wolf (*Canis simiensis*), also known as the Abyssinian wolf, Abyssinian fox, Red jackal, Simien fox, or Simien jackal is a canid endemic to Ethiopia. The numerous names of the Ethiopian wolf reflect previous uncertainty about its taxonomic position. But now, it is thought to be related to the wolves rather than the foxes it physically resembles. It weighs 11–19 kilograms. The Ethiopian wolf exhibit sexual size dimorphism, and males are 20% larger than the females.

Ethiopian wolf

The coat color of the Ethiopian wolf ranges from ochre to rusty red on the face, ears and upper portions of the body, and white to pale ginger on the under parts. Small white spots are present on the cheeks, as well as a white ascending crescent below the eyes. The contrast of red and white markings increases with age and social rank. Females tend to have paler coat colors. The back of the tail has a short, rufous-colored stripe which ends in a thick brush of black guard hairs on the tip. The pelt has short guard hairs and thick under fur which protect the wolf from temperatures as low as −15 °C.

The diet of the Ethiopian wolf is almost exclusively composed of diurnal

rodents. Rodents account for 96% of all the prey, with the endemic Big-headed Mole Rat (*Tachyoryctes macrocephalus*) being the main food item. In areas where the Big-headed Mole Rat is absent, the wolf primarily subsists on the East African Mole Rat. Other prey species of the Ethiopian wolf include the Black-clawed Brush-furred Rat, Blick's Grass Rat, various vlei rats, the Yellow-spotted Brush-furred Rat, young birds, the Ethiopian Highland Hare, the Cape Hyrax, and young of the Common Duiker, Mountain Reedbuck and Mountain Nyala.

Habitat and Ecology

Habitat of Ethiopian Wolf

Ethiopian wolf is much localized endemic species, confined to isolated pockets of Afroalpine grasslands and heath lands where they prey on Afroalpine rodents. Currently, the species is confined to seven isolated mountain ranges of the Ethiopian highlands, at altitudes ranging from 3,000 to 4,500m. These are Bale Mountains National Park, north of the Rift Valley, in the Simien Mountains, Mount Guna, North Wollo and South Wollo highlands and Menz. Attributed to ever increasing agricultural encroachment, wolves in the northern highland are restricted to areas above 3,500 to 3,800m.

Ethiopian wolf utilizes all Afroalpine habitats, but prefer open areas with short herbaceous and grassland communities where rodents are most abundant, along flat or gently sloping areas with deep soils and poor drainage in parts. Prime habitats in the Bale Mountains are characterized by short herbs (*Alchemilla* spp.), and grasses and low vegetation cover: a community maintained in continuous succession as a result of molerat (*Tachyoryctes macrocephalus*) burrowing activity. Other good habitats include tussock grasslands (*Festuca* spp., *Agrostis* spp.), high-altitude scrubs dominated by *Helichrysum* spp. and short grasslands in shallow soils. Plant communities characterized by a matrix of 'Guassa' tussock grasses (*Festuca* spp.), 'cherenfi' bushes (*Euryops pinifolius*) and giant lobelias (*Lobelia rhynchopetalum*) sustain high rodent abundance; thus, are preferred by the wolves. Ericaceous moorlands (*Erica* and *Phillipia* spp.) at 3,200–3,600m are of marginal value.

Major Threats

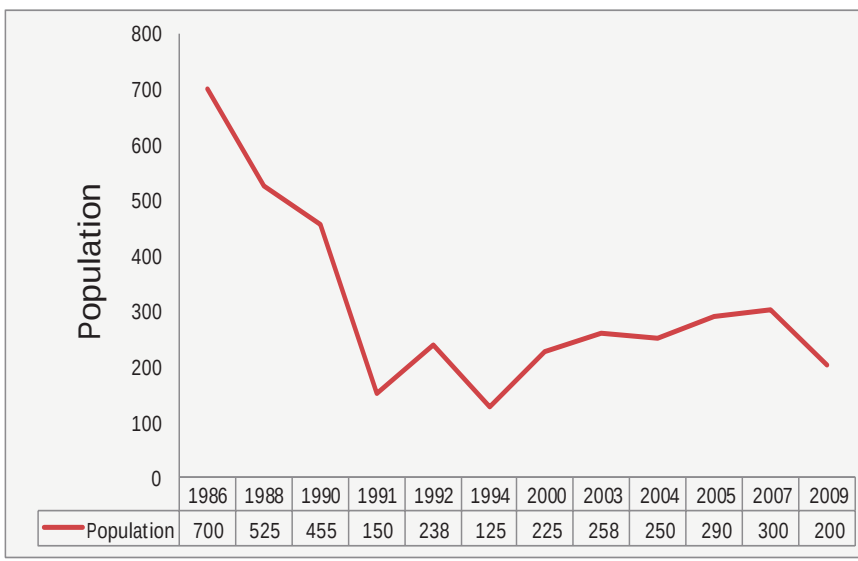
Continuous loss of habitat due to high-altitude subsistence agriculture represents the major threat to the very existence of Ethiopian wolf. Sixty percent of all land above 3,200m has been converted into farmland. Attributed to further habitat loses, therefore, all populations of wolves that exist in areas below 3,700m are particularly vulnerable, especially if the areas are small and of relatively flat relief. Habitat loss is exacerbated by overgrazing of highland pastures by livestock, and in some areas habitat is threatened by development of commercial livestock farms and roads. Land use for livestock still remains one of the major causes of the habitat losses. Recent population decline of the Ethiopian wolf in Bale is mostly due to disease epizootics, with road kills and shooting as secondary threats. Rabies is a potential threat to all populations. Most of these threats are exacerbated by the wolves' specialization to life in the Afroalpine ecosystem.

In Bale, the Ethiopian wolf hybridizes with domestic dogs (*Canis familiaris*). Hybridization is relatively common in western Bale as a result of crosses between female wolves and male domestic dogs. There is no

indication of hybridization taking place outside western Bale. Hybrids have shorter muzzles, heavier-built bodies and different coat patterns. Although hybrids are confined to the Web Valley of western Bale, they may threaten the genetic integrity of the wolf population. Following hybridization, a population may be affected by outbreeding depression or reduction in fitness, although this does not seem to have taken place so far.

Population Trend

More than half of the species' population lives in the Bale Mountains, where wolf density is high for a social carnivore of its size, and is positively correlated with density of rodent prey and negatively with vegetation height. Highest wolf densities are found in short Afroalpine herbaceous communities (1.0–1.2 adults/km²); lower densities are found in *Helichrysum* dwarf-scrub (0.2/km²), and in ericaceous heathlands and barren peaks (0.1/ km²). Wolves are also present at low density (0.1–0.2/km²) in montane grasslands at lower altitudes.



	1986	1988	1990	1991	1992	1994	2000	2003	2004	2005	2007	2009
Population	700	525	455	150	238	125	225	258	250	290	300	200

Figure 2. Population trend of Ethiopian wolf in Bale Mountains NP
Source: IUCN and EWCA

In other localities, the overall wolf density is relatively lower in Menz; wolf density was estimated at 0.2 animals/km². Comparison of census transect data from recent comprehensive surveys indicates higher abundance in North Wollo (0.20 ± 0.20 sightings per km), intermediate in Arsi and Guna (0.10 ± 0.11 and 0.10 ± 0.14, respectively), and lower in South Wollo and Simien (0.08 ± 0.13 and 0.06 ± 0.11, respectively).

The most reliable population estimates are those of Bale and Menz where research has been more intense. The size of the populations in other mountain ranges was derived from field maps of current habitat distribution and extrapolations of wolf densities to the areas of 'optimal' and 'good' quality wolf habitat in each isolated range.

Time series of count data from a long-term monitoring program in the Bale Mountains of southern Ethiopia, spanning over 17 years, evidenced marked variation in wolf abundance in association with disease epizootics affecting high-density populations in the early 1990s (Fig. 2). Population numbers returned to previous levels after disruption, evidencing resilience to catastrophes, but at the lower extreme of densities the population rate of increase was inversely density-dependent; delays in the formation of new breeding units appeared to limit the capacity for immediate recovery. IUCN listed the species as Endangered in 2008, 2004, 1996, 1990, 1988, 1986; whereas Critically Endangered in 1994.

2.2 Trend in Abundance and Distribution of Walia Ibex

Identification

Walia ibex (*Capra walie*) is endemic to Ethiopia. It is sometimes considered as a sub-species of the Alpine ibex. Animals have a chocolate-brown to chestnut-brown coat coloration, greyish-brown muzzle, and a lighter grey in the eyes and legs. The belly and insides of the legs are white, and black and white patterns stretch upon the legs. The males weigh 80-125kg and have very large horns which curve backwards, reaching lengths up to 110cm. The horns are used for dominance disputes between males. The males also have

distinguished black beards. The length of the Walia ibex beard varies with age. The older the males the longer and the thicker are the beards. Females also have horns, but they are shorter and thinner. Females are smaller and lighter in color. The horns on both males and females are rigid. The overall size of the Walia ibex is smaller and slimmer than the Alpine Ibex.

Walia ibex, adult male

Habitat and Ecology

Ethiopia is home to the world's only population of Walia ibex, which is found in and around the Simien Mountains, in the North Gonder Administrative Zone of the Amhara National Regional State of north-western Ethiopia only. Formerly more widespread in the Simien Mountains, most remaining Walia ibex are found within the boundaries of the Simien Mountains National Park (13,600ha), mainly along 25km of the northern escarpment between Adarmaz and Chennek Camps. There are also four small populations outside the protected area: north of Werk Amba west of the park; between Silki and Walka north-east of the park; between Bwahit and Mesarerya; and north of Weynobar along the Ras Dejen escarpment to

the north.

The Simien Mountains are characterized by huge gorges and galleys, both of which carve out steep and jagged cliffs, with this species inhabiting only in the high cliffs that rise above the lower elevated plateau. However, ibex may descend to plateaus in areas where there is less human interference.

Habitat of Walia ibex

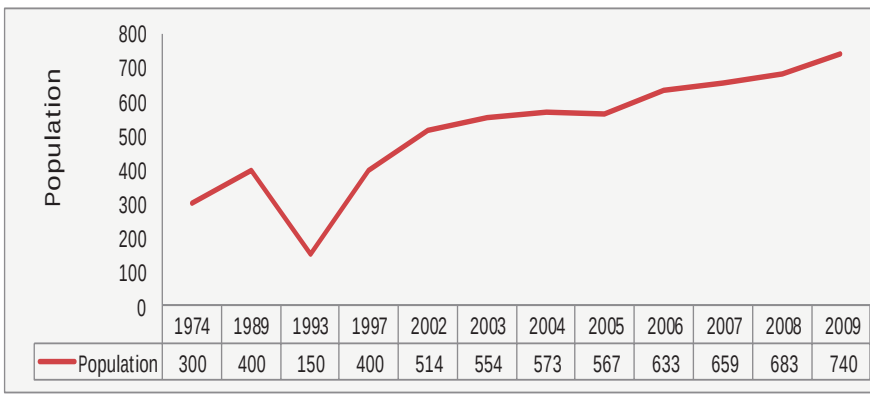
Major Threats

Walia ibex has survived two decades of war and its main threat is habitat destruction, caused by human encroachment. The remaining natural habitat is extremely limited, even though most of the villagers who lived in the lowland areas of the Park were resettled outside the Park in 1978. However, resetllers have returned once again taking advantage of the war that occurred over the last two decades or so and are residing within the National Park, creating increasing pressure on the Park and its wildlife. Today, there are over 30,000 people living within the National Park and its boundaries. Despite the existence of national and regional legislation, the remoteness of the area coupled with the existence of people living within and outside of the Park prior to its establishment as a conservation area makes legislation

difficult to enforce. Few Walia ibex also move to the south-east of their natural range to feed on cultivated crops at places where there is cultivation of barley and other crops on steep gradients. These incidences occasionally lead to conflicts between Walia and the local farmers.

Population Trend

Walia ibex is listed as endangered and it is largely confined to the Simien Mountains National Park and its surroundings. In 2004, the population stood at around 500, a slight increase over earlier estimates of 200-250 animals that were made in 1994-1996 (Fig. 3). In 2008, the population has increased to more than 700 though the species is still listed as endangered. Although the population has been showing signs of increase over the past decade or so, the habitat continues to be degraded by human encroachment.



	1974	1989	1993	1997	2002	2003	2004	2005	2006	2007	2008	2009
Population	300	400	150	400	514	554	573	567	633	659	683	740

Figure 3. Population trend of Walia ibex in Simien Mountains NP
Source: IUCN and EWCA

IUCN listed the species as Endangered in 2008, 1994, 1988, 1986 and Critically Endangered in 1996.

2.3 Trend in Abundance and Distribution of White-eared Kob

Identification

Kobs (*Kobus kob leucotis*) which stand 70 to 100 centimeters at the shoulder, is characterized by white-colored facial markings and conspicuous eye rings. The S-shaped and ringed horns are found only in males and bend sharply backwards, then curve up. Males of the White-eared Kob have distinctive white throat and belly and they are also strikingly different from their closest allies by their deep darker coloration which makes them similar to the male Nile lechwe.

White-eared kob, adult male

Habitat and Ecology

White-eared kob usually lives in the flood plains (well-watered areas). Adult males are territorial, although the size of their defended ranges varies depending on the habitat and population density. The length of time a male may hold his territory varies from days to months. Population densities vary from 8-124 animals per square kilometer depending on the habitat. In southeastern Sudan and southwestern Ethiopia, huge herds congregate along waterways during the dry season at which point the density often exceeds 1,000 animals per square kilometer.

Herds and Habitats of White-eared kob

Major Threats

It is evident that until the mid 1980s, the Gambella region in general and the national park in particular were relatively free area from human interference, and had abundant wildlife populations. However, following the 1984/85 famine, the then government moved a considerable size of people and settled them in the eastern parts of the park. The situation was aggravated by extensive poaching and habitat destruction by the refugees from South Sudan where settlements were established within the park area. As a result, the wildlife resources of the park area including the White-eared kob have been depleted alarmingly for over two decades.

More over, recent observations indicate that extensive poaching, human and livestock population pressure and inappropriate land use accompanied by extensive investments have resulted in massive destruction of wildlife habitat and severe wildlife population decline.

Population Trend

Gambella National Park and its surrounding, which is found in the confluence point of Congolian-Sudanese and Somali-Masai biomes, is known to support large herds of White-eared kobs. However, there is no detailed study conducted on the White-eared kob from the Gambella side since the region is one of the least assessed and poorly developed areas of the country. Thus, it is difficult to know the trend of White-eared kob's population and seasonal distribution in the past though this species is classified as a low risk, near threatened subspecies by IUCN.

The Ethiopian Wildlife Conservation Authority in collaboration with its partners has been conducting more detailed landscape surveys since the recent past in order to know wildlife distribution and socio-economic activities in the Gambella Region. Consequently, dry season aerial survey was conducted in March 2010, which enabled to know the presence of over 250,000 White-eared kobs. Recent studies have also revealed that over 500,000 individuals counted in South Sudan and thus there is a speculation that about a million of kobs inhabiting the whole region, moving between Gambella and South Sudan.

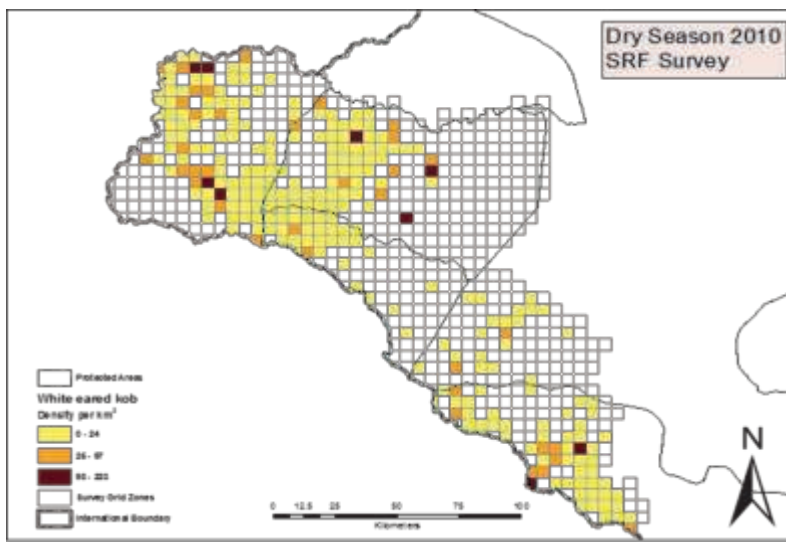


Figure 4. Distribution of White-eared kob in dry season (2010)
Source**:** TFCI Taskforce Aerial Survey Report (2010)

More over, recent surveys have revealed that the herds of Kobs in the Gambella region have flourished better than usual and expansion of routes was witnessed as compared to the findings of some studies conducted decades back from the South Sudan side which show past routes of the wild animal in question (Fig.4 and 5). This is attributed to the present peace since it has provided the Kob population the opportunity to freely move between both regions.

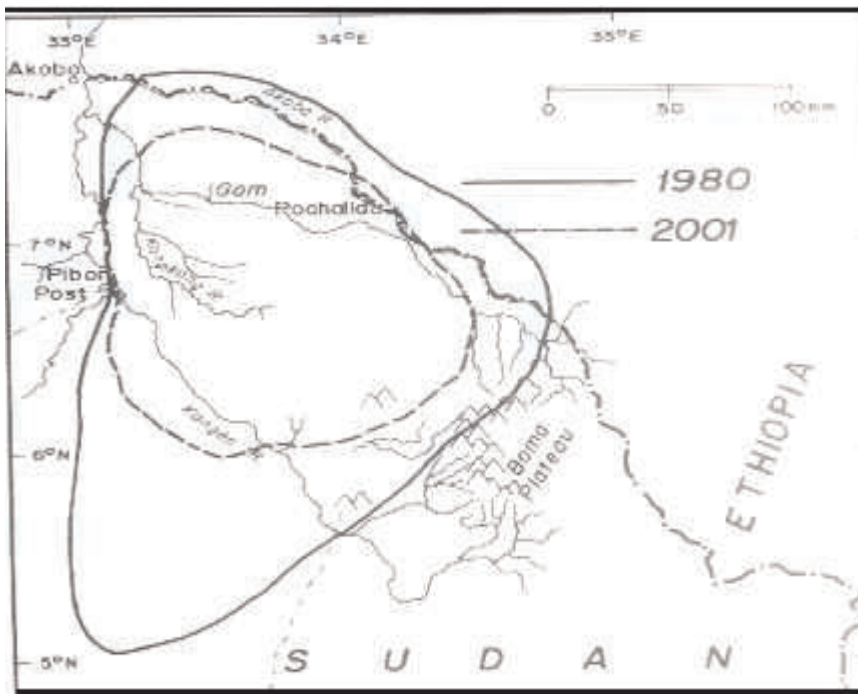
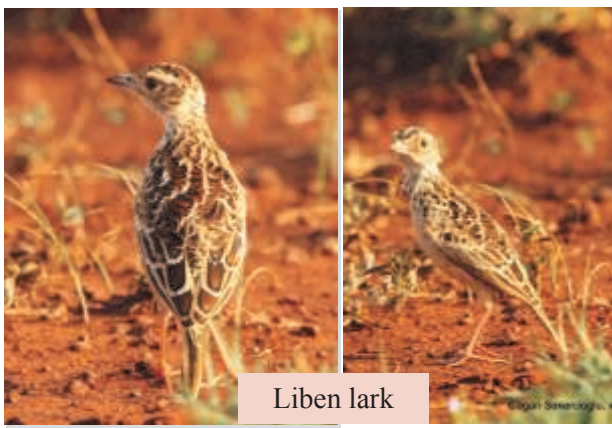


Figure 5. White-eared kob migration routes (1980 compared to 2001)
Source: USAID/IAPUM (2001)

2.4 Trend in Abundance and Distribution of Liben Lark

Identification

Liben lark (*Heteromirafra sidamoensis*) is a small (length 14cm; weight 30gm) large-headed, short-tailed lark endemic to Ethiopia. It has pale buff stripe down the centre of crown. Upper parts look "scaled" and has a short thin tail. A similar species, the Singing lark (*Mirafra cantillans)* is longer tailed, with rusty wing-patches in flight.



Liben lark

It has an unusual triangular shaped head noticeable from most angles. The neck is long and has distinctly thin and long legs. The bill is short and narrow. It has an overall rounded body. It is heavily marked with brown, rufous and buff upper parts. Under parts especially the breast and belly are tinged deep buff with streaking on the breast. It also has a broad white supercillium and narrow whitish central crown stripe. Scaly appearance on the wing coverts is formed by mid-brown feather centres bordered by blackish subterminal lines and pale fringes. On disturbance, it prefers to run swiftly along a zigzag course, than taking flight.

Habitat and Ecology

Liben lark was for some time known only from two specimens collected at adjacent sites near Neghelle in the former Sidamo Province (now Guji

Zone), southern Ethiopia. Since 1994 there have been subsequent sightings of small numbers (less than 10 on each occasion) in the Neghelle area. Analysis of these locations on satellite images and recent fieldwork suggests that the species is restricted to a very specific habitat (tall-grass fields) in the calcareous plateau east and south of Neghelle. By 2007-08 it appeared to be restricted to a single grassland patch 30-36 km^2 in area .

Major Threats

Most of the problems are associated with habitat loss and degradation resulting from overgrazing and cultivation. Some of the established threats are arable cultivation, degradation of habitat and loss of grass cover, scrub encroachment, disturbance of nesting birds, increase of settlements, creation of bare areas and insufficient awareness of the bird's plight.

Between 1973 and 2002, the area of tall grass fields decreased by about 30% and in 2003 much of it was being rapidly encroached by agriculture and shrubs (*Acacia drepanalobium* and others) probably favored by excessive grazing pressure and the suppression of seasonal fires (Fig. 6). Remaining grassland is being heavily degraded by overgrazing.

Figure 6 shows that its habitat has shrunk greatly in a matter of two years especially to the north, northwest, southwest and northeast. Much of the problems associated with the loss of habitat are linked to severe overgrazing that is not allowing the grass a chance of regeneration.

Population Trend

Liben lark was not well documented until coordinated surveys were conducted in 2008. This and other surveys in succeeding years revealed that this bird's numbers had gone down drastically. Earlier estimates which were based on available habitat showed that its numbers were in excess of 2,500 birds in a range of 5,400 km^2. Surveys in 2008-09 showed that their total world range did not exceed 40 km^2 and that there may not be more than 256 birds. These surveys also confirm that there might be a skew towards male-female ratio. The species was listed as Critically Endangered in 2009

as it has an extremely small range which is decreasing from year to year. Remaining habitat is rapidly being degraded. The potentially skewed sex ratio may also mean that the effective population size is getting even smaller.

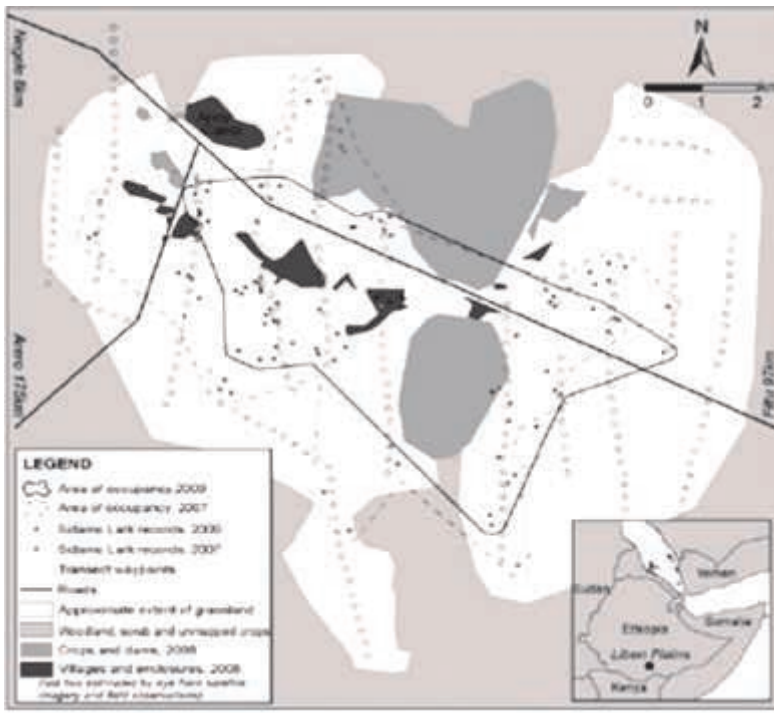


Figure 6. Shrinkage of Liben lark occupancy at Liben Plains (2007-2009) Adapted from Donald *et al* 2010

2.5 Trend in Abundance and Distribution of Swayne's Hartebeest

Identification

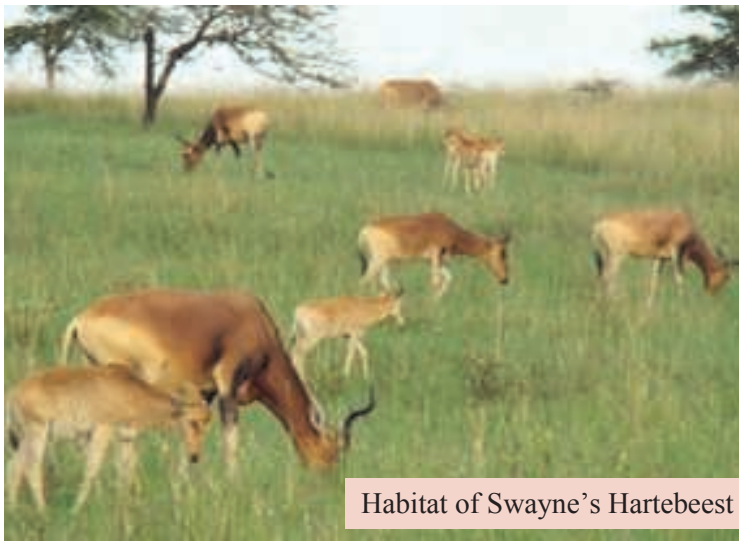
Swayne's Hartebeest (*Alecephalus buselaphus swaynei*) is named after Brigadier-General Swayne who discovered the wild animal during his visit to Somaliland in 1891. It is distinguished from its closest races by its considerably darker body color. It is a deep red chocolate brown or chestnut with a fawn or cinnamon colored rump, tail and lower half of legs. Adult specimens sometimes have a silvery appearance as the hairs are tipped with white. The horns are fully expanded and shaped like those of the tora; and curve out- wards and slightly downwards from the top of the head and then sweep upwards at the tips, and are usually, but not always, hooked backwards and they may or may not turn inwards.

Swayne's hartebeest

Habitat and Ecology

Swayne's Hartebeests live in open country, light bush, sometimes in tall savanna woodland. These are social animals and are normally seen in herds of 4-15, up to thirty. Each herd is under the leader-ship of the master bull which leads the females with their young. The territory is defended by the male. They may be often seen grazing peacefully, with the bull on slightly

higher ground acting as sentinel for his herd.



Habitat of Swayne's Hartebeest

Major Threats

Larger antelopes which constitute the prey population in the savannah grassland ecosystem are among the vulnerable wild species. Swayne's hartebeest that was formerly distributed throughout open grass and bush lands, is one of the most threatened ones. It was known to be found in both Somalia and Ethiopia, is now restricted only to very few areas of Ethiopia and thus it is an endemic sub-species to and also listed as endangered in IUCN report. Habitat loss, render pest and poaching are believed to be the main threats. At present, the largest surviving population is found in Senekele Swayne's Hartebeest Sanctuary (SSHS).

Population Trend

Since the recent past, progressive measures have been taken towards rescuing this endangered sub-species where effective management tools and sound monitoring systems were put in place. Moreover, concrete measures have been taken towards controlling livestock diseases transmission as well as poaching through increase programs of awareness creation. As a result,

the remnant population in SSHS has shown considerable increase (Fig. 7). There is however considerable decline in the case of Nechisar National Park's population of Hartebeest mainly due to poaching.

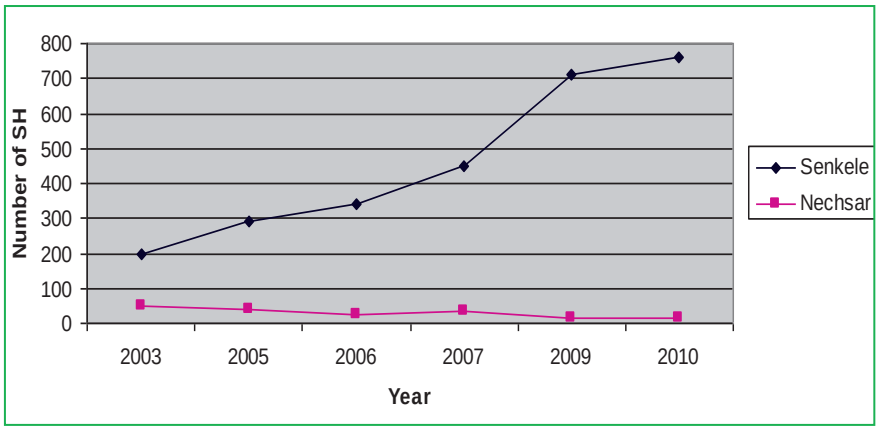
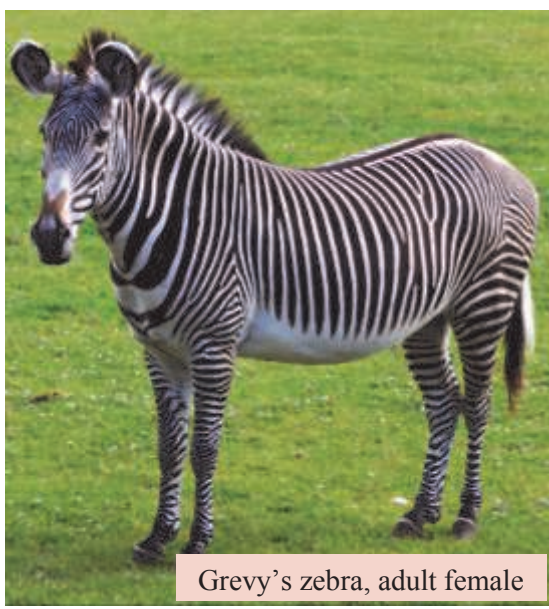


Figure 7. Population trend of Swayne's hartebeest in both PAs
Source: Monthly and annual reports of both PAs

2.6 Trend in Abundance and Distribution of Grevy's Zebra

Identification

The Grevy's zebra (*Equus grevyi*) is the largest (and heaviest) of its family members. It is the most horse-like of the striped Equines. Adults possess huge heads and prominently large ears. Males are larger than females. In general males are 10% more heavier than females. This Equid species is best identified with a combination of large size, close narrow stripes, bolder stripes on neck and shoulders and unmarked belly (very pale to white), black ear markings and stripe along spine. The tall erect crest increasing in size from the shoulders to the top of the head is striking lending the animal a unique outline. Its ears are prominently ovoid shaped and there is no marking on its pure whitish belly. Grevy's in general stand up to 145cm at the shoulder with a range of height from 140-160cm. Males are known to weigh up to 450kgs while females can weigh up to 380kg.



Grevy's zebra, adult female

Grevy's do not form permanent herds or migrate in large numbers as the common zebra, they have a predilection to gather in large herds often in their

hundreds especially at water holes. They gather in smaller herds in the dry season when resources are limited. Females associate in nursing groups and males in bachelor groups.

Habitat and Ecology

Grévy's inhabits *Acacia-Commiphora* thorn bush habitat and expanses of dry short-grass in Somali-Masai Biomes. It rarely migrates if water and feed is adequate. In extremely dry conditions, it can migrate to watered sites. It has preference for Bush/grass mosaics and large sections of its habitat can be waterlogged for some months of the year. It can live on grass species including *Pennisetum* spp., which are usually tough for cattle to eat or digest. It makes use of plains with extensive growth of *Pennisetum schimperi* but also subsists on other species of grasses. They are known to feed on browse composed of leaves and shoots when food is scarce. Grévy's zebra feed mostly on grasses but they will also eat fruit, shrubs, roots, leaves, buds, and bark. They may spend 60-80% of their days eating, depending on the availability of food. Their well adapted digestive system allows them to subsist on diets of lower nutritional quality than that necessary for other herbivores

Major Threats

The major threats to Grevy's zebra include reduction of available water sources, habitat degradation and loss due to overgrazing, competition from resources, hunting and disease. In Ethiopia, killing of this animal is apparently the primary cause of its decline.

Population Trend

Current estimates put the total population of Grevy's zebra remaining in the wild in Kenya and Ethiopia at approximately 1,966 to 2,447. From 1988 to 2007, the global population of Grevy's zebra declined approximately 55%. The worst case scenario is a decline from 1980 to 2007 of 68%. The number of mature individuals is approximately 750, and the largest subpopulation is approximately 255 mature individuals.

In Ethiopia, Grevy's Zebra declined from an estimated 1,900 in 1980 to 577 in 1995, to 106 in 2003. In 2006, the population in Ethiopia was estimated to be 128. The trend from 1980 to 2003 (23 years) is a decline of roughly 94%. The data for 2006 indicates a potential increase in the population in Ethiopia (Fig. 8).

The density and area of occupancy of Grevy's zebra fluctuates seasonally as animals move in their search for resources. A sample count of Grevy's zebra at Alldeghi (Fig. 9) shows the effect of resource partition and presence on the total number seen over a period of time. During the dry season, when they are dependent on permanent water, animals tend to be more concentrated. However, given that they can move up to 35 km from water even during the dry season, their densities are never high.

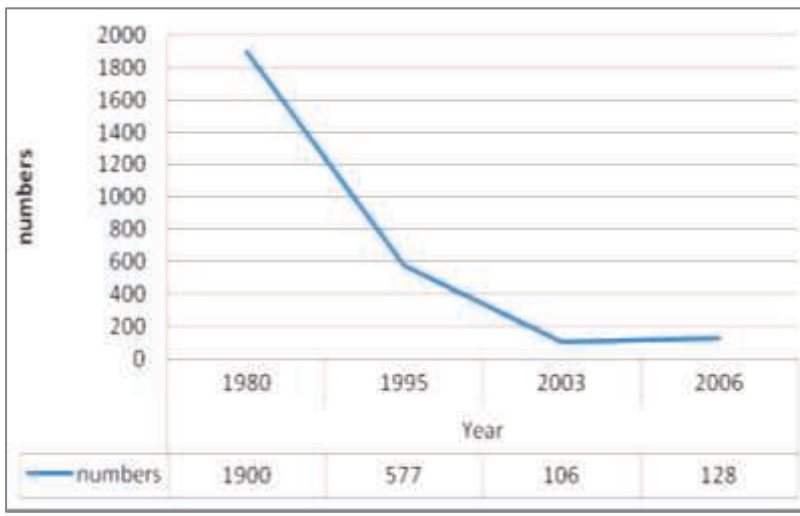


Figure 8. Dramatic decline of Grevy's zebra in Ethiopia
Source: EWCA

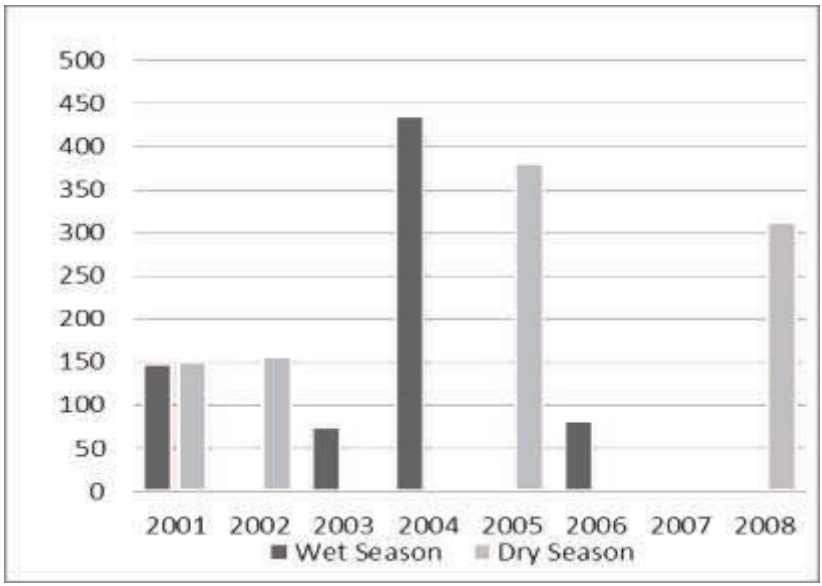


Figure 9. Grevy's zebra count results at Alledeghi plains (2001-2008)
Source: EWCA

3. Trends in Land Use and PAs Coverage in Ethiopia

3.1 Land Cover

Ethiopia covers an area of 1,127,127km^2, of which water area covers 7,444km^2 and land area 1,119,683km^2, with a topographic diversity encompassing high and rugged mountains, flat-topped plateau, deep gorges with river, and rolling plains.

Nearly half of the total land is (41 percent) is non arable land, which includes forest, mountains, roads, cities, etc. and about 43 percent of the total land area is arable that includes temporary crop, permanent crop, pasture, and fallow land. Since the recent past, protected areas coverage is increasing in which 15 percent of the land is covered by national parks, wildlife sanctuaries and reserves, controlled and open hunting areas and community conservation and about one percent of land shares water surface (Fig. 10).

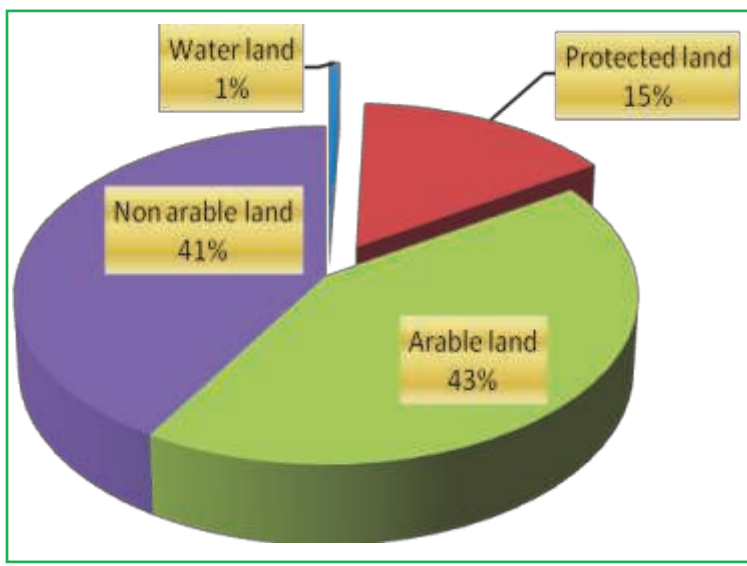
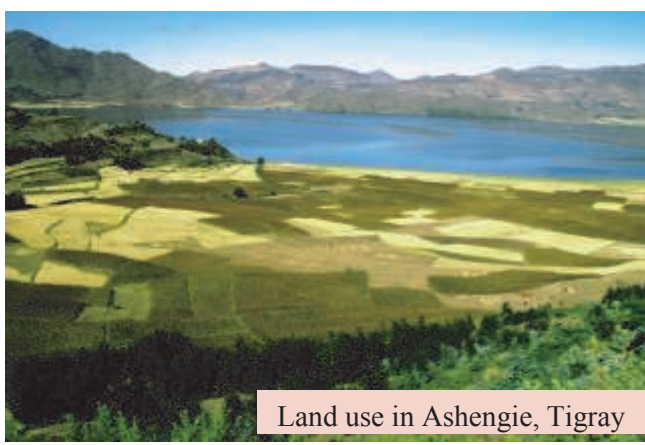


Figure 10. Percentage distribution of land cover surface area in km^2
Source: CSA

3.2 Land Use

Land use refers to activities – such as growing crops, raising livestock or cultivating fish – carried out on the land making up the holding with the intention of obtaining products and/or benefits. Land use should be distinguished from "land cover", the later being description of the physical characteristics of the land, such as grassland or forest.

Land use is the function of land what it is used for. It is a description of how people utilize the land, manipulation of natural ecosystem in order to obtain benefits, which could be material benefits/products (e.g cereals production, livestock purpose) and immaterial benefits (erosion prevention) and socio economic activity (inputs, managements and out puts). Land use information can be used to study food security at national, regional and global levels, to develop solution for natural resource management issue such as salinity, water quality, and deforestation and for planning and policy formulation. Land use directly affects land and triggers process such as land degradation, desertification and loss of biodiversity.



Land use in Ashengie, Tigray

3.3 Protected Area Coverage

From the total land area coverage of the country PA shares about 15 percent only. Figure 11 shows the data of national parks, sanctuaries, controlled

hunting, open hunting, wildlife reserves and community conservation areas. A National Park is a reserve of natural or semi natural land, declared or owned by a government, set aside for animal safety and/ or human recreation and enjoyment, and protected from most development activities.

From the total land area coverage of the country PAs share about 15 percent only. The proportion of different categories of conservation is indicated below (Fig.11). As pointed out graphically, among the protected land area which was set aside between the year 1966 and 2010, the largest portion is covered by open hunting area which is 94,633 (about 55%) and the smallest one (1%) is the community conservation area.

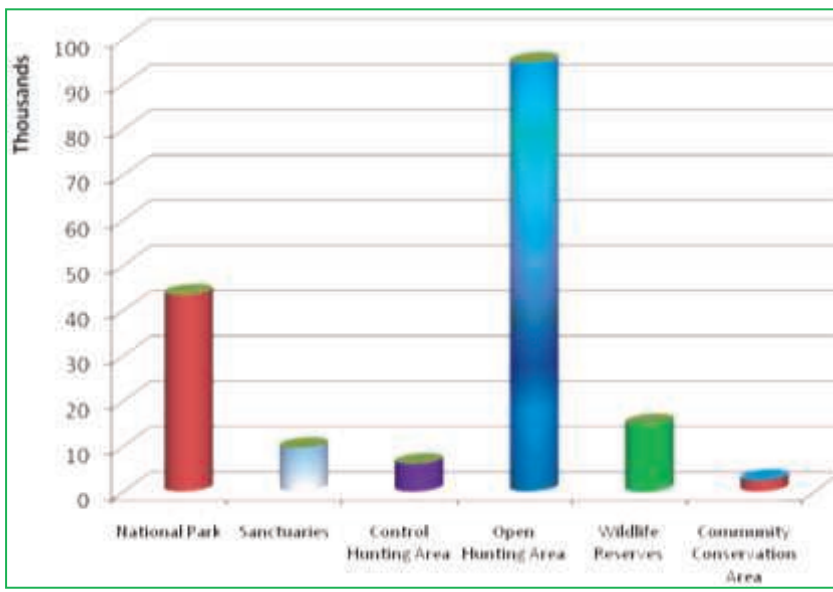


Figure 11. Protected land area (in km^2) in Ethiopia
Source: EWCA and CSA

3.4 Agricultural Land Area in Rural Sedentary Private Holdings

Land plays a critical role in the production of food crops. The expansion of agriculture and intensive exploitation of land by human beings with the aspiration of increasing the volume of crop production impacts directly or indirectly on land. Changes taking place in agriculture are drastically shaping land use patterns and holding sizes.

From agricultural point of view, land is an indispensable factor for production of crops, raising of livestock and other ancillary agricultural activities. There is no universally accepted standard of land use classification. According to the FAO recommendations for the purpose of agricultural census, the total land use is categorized into six main land use types, which are land under temporary crops, land under permanent crops, grazing land, fallow land, forest or other wood land, and land for other purposes.

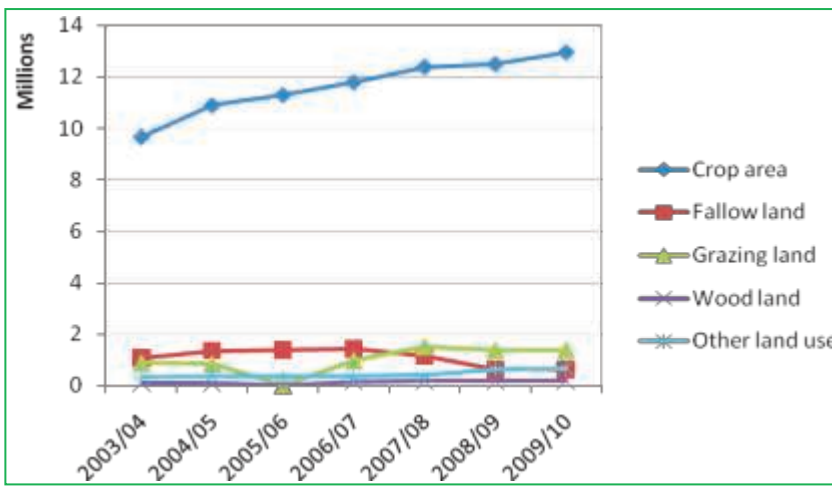


Figure 12. Land use of agricultural land (in hectare)
Source: FAO and CSA

As indicated in Fig.12, the trend of crop area (temporary and permanent crop area in hectare) is increasing. Thus, due to the ever-increasing of crop area coverage, grazing land and wood lands have been declining and this in turn brings negative impact on biological diversity, and maintenance of the ecological integrity.

4. Conclusion and Recommendation

Biodiversity indicators are currently perhaps the best way of assessing the status of biodiversity as well as evaluating progress towards its conservation. One quality that stands out is that biodiversity indicators are purpose-driven and thus the interpretation or meaning given to the data depends on the purpose or issue of concern, thus producing information that fulfills the needs of the user. With precaution and due discretion, they can also be ways of gauging overall biodiversity trends at various levels including at a global scale. They also provide a practical and economical way of prioritizing action for biodiversity when resources including skilled human resource, funds and time is limiting.

The experiences gained through BICSAfrica project enabled the National Taskforce established in Ethiopia, one of the 13 participating countries, to develop national biodiversity indicators utilizing existing data to address national priority issues. This book presents examples of biodiversity indicators developed by the taskforce and provides highlights on the experiences gained and lessons learnt as a result of being involved in the sub-regional BICSAfrica project, executed by UNEP-WCMC.

The exercise and process of developing selected biodiversity indicators for Ethiopia has been a successful and eye-opening venture in the way concerned stakeholders can use selected species for understanding and assessing biodiversity and associated ecosystems where they are found. The capacity building part of the training has been a valuable experience that can be easily transferred to other stakeholders. The process was instrumental in contributing enormously towards improvement of the poor communications and collaborations existed in the past among the participating institutions. It is believed to have paved the way in which the institutions will exchange information and work together in close collaboration in the future.

Ethiopia has a number of species that can potentially act as indicator species. The indicator species described in this book are a sample amongst several others that can show trends and status of biodiversity. All group members

who have actively participated in this process fully acknowledge that the information provided herein is spatially and temporally bounded. That is with new and updated information, the interpretive scope of indicator species will also gain value.

The development of the current biodiversity indicators has been possible due to existing data held by different institutions. One big lesson the taskforce members learnt was that there are, almost always, some sort of scattered data somewhere within various institutions, both government and NGOs. However, the problem lies with absence of clear mechanism to share the data as required. It is also true that the present understanding is inadequate to make use of data as indicators to address key biodiversity conservation issues and to discharge national responsibilities in reporting on international obligations.

To make use of existing data held by various organizations efficiently and facilitate further development of successful and sustainable biodiversity indicators in the future, there is a vital need to establish a centralized biodiversity database management system. This helps to sustainably produce and update biodiversity indicators.

The indicators produced in a sustainable manner will be of great use in national biodiversity monitoring, success measurement, meeting national objectives in reporting to international agreements like CBD and MDG, policy formulation, informed decision-making and biodiversity and environmental management.

It is thus hoped that this work will prompt and give impetus to other stakeholders involved in biodiversity conservation and charged with responsibilities of reporting on progress of international conventions to frame their mind for responsible actions towards mainstreaming the issue of biodiversity indicators in the country.

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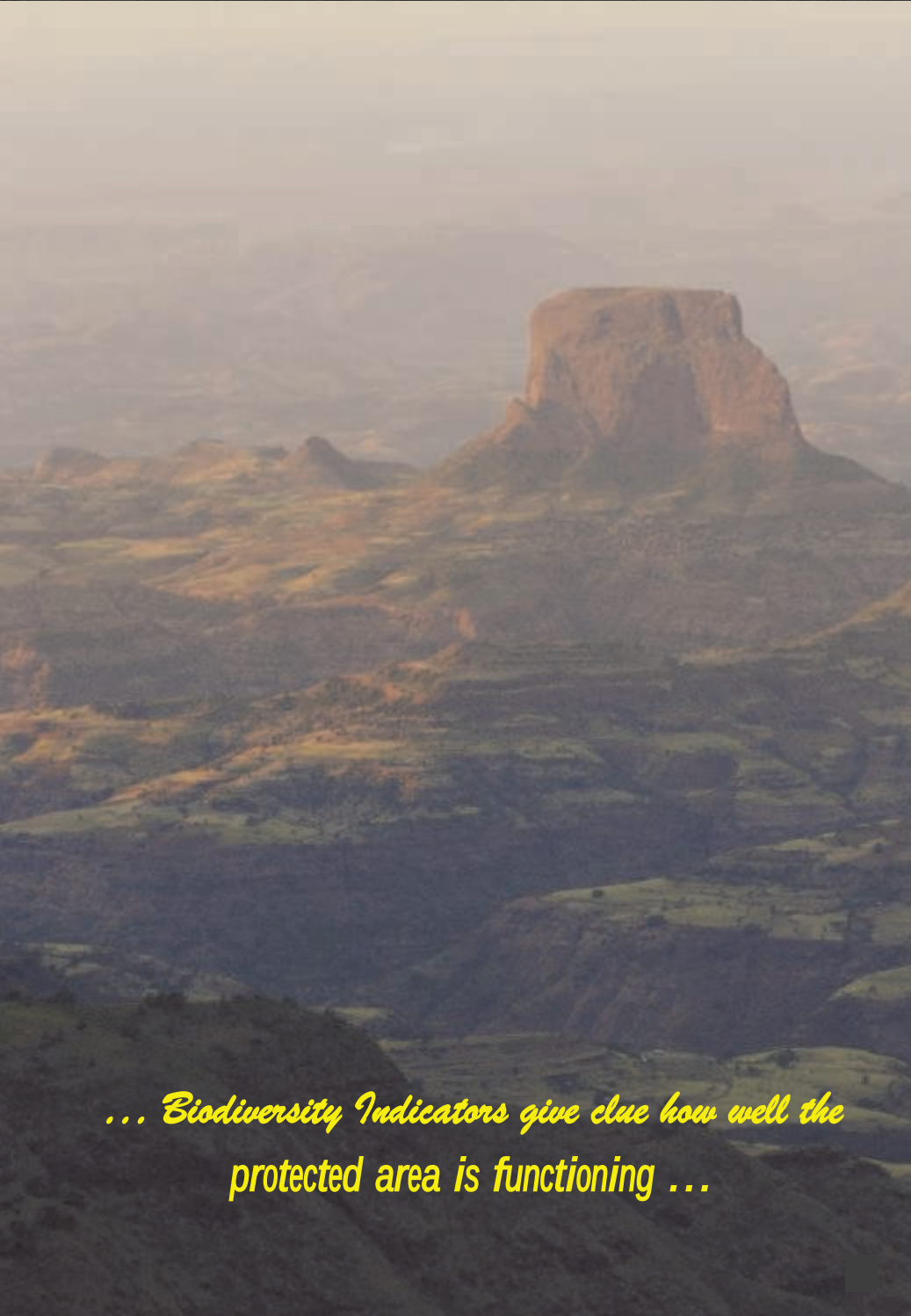

... Biodiversity Indicators give clue how well the protected area is functioning ...

Biodiversity indicators are tools that summarize and simplify information, to help understand the status of biodiversity and threats to it, and to evaluate progress towards its conservation and sustainable use.

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