#2

Eastern Africa

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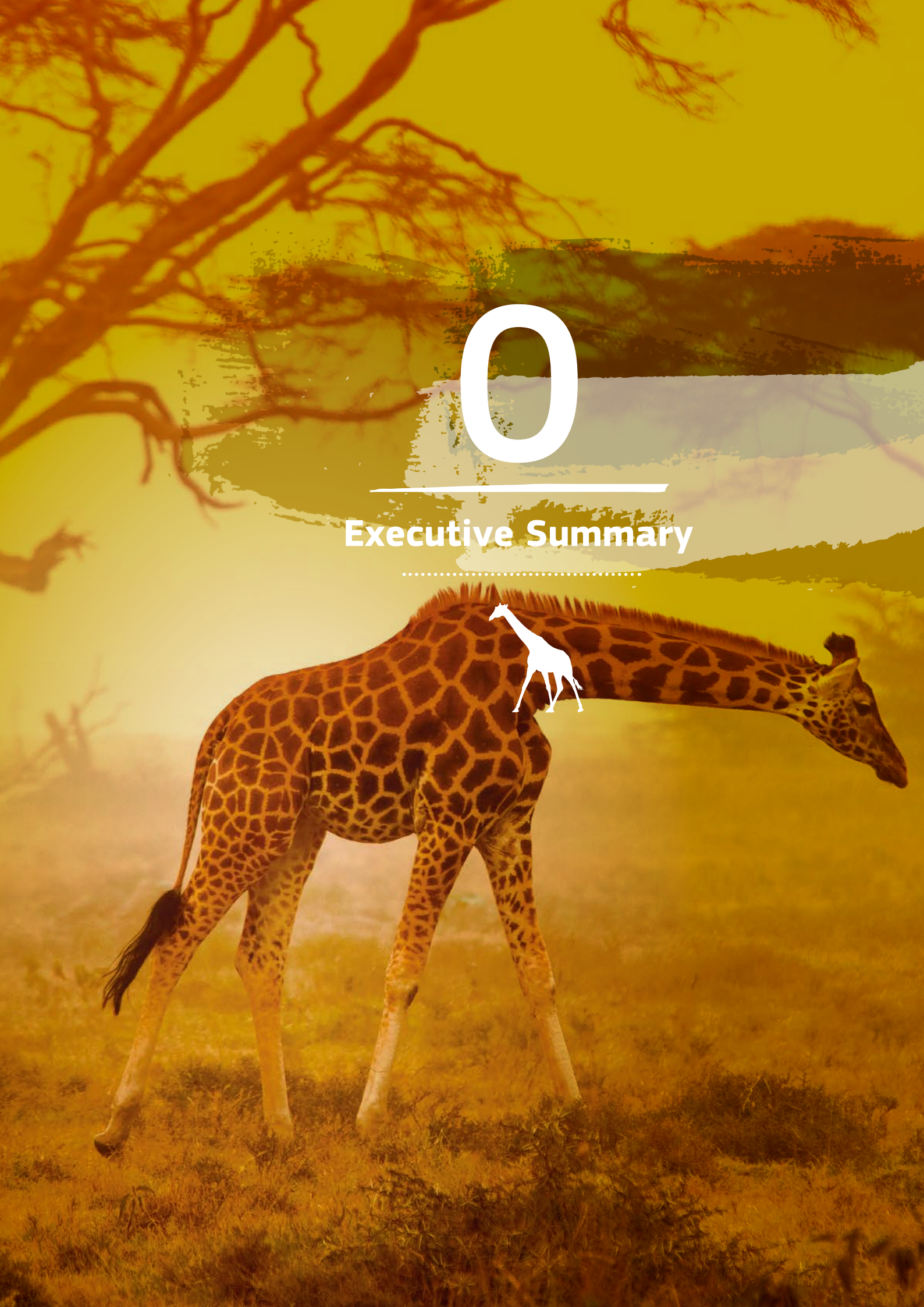
List of acronyms

ACP	Africa Caribbean Pacific
AMCEN	African Ministerial Conference on the Environment
APN	African Parks Network
ASAL	arid and semi-arid land
AU	African Union
AWF	African Wildlife Foundation
CA	conservation area
CAR	Central African Republic
CAWM	College of African Wildlife Management
CBD	Convention on Biological Diversity
CBNRM	Community-based Natural Resource Management
CCAP	Climate Change Adaptation Plan
CCB	Climate, Community and Biodiversity
CITES	Convention on International Trade in Endangered Species
COMESA	Common Market for East and Southern Africa
COMIFAC	Central African Forest Commission
CSO	civil society organisation
DNA	deoxyribonucleic acid
DPG-E	Development Partners Group on Environment
DRC	Democratic Republic of Congo
EAC	East African Community
EAGLE	Eco Activists for Governance and Law Enforcement
ECCAS	Economic Community of Central African States
EDF	European Development Fund
EIA	Environmental Impact Assessment
ESA-IO	Eastern and Southern Africa and Indian Ocean Region
ETIS	Elephant Trade Information System
EU	European Union
EUR	euro
EWCA	Ethiopian Wildlife Conservation Authority
FFI	Fauna and Flora International
FR	forest reserve
FZS	Frankfurt Zoological Society
GCA	game controlled area
GDP	gross domestic product
GEF	Global Environment Fund
GHG	greenhouse gas
GMP	General Management Plan
GR	game reserve
GVTC	Greater Virunga Transboundary Collaboration
HAWEN	Horn of Africa Wildlife Enforcement Network
HEC	human-elephant conflict
HoA-REC&N	Horn of Africa Regional Environment Centre and Network
HWC	human-wildlife conflict
HQ	headquarters
IBA	Important Bird and Biodiversity Area
ICCF	International Conservation Caucus Foundation
ICCN	Institut congolais pour la conservation de la nature
ICCWC	International Consortium on Combating Wildlife Crime
ICPAC	(coupure ici) IGAD Climate Prediction and Application Centre
ICRAF	World Agroforestry Centre
IFAW	International Fund for Animal Welfare
IGAD	Intergovernmental Authority on Development

IGCP	International Gorilla Conservation Programme
IGO	intergovernmental organisation
Interpol	International Criminal Police Organisation
IOC	Indian Ocean Commission
ISO	International Organisation for Standardisation
IUCN	International Union for the Conservation of Nature
KES	Kenya shilling
KFS	Kenya Forest Service
KLC	Key Landscape for Conservation
KWS	Kenya Wildlife Service
LAGA	The Last Great Ape Organisation
LRA	Lord's Resistance Army
MIKE(S)	Minimising the Illegal Killing of Elephants (and other Endangered Species)
MoU	Memorandum of Understanding
NAPA	National Adaptation Programme of Action
NBSAP	National Biodiversity Strategy and Action Plan
NEPAD	New Partnership for Africa's Development
NGO	non-governmental organisation
NIP	National Indicative Programme
NP	national park
NR	nature reserve or national reserve (Kenya)
NRM	Natural Resource Management
NRT	Northern Rangelands Trust
NWS	National Wildlife Sanctuary
OECD	Organisation for Economic Cooperation and Development
PA	protected area
PALF	Projet d'appui à l'application de la loi sur la faune sauvage
PAMSU	Protected Areas Management for Sustainable Use (World Bank)
PES	Payment for Ecological Services
PFM	participatory forest management
RDB	Rwanda Development Board
REDD/REDD+	Reduced Emissions from Deforestation and Forest Degradation/REDD+
RENAMO	Mozambican National Resistance
RhODIS	Rhino DNA Identification System
RIP	Regional Indicative Programme
SADC	Southern Africa Development Community
SAGCOT	Southern Agricultural Growth Corridor
SEA	Strategic Environmental Assessment
SMART	Spatial Monitoring and Reporting Tool
TA	technical assistant/assistance
TAWA	Tanzania Wildlife Authority
TCS	Transboundary Core Secretariat
TEEB	The Economics of Ecosystems & Biodiversity
TFCA	transfrontier conservation area
TNC	The Nature Conservancy
TRAFFIC	The wildlife trade monitoring network
UN	United Nations
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNEP	United Nations Environment Programme
UNITA	National Union for the Total Independence in Angola
UNODC	United Nations Office on Drugs and Crime
US(A)	United States (of America)

USAID	US Agency for International Development
USD	US dollar
UWA	Uganda Wildlife Authority
VCS	Verified Carbon Standard
VGL	Veterinary Genetics Laboratory
VIEA	Very Important Elephant Area
WAVES	Wealth Accounting and Valuation of Ecosystem Services
WCS	Wildlife Conservation Society
WDPA	World Database on Protected Areas
WEN	Wildlife Enforcement Network
WHS	World Heritage Site
WMA	wildlife management area
WR	wildlife reserve
WS	Wildlife Sanctuary
WTA	Water Tower Authority
WWF	Worldwide Fund for Nature



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Executive Summary

>0 _ Executive Summary

This chapter develops a strategic approach for wildlife conservation in Eastern Africa. It is organised into five sections composed as follows: 1) an introduction to Eastern Africa's key ecosystems, their unique features and their values; 2) an outline of the nature and extent of the threats to them and of the drivers behind those threats; 3) a review of ongoing approaches and efforts to reduce the impact of threats and drivers; 4) a discussion of lessons learned, and 5) a set of indicative actions recommended as ways in which an EU intervention could contribute effectively to the long-term conservation of Eastern Africa's extraordinarily diverse natural heritage.

Section 1 opens with the definition of Eastern Africa as used in this study. It goes on to describe the main natural habitats and ecosystems of the region, and the special features of the flora and fauna in each. It pays particular attention to the glaciated high mountains unique to this part of Africa, and the grassy woodlands and open savannahs that characterise its most extensive and productive wildlife habitats. There are also descriptions of forests (montane, highland, mid-elevation, lowland and coastal); of arid and semi-arid lands; of lakes, rivers and wetlands; and of seashore habitats.

Section 2 reviews long-term threats to the wildlife of Eastern Africa and the factors that drive them. Although the current poaching onslaught affecting elephants and rhinos is a matter of huge concern, the greatest long-term threat to the region's wildlife overall is the continuous fragmentation and unsustainable use of natural habitat, and the human-wildlife conflict that follows. Another consequence is that increasingly isolated PAs lose ecological resilience. These threats are driven ultimately by an inexorable and accelerating increase in the number of poor people, which is driving the emergence of an increasingly serious bushmeat problem that is still under-recognised in the region. Other threats and drivers discussed include climate change, market forces, the under-valuation of ecosystem services and biodiversity, and weak governance and corruption.

Section 3 reviews ongoing conservation efforts to overcome the threats and drivers described in the previous section. Context is provided by an initial review of the global to local planning frameworks that influence the approach to wildlife conservation in the region. Given the strength of contemporary concern about all types of wildlife and forest crime in Eastern Africa, the strategic approaches being used to combat this, based on stopping the killing, the trafficking and the demand, are described. Other efforts described and discussed are minimising human-wildlife conflict; improving the PA system connectivity and effectiveness; valuing ecosystem services properly; adapting to climate change; and alleviating poverty, particularly in communities living with wildlife in and around PAs through Community-based Natural Resource Management (CBNRM).

Section 4 reviews some lessons learned. Probably the key lesson is that while PAs contain the most intact assemblages of wildlife and are where biodiversity is being most effectively protected, the responsible management authorities remain under-resourced and without the capacity to deal effectively with the scale and sophistication of poaching and trafficking networks. This situation relates to governments still not fully understanding the value of ecosystem services and, linked to that, poor governance standards. Another key lesson is that in the face of uncontrolled population growth, the sustainability of CBNRM schemes is compromised. Much depends on whether and how the last, best wildlife areas – many of which are transboundary in nature – can be secured in perpetuity. To this end, Eastern Africa needs to learn from the Southern Africa Development Community (SADC), and greatly strengthen its political and financial commitment to the development and formal co-management of transfrontier conservation areas (TFCAs). Acting on any of these lessons will benefit greatly from donor support, but this must be sustained over much longer, more realistic time frames than hitherto, and with tighter performance monitoring and accountability features.

Section 5 proposes a selection of indicative actions that would contribute greatly to achieving long-term wildlife conservation in Eastern Africa. These are organised around four approaches. The first addresses law enforcement and trade control issues by proposing support for the development of Wildlife Enforcement Networks (WENs) at the national level in all countries, and for a forensic laboratory to provide analytical services at the regional level. The second approach centres on elephants and rhinos, and defers to the specific actions proposed in Chapter 5 of this study (Sections 1 and 2). At the same time, however, it argues that the most important populations of these and other iconic species must feature as criteria in the selection of the priority areas around which the next approach is centred, making support for those areas a very powerful, if indirect, way to assist in their conservation.

A Maasai warrior in Ngorongoro Crater, Tanzania.
Living with wildlife comes with costs. The challenge for conservation is to maximise the benefits of living with wildlife for rural communities.

The third approach proposes long-term support for selected Key Landscapes for Conservation (KLCs) containing Eastern Africa's most important PAs and the areas linking them (including TFCAs). Of all the strategic approaches recommended, this is the central pillar since the KLCs are selected so as to capture not only the diversity of the region's ecosystems and important species, but also those areas that have the greatest chance of surviving the many pressures on wildlife and natural resources in the coming years. Thus priority is given to sites harbouring the most intact assemblages of Eastern Africa's wildlife; to World Heritage Sites (WHSs) already recognised for their outstanding universal value; and to sites which protect specific globally important features not found elsewhere. More than 80 PAs are included in the 17 KLCs identified. Several of the most important ones are also TFCAs, notably the Maasai Mara-Serengeti-Ngorongoro complex between Kenya and Tanzania, encompassing 7 PAs including 3 WHSs; the Greater Kilimanjaro complex between the same countries with 8 PAs including 1 WHS; and the Greater Virunga complex (overlapping with the Central African region), which encompasses 11 PAs including 3 WHSs. Between them, these and the other KLCs almost certainly protect the majority of Eastern Africa's floral and faunal diversity. They also include most of the priority areas identified in the Action Plans for elephants, rhinos, big cats, great apes and numerous other endangered and endemic species. It is strongly recommended that the EU gives priority to supporting these KLCs, and the wide range of actions that could be financed to protect and manage them – in both their constituent PAs and the community areas in between – is described.

The fourth and last intervention approach concerns the strengthening of wildlife management-related institutions. Here it is recommended that support should be given to the East African Community Secretariat to promote and professionalise the formal co-management of TFCAs in the region through the elaboration of appropriate policies, procedures and plans. A programme to strengthen the field skills and overall competence of the region's PA wardens through the development of a new course and scholarships at the College of African Wildlife Management is also advocated. Finally, it is recommended as a strategic priority that the EU sets aside resources to enable it to support national-level sectoral, institutional and/or PA system reforms on an ad hoc, if-and-when requested basis, and advertises its willingness and ability to act in this way.

1

Special features of the Eastern African region

>1 _ Special features of the Eastern African region

The Eastern African region as defined for purposes of this report comprises 11 countries – **Burundi**, **Djibouti**, **Eritrea**, **Ethiopia**, **Kenya**, **Rwanda**, **Somalia**, **South Sudan**, **Sudan**, **Tanzania** and **Uganda**. Altogether it has an area of about 6.4 million km^2, and a population of some 305.6 million people. It also has some of the most diverse and awesome ecosystems on earth, let alone in Africa.

This diversity owes much to a still evolving geomorphology that has bequeathed to the region some unique features, including both the highest/coldest[1] and lowest/hottest[2] points on the continent, as well as rift valleys at a scale visible from space, which contain spectacular lakes and active volcanoes. Not surprisingly therefore, there is an astonishing variety of habitats ranging from the equatorial snow peaks and glaciers of Kilimanjaro, Mount Kenya and the Ruwenzori to the coral reefs and mangroves of the Indian Ocean coasts; and from the rainforests of Rwanda and Uganda to the deserts of Sudan, Eritrea and Somalia (see Figure 1).

In between these extremes are the extensive grasslands and savannah woodlands that still harbour the biggest concentrations of large mammals on the planet. These include the iconic phenomena and species that best epitomise Africa in the popular mind: herds of antelope and flocks of flamingos migrating literally in millions, huge herds of elephants, lions in prides of dozens, rhinos, gorillas and so on. Living with these flagship species is a huge, and still under-researched, diversity of smaller vertebrates, invertebrates and plants, a high proportion of which are endemic.

All of this astonishing manifestation of biodiversity is threatened to a greater or lesser extent throughout Eastern Africa. The general descriptions given below are regional in character and necessarily concise. Similarly, only a few specific examples out of very many are given. For a summary of 'biodiversity facts' at a national level, the reader is referred to the country profiles available on the website of the Convention on Biological Diversity[3], to which all countries in the region are party[4].

Rainfall, temperature and soils all interact to determine the ecological character of an area, but the most important of these is rainfall, not just the total amount but also how it is distributed throughout the year. Total amounts are strongly influenced by elevation: generally speaking the higher the land, the more rain it will receive, although this relationship breaks down at the coast where the proximity of the ocean provides high rainfall at sea level. In terms of distribution, most of Eastern Africa enjoys a bimodal rainfall regime, with two rainy seasons, unlike the single rainy season that prevails over most countries to the south. As a result, ecosystem productivity is – all else being equal – greater in Eastern than Southern Africa.

1.1 High mountains

Eastern Africa boasts not just the highest mountain in Africa, Kilimanjaro, but also all 20 or so of the highest peaks. The five highest are distributed amongst five countries, Kilimanjaro (5 893 m) in Tanzania, Mount Kenya (5 199 m) in Kenya, Margherita (5 110 m) in Uganda, Ras Dejen (4 550 m) in Ethiopia, and Karisimbi (4 519 m) in Rwanda. Mt Kenya is described as an example in Box 1.

Box 1. Mount Kenya

At 5 199 m, Mount Kenya is the highest second peak in Africa. It is an ancient extinct volcano, which during its period of activity (3.1-2.6 million years ago) is thought to have risen to 6 500 m. The summit is made up of rock, snow and ice. Above about 3 300 m, the mountain slopes and most of the national park are above the tree line; below it the rich volcanic soils are clothed in forests which are part of the largest continuous block of indigenous closed canopy forest in Kenya. The entire mountain is a vital water catchment for some 7 million people and is the source of the great Tana and Ewaso Nyiro rivers. Plant and animal biodiversity is high, with numerous rare and endemic species.

(1) Mount Kilimanjaro (5 893 m) in Tanzania is the highest mountain in Africa and the highest free-standing mountain in the world. Its summit is presumed to reach the coldest temperatures in Sub-Saharan Africa but in continental terms, lower temperatures probably occur in the Atlas Mountains.
(2) S Lake Asal (-125 m) in the Afar Depression, Djibouti is the second lowest point on earth and the world's most saline lake. The area is also the hottest on earth in terms of average annual temperature: daily temperatures range between 25 °C and 48 °C depending on the season.
(3) S www.cbd.int/reports/search
(4) S Except Southern Sudan which has yet to join in its own right.

Giant groundsel in the alpine zone of Mt. Kenya National Park, Kenya.
The fauna and flora of East Africa's unique Afro-alpine ecosystem contain dozens of endemic species.

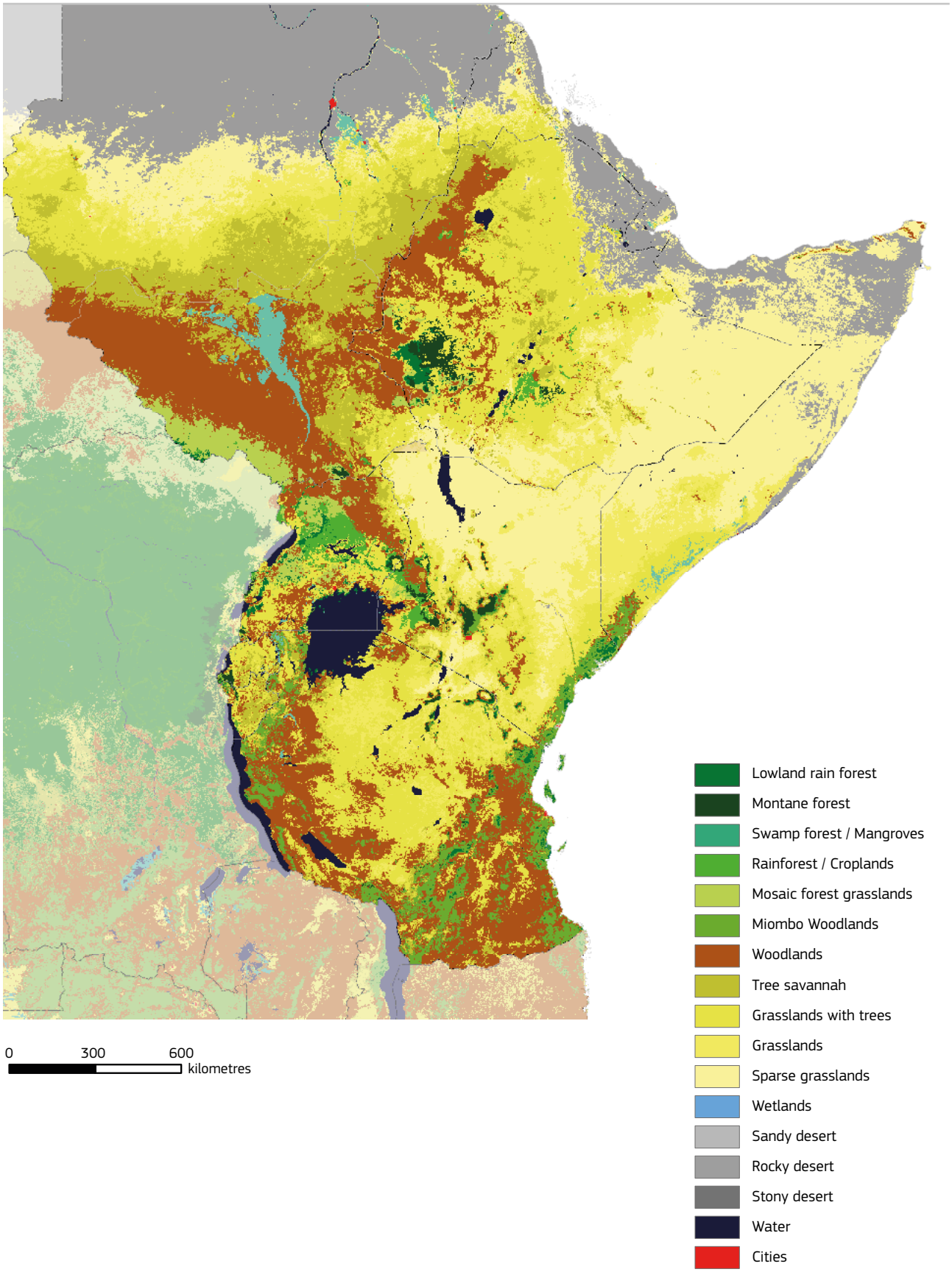
At their very highest elevations, these mountains host Africa's only permanent snowfields and glaciers. Below these but above the tree line (at approximately 3 300 m) is found an alpine ecosystem with flora and fauna unique to Africa (Box 2). It is found most extensively in the Ruwenzori Mountains on the border of Uganda with the Democratic Republic of Congo (DRC); on Mount Kenya and the Aberdares in Kenya; and in the Simien and Bale Mountains of Ethiopia. Although sharing the same fundamental physiognomy, each locality has many endemic species found nowhere else, making them all incredibly important biodiversity 'hotspots'. It is thus hardly a coincidence that mountains high enough to exhibit this ecotype account for four of the ten natural World Heritage Sites in Eastern Africa[5].

Box 2. Afro-alpine flora

Above the tree line, a unique Afro-alpine ecosystem is found whose fauna and flora contain dozens of endemic species, the evolution and ecology of which provide an outstanding example of ecological processes. At its lower elevations (3 300 m-3 800 m) is an alpine moorland zone characterised by high rainfall and a thick humus layer. Waist-high tussock grasses and sedges predominate. The higher elevations (3 800 m-4 500 m) contain a more varied flora, including several species of iconic 'giant rosette plants' in the genera *Lobelia*, *Senecio* (giant groundsels) and *Carduus* (giant thistle). The evolution in these plants of adaptations to extreme cold is of particular scientific interest, the rosettes being composed of a great number of adult leaves surrounding a central cone of developing leaves. Upon the onset of a night frost, the adult leaves bend inwards to insulate the central leaf bud, which slows cooling long enough to protect it from freezing until re-warming by the following day's sunshine.

(5) Simien National Park (Ethiopia); Mount Kenya National Park/National Forest (Kenya); Kilimanjaro National Park (Tanzania); and Ruwenzori Mountains National Park (Uganda).

Figure 1. Land-cover types of the Eastern African region



^
The Ethiopian wolf (Canis simiensis), a species endemic to the Ethiopian highlands.

Although not necessarily linked closely to the afro-alpine ecosystem per se, all the highest massifs harbour a wide array of rare and endangered species, many of them endemic. The Bale Mountains provide a good general example of this (Box 3), while certain specific animals emphasise the point, including the iconic mountain gorilla[6], ranging exclusively in the high volcanoes of Rwanda and Uganda; the mountain bongo[7], found in a few mountain forests of Kenya; and the walia ibex[8] and gelada baboon[9], restricted to the Simien Mountains of Ethiopia.

Mountains, irrespective of height, are very also important for the closed and evergreen forests they support as described below.

Box 3. The Bale Mountains

Ethiopia is known as a global centre of biodiversity. The Bale Mountains represent an essential area for the conservation of endemic species and is regarded as the largest Afro-alpine habitat in the whole of Africa. The Bale Mountains, with their vast moorlands, extensive heathlands, woodlands, pristine mountain streams and alpine climate, represent an area of exceptional natural value. With an altitudinal range of 1 600-4 377 m on Tulu Dimtu (the second highest mountain in Ethiopia), the Bale Mountains encompass a range of habitats and contain a great diversity of fauna, including 77 species of mammals (17 endemic) and over 220 species of birds (16 endemic) which have been recorded in the Bale Mountains National Park. The mountain nyala, Ethiopian wolf (the world's most endangered canid), Bale monkey and giant molerat are just some of these many species endemic to the highlands of Ethiopia, and the Bale Mountains hold the largest remaining populations. They also give rise to several rivers that are of major importance for agriculture in the lowland areas of Ethiopia, Kenya and Somalia.

(6) The mountain gorilla (*Gorilla beringei beringei*) is found in two isolated sub-populations: Bwindi Impenetrable National Park, Uganda and the Virunga Volcanoes region of Rwanda, Uganda and DRC. It is chiefly because of its gorillas that Bwindi is a World Heritage Site.
(7) S Eastern bongo, *Tragelaphus euryceros isaaci*.
(8) S *Capra ibex walie*, the only wild sheep found in Sub-Saharan Africa.
(9) S *Theropithecus gelada*, a species in its own genus.

The forests of the Eastern Arc Mountains, stretching from Zambia, through Tanzania to Kenya, are over 30 million years old and constitute one of Africa's most important biodiversity hotspots. At least 25 % of Tanzanians also depend on the forest covered mountains for their water supply.

1.2 Forests

Continental data on the extent of forests and their rates of depletion are provided in the summary document – Synthesis, Section 2.3.

A much-simplified description of the main types of forest found in Eastern Africa is given below: montane and highland, mid-elevation and lowland, and coastal. All are important reservoirs of biodiversity, and all provide important goods and ecological services. Furthermore, all forests (and woodlands too) serve as carbon sinks, thus playing a role in mitigating global warming.

1.2.1 Montane and highland forests

Due to the relationship between elevation and rainfall, extensive tracts of forest in Eastern Africa are usually associated with mountains and hills, irrespective of their height. Some of these areas are relicts of forests dating back to a time when the region as a whole was wetter and forests far more expansive. These so-called 'Pleistocene refugia' are analogous to islands, separated by savannah seas, and like islands very often contain unique endemic species. The Eastern Arc Mountains in Tanzania and Kenya provide a good example (Box 4).

Box 4. The Eastern Arc Forests

'Eastern Arc' is the name applied to an archipelago of a dozen mountains scattered in a chain stretching across Tanzania between the Kenyan and Zambian borders. Included are the Taita Hills (Kenya) and the Pare, Usambara and Udzungwe Mountains of Tanzania. Scientists believe that the forests on the Eastern Arc Mountains have survived for over 30 million years, and were once connected to the forests of the Congo Basin and West Africa. Neighbouring mountains are much younger, for example Kilimanjaro is estimated to be about 1-2 million years old. Many thousands of species of plants and animals are found in these forests and nowhere else on earth. This includes at least 100 species of birds, mammals, amphibians and reptiles, at least 800 plants and huge numbers of smaller creatures, including butterflies and millipedes. Many of these species are threatened with extinction.
The Eastern Arc is recognised internationally as an area with an exceptional concentration of endemic species. In addition, at least 25 % of Tanzanians depend on the Eastern Arc Mountains for their water supply.

The Southern Highlands of Tanzania also boast important highland forest with high levels of endemism, and provide a stronghold for Abbott's duiker, the kipunji monkey discovered in 2003 on Mount Rungwe (Africa's rarest primate species and genus [10]) and more than a dozen new vertebrates discovered in the last few years. They also harbour the region's most extensive montane grasslands (Eastern Africa's rarest habitat type), and an impressive orchid flora (Kitulo National Park in particular). Altogether, Tanzania's mountains contribute to the country having the highest primate diversity of any in the region. Tanzania boasts 27 species including the chimpanzee (e.g. in the Mahale Mountains).

The Imatong Mountains of South Sudan provide another example of rich and unique highland biodiversity. The vegetation is relatively intact and the mountain range still has some of the best-conserved Podocarpus forests in Eastern Africa. In addition to Afro-montane floral associations, the Imatongs also have vegetation types associated with the lowland forests of the Congo Basin and the drier woodlands and savannahs of northern Sudan and Somaliland. There are no other mountains in Eastern Africa that have so many floral assemblages converging on them, resulting in at least 21 endemic plant taxa.

There are very many other forested highlands across the region that could be mentioned, almost all of them characterised by high biodiversity and endemicity. Without exception however, they all provide a range of ecological goods and services to the often-substantial human populations living around them. Goods include fuel, timber and non-timber forest products (fruits, wild crop relatives [11], medicines, etc.) as for any forest, but the most important service of an upland forest is as a water catchment area. As highlands they receive higher rainfall than the surrounding lowlands, and their forest cover regulates the recharge of rivers rising in them. Without the forest to retard run-off, the relatively high precipitation received would flood torrentially down steep slopes, to the detriment of soils and habitats below. As a result of this service, key upland catchment forests are often referred to as 'water towers'.

Kenya, for example, officially recognises five water towers of critical economic importance: namely the Mau Forest Complex, Mount Kenya, the Aberdares Range, Mount Elgon and the Cherangani Hills [12]. In Tanzania, the Southern Highlands contribute water via the Usangu Flats and Ihefu Swamp to the Great Ruaha River, thus providing important ecosystem services to both people living downstream and the important wildlife populations of the Greater Ruaha-Rungwa-Kitulo-Kipengere landscape, which now hosts the largest population of elephants in Eastern Africa [13]. Similarly the Imatongs form the most important watershed in southern South Sudan, with numerous towns and villages dependent on the maintenance of this catchment area.

1.2.2 Mid-elevation and lowland forests

Compared to West and Central Africa, inland Eastern Africa has little true lowland forest on relatively flat terrain. Coastal forests are described separately below, and the more open woodland formations in Section 1.3. The most extensive closed and evergreen lowland forests in the region are found in western Uganda (e.g. Semuliki National Park, Kibale National Park and Budongo Forest Reserve), with patches elsewhere (e.g. south-western South Sudan). Also notable are the transfrontier forests of Nyungwe National Park in Rwanda and Kibira National Park in Burundi. This landscape represents one of the few substantially intact mid-altitude rainforests in Eastern Africa.

All these areas host a variety of forest animals, including elephant, buffalo and giant forest hog. The primate fauna, including important chimpanzee populations, is especially diverse with 13 species recorded in Kibale for example. Semuliki is dominated by the easternmost extension of the great Ituri Forest of the Congo Basin, one of Africa's most ancient and bio-diverse forests. Birdlife is especially spectacular in Semuliki with 441 recorded species, representing 40 % of Uganda's total bird species and 66 % (216) of the country's forest bird species. There are numerous rarities: 46 Guinea-Congo biome species are found nowhere else in Eastern Africa. Similarly, Nyungwe-Kibira is an important centre for primates (including chimpanzee), and contains many Albertine Rift endemics.

Whilst not quite so critically important as highland forests in terms of water catchment services, mid-elevation and lowland forests do of course offer a similar range of goods.

([10]) *Rungwecebus kipunji*.
([11]) For example, wild coffee (*Coffea arabica*) indigenous to the last patches of cloud forest found in south-western Ethiopia.
([12]) UNEP (2012). The Role and Contribution of Montane Forests and Related Ecosystem Services to the Kenyan Economy, UN Environment Programme, Nairobi, ISBN: 978-92-807-3273-3. Note that Mt Kenya, the Aberdares and Mt Elgon are all national parks.
([13]) This includes the following PAs: Ruaha NP, Rungwa Game Reserve (GR), Kitulo NP, Mpanga-Kipengere GR and Mount Rungwe Forest Nature Reserve.

1.2.3 Coastal forests

The coastal forests of East Africa are found in a chain of relict forest and thicket patches set within savannah woodlands, wetlands and agricultural land at elevations between 0 and 500 m, extending from southern Somalia to southern Mozambique. Those of Kenya and Tanzania are part of the Northern Zanzibar-Inhambane coastal forest mosaic, which extends from the Kenya-Somali border to the Tanzania-Mozambique border along the coast. The ecoregion includes forest patches found on the islands of Zanzibar, Pemba and Mafia. These forests are characterised by a mosaic of vegetation types including closed canopy evergreen forest, *Brachystegia* woodland, scrub forest and dry forest. They are typically found in small fragmented patches. Mangrove forests are not considered to be coastal forest under this definition.

The coastal forests of Eastern Africa are a globally recognised area of great biological importance, due to the high levels of biodiversity and endemism found within the small, fragmented and highly threatened patches of forest (Box 5).

The highest levels of biodiversity are found in the closed canopy forest, but this only makes up 2% of the total area of the coastal forest mosaic. The two largest protected areas in Kenya are Arabuko-Sokoke (417 km^2) and Shimba Hills (63 km^2). Arabuko-Sokoke alone hosts an abundance of mammal, bird, reptile and amphibian species limited to that one forest[14]. The rare antelope known as the hirola[15] is restricted to the northernmost coastal zones of Kenya (although it might also survive in Somalia).

In addition to their high biodiversity values, coastal forests provide the same goods and services as any forest. More than others however, many have an important cultural value to local people. For instance, the *kaya* forests in Kwale and Kilifi districts of Kenya are sacred to local communities, with graves of important elders found within the forest. Sacred forests are also common in Tanzania where extractive use is closely regulated by communities.

Tana River mangabey, one of the five primate species endemic to the coastal forests, Kenya.

Box 5. Coastal forests

Many species are endemic to these forests, for example 44% of plants are endemic to the coastal forests and 40% of plant genera are confined to a single forest patch. Forests only 100 km apart may have an 80% difference in their plant species. The coastal forests are home to five endemic primates: Tana River red colobus (*Procolobus rufomitratus*, critically endangered), Tana River mangabey (*Cercocebus galeritus*), Zanzibar red colobus (P*rocolobus kirkii*, endangered), Rondo galago (*Galagoides rondoensis*, endangered) and the Kenya coastal galago (*Galagoides cocos*). The coastal forests support populations of threatened (Red List) flagship mammal species: black rhino (*Diceros bicornis*, critically endangered if not locally extinct), elephant (*Loxodonta africana*, threatened) and wild dog (*Lycaon pictus*, endangered). Musical instruments, such as the clarinet, oboe and highland backpipe, are made from one highly valued hardwood species, African blackwood (*Dalbergia melanoxylon*) which is found in coastal forests and is threatened by unsustainable harvesting. Coastal forests together with the Eastern Arc Mountains, are home to the African violet (*Saintpaulia spp*) from which 40 000 varieties have been cultivated commercially from three species, with a retail trade of USD 100 million per annum*.

(*) BirdLife International (2013) *Biodiversity Status and Trends Report for the Eastern Arc Mountains and Coastal Forests of Kenya and Tanzania Region 2012*. BirdLife International-Africa Partnership Secretariat Nairobi

(14) BirdLife International (2014). Important Bird Areas factsheet: Arabuko-Sokoke Forest. Download from http://www.birdlife.org. Unique and endangered birds include (*Otus ireneae*) Clarke's weaver (*Ploceus golandi*) and Sokoke pipit *(Anthus sokokensis)*.

(15) *Beatragus hunter*, an Alcelaphine antelope allied to the topi and hartebeest.

Cheetah, an iconic species of the plains of Serengeti National Park, Tanzania.
Cheetahs have disappeared from 76% of their historic range in Africa. They are threatened by habitat loss and fragmentation, and killing and capture for protection of livestock and for the wildlife trade.

1.3 Woodland and grassland

The wooded and grassy habitats of Eastern Africa come in many varieties, ranging from vast open grass plains and highland grasslands, to the acacia[16]-dominated savannah woodlands found over much of the region, to the sometimes dense miombo[17] woodlands so typical of western and southern Tanzania and beyond. The important common feature of them all, however, is the availability of grass.

It is in these grassy ecosystems that one finds the amazing, interdependent communities of large mammals for which Africa is so famous, made up especially of large numbers of grazers, but also specialist browsers, all of them supporting an impressive cast of large and small predators as well as an array of scavengers.

Examples include, for grazers: many species of antelope, zebra, buffalo and hippo; for browsers: rhino and giraffe; for both: elephant; for predators: lion, leopard, cheetah, wild dog and crocodile; for scavengers: hyaena, jackal and vulture.

It is in the vast and productive grassy habitats in Eastern Africa that one still finds the last two great mammalian migrations in Africa. The most famous of these is undoubtedly that of the Serengeti-Mara ecosystem, in which massive herds dominated by wildebeest circulate between Tanzania and Kenya (Box 6).

Box 6. The Serengeti

The vast plains of the Serengeti National Park, comprising 1.5 million hectares of savannah, support the largest remaining unaltered animal migration in the world. Over 1 million wildebeest plus hundreds of thousands of gazelle and zebra – followed by their predators – engage in a 1 000 km-long annual circular trek in search of pasture and water, spanning the two adjacent countries of Kenya and Tanzania.
This spectacular phenomenon takes place in a unique scenic setting of 'endless plains': 25 000 km^2 of treeless expanses of spectacularly flat short grasslands dotted with rocky outcrops (kopjes) and interspersed with rivers and woodlands. This is one of the most productive ecosystems on earth, sustaining the largest number of ungulates and the highest concentration of large predators in the world. The ecosystem supports roughly 1.3 million wildebeest, 300 000 Thomson's gazelle and 200 000 zebra that dominate the migratory herd. Other herbivores include 90 000 impala, 50 000 Grant's gazelle, 40 000 buffalo, 40 000 topi, 15 000 eland, 8 000 hartebeest, 10 000 giraffe and 3 000 elephant, but fewer than 40 black rhino. The park has the highest ostrich population in Tanzania and probably in Africa. This abundance of prey animals supports very important populations of lion, leopard, cheetah, spotted hyaena and wild dog.

(16) In 2011, the Latin name *Acacia* was transferred from the African-type genus to one in Australia. All of the African species have new generic names. However, the name remains so quintessentially African that its use as a common name is continued here.
(17) 'Miombo' is a vernacular word that has been adopted by ecologists to describe woodland ecosystems dominated by trees in the genera *Brachystegia, Julbernardia and Isoberlinia.*

Much less well-known, but as impressive in scale, is that of the Sudd-Badingilu-Boma-Gambella ecosystem, in which herds dominated by white-eared kob circulate between South Sudan and Ethiopia. The most recent estimates obtained in 2009 for the migratory species are 1.67 million white-eared kob (*Kobus kob leucotis*), 340 000 Mongolla gazelle (*Gazella rufifrons albonotata*) and 125 000 tiang, the Sudanese form of topi (*Damaliscus lunatus tiang*)[18]. These species range mostly within South Sudan: 90 % in the case of the kob, and 100 % for tiang.

The best known of Eastern Africa's parks and reserves are mostly those that strive to conserve intact, functioning examples of grassy and open woodland ecosystems. In addition to the Serengeti NP (Tanzania) and Mara Game Reserve (Kenya) mentioned above, these include Omo-Mago NP in Ethiopia; Samburu National Reserve, Amboseli and the two Tsavo NPs in Kenya; Ngorongoro Conservation Area, Selous Game Reserve and Ruaha NP in Tanzania; and Queen Elizabeth[19], Murchison Falls and Kidepo Valley National Parks in Uganda. Unsurprisingly perhaps, several of these protected areas are inscribed on the list of World Heritage Sites[20]. Together, they represent the backbone of Eastern Africa's economically very important tourism industry.

Some of those mentioned, notably the Selous GR (see Box 7) and Ruaha NP, are representative of the miombo ecotype in which the dominant trees are deciduous. Due partly to the relatively dense canopy prevailing during the time of year when the trees are in leaf and partly to much poorer soils, the abundance and quality of grazing is not as high in miombo as it is in acacia savannah. This translates into a significantly lower carrying capacity of large herbivores. Nonetheless, the sheer extent of the habitat means it also supports very important populations of herbivores, especially elephants, and predators.

Miombo woodlands are central to the livelihood systems of millions of rural and urban dwellers in Tanzania. Goods provided to support the livelihoods of local communities include products such as medicines, fuel, food, fibres, and construction and craft materials. The services include cultural and spiritual values, climate regulation, erosion and hydrological control.

Lake Nzerakera in Selous Game Reserve, Tanzania. Selous is one of the largest protected areas in Africa.

Box 7. The Selous

The Selous Game Reserve, covering 50 000 km^2, is one of the largest protected areas in Africa. It lies between the Somalia-Maasai and Zambezian centres of endemism, mostly within the latter. Together with the adjacent Mikumi National Park and Kilombero Game Controlled Area to the west, and the nearby Udzungwa Mountains National Park to the northwest, the Selous and its surrounding areas constitute one of the largest continuous protected and undeveloped wildlife areas in the world, in which ecological and biological processes are relatively undisturbed, including a diverse range of wildlife with significant predator/prey relationships. Despite a long winter drought and poor soils, the reserve has a higher density and diversity of species than any other miombo woodland area, thanks to its size, the diversity of its habitats, the availability of food and water, and the lack of settlements. More than 2 100 plants have been recorded and more are thought to exist in the remote forests in the south. Similarly, the reserve protects an impressive large mammal fauna and contains globally significant populations of elephant, black rhinoceros, buffalo, hippo and wild hunting dog. There are also important populations of ungulates that favour miombo, such as sable antelope, Lichtenstein's hartebeest, greater kudu and Niassa wildebeest. In addition, there is also a large number of Nile crocodile.

([18]) The Wildlife Conservation Society (WCS) considers the kob estimate to be an over-estimate, and those for gazelle and tiang to be under-estimates. For more detail see Grossmann F., P. Elkan, C. Tiba, J. Moi, P.P. Awol, J. Lita, P. Demetry and S. Kenyi (2011). Aerial Surveys of Wildlife, Livestock, and Human Activity in and around Existing and Proposed Protected Areas of the Republic of South Sudan 2009 - 2010, WCS Report No 4 to USAID and Government of South Sudan.

([19]) Biomass densities for this park exceed those published for any other wildlife community anywhere in the world. During the late 1960s, the year-round average biomass of large mammals in the grasslands of the Queen Elizabeth NP was recorded as 29 490 kg/km^2, compared to 6 300 kg/km^2 for the Serengeti.

([20]) Serengeti NP, Selous GR and Ngorongoro Conservation Area (all in Tanzania).

1.4 Arid and semi-arid land

A huge crescent of land that includes northern Kenya, eastern Ethiopia, much of Somalia, Djibouti, Eritrea and most of northern Sudan is dominated by dry bushland, semi-desert dwarf shrubland and deserts. Except on mountains or near the coast, proper woodland is confined to drainage lines of rivers and streams, many of which are seasonal and flow only intermittently. Due to low rainfall and productivity, these arid and semi-arid lands (ASALs) have never supported wildlife in abundance, and nowadays the best areas are anyway heavily utilised by pastoralists. Overstocking and overgrazing in relation to carrying capacity is common, leading to range degradation and desertification. Consequently, wildlife species adapted to ASAL conditions are rare and endangered[21]. Surprisingly, small relict elephant populations survive in a couple of favourable areas: one in the Babile Sanctuary of north-eastern Ethiopia and another in the Gash-Setit Wildlife Reserve of Eritrea on its southern border with Ethiopia.

1.5 Lakes, rivers and wetlands

The most notable components of Eastern Africa's nominally freshwater ecosystems are strongly associated with two very major geographical phenomena: the Great Rift Valley and the River Nile.

The East African Rift came into being approximately 40 million years ago as the African tectonic plate began to split. It comprises two distinct arms: the Eastern or Gregorian Rift and the Western or Albertine Rift.

The **Eastern Rift** holds a string of lakes on the rift floor running south from Ethiopia through Kenya to Tanzania: with few exceptions these lakes are all saline and alkaline. The Ethiopian lakes from north to south are Zeway, Shala, Abyata, Langano, Awassa, Chamo, Abaya and Chew Bahir. The Kenyan section is home to eight lakes, of which two are freshwater and the rest alkaline. From north to south these are Lakes Turkana (largest of the Kenyan lakes and only slightly saline[22]), Logipi, Baringo (freshwater), Bogoria (a national reserve), Nakuru (a national park), Elmenteita, Naivasha (freshwater) and Magadi[23]. The chain of alkaline lakes continues into Tanzania with Lakes Natron and Manyara.

(21) For example, Grevy's zebra, wild ass, dibatag, desert warthog, oryx, beira, Speke's gazelle and Soemmerring's gazelle; some are endemic to, and all formerly widespread in, the Horn of Africa.
(22) Also inscribed on the list of World Heritage Sites, mainly on account of its paleontological importance for hominid fossils.
(23) Baringo, Bogoria, Nakuru and Elmenteita are all Ramsar sites.

Lake Nakuru National Park, part of the serial World Heritage Site called the Lake System in the Great Rift Valley. The shallow soda lakes support millions of lesser and greater flamingos and are an integral part of the most important route of the African-Eurasian flyway system for birds travelling from the northern breeding grounds to African wintering places.

The shallow soda lakes of the Eastern Rift represent a unique ecosystem based on alkaline-tolerant blue-green algae and zooplankton, whose high productivity in the warm, strongly insolated water supports huge populations of lesser and greater flamingos respectively, these birds being highly adapted to exploit these resources. Three of these lakes in Kenya, namely Bogoria, Nakuru and Elmenteita form a 'serial' World Heritage Site called the Lake System in the Great Rift Valley (Box 8). Together these areas present an exceptional range of geological and biological processes of exceptional natural beauty, including falls, geysers, hot springs, open waters and marshes, forests and open grasslands, all concentrated in a relatively small area. The massed congregations of birds on the shores of the lakes, including up to 1.4 million lesser flamingos that move between the lakes against the backdrop of the Great Rift Valley, constitute an exceptional natural phenomenon of global significance. Lake Natron to the south in Tanzania is the lesser flamingo's major nesting site and the aim in due course, as reflected in the official Action Plan for the species, is to include this lake into the World Heritage Site as well.

The Western or **Albertine Rift** contains another chain of lakes running south from Uganda, through the DRC to Tanzania and beyond. With one exception, these are fresh and include the largest, deepest and oldest of all the Rift Valley Lakes. From north to south these are Lakes Albert, Edward, Kivu and Tanganyika (at 32 000 km^2 and more than 1 400 m deep, this is the largest and deepest of the Rift Valley Lakes, and the second deepest freshwater lake on the planet). Rukwa is the alkaline exception. The lakes continue south out of Eastern Africa with Lakes Malawi, Malombe and Chilwa.

Box 8. **Rift Valley Lakes in Kenya**

The Kenya Lake System is the single, most important foraging site for lesser flamingo in the world, with about 1.5 million individuals moving from one lake to the other. It also provides the main nesting and breeding grounds for great white pelican in the Great Rift Valley. The lakes' terrestrial zones also contain important populations of many mammal and bird species that are globally or regionally threatened (e.g. black rhino and Rothschild's giraffe). They are home to over 100 species of migratory birds and support globally important populations of black-necked grebe, African spoonbill, pied avocet, little grebe, yellow-billed stork, black-winged stilt, grey-headed gull and gull-billed tern. The area makes a critical contribution to the conservation of the natural values within the Great Rift Valley, and is an integral part of the most important route of the African-Eurasian flyway system, along which billions of birds travel from northern breeding grounds to African wintering places.

Lake Victoria with an area of 68 800 km² is the largest lake in Africa. It is not in the Rift Valley however, occupying a depression formed between the two arms by the uplift of the rifts to either side. Its catchment is of huge economic importance (see Box 9).

The freshwater lakes of the Albertine Rift Valley are home to an extraordinary number of endemic fish species, including most notably some 1 500 cichlid species. The species radiations of cichlids in these lakes rival radiations of terrestrial fauna in the Galapagos, and serve as a classic example of evolutionary adaptation (Box 10).

In addition to their biodiversity and tourism values, all the lakes support commercially important fisheries that sustain the livelihoods of the millions of people living on their shores.

The river systems of Eastern Africa are dominated by the Nile, the longest river in the world, which runs for more than 75 % of its length through the region before entering Egypt. The White Nile rises in the catchments of Lakes Victoria, Albert and Edward and flows north through Uganda and the Sudans to Khartoum, where it is joined by the Blue Nile, whose source, Lake Tana, lies in the Ethiopian highlands north of the Rift Valley and is thus not a Rift Valley Lake[24]. The region's other major river systems include the Omo in Ethiopia, the Tana, Mara and Ewaso Ngiro in Kenya, and the Rufiji and Pangani in Tanzania.

Eastern Africa contains many wetlands associated with its lakes and rivers. Uganda has the most, including 12 Ramsar sites. The largest and perhaps the most important is the massive swamp on the Nile in South Sudan known as the Sudd (see Box 11).

The deltas of the following rivers form important wetlands: the Omo (Ethiopia/Kenya) draining into Lake Turkana; the Ruvuma and Rufiji[25] (Tanzania) and the Kagera (Rwanda) draining into Lake Victoria; and the Tana (Kenya). The Ewaso Ngiro (Kenya) drains into an inland delta known as the Lorian Swamp. Other wetlands of note include the Kilombero, Ihefu and Malagarasi (Tanzania) and the Kyoga (Uganda). All contain exceptional biodiversity, of which hippos, crocodiles, shoebill storks and sitatunga antelope are symbolic.

Some famous wetlands are created by upwellings of groundwater draining off mountains, such as the Amboseli swamps linked to Kilimanjaro, and the Mzima Springs linked to the Chyulu Hills, whose waters supply the cities of Mombasa and Nairobi. The fact that all the wetlands and mountains just mentioned are in national parks underlines their importance[26].

Box 9. The Lake Victoria basin

The Lake Victoria basin is located in the centre of Eastern Africa and covers an area of 194 000 km², of which 7 % is in Burundi, 22 % in Kenya, 11 % in Rwanda, 44 % in Tanzania and 16 % in Uganda. The lake basin contains Lake Victoria, the second largest lake in the world with an area of 68 800 km², and a number of satellite lakes and rivers (including the threatened Yala Swamp complex IBA), which are fringed in many places by extensive wetlands. About 35 million people (about 30 % of the entire population of Eastern Africa) are estimated to live and derive their livelihood directly or indirectly from the basin. Lake Victoria supports one of the largest freshwater fisheries in the world, which by 2007 was producing about 1 million tons of fish annually, valued at between USD 300-400 million. Until the Nile Perch was introduced, the lake had high fish diversity of over 500 species, most of which were endemic to the lake and of economic and scientific value. The Lake Victoria Basin Commission maintains an 'aquatic biodiversity meta-database'. The lake provides water for irrigation, hydropower generation, industrial and domestic use, and modulates local climate.

Box 10. Albertine Rift Valley Lakes

The Albertine Rift Valley Lakes are well known for the extensive radiations of fish species in the family *Cichlidae*. Large numbers of cichlid species live adjacent to one another along the edges of the lakes, having evolved specialisations to take advantage of their environment and to limit competition for resources. For example, one unusual group of fish, the scale-eaters, feed exclusively on the scales of other fish. Most cichlids are mouth-brooders in which the young swim into their parent's mouth for protection in the face of imminent danger. Cichlids are not the only fish unique to these lakes; copepods, ostracods, shrimps, crabs, and molluscs are also represented by high numbers of endemic species.

(24) Like them, however, it supports a unique fish fauna, comprising a group of cyprinid fish that are all descended from a common ancestor (called a 'species flock'). This cyprinid species flock is one of only two known in the world, and the only one that is still intact.
(25) The Rufiji delta is part of the Rufiji-Mafia-Kilwa Marine Ramsar Site.
(26) Amboseli, Tsavo West (for Mzima) and Chyulu Hills NPs in Kenya; and Kilimanjaro NP in Tanzania.

Fishermen in the vast wetland area known as the Sudd situated in the lower reaches of the Bahr el Jebel, a section of the White Nile in South Sudan.

Box 11. The Sudd wetland

The Sudd is one of the largest tropical wetlands in the world, located in South Sudan in the lower reaches of Bahr el Jebel, a section of the White Nile. It is composed of various ecosystems, from open water and submerged vegetation to floating fringe vegetation, seasonally inundated woodland, rain-fed and river-fed grasslands, and floodplain scrubland. Seasonally it hosts the great migratory populations of white-eared kob and tiang. Notable resident wildlife includes South Sudan's largest remaining elephant population, Nile lechwe and shoebill storks. In addition it is an important wintering ground for migratory birds, and contains a number of endemic fish, bird, mammal and plant species. The wetland serves as a filter that controls water quality and as a sponge that stabilises water flow. It is a major source of water for domestic livestock and wildlife, and an important source of fish. The socio-economic and cultural activities of local people are dependent on its annual floods to regenerate floodplain grasses to feed their cattle as they move from permanent settlements on the highlands to dry-season grazing around the swamp.

1.6 Coastal habitats

Any account of the biodiversity of Eastern Africa's Indian Ocean littoral must go beyond the coastal forests and woodlands already described (Section 1.2.3), and include mangroves, sea grass beds, coral reefs and the inshore marine ecosystem generally.

Mangrove forests constitute a unique inter-tidal ecosystem that not only provides habitat and breeding areas for many species, some of them economically important (e.g. crabs and prawns), but also the wood is used for building poles much valued for their strength and durability. They also inhibit coastal erosion, a free service that offsets the huge cost of any engineered solution. Sea grass beds support turtles and the dugong, a large grazing sea mammal. The dugong was once relatively plentiful off the Red Sea coasts of Sudan and Eritrea but its present status there and in Somali waters is uncertain. Further south, sea grass beds are discontinuous and dugongs rare. Coral reefs are well known as spectacular hotspots of biodiversity, and those of Eastern Africa are no exception. The best-known reefs are those protected in marine national parks such as Kiunga, Malindi and Watamu in Kenya, and Mafia Island in Tanzania (Box 12). These and many other reefs are important tourist attractions, being enjoyed by scuba divers, snorkelers and people in glass-bottomed boats.

The overall diversity of East African coastal waters is astounding, estimated at some 11 000 species of marine life. This includes many species of marine mammal, including humpback whales, dolphins and dugongs. All five species of sea turtle living in the Indian Ocean are found along the East African coast, and nest on its undisturbed beaches. Big game fish, such as marlin and sailfish, are plentiful and attract large numbers of sport fishermen. Whale sharks, the biggest fish in the world, are common and a tourist attraction in their own right.

Overall diversity of East African coastal waters is astounding, estimated at some 11 000 species of marine life.

Box 12. The Mafia Island seascape

The Mafia Island seascape arguably contains the finest representative complex of characteristic tropical marine habitats and species in Eastern Africa. It includes Rufiji Delta, which has the largest intact block of relatively well-protected mangrove forest in the region (540 km^2). There are extensive and diverse coral reefs around Mafia and the Songosongo Archipelago that are relatively resilient to coral bleaching. There are also extensive sea grasses, algal beds and intertidal flats; the area contains habitats important to sharks, rays and turtles; coelacanths have been caught there; and the number of seabird species is very high. This variety of habitat gives rise to some of the highest marine species diversity in the region.

Tanzanian coastal waters are renowned for incidental catches of the West Indian Ocean coelacanth (*Latimeria chalumnae*). The coelacanths constitute a primitive order of fish found only along the coastlines of the west Indian Ocean and Indonesia. They belong to the oldest known living lineage of sarcopterygii (lobe-finned fish and tetrapods), which means they are more closely related to lungfish, reptiles and mammals than to the common ray-finned fishes. The West Indian Ocean coelacanth is a critically endangered species, and a marine park to help protect it has been proposed along 100 km stretch of coastline between the Pangani River and Tanga. Since there are only two species of coelacanth and both are threatened, it is the most endangered order of animals in the world.

Amidst this tremendous biodiversity, the coastal zone is also home to millions of mostly poor people, many of who rely almost entirely on marine resources. Threats to these resources thus also threaten their livelihoods. The important indigenous tuna fishing industry of Zanzibar is threatened by commercial operations, to give just one of many similar examples.

1.7 Transformed ecosystems

The descriptions above all relate to the different types of ecosystem in an undisturbed state. The greater proportion of each, however, has already been disturbed and the process continues inexorably. Such 'transformed' ecosystems are generally overlooked by conservationists. In an African context, ecosystems that have lost their charismatic megafauna are often dismissed as having little residual biodiversity or other value. This of course is a mistake, because many disturbed ecosystems continue to host an important variety of plants, birds, small mammals, reptiles, amphibians, insects and invertebrates, some of significant economic importance (e.g. as pollinators). This does not mean that such areas are a priority, but as the process of habitat fragmentation and transformation continues to erode fully intact ecosystems, depleted habitats will take on an increasing importance, just as they have historically in the developed nations of Europe in particular. In many of those countries, the conservation of essentially man-made ecosystems, such as wildflower meadows and hedgerows, are now a priority. Over time, the management of biodiversity in transformed ecosystems, including mosaics of undisturbed patches with agricultural land, will become more important and require greater attention in Africa as well. The Kinangop Highland Grasslands in Kenya is a good example in this category. The entire habitat is in the hands of private landowners, whose sensitisation by local conservation organisations, particularly Nature Kenya (BirdLife in Kenya), catalysed the formation of the Friends of the Kinangop Plateau. Nature Kenya has used 195 acres of the grassland to set up breeding reserves for the globally threatened and endemic Sharpe's longclaw and other endemic fauna.

2

Conservation issues and challenges

>2 _ Conservation issues and challenges

2.1 Threats to biodiversity and ecosystem services

2.1.1 Unsustainable consumptive utilisation

Natural resources are an important source of food, medicine, clothing, trophies, ornaments, fuel and building materials, both domestically and internationally. Probably the biggest threat to biodiversity conservation in any region of Africa is the fact that the consumptive utilisation of natural resources is invariably both destructive and unsustainable. It is also, with extremely few exceptions, either illegal or very poorly regulated.

This is a huge topic that can only be summarised here, as it concerns both domestic and international demand, involves both plants and animals, occurs in all types of ecosystem, and operates at both generalised and species-specific levels.

Of the three forms of generalised utilisation that have the most serious negative impacts, two involve animals and one involves plants.

The hunting of terrestrial wildlife for food, or 'bushmeat' as it is more generally known, has long been recognised as a severe threat to the food resources of indigenous peoples and to wildlife populations in the forests of West and Central Africa, but far less attention has been focused on the issue in savannah areas, in part due to the misconception that illegal hunting for bushmeat in savannahs is a small-scale phenomenon practised for subsistence living. Recent reports confirm that widespread illegal hunting and bushmeat trading occurs on a much greater scale in the savannahs of Eastern and Southern Africa than previously thought [27, 28, 29], and should be viewed with the same levels of concern as it is in other parts of Africa. The analysis of bushmeat trading and related recommendations given in this report's chapter on Central Africa therefore are also very relevant to the Eastern region (see Chapter 3, Sections 2.1.1, 4.10 and 5.4).

The hunting of aquatic wildlife for food, or **fishing**, is another massive issue that could merit a separate chapter but can only be touched on here. All Eastern Africa's fisheries, whether freshwater or marine, are threatened by unsustainable offtake.

The most important and threatening form of generalised plant-based utilisation is **deforestation**. The direct consumption of forest resources occurs to satisfy two principal needs: timber and fuel [30]. The resulting degradation and loss of forest cover and diversity then of course impacts all forest-dependent animal species as well, not to mention the adverse impacts on the ecosystem services of forests (e.g. as water catchments).

Not only is there a strong domestic demand for **timber and poles** for building and furniture, but an international one too, principally from India. The scale of the international timber trade in some countries, such as Tanzania, is massive and contributes to widespread forest degradation and clearance [31].

As is the case elsewhere, wood fuels play a major role in supplying the energy needs of the people in Eastern Africa. The need for wood fuels arises from the low electrification rate in these developing countries, as well as unreliability and expense where electricity is available. In Tanzania, energy from wood fuels account for 90% of the country's energy consumption. Of these wood fuels, **charcoal** is a prevalent choice, especially in urban settings where ease of transport and low storage space are of high importance. The domestic demand for charcoal is huge and increasing as population growth leads to an even greater need for energy sources.

(27) Jambiya G., S.A.H. Milledge and N. Mtango (2007). 'Night Time Spinach': Conservation and livelihood implications of wild meat use in refugee situations in north-western Tanzania, TRAFFIC East/Southern Africa, Dar es Salaam, Tanzania.
(28) Roe D. (2008). Trading Nature: A report, with case studies, on the contribution of wildlife trade management to sustainable livelihoods and the Millennium Development Goals (Case study 1: The trade in wild meat in East and Southern Africa), TRAFFIC International and WWF International.
(29) Lindsey P., G. Balme, M. Becker, C. Begg, C. Bento, C. Bocchino, A. Dickman, R. Diggle, H. Eves, P. Henschel, D. Lewis, K. Marnewick, J. Mattheus, J.W. McNutt, R. McRobb, N. Midlane, J. Milanzi, R. Morley, M. Murphree, P. Nyoni, V. Opyene, J. Phadima, N. Purchase, D. Rentsch, C. Roche, J. Shaw, H. van der Westhuizen, N. Van Vliet and P. Zisadza (2012). Illegal hunting and the bush-meat trade in savannah Africa: drivers, impacts and solutions to address the problem, Panthera/Zoological Society of London/Wildlife Conservation Society report, New York.
(30) Other causes of deforestation are considered in Section 2.1.4.
(31) Milledge S.A.H., I.K. Gelvas and A. Ahrends (2007). Forestry, Governance and National Development: Lessons Learned from a Logging Boom in Southern Tanzania, TRAFFIC East/Southern Africa / Tanzania Development Partners Group / Ministry of Natural Resources of Tourism, Dar es Salaam, Tanzania.

A Somalian soldier walks past a consignment of charcoal destined for the export market in the port town of Barawe, soon after it was recaptured from Al Shebaab terrorists who were heavily involved in the charcoal trade.

In Somalia, however, supply exceeds local demand, and huge quantities are being exported illegally through the southern ports of Kismayu and Barawe. A report by the UN's Somalia-Eritrea Monitoring Group released in October 2014 provides strong evidence that this trade constitutes a major source of finance for the activities of the notorious rebel militia, Al Shabaab. The report alleges that attempts to regulate this trade have been ineffective, partly due to the complicity of elements of the occupying Kenyan forces. Trading in charcoal and taxing the ports have generated an estimated annual total of USD 38-56 million for this organisation. The overall value of the illicit charcoal exported from Somalia has been estimated at USD 360-384 million per year[32]; harvesting at this rate must be unsustainable in the long term.

The ever-growing demand for charcoal all over Africa creates many sustainability challenges. Without intervention, the business-as-usual model for charcoal will not only rob future generations of their ability to meet their energy needs, but will rob Africa of its native forests, their biodiversity and their services.

Whether for timber or fuel, deforestation and forest degradation have long been a problem throughout Eastern Africa. Charcoal production and the use of wood fuels in general are certainly contributors, but it is the illegal harvesting of the trees without reforestation and the lack of good forest and trade management oversight that are the fundamental causes of forest loss.

Some natural-resource value chains are species specific, and the illegal poaching and trafficking activities needed to meet demand are among the commonest contributory factors to a species becoming endangered. The issue of the trade in wildlife generally, and endangered species in particular, is of such great and overriding importance to conservation throughout Africa, not just in the East, that it is described and analysed in a separate, dedicated section of this report (see Chapter 5, Section 3). Some observations specific to Eastern Africa are given in Box 13.

The trade in some items is driven by the extraordinarily high prices consumers are prepared to pay. Elephant ivory can fetch more than USD 3 000 per kilo, unworked billets of African blackwood sell at USD 20 000 per cubic meter, and rhino horn over USD 60 000 per kilo. Due to the fact that they are so gravely threatened by the trade in their parts, and because of their great economic and ecological importance, the conservation of elephants and rhinos is also covered in separate, dedicated sections (see Chapter 5, Sections 1 and 2).

It can be noted here that the consumptive utilisation of wildlife is not limited to dead materials. The trade in live specimens for zoos, laboratories and the pet trade generally has a serious impact on some species. Examples from Eastern Africa include many primate species, including gorillas and chimpanzees, birds and reptiles, and the supply of cichlid fish for aquaria.

State-sanctioned hunting based on official quotas is supposedly sustainable and so it not discussed here. The licensed hunting of certain 'big game' species is available in Tanzania, Uganda and Ethiopia but not Kenya, where it was banned in 1977; only certain game birds may still be shot.

(32) See Nellemann C., R. Henriksen, P. Raxter, N. Ash and E. Mrema (Eds.) (2014). The Environmental Crime Crisis: Threats to Sustainable Development from Illegal Exploitation and Trade in Wildlife and Forest Resources, UNEP and Interpol.

Part of an illegal cargo of 3.1 tons of ivory intercepted in Bangkok in April 2015 by Thai customs officials. The elephant tusks were hidden in bags containing dried tea leaf in containers originating from Mombasa in Kenya and were bound for Laos.

2.1.2 Human-wildlife conflict

The continuing fragmentation and conversion of natural habitats leads to reduced space and food for wildlife, which in turn generates human-wildlife conflict (HWC). As habitat conversion increases, so does HWC and its impacts on crops, livestock and humans themselves. Many lives, principally animal but also human, are lost in the process.

Crop damage in Eastern Africa is caused by many species including insects (locusts and army worms), birds (quelea) and mammals (rodents, monkeys, pigs). By far the most serious problems, however, are caused by the largest of all, the elephant. Not only does it either consume or damage on a grand scale, it is also a direct danger to humans, many of whom lose their lives to crop-raiding elephants. The main impact on livestock comes from large predators, which are the first to be affected by a shortage of natural prey, namely lion, leopard and hyaena, and occasionally cheetah and wild dog.

Box 13. Wildlife trafficking in Eastern Africa

Due to its strategic location, the Horn of Africa has been identified as both a source and transit route for illegal wildlife trade in ivory, rhino horn, live animals, shark fins, corals and other wildlife products between Africa, the Middle East and Asia. The April 2013 issue of *Africa Geographic* states that Kenya is a principal exit point for ivory leaving Africa, and this is acknowledged by the United Nations Office on Drugs and Crime (UNODC) and Interpol*. The majority of recent large seizures of illicit ivory made anywhere in the world were exported from either Kenya or Tanzania, largely through the massive container ports of Mombasa and Dar es Salaam. Since ivory comes from many places and is distributed to buyers across Asia, these ports represent a vital checkpoint in the trafficking network. Addis Ababa in Ethiopia and Khartoum in Sudan contain two active ivory markets and have also been identified as key source and transit smuggling routes.

(*) UNODC (2013) Transnational organised crime in Eastern Africa: a threat assessment. UN Office for Drugs and Crime and INTERPOL (2014) Elephant Poaching and Ivory Trafficking in East Africa: Assessment for an Effective Law Enforcement Response.

Control measures – frequently done illegally – include shooting, trapping, poisoning, repelling, scaring and fencing. Predators, especially lions, are baited with poisoned meat, and their carcasses are then consumed by vultures and other scavengers, all of which perish in turn.

The concept of HWC can also be extended to issues such as pollution (both industrial and agricultural), and the indiscriminate use of pesticides and herbicides, both of which can have devastating impacts on biodiversity.

Introduced and invasive species too are a form of HWC because, in the final analysis, their introduction is invariably anthropogenic. The most potent invasive species threaten biodiversity on an ecosystem scale. A few notable examples of great contemporary concern in Eastern Africa include *Parthenium*, which threatens grassland productivity (thus threatening livestock as well as wildlife)[33], mesquite (*Prosopis juliflora*) and prickly-pear (*Opuntia* spp), both capable of transforming bushlands, and the water hyacinth (*Eichornia crassipes*), which has affected both fish and fishermen in the lakes, with huge economic consequences. Of historical note is the fact that the introduction of the predatory Nile perch (*Lates niloticus*) into Lake Victoria in 1956 contributed to the extinction of that lake's own unique cichlid fish fauna.

(33) *Parthenium hysterophorus* is an aggressive and toxic weed that has the potential to harm people and animals, as well as drastically reduce the productivity of rangelands. It has been recorded in the Serengeti-Mara and Ngorongoro Crater, thus threatening these highly important World Heritage Sites.

Human elephant conflict is increasingly frequent in Africa as human populations increase and elephant habitat shrinks.

2.1.3 Inadequate PA systems

The traditional state-led approach to wildlife conservation common to all countries in Eastern Africa has been through the establishment and management of protected areas (PAs), such as national parks, forest reserves, etc. In many countries, PA systems date back to colonial times, when the criteria used for selection were not as well developed as they are today. Ideally a PA system should include examples of all significant ecosystems in the country, and provide protection to all of its endemic and rare species. Looked in this way, most PA systems have gaps which governments are slow to fill. Apart from gaps, it is increasingly being realised that many PAs are poorly sited, and less than ideal in terms of size and shape. Thus, especially in cases where a PA protects only part of an ecosystem, insufficient thought was given to possible future scenarios in which it might become an isolated island. Consequently, opportunities to create optimal ecological connectivity were and still are being ignored, rendering PAs far less resilient than they might otherwise be.

Apart from such shortcomings in design, many PAs exist only on paper with few if any staff assigned to manage them. This is certainly true of the countries most affected by chronic civil strife, like Somalia and South Sudan, but is also true, to differing extents, of countries that have been slow to invest in PAs for lack of economic and/or political incentive, which means all of them other than Kenya, Tanzania and Uganda. Even the latter, whose PA systems underpin extremely important tourism industries, finds it difficult to keep its management authorities well enough resourced to enforce wildlife policies and laws to their full effect (see also Section 2.2.5).

2.1.4 Fragmentation, transformation and loss of natural ecosystems

No ecosystem is immune to fragmentation and transformation: it follows that such processes constitute the most important threat to ecosystem-level services. One of the most obvious and important examples is provided by forest where degradation results in soil erosion, ecological instability due to loss of biodiversity, and ultimately loss of functionality as a water catchment.

The degradation and loss of forest cover caused by the demand and supply of timber and fuel was discussed above (Section 2.1.1), but it is also caused by outright clearance at different scales. Forest encroachment by peasant farmers clearing small subsistence farms is an insidious and near universal phenomenon strongly correlated with human population growth: as such it is cumulatively massive.

Overstocking and overgrazing in relation to carrying capacity is common, and has led to range degradation, desertification and biodiversity loss over vast areas of arid, semi-arid and savannah land (see Section 1.4). Invasive species too can transform ecosystems, and their susceptibility to invasion can be increased by overgrazing and climate change (see Sections 2.1.2 and 2.1.6).

Large-scale clearances and land-use conversions occur as part of the formal development agenda, and can affect any type of ecosystem, not just forest. In addition to immediate local extinctions, they threaten to create many problems relating to isolation and lack of connectivity between existing PAs. For example, the Galana/Kalalu food security project in Kenya will bring a million acres under irrigation in an area adjacent to Tsavo East NP, formerly noted for the development of game ranching; the impacts of abstraction on the Tana river and its nearby delta, a wetland

The abrupt transition between cultivated fields and the forest of the Bwindi Impenetrable National Park, a World Heritage site in Western Uganda. Such 'hard edge' parks are typical of the fertile highlands along the Albertine Rift where human population densities are among the highest of Africa.

of national and international importance, will be significant. There are dozens of other examples of big schemes from all over Eastern Africa that could be quoted, involving crops as varied as sugar cane, rice, maize, soya, oil palm and even controversial biofuels like *Jatropha*. The intensification and commercialisation of existing smallholder agriculture through investment in so-called Agricultural Growth Corridors is also gaining momentum throughout Africa[34]. These schemes too can contribute to the further isolation and lack of connectivity between existing PAs. An example from Eastern Africa is the massive SAGCOT programme in southern Tanzania, some of whose priority areas fall in or near KLCs (see Section 5.3), where plans to expand irrigation are a particular concern. Fortunately SAGCOT has established a multi-stakeholder Green Reference Group to guide the identification and mitigation of environmental risks and damage, and to the same end has formed partnerships with a number of international conservation non-governmental organisations (NGOs) through projects such as SUSTAIN (Sustainability and Inclusion Strategy for Growth Corridors in Africa, an International Union for the Conservation of Nature/African Wildlife Foundation – IUCN/AWF initiative funded by the Netherlands), and Vital Signs (a Conservation International-led programme funded by the Bill & Melinda Gates Foundation). Hopefully this collaborative model will be followed in other corridors.

Large-scale habitat impacts are not limited to agricultural schemes. Extraction and infrastructure projects also invariably incur negative impacts on ecosystems and their inherent biodiversity[35]. Among controversial examples from Eastern Africa is the excision of nearly 20 000 ha from the Selous Game Reserve, Tanzania to mine uranium – despite it being a World Heritage Site. Also in Tanzania, and also in a World Heritage Site, a proposal to build a major highway right across the path of the Serengeti migration threatens the viability of that amazing phenomenon, one also shared by Kenya. Measures to develop a large oil field in the middle of Murchison Falls National Park and adjacent conservation areas in Uganda are far advanced, and a similar threat hangs over the Sudd, in South Sudan, the biggest wetland in Eastern Africa. Proposals to develop a soda ash plant on Lake Natron, Tanzania recur frequently, despite the threat this poses to the one and only flamingo breeding ground on which the entire Rift Valley population depends. Many more examples of similar non-agricultural development threats could be cited, including major dams in Ethiopia especially.

Habitat fragmentation is a particularly serious threat to wide-ranging species that need very extensive home ranges, such as elephant, wild dog and cheetah. The same applies to the migratory populations of certain species (e.g. wildebeest).

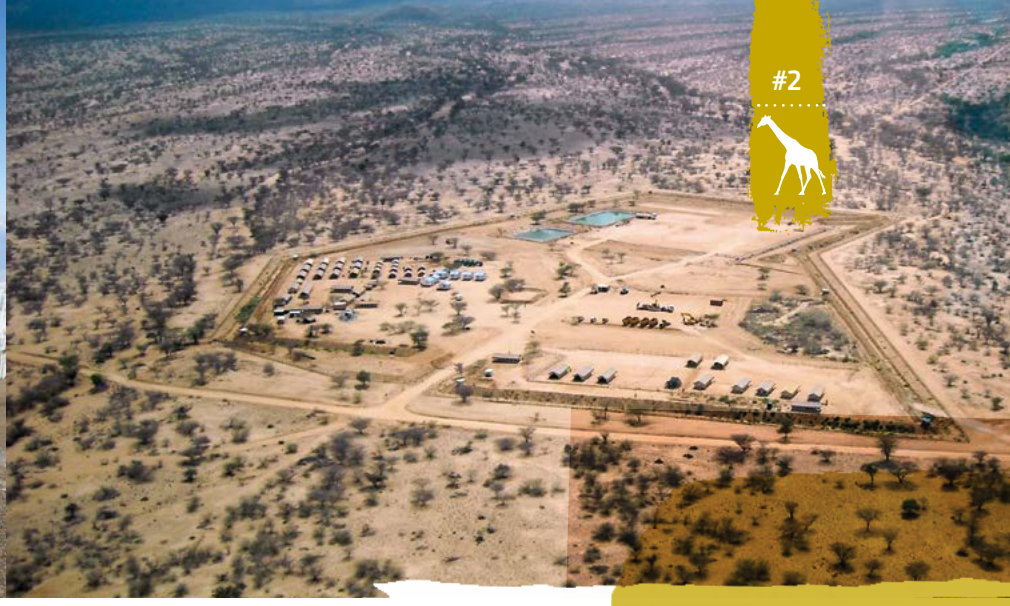
2.1.5 Infrastructure, oil, gas and mining development

The boom in East African oil and gas development is well under way, with Uganda, Tanzania and Mozambique being the front-runners. In addition to exploration and extraction, land-locked countries such as Uganda face challenges with exporting the oil – indeed with all oil and gas, and other hard rock mineral extraction, comes the need for substantial infrastructure development: pipelines, roads, railways and ports. Depending on remoteness this can often result in far-reaching environmental damage and biodiversity loss, in addition to the oil and gas infrastructure in itself.

(34) Weng L., A.K. Boedhihartono, P.H.G.M. Dirks, J. Dixon, M.I Lubis and J.A. Sayer (2013). Mineral industries, growth corridors and agricultural development in Africa, *Global Food Security* 2 (2013), pp. 195-202.

(35) See also the discussion of industrial oil, gas and mineral exploration and extraction in the summary document – Synthesis, Section 2.3.1.

The glaciers of Mount Kilimanjaro, Africa's highest peak, are receding rapidly as a result of global warming.



The Ngamia oil drilling site in the Turkana region of northern Kenya. Over a quarter of leased oil and gas concessions in Africa overlap with protected areas, including World Heritage Sites.

The effects of oil and gas development range from immigration and increased bushmeat hunting to permanent settlement, land-use changes and biodiversity impacts. For example, in the case of Uganda, South Sudan, Kenya (Turkana oil fields) and Ethiopia, the development of the LAPPSET transport corridor and deep-sea port in Lamu (Kenya) is driven by the need to export oil, but has many other developments associated with it (airports, roads, settlements, deep sea port).

2.1.6 Climate change

Global warming will induce climate change in Eastern Africa as elsewhere, but its impact over so large an area will vary from place to place. A general prediction, however, is that while mean annual temperature will increase, rainfall will remain much the same quantitatively, although its temporal distribution will change. Rainy seasons will alter ('short' rains getting longer, 'long' rains shorter) and become more intense. An increase is expected in the frequency and intensity of extreme events, primarily droughts and floods, and these will occur in new locations.

To date in Eastern Africa, adverse climate change impacts have been observed through a rise in sea level, which has already led to infrastructure destruction along the coast and the submergence of some small islands in the Indian ocean (e.g. Maziwe and Fungu la Nyani), intrusion of seawater into freshwater wells along the Tanzanian coast, beach erosion in Kenya, and inland, rampant floods and droughts across the region.

Various studies indicate that the deep-water temperatures of lakes Edward, Albert, Kivu, Victoria, Tanganyika and Nyasa, which reflect long-term trends, have risen by 0.2° to 0.7 °C since the early 1900s. Since 1912, the area of Mt Kilimanjaro's ice fields has decreased so far by between 50% and 80%. It has been estimated that if current trends persist, the remaining ice fields are likely to disappear between 2015 and 2020. Moreover, the Ruwenzori ice-cap field has decreased from 563 ha to being currently less than 50 ha.

As noted, the glaciers of Africa are already all in retreat and as general warming proceeds, the band in which climatic conditions remain compatible with the Afro-alpine ecosystem will get smaller and smaller as it moves upwards over an ever-diminishing surface area. Thus these uniquely biodiverse and important ecosystems are highly endangered by climate change, as are the many rare and endemic species found only in them.

With a more intense rainfall pattern, dry intervals may become longer, rains may also fail more often, and bush fires become more common. This will have a variety of consequences, but one likely scenario is that the already great extent of over-grazed rangeland in Eastern Africa will become even greater, essentially driving desertification and pushing pastoralists more and more into woodlands and forests.

Climate change-related phenomena also threaten marine ecosystems, notably coral reef death due to 'bleaching', which is associated with rising sea temperatures and ocean acidification. This phenomenon has been noted in East African waters.

Confiscated carved ivory objects are placed out to be crushed in New York's Times Square in June 2015. Over a ton of confiscated ivory was destroyed.

2.2 Fundamental drivers underlying the threats

While the topics discussed in the preceding section represent the major immediate, 'on-the-ground' threats to biodiversity, the existence of each can be explained in terms of drivers. These are the often interrelated forces or circumstances that create the threats in the first place. It follows that if the fundamental drivers can be identified, and work done to reduce or remove them, biodiversity and species loss will be slowed and in some cases halted.

2.2.1 Market forces

The increasingly high value being put on natural resources as they become scarcer generates powerful market forces, as exemplified by ivory and rhino horn. As is fully discussed in Chapter 5 (Sections 1, 2 and 3), counteracting these forces requires action along the entire value chain, but as long as there is demand, protective action at the supply end will remain an essential pre-requisite.

The high demands and prices generated by end-consumers have encouraged certain rebel militias and terrorist groups to enter the value chain[36]. Such groups often hide out in wilderness areas, and are always in need of funds to support their operations. For outlawed organisations such as these, the risk-return ratio for poaching wildlife is irresistible. This is a notable problem in Eastern Africa where there is evidence that the Somali faction Al Shabaab trades opportunistically in and runs protection rackets involving charcoal (definitely), ivory (probably) and rhino horn (possibly). The Lord's Resistance Army (LRA) of Uganda has been for many years hiding in and around the Garamba NP in the eastern DRC, and is heavily implicated in not just a crash in elephant numbers, but also the total extinction of the world's biggest, and almost certainly last, population of wild northern white rhino.

Sudan also provides examples of this type of operation. The horse-mounted Arab militia known as the Janjaweed, which operates out of Darfur, is known to have mounted elephant poaching raids far to the west, including into Chad, the Central African Republic (CAR) and even Cameroon, where they massacred 450 elephants in the Bouba N'Djida NP. Ivory is particularly attractive to Sudanese groups, as there is still a domestic ivory market in Khartoum that proves the existence of established trade routes. The coasts of Sudan, Eritrea and Somalia offer innumerable means of export in dhows to middle-eastern entrepôts.

2.2.2 Population growth

Whether directly or indirectly, inexorable human population growth underlies not only all the threats outlined in the section above, but the other fundamental drivers described in this section as well. Population trends for the continent as a whole are given in the summary document – Synthesis, Sections 1.4 and 2.4.1. More people need more food, more water, more energy and more space. All these can only be found at the expense of natural ecosystems, a fact emphasised in all chapters of this study. Chapter 1, Section 2.1.1 provides a good example from Southern Africa of how population can, and ever increasingly will, build up around protected areas[37].

(36) The involvement of militias and rebel groups in ivory poaching and smuggling is nothing new. During the late 1970s and 1980s, both the National Union for the Total Independence in Angola (UNITA) and the Mozambican National Resistance (RENAMO) were heavily involved in the killing of elephants and the export of illegal ivory.
(37) The map presented as Figure 7 in Chapter 1 (Southern Africa) shows settlement trends around Lake Kariba and the Matusadona NP in Zimbabwe.

2.2.3 Poverty

Poverty is a fundamental driver of forest encroachment and poaching. It is also a function of population growth: the larger the number of people sharing a finite resource, the poorer they become. It is this reality that drives the big governmental food, water and energy development programmes which reinforce the impact of population growth on natural resource depletion. It also represents a long-term threat to the success of community-based natural resource management approaches (see Section 3.7).

2.2.4 Under-valuation of ecosystem services and biodiversity

An appreciation of natural ecosystem service values has gained much ground over the past decade, thanks especially to awareness of climate change issues. Consequently the value of forests in particular, which, in Eastern Africa especially, provide such an important water catchment function, is increasingly well understood. Despite this, such services continue to be under-valued when it comes to a confrontation with a development project. In other words, the real costs of degrading and destroying natural ecosystems are still not properly or accurately reflected in the economic analyses on which development decisions are based.

Environmental Impact Assessment (EIA) procedures are anyway often flawed and corruptible. Thus cases for considering alternative, less costly, more sustainable solutions are continually avoided, meaning the attrition of natural ecosystems remains biased towards being far greater than it need be.

Other less tangible, non-economic values, such as existence values attributable to particular species, have no real impact on the development agendas of most East African countries. An existence value remains an essentially western concept that has very little momentum beyond some elements of the emerging middle class in countries like Kenya.

2.2.5 Weak governance and corruption

All the threats to ecosystems and biodiversity outlined earlier could be prevented, mitigated or rectified but for weak governance. The term 'governance' as used here embraces all of the policies, laws, areas and institutions established for the purpose of biodiversity conservation and management.

Inevitably, the importance of these various weaknesses varies between countries. Generally speaking, within Eastern Africa at least, wildlife and forest authorities are consistently underfunded and understaffed. This is true even of countries like Kenya and Tanzania where tourism provides a strong economic incentive to value wildlife, to the extent that some authorities generate much more for Treasuries than is ever re-invested in them. This means there tends to be a constant shortage of transport, equipment and recurrent operating budgets. Obtaining significant investment capital for new buildings, for example, is always a struggle. Similarly the manpower available is always less than is needed to do the job properly, and in terms of training, skill levels are generally better aligned to responsibilities among lower ranks, and much less so at middle (e.g. PA manager) and director levels. This is partly due to flawed human resource management procedures (e.g. for recruitment, in-service training and performance-based promotion), and partly due to the prevalence of political appointees in top jobs. Last but not least, the salaries paid to field staff in particular are seldom commensurate with the hardship and dangers involved, let alone the simple cost of living.

These weaknesses are not limited to wildlife and forest authorities; they also apply to those other agencies that are becoming increasingly involved in the enforcement of wildlife policies and laws, including customs, police, the military and the judiciary. Many officers find themselves in roles they are not competent to fulfil, and dissatisfaction with conditions of service and personal benefits leads to corruption, which is common within all the services mentioned and can occur at all levels.

Whether by deliberate neglect, or active participation, corruption is a fundamental driver of the illegal consumption of, and trade in, wildlife. Key officials at different levels are easily bribed to facilitate crime, and wildlife rangers are often found to be complicit in poaching and even engage in it themselves. EIA officials can suppress negative impacts, but even military units engaged in anti-terrorism will succumb to the same temptations as their quarry: units of the Ugandan army searching for the LRA in Garamba NP allegedly killed elephants and rhinos there, and removed the trophies by helicopter. Similarly, the Kenyan military in Somalia is now said to be benefiting from the export of charcoal from Kismayu, a trade formerly controlled by Al Shabaab.

Wars, rebellions and insecurity are strong indicators of poor governance, and will often take a direct as well as an indirect toll on wildlife. In sustained conflict this can be huge, as in Uganda throughout the 1970s when the entire national park system was vandalised and elephants, rhinos and all other species were decimated by the warring factions. As recent events in South Sudan and CAR remind us, the spectre of civil war is never too far away in Africa.

3

Ongoing conservation efforts

>3 _ Ongoing conservation efforts

This section considers the conservation approaches and actions that have been, are being and could be taken to counter the threats to ecosystem and biodiversity conservation in Eastern Africa, and to lessen the prevalence and power of their underlying drivers.

Research carried out for this report revealed that not only is the amount of relevant action already initiated in all countries of the region immense, but that the number of actors is also, ranging from regional bodies, national governments, intergovernmental organisations (IGOs) and multi-lateral donors, bilateral donors, NGOs and civil society organisations (CSOs). For example, as of November 2013, the database maintained by the Development Partners Group on Environment (DPG-E) in Tanzania held 125 records of active programmes and projects in five categories[38], with a total value of EUR 561.6 million.

As a direct consequence therefore, this section provides a succinct overview of what is going on in the region, using a selection of examples relevant to the different approaches being applied.

3.1 Planning frameworks

The overall response of countries in Eastern Africa to environmental management issues relevant to biodiversity conservation is influenced and guided by a number of international, pan-African, regional and national agendas.

3.1.1 International

Most countries in the region are party to a number of multi-lateral environmental agreements. Some of the most relevant and influential of these conventions are (short titles only):

- Ramsar Wetlands 1971
- World Heritage Convention 1972
- CITES 1975
- Bonn Migratory Species 1979
- Marine and Coastal Environment of the Western Indian Ocean 1985
- Biological Diversity 1992
- UN Framework Convention on Climate Change 1992
- International Tropical Timber Agreement 1994
- UN Convention to Combat Desertification 1994.

The countries of Eastern Africa are also members of the International Union for the Conservation of Nature (the IUCN, previously known as The World Conservation Union), which through its various commissions sets the international management criteria and standards for different categories of PA, and coordinates efforts to conserve a wide range of plant and animal taxa of importance and concern.

Virtually all these treaties and bodies require their Member States to produce some sort of national action plan: a few examples include National Biodiversity Strategy Action Plans (NBSAPs) under the Convention on Biological Diversity (CBD); Ivory Action Plans under the Convention on International Trade in Endangered Species (CITES); and a huge range of species-specific action plans at regional and/or national levels driven by the Specialist Groups of IUCN's Species Survival Commission. Thus many East African countries have action plans relating to these and many other taxa: elephant, rhino, lion, hyaena, giraffe, great ape, lesser flamingo and so on.

Whilst external assistance in the preparation of all these multiple types of plan is generally forthcoming, this is not necessarily the case when it comes to their implementation.

3.1.2 Pan-African

The East African countries' overall response is also influenced by the pan-African and regional political bodies to which they belong. The African Ministerial Conference on the Environment (AMCEN) for example has developed an action plan for the Environment Initiative of the New Partnership for Africa's Development (NEPAD), and commissions the United Nations Environment Programme's (UNEP) *Africa Environment Outlook*, a comprehensive regional report on the state of Africa's environment.

(38) Natural resources sector support, biodiversity, environment, climate change and NGO support.

Nile perch caught in Lake Victoria.
The Lake Victoria Basin Authority and the Lake Victoria Fisheries Organization are important statutory institutions of the East African Community.

3.1.3 Regional

The principal regional groupings to which the East African countries recognised in this report belong are the East African Community (EAC)[39], the Common Market for East and Southern Africa (COMESA)[40], Central African Forest Commission (COMIFAC)[41], Intergovernmental Authority on Development (IGAD)[42] and the Southern African Development Community (SADC)[43]. The most relevant in a conservation context are the EAC and the IGAD.

The EAC recognises an environment and natural resource management sector[44], for which it has instituted both a sectoral council and a committee, and for which it hosts regular meetings at both Ministerial and Permanent Secretary levels. The focal topics are climate change, biosafety, water resource management, and mines and mining. The dominant statutory EAC institutions in the sector are the Lake Victoria Basin Authority and Lake Victoria Fisheries Organisation. In 2005, the EAC promulgated an East African Protocol on Natural Resource Management, which has still not been ratified by all parties[45]. In 2012, the East African Legislative Assembly passed the East African Community Transboundary Ecosystems Bill, and in August 2013 it passed a Resolution urging partner states to take concerted action to end the massacre of elephants and the trafficking of ivory.

Within the EAC Secretariat, wildlife management issues are grouped with tourism, and the implementation of all related decisions is guided by the Sectoral Council on Tourism and Wildlife Management. In 2009, a decision was made to develop a legal and regulatory framework for collaboration in the tourism and wildlife sectors. To this end, two main activities are in the process of being implemented:

- the development of a Protocol for Tourism and Wildlife Management;
- harmonisation of policies and laws in tourism and wildlife management.

The EAC Secretariat considers the Protocol to have reached an advanced stage, but the current draft is very heavily biased towards tourism and remains extremely weak with respect to wildlife management, not least because it fails to seize the opportunity to establish clear policies and procedures for the co-management of TFCAs. Regarding the harmonisation of policies and laws, the EAC had by mid-2014 just finalised a study to analyse and compare the relevant policies and laws in each partner state to inform the process of drafting harmonised legal instruments. Eventually, the establishment of an East African Tourism and Wildlife Coordinating Agency is envisaged to act as a regulatory body for the EAC.

(39) Burundi, Kenya, Rwanda, Tanzania and Uganda.
(40) Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania and Uganda.
(41) Burundi and Rwanda.
(42) Djibouti, Eritrea, Ethiopia, Kenya, Somalia, South Sudan, Sudan and Uganda.
(43) Tanzania.
(44) See its website: http://www.eac.int/environment/index.php
(45) Indeed, in September 2014, Tanzania wrote to the EAC to say it would not do so due to certain contentious clauses.

Rangers from the environmental company Wildlife Works stand near a decomposing carcass of an elephant in one of the ranches within the Tsavo West wildlife ecosystem, Kenya.

Trained dogs are used by African Parks Network for anti-poaching in Akagera National Park, Rwanda.

IGAD evolved from a drought-focused body and now has an Agriculture and Environment Division which has a natural resources management programme with three components: rational utilisation of transboundary natural resources; promoting the development and use of renewable energy resources; and promoting rational management of fresh water resources. The division also coordinates the programme activities of the IGAD Climate Prediction and Application Centre (ICPAC) based in Nairobi, Kenya. The main objective of ICPAC as a specialised centre is to provide climate information, prediction products and services for early warning, and related applications to reduce climate-related risks for disaster management, environment management and poverty reduction in support of sustainable development efforts of the member countries.

3.1.4 National

National Plans generated by international agendas are discussed in Section 3.1.1 above.

All countries in Eastern Africa have a range of ministries and departments responsible for the environment and different natural resources, some of which generate their own development strategies and action plans, which may involve policy and legal reform and institutional restructuring. All forest and wildlife management agencies produce site-specific management plans. These matters are discussed further in Section 3.4.3 below.

3.2 Controlling illegal trade in wildlife

Gaining control over the illegal consumption of, and trade in, natural resources rests very much on tackling the fundamental weaknesses of governance driving these issues. It also requires, for each commodity involved, action along the entire relevant value chain. This approach is elaborated in Section 3 of Chapter 5, which is devoted to Africa's wildlife trade in general[46]. It is built around three sets of actions at the supply, transit and consumer points in the chain, their respective objectives being to 'stop the killing', 'stop the trafficking' and 'stop the demand'.

Much of the response noted below has been catalysed by the trade-related crises surrounding elephant and rhino (for further detail see the sections devoted to these two species in Chapter 5), but which stands to benefit all species. Of relevance here are the National Ivory Action Plans produced for CITES by Kenya, Tanzania and Uganda, with a similar plan under preparation by Ethiopia.

Actions in relation to the trade in bushmeat generally are elaborated in Chapter 3, Section 5.4 of this report, which is devoted to that topic.

The promotion of legal and sustainable utilisation schemes is covered in Section 3.7 below.

(46) It includes many examples from Eastern Africa that are not repeated here.

Wildlife Conservation Society (WCS) officials measure the size of an adult male elephant during a collaring exercise in a remote area of South Sudan. South Sudan's elephant population has dropped to less than 5 000 from around 80 000 in the 1950s.

3.2.1 Stopping the killing

The cutting and killing of trees, and the poaching of animals, is primarily an issue of *in situ* protection. It follows that controlling these activities depends on the capacities of the responsible enforcement personnel. All countries in Eastern Africa have forest and wildlife ranger forces, but all of them need strengthening. Actions taken to reinforce law-enforcement capacity at the field level vary.

Actions by governments include increasing the number of rangers and creating special highly mobile anti-poaching 'strike forces', who are able to move in to supplement staff resident in the area of an incident. Some members of these units are being trained as wildlife-specific crime scene investigation officers.

For example, in 2013 the Kenya Wildlife Service (KWS) recruited an additional 750 rangers and formed a special 120-man inter-agency body known as the Elite Inter-Agency Anti-Poaching Unit, comprising security officers from the KWS, the Administration Police and the General Service Unit. This is now deployed in three strategic poaching hotspot areas in different parts of the country (Narok, Tsavo and Isiolo), and has been facilitated with equipment and aerial surveillance support. The unit is supported by the governments of Kenya, the United States of America, China and the United Kingdom. As a further measure, the security forces of KWS and the Kenya Forest Service (KFS) have both been placed under the overall command of the Inspector General of Police.

In times of crisis, Tanzania's wildlife agencies favour mounting country-wide operations jointly with the country's Defence Forces: the latest such exercise in 2013, Operation Tokomeza Jangili, eventually proved most successful (see Section 1.4.4.1 of the elephant chapter in Chapter 5). From 9 to 10 May 2014, the Government hosted a *Tanzanian Wildlife Summit to Stop Wildlife Crime and Advance Wildlife Conservation: A Call for Action* at the conclusion of which a Partnership Framework to Support Combating Poaching and Illegal Wildlife Trade was signed between the Government and nine development partners (including the EU). The Government announced at the summit that it would be recruiting 900 additional rangers in 2014, with approximately 1 000 more each year until the need for 5 000 is met by 2018.

At the same time as boosting field-level protection, Uganda and Tanzania are moving to revise their respective Wildlife Acts, with a view to greatly enhancing statutory penalties for wildlife crime as a deterrent and, in the case of Tanzania, to allow the adoption of a paramilitary system among the employees of the wildlife sector, including those of a new Tanzania Wildlife Authority (see Section 3.4.3).

Kenya recently completed this process: its new Wildlife Conservation and Management Act (2013) enacted on 10 January 2014 includes provision for penalties of life imprisonment or a minimum fine of KES 20 million, equivalent to about EUR 180 000 (c. USD 230 000) for poaching rhinoceros or elephant or trafficking their parts or derivatives. Unfortunately, some consider the clause in the section that contains these new sentences to be ambiguous. What this means is that the new Wildlife Act, though far better than the old one, is unlikely in practice to provide any deterrent to the big dealers. Currently there are deliberate efforts between some NGOs, Kenya Wildlife Service, the Directorate of Public Prosecutions, judicial officers and legal experts to amend the Act by operationalising the clause containing these new sentences (Section 92) through a motion in parliament to strengthen it even further.

Action by NGOs takes many forms. The Frankfurt Zoological Society (FZS) for example has prepared specific Security Plans for the PAs it supports: in Eastern Africa these include the Serengeti NP and Selous Game Reserve. Support for implementation of the plans is included. The AWF has set up a Species Protection Grant Fund to implement a number of action plans including one for law enforcement.

In South Sudan, the Wildlife Conservation Society (WCS) is working closely with the Government to re-constitute, re-train and re-deploy an effective ranger force to the country's premier protected areas (see Section 3.4.1).

3.2.2 Stopping the trafficking

The principal government-led approach being recommended here is the formation of inter-agency Wildlife Enforcement Networks (WENs) at the national level. A key feature of these is the incorporation of a more deliberate intelligence gathering effort, proactive as well as reactive. The Uganda Wildlife Authority (UWA) has already set up an Intelligence Enforcement Unit that can serve as a founding component of a national WEN.

In countries where the relevant government machinery is particularly weak or compromised, an NGO-dominated approach known as EAGLE (Eco Activists for Governance and Law Enforcement) has proved effective. This has been pioneered in Central and West Africa by NGOs like LAGA and projects like PALF[47] (see also Chapter 3, Section 4.9). In Eastern Africa, the country most suited to this approach is South Sudan where WCS has been working with the Ministry of Wildlife and LAGA to develop a WCS-implemented LAGA model for South Sudan. WCS Uganda is developing an anti-trafficking programme with the Uganda Wildlife Authority, which includes intelligence-led enforcement and LAGA-type components. For further details of the WEN and EAGLE approaches to stopping the trafficking of wildlife and their applicability, see Section 3.5 in Chapter 5.

Much could be done to identify and then dismantle both internal and external trade routes if the true identity of bushmeat for example, or the provenance of ivory seizures, could be determined scientifically. This can be done through DNA (deoxyribonucleic acid) and isotopic analysis, but the capacity for this within Eastern Africa is very low. Although Tanzania and Uganda are said to be considering the establishment of wildlife forensic laboratories, Kenya already has one.

The lab referred to is run by the Kenya Wildlife Service, and was developed originally to address bushmeat seizure and public health issues[48]. As such, the need to produce evidence in court introduced security elements into its design that preadapt it to handling high value products like rhino horn and ivory. In fact it is already being prepared to provide a regional service with respect to rhino horn analysis. With funding from WWF, its technicians are receiving training in the relevant techniques from the Veterinary Genetics Laboratory (VGL) in Pretoria (see Box 14).

The potential for the KWS lab to provide DNA-analytical services to the East African region is discussed further in Section 5.1.2.

Other agencies involved in counter-trafficking operations include customs: officers are being trained to detect wildlife contraband and are being given sniffer dogs and scanners to assist in this. Help with such measures is coming from the USA and a number of NGOs.

Box 14. Interregional collaboration in rhino horn forensics

Three Kenyan scientists visited the VGL in Pretoria during 2012, two from KWS and one from Jomo Kenyatta University, together with the person in charge of technical work in the KWS forensic laboratory. The aim of their visit was to establish a collaboration between the Pretoria and KWS labs, and train the personnel on the Rhino DNA Identification System (RhODIS) methodologies to ensure standard and credible tests.
This standardisation means that the Kenyan rhinoceros DNA profiles can be uploaded to the RhODIS database and all recovered horns can be compared to both Kenya and South Africa's poached animals. Thus the RhODIS tool is utilised as a powerful and cross-continental anti-poaching investigation tool. This training is to continue under a formal Memorandum of Understanding (MoU) between KWS and the University of Pretoria, which was signed in 2013. The lead KWS technician revisited the VGL to analyse poaching cases from Kenya and returned with a mirror of their data, as well as updated methodologies to apply in his own laboratory.
In future it is envisaged that visits and sample transfers will no longer be necessary but that the KWS laboratory will be able to produce DNA profiles from rhino samples using the standard methodology, and upload and compare these directly to the RhODIS database.

(47) LAGA: The Last Great Ape Organisation. PALF: Project for the Application of Law for Fauna operates in the Republic of Congo where it runs investigations, assists in operations, does legal follow-up and has a communication department to publicise convictions and other successes.
(48) Particularly as regards screening of samples for zoonotic pathogens, especially from areas where there is considerable mixing of wildlife and livestock on the landscape. In this connection KWS is partnering with the Barcode of Wildlife Project based at the Smithsonian Institution, which aims at providing DNA-based species identification of things like powders and bushmeat.

An innovative solution for reducing human-elephant conflict developed by Save the Elephants, Oxford University and Disney's Animal Kingdom. Bee-hives strung along a fence around a field of crops cause elephants to avoid the fields while providing honey for the farmers.

3.2.3 Stopping the demand

The need for anti-poaching and anti-trafficking measures would be greatly curtailed if the principal market force driving the trade, namely consumer demand, could be reduced or even eliminated. As detailed in the elephant, rhino and trade sections of Chapter 5, considerable effort is going into this approach in relation to commodities of special concern, like rhino horn and ivory. The approach involves conducting scientific surveys of consumer behaviour and attitudes; raising awareness among consumers of the cruelty of the trade and its role in endangering species; and – for some commodities – debunking their alleged medicinal properties. Since consumers in the international trade will be far removed from suppliers, these efforts are implemented mostly by NGOs, usually ones of global repute working with local counterparts.

At the same time, some NGOs within Eastern Africa have mounted campaigns to raise awareness of the international crises their country is caught up in, and so generate extra pressure on home governments to take appropriate action. A good example is Kenya's *Hands Off Our Elephants* campaign led by an indigenous NGO called WildLife Direct. The campaign has published strong-impact advertisements in the national press, and has benefited from the direct involvement and support of the country's First Lady.

3.3 Minimising human-wildlife conflict

The fundamental drivers of HWC are population growth leading to habitat fragmentation and loss. As noted earlier, control measures include shooting, trapping, poisoning, repelling, scaring and fencing. Official government efforts to prevent or compensate for HWC are generally inadequate, and often corrupted: game control officers are responsible for huge areas but have no transport, and they often have to be bribed just to verify and forward claims, thus negating the whole purpose of compensation. Kenya's new Wildlife Act 2013 has improved procedures however, and compensation of up to KES 5 million will now be paid against fatalities.

None of the non-destructive remedial measures are completely effective. Many animals soon learn to ignore scare tactics based on noise or fire. NGOs in several countries are working in pastoral communities to provide them with movable and re-usable lion-proof *bomas*[49] (made of metal rather than thorn bushes), and/or subsidise and manage local compensation schemes.

Due to an elephant's strength and intelligence, the application of any measure to control human-elephant conflict (HEC) is particularly difficult and expensive, notably fencing. Rhino Ark is a Kenyan NGO whose sole agenda is building hugely expensive elephant-proof electric fences to protect wildlife and people from each other in mountain forest areas[50]. To date they have put a fence around the entire perimeter of the Aberdares NP (400 km), and

([49]) Fenced livestock enclosures.
([50]) Much of the money required has been raised from leading Kenyan private sector companies.

are now doing the same for Mt Kenya NP (450 km) and Eburu (50 km), a component of the Mau forest complex; all of these areas are important water towers. Chemical repellents based on *Capsicum* (chilli) have had mixed results, but the discovery made in Kenya that elephants actively avoid bees holds promise. Trials based on the use of beehives along farm boundaries are underway in several countries, but have yet to be scaled up.

For rural people, the costs of living with wildlife are obviously a major disincentive for them to conserve it. Measures to maximise the benefits of living with wildlife can therefore be seen partly as another, important way of compensating for HWC (see Section 3.7). The securing of strategically aligned wildlife corridors is another way of preventing or mitigating HWC (see Section 3.4.1).

3.4 Improving PA system effectiveness

Measures and actions designed to improve PA systems revolve around two issues: their overall design, and the effectiveness with which the system's component PAs are managed. The latter cannot be separated from the capacity of the management authority responsible.

3.4.1 Scope and design of national PA systems

In most countries in Eastern Africa, the array of formal PAs such as national parks and game reserves has been established for decades. Details regarding the PAs in each are available from the World Database of Protected Areas, which is maintained by UNEP's World Conservation Monitoring Centre and accessible through their website[51]. Figure 7 in the summary document – Synthesis – provides a continental overview of PA coverage.

It is very likely that in every country of Eastern Africa examples could be found of gaps where some hitherto unprotected ecotype or endemic species would benefit from the creation of a new PA, but each of these would generate additional overheads for the management authority, so unless they can pay their way, internal motivation for their addition to the PA system will remain elusive.

Of more interest and priority are the situations in which whole PA systems are more or less paper systems, such as is the case in South Sudan and Somalia. In these countries, the re-development of their PA systems offers opportunities to re-design them significantly by retaining old PAs but redefining their boundaries perhaps, and by adding entirely new areas that would fill gaps in the old system and provide the connectivity essential to protecting whole eco-processes rather than just a part. Such work has been underway in South Sudan since 2007 through a major United States Agency for International Development (USAID) and UNDP/GEF-funded programme implemented by WCS[52]. This and a smaller-scale PA support programme managed by Fauna and Flora International (FFI) continue despite the very recent outbreak of civil conflict. Somalia as a whole is not yet ready for any serious PA development work.

In the stable countries of Eastern Africa, there have been some very important additions to the PA systems inherited from colonial times. These include the various types of area in which responsibility for the utilisation and management of natural resources has been devolved to communities, such as wildlife management areas, and village forest reserves. These are discussed further in Section 3.7.

Other important additions to PA systems include conservancies, in which the owners of land – be they communal or private – elect to dedicate that land to conservation. There are several hundred community and private wildlife conservancies in Kenya that engage in the non-consumptive utilisation of wildlife (i.e. tourism). Since ownership and ultimate responsibility for all wildlife is vested in the state, regardless of whether it is inside or outside the formal PA estate, the conservancy movement is of great assistance to the Kenya Wildlife Service, which seeks only to register conservancies and assist in the development of their management effectiveness.

Another Kenyan example of an effective addition to a PA system in terms of the diversity of constituent parts is the designation of five areas as official water towers (see Section 1.2.1 above). This designation has been given power through the establishment of a Water Tower Authority (WTA) to oversee and coordinate the actions of the various pre-existing management agencies and stakeholders in these areas, including the Forest and Wildlife Services. The European Commission has approved an intervention for launch in 2014/15 to support the WTA and its forests entitled the *Kenya Water Tower Protection and Climate Change Mitigation and Adaptation Programme*. There is currently most interest in the addition of a 'corridor' to established PA systems, in other words a PA created to prevent the isolation, and improve the resilience, of existing PAs (see Box 15). In Tanzania, concern over the likely impact of widespread agricultural development on PA connectivity and viability resulted in a specific study on the status of key corridors in the country and the increasingly urgent need to secure their function (see also Section 2.1.4)[53].

(51) www.protectedplanet.net
(52) The WCS has had an overall estimated annual budget of USD 5 million per year for this initiative in South Sudan over the past six years and it will be continued into future with long-term commitments.
(53) Jones T., T. Caro. and T.R.B. Davenport (Eds.) (2009). Wildlife Corridors in Tanzania, Tanzania Wildlife Research Institute.

Migrating wildebeest crossing the Mara River in Kenya. Wildlife corridors linking protected areas are vital for species with large dispersal areas.

Box 15. Wildlife corridors

Some protected areas, designed decades ago for varying reasons, do not encompass the range of ecosystem requirements needed by certain flora and fauna. Migrating species, for example, especially large mammalian herbivores and associated carnivores, move outside and/or between protected areas. They may also use corridors as dispersal areas. Wisely set-aside and well-managed corridors can reduce human-wildlife conflict, including crop raiding, and thus increase agricultural yield over the long term. If an animal or plant population declines to low levels or becomes extinct in one area or habitat patch, individuals from another patch can emigrate and rescue that population from local extinction. If a small population is isolated, it will lose genetic variation over the long term and suffer from inbreeding. A corridor allows immigrants to import new genetic variation into isolated populations. If the habitat of one area becomes unsuitable (e.g. because of climate change), organisms (both plants and animals) can move along corridors to reach more suitable habitat, and thus be 'rescued'.

The Simien Mountains National Park, Ethiopia, a World Heritage Site.

The website www.tzwildlifecorridors.org/info documents 31 corridors in Tanzania, and indicates that the majority of these now seem to be in a critical condition. Based on current rates of habitat change, they are estimated to have less than three years remaining before they disappear. Five corridors are in extreme condition and could either disappear within one year unless immediate action is taken or they have already been closed.

Kenya too is alert to the need for corridor linkages between PAs. A much-lauded example is the one whose recent creation enlarged the Mt Kenya World Heritage Site by linking it to the privately owned Lewa Wildlife Conservancy, which then became part of the WHS. A critically important feature of this corridor is a tunnel under a main road, big enough for elephants, which are indeed using it. The move greatly enhances species and habitat diversity and resilience in the WHS, the new whole being greater than the sum of its parts.

The northern Mount Kenya corridor is successful, largely because it follows an ancient elephant travel route that had been well researched. Care needs to be taken that potential corridors are not just drawn on maps without taking wildlife's natural movement and habits into account. It follows that money on research to identify real travel routes would be well spent before millions are invested in corridor developments that may fail.

3.4.2 Sites of international importance

Some national PAs gain additional recognition and status under internationally coordinated schemes with their own accreditation criteria. These include World Heritage Sites, Ramsar Sites, Man and Biosphere Reserves, the Critical Ecosystem Partnership Fund global biodiversity hotspots, Key Biodiversity Areas and Important Bird and Biodiversity Areas, of which there are many distributed among all the countries of Eastern Africa. This recognition carries additional responsibilities, for which the scheme usually offers technical and sometimes financial assistance.

All these categories are relevant, but probably the most important for present purposes is the **World Heritage Site (WHS)**, a designation based on strict criteria that establish 'outstanding universal value'. The World Heritage Convention, administered by the United Nations Educational, Scientific and Cultural Organisation (UNESCO), sets out the duties of state parties in identifying potential sites and their role in protecting and preserving them. The parties are encouraged to integrate the protection of the cultural and natural heritage into regional planning programmes, set up staff and services at their sites, undertake scientific and technical conservation research, and adopt measures which give this heritage a function in the day-to-day life of the community. To this end they are required to produce National Heritage Action Plans, the latest being for 2012-2017. Technical assistance comes in the form of guidance for achieving maximum management effectiveness[54], while financial assistance is available to developing countries through access to the World Heritage Fund and a similar fund for World Heritage in Danger.

(54) UNESCO (2008). Enhancing our Heritage Toolkit: Assessing management effectiveness of natural World Heritage Sites. And: UNESCO (2012). Managing Natural World Heritage.

The Gelada, a primate species endemic to the Simien Mountains World Heritage Site.

At present there are ten natural WHSs in Eastern Africa:

Ethiopia	Simien Mountains National Park[55]
Kenya	Lake Turkana National Parks
	Mount Kenya National Park/ National Forest
	Lake System in the Great Rift Valley
Tanzania	Kilimanjaro National Park
	Ngorongoro Conservation Area[56]
	Selous Game Reserve
	Serengeti National Park
Uganda	Bwindi Impenetrable National Park
	Ruwenzori Mountains National Park

In addition, the following countries have submitted 'tentative lists' of sites to be considered for future inclusion: Burundi, Ethiopia, Kenya, Sudan, Tanzania and Uganda[57].

The Rift Valley Lakes site in Kenya is known as a 'serial site' because its components are separated from one another. The intention if possible to add Lake Natron, which is in Tanzania, would create only the second transboundary WHS in Africa[58].

Lake Naivasha and Hell's Gate NP could perhaps also be added; they are already on Kenya's 'tentative list'. The latter list also includes the Maasai Mara Reserve, which would create another transboundary WHS with the contiguous Serengeti NP in Tanzania.

Taking a cue from the above to go beyond national PA systems, there is considerable interest in promoting the concept of **transfrontier conservation areas (TFCAs)**, where contiguous PAs that straddle an international border are developed and managed in a highly integrated, well-coordinated manner. The Southern African region is by far the most advanced in terms of TFCA development, as detailed in Chapter 1, Section 4.2.1 of this report.

There is much potential for the concept in Eastern Africa, and although interest is growing, real progress is hampered by two constraints. The first is the mistrust between potential partners, based on unfamiliarity with each other's policies and procedures. This could more easily be dispelled but for the second, which is a lack of really energetic political support at the level of the EAC. Compared to SADC, which has come powerfully behind the concept by actively facilitating the conclusion of formal treaties to establish specific TFCAs, and creating permanent bodies to coordinate their development and management, the EAC has done little more than pay lip service to the concept, although all countries in the region do have some guiding mechanism that would allow its advancement (e.g. policies, treaties, strategies and MoUs).

(55) Listed as a 'site In danger'.
(56) A joint 'natural' and 'cultural' site.
(57) See: http://whc.unesco.org/en/tentativelists/
(58) The other is Tri-national Sangha (TNS), shared by Cameroon, CAR and Congo.

For historical reasons relating to the personal interests of individuals who helped establish the EAC and its organs, its orientation with regard to intra-Eastern African cooperation in natural resource management has always been heavily biased towards the Great Lakes. In 2012, the EAC did host, with USAID funding, the *EAC Regional Workshop on Transboundary Ecosystems Management and Conservation in East Africa*, but seemingly this was driven more by the organisers (WCS and the US Forest Service) rather than any internal sense of importance or priority on the part of the EAC itself. Thus neither the workshop nor its conclusions and recommendations were mentioned to a late-2013 mission that visited the EAC to develop the natural resource management pillar of the European Commission's next Regional Investment Programme.

Both the *EA Protocol on Natural Resource Management and the East African Community Transboundary Ecosystems Bill* provide a policy and legal platform on which TFCAs could be developed, but the clear intent of the Bill is to harmonise law and practice as concerns national environment management agencies, including EIAs, and is not explicitly geared towards wildlife or transboundary PA management. Again the Bill stems from fundamental concerns about pollution and other negative impacts on the shared resources of the Great Lakes. As noted earlier, the draft *East Africa Tourism and Wildlife Protocol* fails to establish policies and procedures for the co-management of TFCAs (see Section 3.1.3).

Probably the closest Eastern Africa has got to a truly SADC-like TFCA is in the Greater Virunga Landscape that is shared by the DRC, Rwanda and Uganda, and which thus falls partly within the jurisdiction of the East African Community (EAC) and partly in the Economic Community of Central African States (ECCAS). For further details see Box 16 beside, and Section 5.1.1 in Chapter 3 which includes a map.

Another TFCA involving the DRC exists between Lantoto NP in South Sudan, and the contiguous Garamba NP and nearby Bili Uele Reserve in DRC. Good transboundary technical collaboration between Garamba and Lantoto already exists, driven by the WCS-South Sudan programme and the APN project in Garamba, resulting in several major arrests in 2012, 2013 and 2014. In addition, formal transboundary meetings between ICCN and South Sudan were initiated in 2008 with support from APN and WCS. This complex is part of a formerly very important elephant and rhino[59] range which, it has been proposed, should be also linked with the Southern NP in South Sudan and the Zemongo WR and Chinko hunting zones in CAR to form a mega-TFCA. The merits and feasibility of this idea are discussed more fully in Chapter 3, Section 5.1.1.

Another important TFCA initiative concerns the 1 500 km^2 Nyungwe-Kibira landscape that includes the transfrontier forests of Nyungwe National Park in Rwanda and Kibira National Park in Burundi. Apart from its important biodiversity (see Section 1.2.2), this forest is also key to providing watershed services to a large population in both the Nile and Congo basins. The site is pioneering efforts to develop payment for ecosystem service schemes, as well as having made great strides in transboundary cooperation and ecotourism development. It is a primary focus for external support by the governments of both Rwanda and Burundi, which have developed transboundary agreements and are implementing a transboundary action plan.

There are two other TFCA-related programmes of note ongoing within Eastern Africa. The first is the EU/IGAD *Biodiversity Management Programme* aimed at building overall regional capacity for biodiversity and ecosystem management with a strong emphasis on transboundary management through the strengthening of regional, national and community-level institutions. The validity of this approach is to be showcased through four-year grant contracts with three specialised implementation partners[60], each working in one of the following three pilot cross-border ecosystems:

- The Boma-Gambella Landscape (southeast South Sudan and southwest Ethiopia);
- The Tana-Kipini-Laga Badana Bushbush Land and Seascape (northeast Kenya and southeast Somalia);
- The Lower Awash-Lake Abbé Landscape (northeast Ethiopia and southwest Djibouti).

The second is the USAID-funded *Boma-Jonglei-Equatoria Landscape Programme* implemented by WCS whose inputs to the South Sudanese side of the Boma-Gambella Landscape complement those of the EU programme, which is limited to the Ethiopian side where the Horn of Africa Regional Environment Centre and Network (HoA-REC&N) is working with the Ethiopian Wildlife Conservation Authority (EWCA). Even prior to this involvement, the WCS initiated the ongoing discussions for a formal cooperation agreement between the two countries.

(59) Notably for the now nearly extinct northern white rhino.
(60) Horn of Africa Regional Environment Centre and Network (HoA-REC&N), International Union for the Conservation of Nature (IUCN) and World Agroforestry Centre (ICRAF).

Mountain gorilla viewing in the Greater Virunga TFCA generates millions of dollars annually for the three countries (Rwanda, Uganda and DRC) that share the population.

Box 16. The Greater Virunga TFCA

The Greater Virunga Transboundary Collaboration (GVTC) is a mechanism for the strategic, collaborative management of the Greater Virunga landscape, one of the most biologically diverse ecosystems in the world. IUCN rates the Afro-montane forests of the Virunga as of global biodiversity significance and amongst the highest priority for conservation in Africa. The area is made up of eight national parks and three reserves in three countries*. Between them the Virunga National Park (DRC), Volcanoes National Park (Rwanda), and Mgahinga Gorilla and Bwindi Impenetrable National Parks (Uganda) provide key habitat and sanctuary to the endangered mountain gorilla. At the policy level, the Chief Executive Officers of Rwanda Development Board (RDB), Institut Congolais pour la Conservation de la Nature (ICCN), Uganda Wildlife Authority (UWA) and International Gorilla Conservation Program (IGCP) form the Transboundary Core Secretariat (TCS), which is the Board of the Executive Secretariat headquartered in Kigali, Rwanda. A Transboundary Strategic Plan (2006-2016) has been prepared by the stakeholders to guide the implementation of activities by all stakeholders in the landscape.

(*) DRC: Virunga NP. Rwanda: Volcanoes NP. Uganda: Queen Elizabeth NP, Mgahinga Gorilla NP, Bwindi NP, Semiliki NP, Kibale NP, Ruwenzori NP, Kasyoha-Kitomi FR, Kalinzu-Maramgambo FR, Kyambura WR

The WCS has already helped secure a still active inter-government MoU signed between South Sudan and Uganda in 2007 with respect to the co-management of the following specific areas:

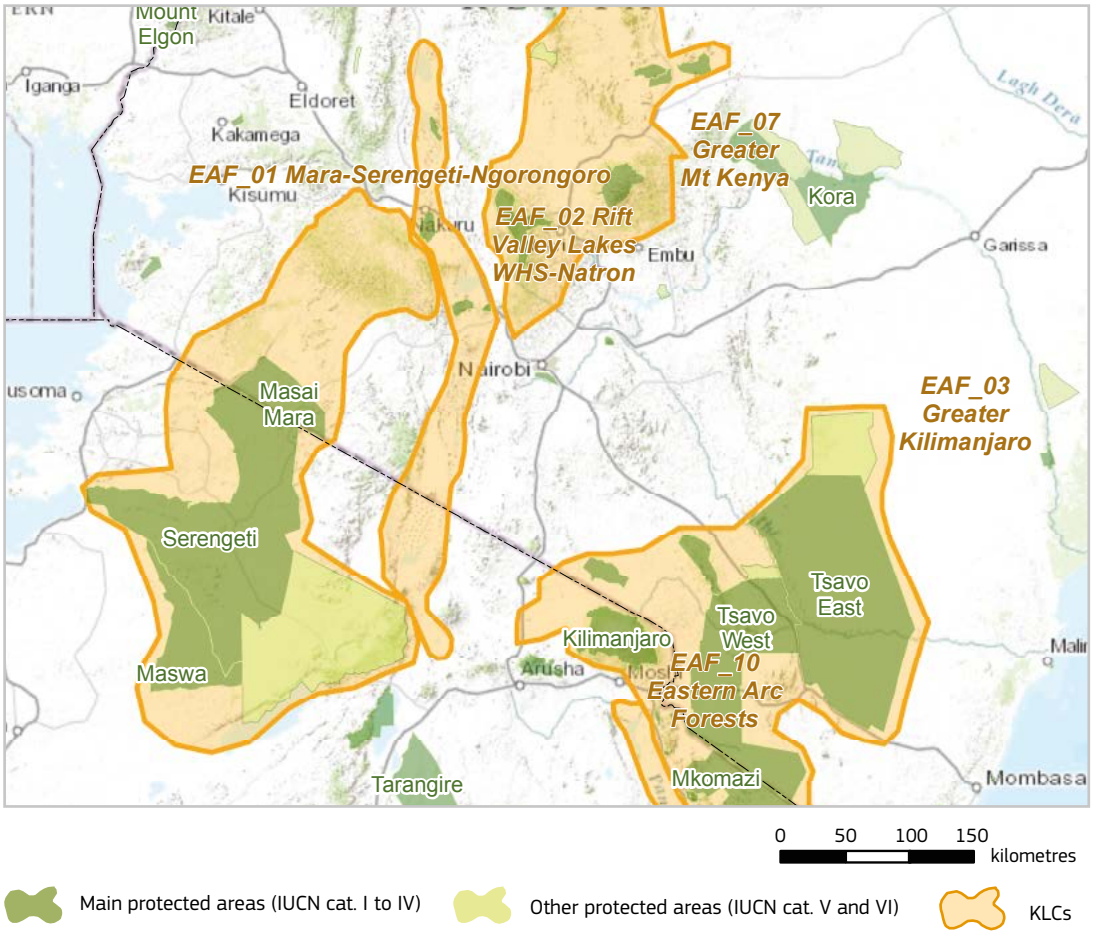
- **Kidepo Landscape:** including Kidepo Game Reserve, Didinga and Dongotona Mountains in Southern Sudan, and Kidepo Valley National Park, Nyangea-Napore, Morungole, Zulia and Rom Forest Reserves and Karenga Community Wildlife Reserve in Uganda;
- **Imatong Massif Peace Landscape:** including the Imatong Mountains in Southern Sudan and Agoro-Agu Forest Reserve in Uganda;
- **Otzi-Nimule Landscape:** including Nimule National Park in Southern Sudan and Otzi and Era Forest Reserves in Uganda;
- **Mt Kei-Aloma Plateau Landscape:** comprising Aloma plateau (including Iwatoka Mountain) in Southern Sudan and Mt Kei Forest Reserve in Uganda.

Other areas within, or partly within, the EAC with potential for development as formal TFCAs would be complexes centred on, and providing connectivity between, the following core PAs, some of them of iconic importance in continental as well as regional terms:

- Maasai Mara (Kenya)-Serengeti-Ngorongoro (Tanzania): the key components of this TFCA are shown in Figure 2;
- Zeraf-Shambe-Badingilu-Boma (South Sudan)-Gambella (Ethiopia)-Machar Marshes (proposed PA in South Sudan): the key components of this TFCA are shown in Figure 3;
- Kilimanjaro (Tanzania)-Amboseli-Chyulu-Tsavo West-Tsavo East (Kenya)-Mkomazi (Tanzania): the key components of this TFCA are shown in Figure 2;
- Selous (Tanzania)-Niassa (Mozambique), in Figure 4;
- Elgon (Kenya)-Elgon (Uganda);
- Loelle (proposed PA in South Sudan[61])-Omo-Tama-Mago (Ethiopia).

Several of the more important TFCAs mentioned in this section feature in the selection of KLCs recommended to the EU for priority support (see Section 5.3.1).

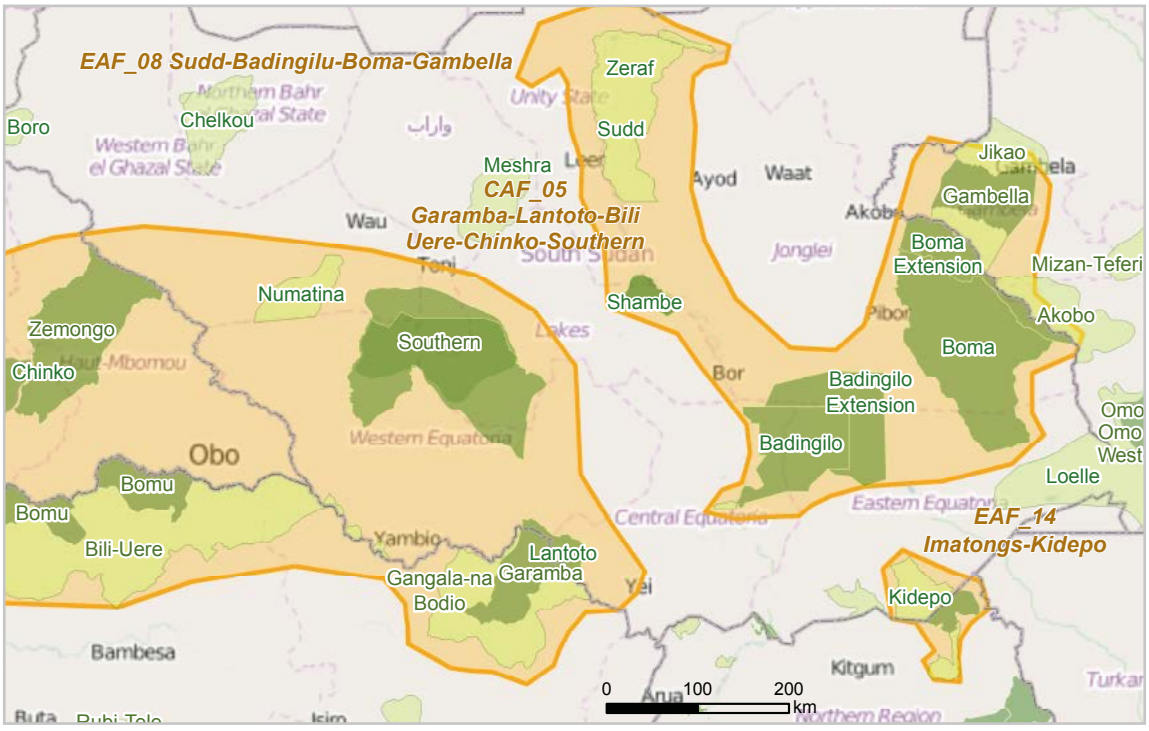
Figure 2. The Mara-Serengeti-Ngorongoro TFCA



(61) Much of this proposed PA falls in the so-called Ilemi Triangle, a disputed area claimed by both Kenya and South Sudan.

At 5 895 m, Kilimanjaro in Tanzania is the highest point in Africa. Mount Kilimanjaro National Park is a World Heritage Site.

Figure 3. The Sudd-Badingilu-Boma-Gambella TFCA

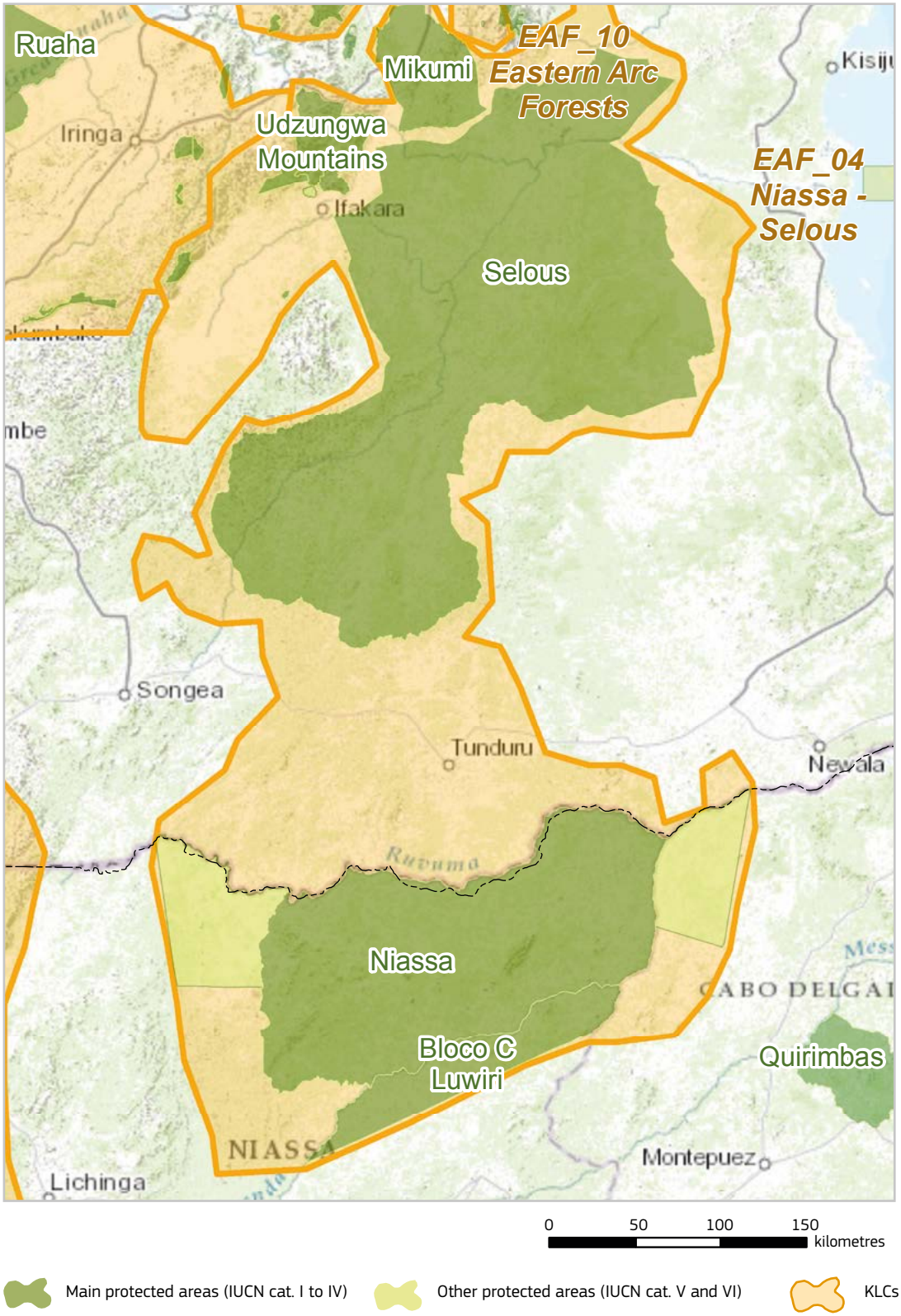


Main protected areas (IUCN cat. I to IV)

Other protected areas (IUCN cat. V and VI)

KLCs

Figure 4. The Niassa-Selous TFCA



Topi in Queen Elizabeth National Park, Uganda. This protected area is contiguous with DR Congo's Virunga National Park and has played a vital role in ensuring a safe haven for wildlife during the decades of conflict in DRC that have decimated wildlife in the savannah section of Virunga National Park.

3.4.3 PA management capacity and effectiveness

Nowadays all PA management agencies produce, or intend to produce, a General Management Plan (GMP) for each of their areas. Since the effectiveness of entire PA systems rests on the effectiveness with which these individual plans are implemented, it is instructive to consider the constraints to effective management in a bottom-up sequence.

At the PA level, management effectiveness is dependent on adequate funding and manpower, and typically both are in short supply. Funds must cover operational and recurrent expenditure (salaries, fuel, maintenance) as well as any capital investments needed (vehicles, buildings, roads). Whilst most rangers receive adequate training, the same is not true of the senior staff in charge of PAs. Even in relatively advanced countries, persons are recruited as wardens on academic grounds (e.g. a degree in a relevant subject) and then simply posted to the field without further training for the task. Analyses have shown that the range of skills needed is greatest for wardens-in-charge than at any other level. In years gone by the preparation of recruits for this role involved a formal probationary period in the field working alongside an experienced warden, followed by a course at the College of African Wildlife Management (CAWM) in Mweka, Tanzania, attended by personnel from all countries of Eastern Africa and beyond. Nowadays, career progression is only weakly linked to performance (if at all), and courses tailor-made for trainee wardens have died out, because they necessarily take years not months if they are to convey the full set of skills required and are therefore expensive. Consequently, courses now offered at CAWM and national colleges tend to be short, and more scientific than practical. As a result of all this, poor leadership is common at the PA level.

At the headquarters level, management agencies inevitably suffer similar problems of funding and manpower, but since they have greater power to look after themselves they are often bloated. Again the lack of rigorous performance-based career progression procedures is a problem, and again a lack of appropriate skills is evident at the senior-most level. This is due to the common practice of assigning political appointees – often academics – to head agencies, rather than experienced sector professionals. Since direct responsibility for a surprisingly large proportion of required actions identified in the GMPs of individual PAs is vested in the Director, many important decisions and dependent actions get delayed or blocked as a result.

Donor partners, very often working through NGOs, have always favoured working at the PA and PA management agency level to overcome the constraints outlined above. At the PA level, assistance is often given with the production of GMPs, with the equipment and the operations needed to implement them, and with calculating the effectiveness of these and other measures[62]. Quite often ranger salaries are augmented with allowances designed to incentivise maximum patrol effort. A good example of this type of approach is FZS's decades-long programme in support of Tanzania National Parks.

An elaboration of the passive support approach is the Co-Management Agreement in which some actual management responsibility is vested in the NGO partner with respect to one or several named PAs. An example for Eastern Africa is that concluded between WCS and the Government of South Sudan in 2007 with respect to Zeraf GR in the Sudd, Badingilu NP and Boma NP. In its most extreme version, total management responsibility for a PA will be contracted out to an organisation like African Parks. These approaches present sustainability problems, but are a necessary last resort if official capacity is totally inadequate; no intervention at all would result in a complete breakdown in law and order, followed by the loss of the PA and all it is supposed to protect.

The latter, total management-contract approach has been more prevalent in other regions, although there is one example in Eastern Africa where the Rwanda Development Board has a contract with African Parks to manage the Akagera NP. This is an interesting and rare example of a relatively well-resourced Government being willing to contract out park management. Less surprisingly perhaps, a similar agreement between the Government of Ethiopia and African Parks to manage the problematic Gambella NP on the western border with South Sudan is under discussion. Similarly, WCS is talking to the Government of South Sudan about moving from co-management contracts to full private-public partnership agreements for the above-mentioned PAs, as well as the central and eastern parts of Southern NP.

Another fairly typical approach taken by donors and NGOs in Eastern Africa is the provision of resident park management advisors, of which there are many examples. Also at a national, headquarter-level, the deployment of senior technical assistants as advisors is quite common and usually effective. Contemporary examples include the individual advisors provided by the German Government to the Wildlife Division in Tanzania, by the Frankfurt Zoological Society to the Ethiopian Wildlife Conservation Authority, and by the African Wildlife Foundation to the emerging South Sudan Wildlife Service[63].

Projects, or rather programmes, in which a whole team of technical assistants (TAs) based at headquarters help build management capacity throughout the organisation (or even the sector as a whole), can be very effective in situations where a complete overhaul and restructuring is necessary and appropriate. The initial merger between the former Kenya National Parks and the Game Department to form the Kenya Wildlife Service faltered until a major investment programme was drawn up and implemented with US and European Commission support.

In the late 1970s, after a long period of devastating civil war, the European Commission funded the Uganda National Parks Programme, which helped overhaul the PA system by rehabilitating key old parks, and catalysing the upgrading of several PAs to national park status. Also in Uganda, the World Bank's Protected Areas Management for Sustainable Use (PAMSU) programme helped draw up and implement a massive investment programme for both the forestry and wildlife sectors, including technical support to the newly formed Uganda Wildlife Authority. Since 2007, USAID and UNDP/GEF have been funding very similar PA and sector rehabilitation programmes in South Sudan implemented by WCS.

Approaches of this sort continue to be highly relevant throughout Eastern Africa. The Tanzanian Government has decided to transform the Wildlife Division from a rather inefficient, allegedly corrupt, government organ in charge of game reserves, into the Tanzania Wildlife Authority (TAWA), a parastatal entitled to retain revenue (mostly from hunting) and manage its own finances. TAWA is to be based in Morogoro, with a start to the organisational changes involved scheduled for June 2014. The TAWA Director General is to be selected via an international tender subject to presidential approval. This transformation is to be effected with bilateral technical and financial assistance from the German Government. A similar transformation is on the cards in Kenya, where the Government is seriously considering a merger between the Wildlife and Forest Services. If implemented, external technical and financial assistance will be needed and welcomed.

All other national wildlife management authorities in Eastern Africa, with the possible exception of Uganda, would benefit from the sort of game-changing capacity building that only a major donor support programme could deliver. A leading candidate is Ethiopia, a country of incredibly important but still poorly protected biodiversity, whose huge tourism potential remains virtually untapped. The reasons for this are complex, but a major investment programme is needed to turn things around before it is too late for some areas and species.

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(62) Stolton S., M. Hockings, N. Dudley, K. MacKinnon, T. Whitten and F. Leverington (2007). Reporting Progress in Protected Areas: A Site Level Management Effectiveness Tracking Tool, World Bank/WWF Forest Alliance, published by WWF, Gland, Switzerland.

(63) This, as yet, does not operate as a parastatal as the name might imply, but functions as a department within the Ministry of Interior and Wildlife Conservation.

Tourists in Serengeti National Park, Tanzania.
Even in countries where the link between parks and tourism is economically important insufficient resources are channeled back into protecting the areas that generate the revenue.

3.5 Valuing ecosystems properly

Even in countries in which the link between parks and tourism is economically important and well recognised, the environmental sector remains under-resourced. The under-valuation of ecosystem services and biodiversity by governments is a fundamental driver of ill-considered ecosystem conversions, and of the institutional weaknesses that generate inefficient, ineffective and corrupt management practices. Clearly a better understanding of ecosystem values should result in governments investing more heavily, firstly in the agencies responsible for land-use planning, strategic environmental assessments (SEAs) and EIAs, and secondly in those responsible for protecting natural resources and/or managing their utilisation. The greater 'investment' required has several forms, ranging from policy, legal and structural reforms, to greater capital investments and operational budgets. Importantly, the latter should cover enhanced manpower, improved salaries, allowances and working conditions (especially in the field), and more and better training.

Making such investments in the key environmental and natural resource management agencies would have massive knock-on benefits by addressing the common root causes, which underlie unsustainable resource utilisation and the relentless degradation – both legal and illegal – of natural ecosystems, whether protected or not. The root causes arise from ill-qualified, poorly motivated and often corrupt officials, who are approving development actions whose environmental impacts are not being minimised to the greatest possible extent.

Clearly before governments in particular, and consumers in general, will attach proper and higher value to ecosystems, they must be presented with robust supporting economic analyses that convincingly demonstrate that value. As conservationists increasingly realise that environmental economics must therefore be mainstreamed into the work of ministries of finance and planning, so more and more initiatives are being taken by both IGOs and NGOs to show how this can and should be done.

These include UNEP's T*he Economics of Ecosystems and Biodiversity* (TEEB) programme (with funding from the EU and some Member States); the *Wealth Accounting and Valuation of Ecosystem Services* (WAVES) partnership led by the World Bank (also involving the EU); and the UNEP-GEF *Project for Ecosystems Services* (ProEcoServ). All these are designed to help countries incorporate the value of natural capital in national accounts. They work to develop scientifically credible methods for ecosystem accounting and promote their use in decision-making among a wide range of stakeholders.

Although only WAVES is active in Eastern Africa (Rwanda), other activities using a Natural Capital Accounting approach have revealed facts that are compelling the region's governments to move in the right direction, particularly in the closely linked forestry and water sectors (see Box 17).

A number of other IGOs and NGOs are taking similar action to promote the conservation of ecosystems on the grounds of the value of the services they provide.

REDD+[64] **projects** in particular hold great promise as a means of conserving forest biodiversity and services and enhancing livelihoods locally, while mitigating CO_2 emissions and climate change globally. Unfortunately the procedures involved are complex and costly so fully certified schemes are still few and far between, but one of the first in the world was in Kenya[65]. Nonetheless assistance in preparing REDD schemes features in more and more programmes (see also Section 3.6).

(64) Reducing Emissions from Deforestation and Forest Degradation.
(65) The Kasigau Corridor Project managed by Wildlife Works is the first ever to be issued Voluntary Carbon Units (VCUs) for REDD under the Voluntary Carbon Standard (VCS), the most widely used carbon accounting standard among projects issuing credits in the voluntary market.

The Aberdare National Park, Kenya, a World Heritage Site. The Aberdare Mountains are one of Kenya's major water catchment areas. Between 2000 and 2010 deforestation of Kenya's main water towers led to a reduced water availability of approximately 62 million m³ per year.

Box 17. Economic importance of forests

Forestry in Tanzania officially contributes about 2.3% of gross domestic product (GDP), but research indicates that if the wider benefits of ecosystem services are factored in, the real contribution is over 4% of GDP. A similar percentage has been calculated for Uganda, at a value of USD 136 million per annum. In Kenya too, similar economic valuations of its forests have catalysed a response to conserve and rehabilitate that resource. A recent UNEP-Kenya Forest Service report (2012) shows that deforestation deprived Kenya's economy of an estimated USD 69 million in 2010, far outstripping the revenue earned from forestry and logging. It concludes that the 'official' contribution of forests is undervalued by some 2.5%, putting its real annual contribution at 3.6 % of GDP. Between 2000 and 2010, deforestation of the country's main water towers amounted to c. 50 000 ha, leading to a reduced water availability of approximately 62 million m³ per year. This has affected Kenya's macro-economy, which is vulnerable to inflation spikes during periods of drought. In response to this data, the Government is now working to rehabilitate key water towers; between 2011 and 2012 more than 21 000 ha were repossessed and some 10 000 ha were rehabilitated. A number of programmes and activities were also launched to improve the livelihoods of people living in and around the forests (see also Section 3.7). Rwanda has committed all of its GEF funds to forest landscape restoration throughout the country.

Similarly **Payment for Ecosystems Services** (PES) schemes are gaining a great deal of interest and attention. This approach revolves around the principle that remote beneficiaries of an ecosystem service should pay the people living in the ecosystem to keep it in its naturally functional state, rather than putting it to some other use. A large-scale example is a project of The Nature Conservancy (TNC) to establish an Upper Tana-Nairobi Water Fund (see Box 18), while at a smaller scale there is the Conservation International-led initiative to enhance water for people and wildlife through a PES scheme for part of the Chyulu Hills catchment that feeds the Mzima-Mombasa pipeline and serves as a corridor linking Chyulu NP with Tsavo West and Amboseli NPs.

Box 18. Economic importance of the Tana River

The 1 000 km-long Tana River gets most of its water from the forested catchments of the Mt Kenya and Aberdares 'water towers'. Tana water supports most of Kenya's important power and urban water needs, including over 90% of Nairobi city's requirements. Water funds engage large public and private urban water consumers – utilities, downstream industries, agricultural producers, and/or private donors and aid agencies – to invest in a fund that pays for the protection of water quality and quantity upstream, and protects the supply to millions of people living in towns and cities downstream.

Many conservation NGOs are extending the principles of Natural Capital Accounting and PES by developing different ways of making the private sector more cognisant of, and responsive to, ecosystem values. This is considered a good strategy because businesses are much easier to make headway with than the other actors: governments tend to be short-sighted and corrupt, and civil society is generally weak. This is because, for extractive and agricultural industries especially, incorporating environmental concerns into their Corporate Social Responsibility programmes are now considered vital to both the production and marketing aspects of any sustainable business model[66], if only to avoid litigation for negative impacts (e.g. pollution).

WWF has appointed an Adviser on Green Economy for the whole of Africa, and in this connection is engaging with the foreign, especially Chinese, banks that provide loans to finance huge development schemes in Africa in order to make sure they insist, as a precondition to any loan, on state-of-the-art, independent EIAs that take full account of the true economic value of any negative impact on ecosystem services.

Conservation International has finalised a programme entitled *VITAL SIGNS AFRICA: Integrated Monitoring System for Ecosystem Services in African Agricultural Landscapes*, which is to be funded through a grant from the Bill and Melinda Gates Foundation. This programme, launched in 2014 in Tanzania, Ethiopia and Ghana initially, will provide data and diagnostic tools to guide agricultural development decisions and monitor their outcomes (see Box 19).

Box 19. The Vital Signs monitoring programme

The objectives of the Vital Signs Africa monitoring system are to:

- minimise unintended consequences of agriculture on nature by providing key data and analytical tools for evaluating trade-offs and informing decisions;
- establish reference levels and a tracking system for land cover, carbon stocks, hydrology, biodiversity and ecosystem services in areas targeted for agricultural intensification;
- build local and national capacity for environmental monitoring among scientists, civil society, government leaders and the private sector;
- create resilient ecosystems and sustainable livelihoods for smallholder farmers;
- create a 'global public good', a freely accessible and transparent information

Another notable approach to educating political decision-makers and business leaders as to the value of ecosystems in both an economic and security context is that of the Conservation Caucus. This is an informal discussion group that provides a framework to link parliamentarians from all political parties, industrialists and NGOs, so that public and private actors can engage in meaningful dialogue about why conservation matters, share information and better leverage one another's efforts to address conservation challenges. The US-based International Conservation Caucus Foundation (ICCF) is facilitating the formation of these forums around the world, including two in Eastern Africa to date (Kenya and Tanzania)[67].

Given the relatively obvious relevance and importance of the services that ecosystems provide in terms of helping to sustain water supplies and mitigate climate change, it is easy to forget that the biological diversity making up an ecosystem has immense economic value in its own right:

- many individual species are exploited for their utilitarian or trade values: individually these can be huge, and when added together the overall value of biodiversity nationally and globally is staggering;
- the biodiversity of ecosystems underpins their power as a tourism attraction;
- the greater the heterogeneity of an ecosystem, the more effective and resilient are its service functions (and vice versa);
- numerous wild species have known and unknown medicinal properties;
- loss of species results in loss of important ecological services, such as pollination of crops (birds, bats, insects), seed dispersal (birds, primates, bats, elephants) and natural control of agricultural pests. These losses can affect fruit and vegetable productivity, as well as the regeneration of natural vegetation and forests;
- important aspects of global food security depend on the existence of wild relatives of staple and commercially valuable food plants.

Throughout Eastern Africa, there are many international and national NGOs engaged in education and awareness campaigns designed to ensure greater public knowledge and appreciation of ecosystem and biodiversity values, including among children and rural communities. The incorporation of environmental studies into national school curricula is also needed. Without public understanding and support, it will always be much harder for conservation to succeed.

(66) In Central Africa, the potential contribution of private mining and plantation schemes to conservation is considered huge (see Chapter 3, Sections 4.4 and 5.2).
(67) A reviewer of this report pointed out that Members of the European Parliament should also form a Conservation Caucus to emulate that of the United States of America.

Hot springs at Lake Bogoria in Kenya.
Development of geothermal energy sources along the Rift Valley is one of the possible energy-related mitigation options for climate change.

3.6 Adapting to climate change

The general response of East African countries to this topic is taking place within the context of their participation in the UN Framework Convention on Climate Change, which requires parties to prepare and implement projects and programmes that focus on both adaptation and mitigation activities. Four partner states, namely Burundi, Rwanda, Uganda and Tanzania, have developed National Adaptation Programmes of Action (NAPAs), which are in various stages of implementation. The NAPAs identify immediate, urgent and priority project activities that are necessary to enhance adaptation capacities to the adverse impacts of climate change. Kenya, not being a least developed country, has prepared instead a Climate Change Strategy, which spells out priority adaptation and mitigation activities.

Developing countries do not have binding targets under the Kyoto Protocol, but are still committed under the treaty to reduce their emissions. Actions taken by developed and developing countries to reduce emissions include support for renewable energy, improving energy efficiency and reducing deforestation. Under the Protocol, emissions of developing countries are allowed to grow in accordance with their development needs.

These strategies and action plans have identified energy-related mitigation options, which can be used to foster economic development in the region while contributing to global efforts to reduce greenhouse gas emissions. The potentials in various parts of the region range from geothermal along the Rift Valley, wind, cogeneration, hydropower, solar, carbon sequestration, use of natural gases and methane recovery from waste management. So far three partner states, namely Tanzania, Kenya and Uganda, have registered clean development projects.

Appropriate natural resource management constitutes another very important response to climate change in the region. As already recounted above, this includes widespread forest restoration and rehabilitation measures, and the development of REDD+ projects, where the carbon absorption value of a conserved forest is rewarded, through carbon credits, for offsetting emissions elsewhere in the world.

In terms of wildlife conservation, it is important that PA managers now participate in predictive climate change adaptation exercises, in order to identify and be ready to deal with anticipated likely impacts. The best approach is to incorporate responses to the threats posed by climate change into the established process used to develop site-specific General Management Plans. UNESCO has already taken steps in this direction for natural World Heritage Sites. In 2013 it piloted the use of guidance materials for the preparation of Climate Change Adaptation Plans (CCAPs) at two sites in India, and two sites in Kenya. Thus it is that Mt Kenya and the component PAs of the Great Rift Valley Lakes Site are among the first to have site-specific CCAPs. Once the plans are refined on the basis of these pilots (and possibly one more in Latin America), UNESCO will roll out the guidelines globally.

3.7 Alleviating poverty

The relevance of poverty as a fundamental driver of ecosystem degradation and biodiversity loss is universally recognised and accepted today. However, it was only about 15 years ago that conservation-linked approaches to poverty alleviation were initiated; since then they have evolved into the variety of approaches collectively termed Community-based Natural Resource Management (CBNRM).

The basic premise underlying all CBNRM is that illegal and unsustainable natural resource use by the rural poor can be halted by giving them ownership of and management responsibility for the resource, so that they may directly benefit from its use, improving their livelihoods accordingly. Consequently they will automatically acquire a vested interest in protecting it from unsustainable exploitation.

Apart from generating benefits directly linked to the utilisation of wildlife, CBNRM also addresses other ways of improving livelihoods while minimising environmental damage. These can include measures to reduce the costs of living with wildlife (self-help against HWC), as well as to promote alternative crops, or improve agronomy and livestock breeds. It also involves the introduction of new 'holistic' grazing strategies for the improved exploitation of rangelands, as well new techniques of soil and carbon friendly 'conservation agriculture'.

As a result of their relevance to poverty alleviation, all of these approaches have received massive support from the donor community, to the extent that a huge body of experience exists that is far too great to review more than superficially here. A few key examples and points pertaining to measures directly linked to wildlife – both plant and animal – are given below.

CBNRM in the forestry sector revolves around participatory forest management (PFM) where defined and organised communities either manage a forest with the state forestry authority to their mutual benefit, or the state devolves full management responsibility for 'village forests' to the community. In some cases the user rights granted include timber; in some cases it is only non-timber forest products.

There is a large number and variety of projects of this type throughout Africa, several of them supported by the European Commission, and Eastern Africa is no exception. Three particular community forestry approaches are notable. This first involves PFM and REDD+ so that the proceeds from carbon credits are distributed amongst the community on, theoretically at least, a significant scale (see Box 20). The second works on the same principle, but with the benefits to be shared being generated by formalised Payments for Ecosystem Services.

Box 20. Linkages between PFM and REDD+

The idea of linking PFM and REDD+ makes a great deal of sense at first sight, and indeed the obvious complementarities between the two have spawned a number of new standards against which a forest can be certified, in addition to a fundamental greenhouse gas- (GHG) reduction standard such as the Verified Carbon Standard (VCS), thus adding value to the carbon credits generated. These include the Climate, Community and Biodiversity (CCB) Standards, which identify projects that are designed to deliver robust and credible GHG reductions while also delivering net positive benefits to local communities and biodiversity, and the REDD+ Social & Environmental Standards initiative, which aims to build support for government-led REDD+ programmes that make a significant contribution to human rights, poverty alleviation and biodiversity conservation.

The third uses a globally recognised certification of sustainability to add value to specific forest products in trade. The community managing the resource thus gains a double benefit: an enhanced revenue stream to share, without compromising a sustained supply to the market. The best example of this is provided by the village forests in Tanzania that are participating in an NGO-facilitated and Forest Stewardship Council-certified trade in African blackwood. This wood, used for musical instruments, commands huge prices; by cutting out the middlemen, the returns now reaching the community are truly transformative.

CBNRM in the wildlife sector relates to the granting of user rights to communities in agreed, legally defined 'wildlife management areas'. The utilisation allowed may be consumptive (hunting), non-consumptive (tourism) or a combination of the two. Different approaches predominate in different countries, with consumptive utilisation not even an option in those countries in which hunting of all types is banned.

Within Eastern Africa, Tanzania has taken the lead in developing a legal framework for the establishment of community-managed wildlife management areas (WMAs), to which species-specific consumptive user rights are devolved on the basis of government-imposed, sustainable offtake quotas. In Kenya on the other hand, community (and private) landowners have taken the initiative to declare all or part of their land as conservancies devoted to the conservation and non-consumptive utilisation of wildlife, often in associations like the Northern Rangelands Trust. In either model, hunting and tourism revenues are shared amongst the entitled community members.

Charcoal for sale in a market in Ethiopia. Excessive charcoal use causes forest degradation in many countries. Lack of alternative sources of domestic fuel is as important as poverty as a driver for charcoal use. Urban markets, often far from source forests, have the greatest influence on forest degradation.

CBNRM is now increasingly being also applied in the fisheries sector, on both coasts and lakes, with the devolution of resource user and management rights and responsibilities being organised around Beach Management Units. The EUR 15 million programme for the Coastal, Marine and Island Specific Biodiversity Management in the Eastern and Southern Africa and Indian Ocean Region (ESA-IO), signed in January 2013, aims at developing and strengthening, over five years, national and sub-regional capacities for the sustainable participatory management of coastal, marine and island-specific biodiversity in the island states and coastal states of the ESA-IO region, namely Comoros, Madagascar, Mauritius, Seychelles, Kenya and Tanzania.

Whilst CBNRM has indeed helped communities to develop a vested interest in protecting natural resources from unsustainable exploitation, it has not been, nor is it likely ever to be, an unqualified success everywhere. In all cases where government approval is involved, whether for PFM (as in Ethiopia) or WMAs (as in Tanzania), the procedural steps involved are complex and time-consuming and mostly beyond the capacity of communities to follow without help from a donor-funded NGO partner. Once approved, management of the user rights so granted is often hijacked by 'elites', but even without that the benefits generated are very modest once shared out amongst all entitled households.

Situations also arise in which extreme scarcity can generate an unsustainable resource use that is NOT driven by poverty, and therefore relatively immune to mitigation through PFM. An excerpt from the evaluation of an European Commission-funded PFM project in Malawi provides an example of such a situation[68] (see Box 21).

Box 21. Charcoal and deforestation

The situation in Malawi today is such that forests are being degraded and destroyed because the demand for biomass fuel (wood and charcoal) far exceeds supply. This process, however, is not being driven by the poverty of forest-dependent communities. It is being driven partly by a simple lack of alternatives, meaning that even if you improve a person's livelihood or income through PFM, they still will have no choice but to go on cooking using wood or charcoal, irrespective of whether that improvement is forest-dependent and irrespective of whether they have come to value the forest more than previously as a result. An even more important driver is the charcoal industry, which is linked to markets and communities in mostly urban centres, a far distance from the source forests. In other words, the destructive process is largely independent of the livelihoods or wealth of communities living close to and/or partially dependent upon forests.

(68) TRANSTEC Project Management (2012). Final Evaluation of Improved Forest Management for Sustainable Livelihoods Programme. Report to the European Union Delegation in Malawi.

A group of pastoralists with their livestock in the Omo valley, Ethiopia. Ensuring sustainable livelihoods in landscapes shared with wildlife presents many challenges for conservation in Eastern Africa.

Despite its promise, CBNRM is not a panacea that alone will neutralise the unsustainable utilisation of natural resources that is driven by poverty. As already alluded to, CBNRM schemes may seem viable when first devised, the harvest having been correctly calculated for the number of wild animals (or trees) that live in the area and the income shared out fairly. In due course however, the number of people increases and there is a demand to increase offtake, but the wildlife in an area does not increase, its numbers remain steady, and so must the harvest if it is to be sustainable. A steady harvest means that each person now receives a declining income. Furthermore, each person is not content to receive even a steady income their whole lives, let alone a declining one; they expect an increasing income so that the demand for an increased harvest is exacerbated.

For these and other reasons, there is an inevitable trend over time for CBNRM to become unsustainable. The ultimate solution must depend on a combination of two things. The first is greater government efforts to overcome poverty through large-scale development initiatives, including greater provision of services to these communities and better employment opportunities, that are not directly linked to natural resources, but which must be respectful of them nonetheless. The other is to reduce the population growth rate to the greatest extent possible, thereby minimising the scale of the poverty alleviation challenge. Some countries, notably China, have grasped this nettle with albeit unpopular measures but at least they are not in denial of this fundamental problem, as are most countries in Africa. Family planning within CBNRM areas is essential if they are to be sustainable in the long term.

4

Lessons learned and promising approaches

>4 _ Lessons learned and promising approaches

Listed below are the main lessons to be learned with regard to the conservation and management of natural resources in Eastern Africa. Most of the lessons learned noted in the reviews of other regions are also applicable to Eastern Africa (see the equivalent sections of Chapters 1, 3 and 4).

4.1 Value of ecosystem services still not sufficiently well understood

The root causes underlying unsustainable resource utilisation and the relentless degradation of natural ecosystems are ill-qualified, poorly motivated and often corrupt officials, and the approval of development actions whose environmental impacts are not being minimised to the greatest possible extent. These problems relate back to ignorance in Ministries of Finance and Planning as to the economic value of biodiversity and ecosystem services. Agricultural, extractive and financial services industries are also ignorant.

4.2 NRM agencies remain under-resourced

The under-valuation of ecosystem services and biodiversity by governments is a fundamental driver of the institutional weaknesses that generate inefficient, ineffective and corrupt management practices. These weaknesses centre on human resources that are too few in number, poorly paid and equipped, ill trained and inadequately supervised. Whether for routine operations or capital development, the level of funding made available to Natural Resource Management (NRM) agencies is invariably inadequate. Badly paid and unsupervised field staff in particular will always be corruptible.

4.3 Poaching cannot be contained by *in situ* protection alone

Recent failures to protect elephants and especially rhinos in areas considered extremely safe prove that in situ protection measures can never be impenetrable. The lesson to be learned is that much more must be done at other points along the value chain. For 'supply' countries, the biggest constraint to combating the illegal trade in wildlife products is insufficient coordination between different law-enforcement agencies, and in particular a lack of skills in intelligence-based methods at the national level.

4.4 CBNRM is not a panacea against all threats

Communities will value their local wildlife if it can provide livelihood benefits that outweigh alternatives. Despite this sound theoretical foundation, CBNRM has its limits in terms of alleviating the poverty that drives most of the region's environmental problems. Community success in obtaining and maintaining user rights is very heavily dependent on the assistance of donor-funded NGOs due to complex and demanding government procedures. Schemes fail when technical support is withdrawn prematurely; it must be maintained for decades rather than years. Even then, prospects for sustaining meaningful benefits in the long term are poor in the face of high population growth rates and slow economic development.

4.5 PA designs need improving

Recent and developing trends are exposing weaknesses in the designs of PA systems inherited from colonial administrations. These include the failure to include representative examples of all major ecotypes, and the erosion of connectivity through the accelerating transformation of hitherto undeveloped areas between PAs. Elephants in particular seldom if ever spend a full year within a PA, and so is the species most affected by the ongoing appropriation of unprotected habitat, and the one causing the most serious conflict with man as a result. In response, new PAs and corridors between PAs must be created wherever possible in order to improve PA resilience and long-term system viability. Such needs have inspired many stakeholders to adopt a 'landscape' approach to area-based conservation, in which complexes of PAs are conserved hand-in-hand with the eco-sensitive and wildlife-friendly development of intervening and surrounding areas. These complexes may be within or straddling national borders, the latter being known as transfrontier conservation areas. Experience and logic indicate that priority should be given to the integrated conservation and development of complexes that support key elephant populations.

Scientists from the Kenya Wildlife Services (KWS) and International Fund for Animal Welfare (IFAW) fit a GPS collar on an elephant in the Tsavo East National Park in Kenya. Collaring helps wildlife managers map migratory routes and design corridors between protected areas.

4.6 EAC has yet to fully embrace a regional approach to wildlife conservation

Compared to some other regions, the East African Community has yet to take seriously a coordinated, transfrontier approach to conservation. To date, the regional NRM interests of the EAC have been heavily biased towards shared lake and freshwater fishery resources. Momentum towards the development of properly mandated TFCAs is still tentative, and the regional function for which the College of African Wildlife Management was created has been greatly weakened, thus partly explaining deficiencies in adequately trained manpower at the PA-manager level in particular.

However, a recent request from the EAC's Deputy Secretary General, Jesca Eriyo, for member countries to work together in order to effectively manage and protect their ecosystems as an integral part of development, and her statement that 'regional and continental park authorities need to share information and carry out enforcement jointly', are encouraging and suggest that the necessary political will is emerging [69].

4.7 Donor-funded programmes to support the wildlife sector can be effective but must be sustained longer

Projects and programmes which provide technical and material support to build management capacity in an NRM organisation, or even throughout the sector as a whole, can be very effective, especially in situations where a complete overhaul and restructuring is necessary and appropriate.

Experience has shown that PA-support projects should not focus entirely on the selected PAs: they work best when complementary support can also be given at headquarters (HQ) level.

While the need to ensure that TA to CBNRM is maintained long enough has already been noted above, there is a tendency for all forms of TA provided to the wildlife sector to be too short lived. No doubt high costs are one reason for this, but it can take a very long time for the new policies, laws, procedures or skills that TA might impart to be formulated, implemented and embedded. At the same time, European Development Fund (EDF) procedures tend to inhibit the speedy implementation of activities (especially those for procurement). With the benefit of hindsight, there are many examples of the efforts of advisors – whether deployed at PA or HQ level – collapsing after they were removed too soon. Project designs must make more realistic appraisals of sustainability prospects within alternate timeframes.

Another project design problem frequently encountered, irrespective of donor and common to all regions, is that disbursements are not linked tightly enough to the achievement of targets and results. This compromises the motivation and efficiency of project executants, opens a door to the misapplication of funds, and ultimately reduces effectiveness and impact to well below what should be attainable. If projects and programmes are to become longer and bigger, this must go hand-in-hand with the introduction of more rigorous performance monitoring and accountability measures.

(69) Reported in the 22-28 November 2014 edition of *The East African* weekly newspaper.

5

Indicative conservation actions

>5 _ Indicative conservation actions

On the basis of the above reviews it is very evident that the East African region contains a spectacular variety of ecosystems and natural resources of great economic value, all of which are under an inexorably mounting threat of degradation or loss, and therefore urgently in need of improved protection and/or sustainable management. Therefore the grounds for the EU to greatly magnify its support for their conservation are extremely robust and compelling. At the same time, as the reviews have clearly attempted to indicate, there are numerous programmes, projects and actions already underway or planned by governments, IGOs and NGOs, covering a wide spectrum of issues and approaches.

It follows that the EU needs to identify a niche within this spectrum within which it can implement a suite of interventions designed to deliver an optimal ratio between cost and impact, whilst simultaneously satisfying its pre-declared interests and priorities.

The Terms of Reference for this study indicated clearly that the contemporary crisis issues of international wildlife trade, and related to that issues of elephant and rhinoceros conservation, are areas to which the European Commission would like to afford priority, while at the same time taking advantage of the interest and concern generated by these issues to make a significant, long-lasting contribution to conserving other key elements of Africa's wildlife.

The choice of 'other key elements' is critical because the scope is huge, yet even magnified resources will be finite. A narrow, selective focus is thus inescapable, but it is also acceptable given the fact that nothing of genuine importance will escape the attention of one actor or another. It is recommended that selectivity in the present case be based on two fundamental premises. Firstly, selected interventions should have multiple benefits, thus optimising the ratio between cost and impact. Secondly, in order to facilitate acceptance of higher spending, it is more important to select interventions that align well with the relatively unsophisticated perceptions and interests of the average European taxpayer, the ultimate financier of any pan-African conservation programme, rather than take an overly technical or scientific approach.

Based on the above-mentioned priorities (trade, elephants, rhinos) and premises (multiple benefits, popular appeal), a variety of interventions suitable for EU support in Eastern Africa can be identified. These can be differentiated according to whether they address an issue, a species, an area or an institution. Some can be further distinguished according to whether they are relevant to the entire region, or only at a national level.

Inevitably, any deliberately selective approach can create debate and dispute amongst different stakeholders with different vested interests about what to include or exclude. However, it must be borne in mind that since the approach proposed is for a EU programme then the EU's vested interests are entitled to prevail.

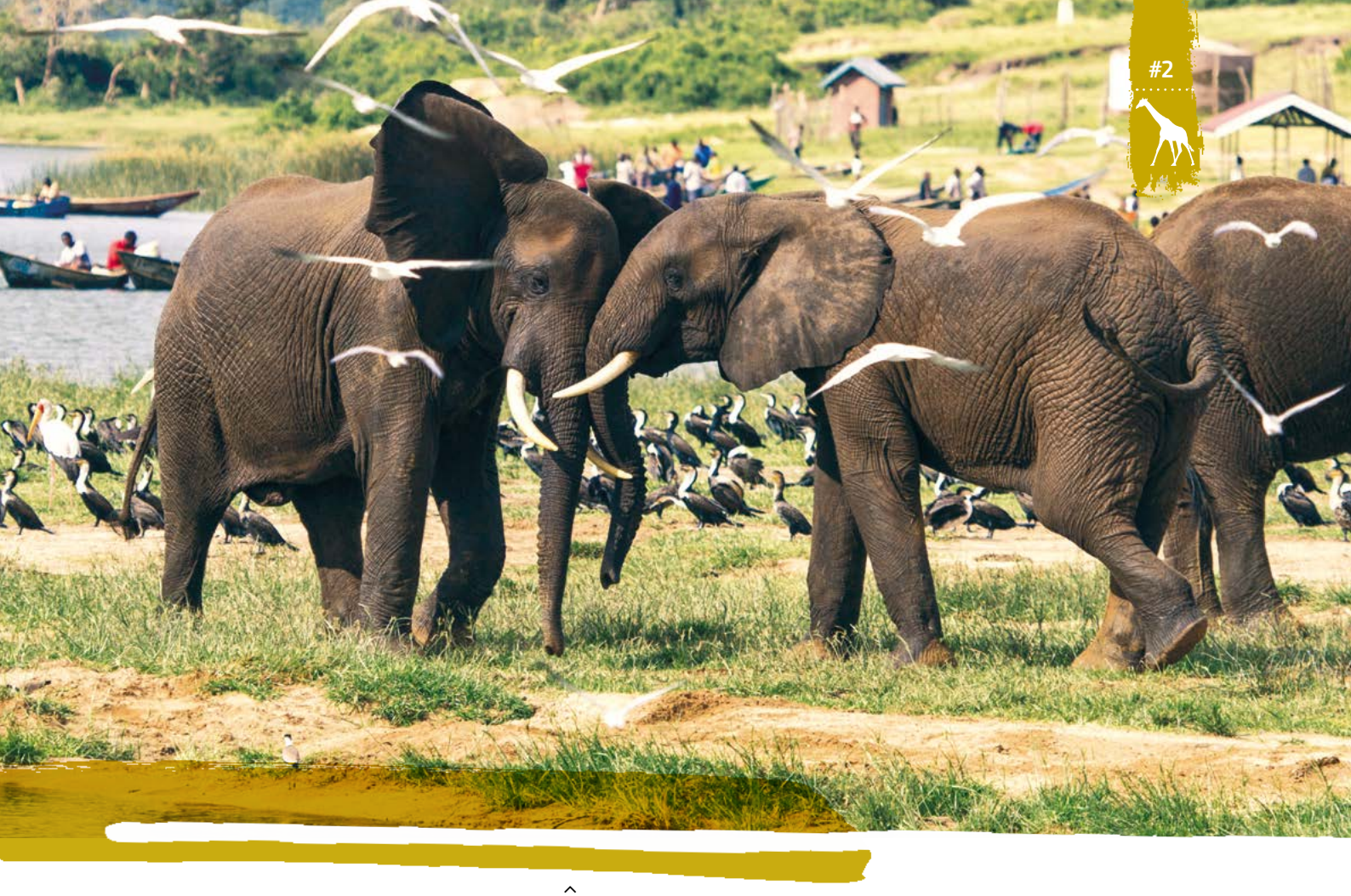
5.1 Issues: Law enforcement and trade control

The illegal wildlife trade is a cross-cutting issue relevant to all regions. As such the topic has a stand-alone section in Chapter 5 of this report in which a full set of relevant actions recommended for EU support is presented. While those particularly important for Eastern Africa are briefly outlined below, please refer to the overall trade section for further detail.

5.1.1 National

Support for national-level, multi-agency Wildlife Enforcement Networks (WENs) in all countries is recommended, irrespective of whether a WEN or an equivalent already exists. The main components of that support would be application of ICCWC's *Wildlife and Forest Crime Analytic Toolkit*, and the secondment through ICCWC of Wildlife Security Advisers to boost the intelligence aspects of WEN work in particular (see also Chapter 5, Section 3.9.3.3).

The urgency and relevance of such support has been highlighted by the trade in ivory and rhino horn, but the investigative actions necessary to control that trade along the entire value chain are basically the same as those required to control the trade in any and all other wildlife commodities. Thus action in this area has multiple benefits: all species of plant or animal being traded will benefit.



Elephants near a fishing village in Queen Elizabeth National Park, Uganda.

5.1.2 Regional

A WEN for the Horn of Africa (HAWEN) is under development, but its utility is questionable if functional WENs exist at national level. The situation thus requires further debate and analysis before unequivocal EU support can be recommended (see Chapter 5, Section 3.9.3.2).

There is a strong case for the development of a forensic laboratory that is able to provide regional services for DNA and isotopic analyses of ivory, rhino horn and other specimens, including bushmeat. Given its pre-existing inter-regional orientation, the KWS forensic lab in Nairobi is the obvious place in which to develop such a service (see Section 3.2.2 above), not least because the same equipment can be used irrespective of the type of sample, be it rhino horn, ivory or something else.

The development of forensic services for Eastern Africa at the KWS lab is recommended for EU support, as elaborated further in section 3.9.3.4 of Chapter 5.

Support to law-enforcement training for PA managers features under institutional strengthening for Eastern Africa's regional College of African Wildlife Management (see Section 5.4.1 below).

5.2 Species: Protecting threatened flagship species

5.2.1 Elephant

Elephant conservation is a crosscutting issue relevant to all regions of Africa. As such the topic has a stand-alone section in Chapter 5 of this report in which a set of relevant actions recommended for European Commission support is presented. Those applicable to Eastern Africa are briefly outlined here. Please refer to the section on elephants in Chapter 5 for further detail.

All East African nations are elephant range states with the exception of Burundi and Djibouti, and the possible exception of Sudan and Somalia. As such they all stand to benefit from the recommendations made. These include further support to the following: the MIKES (Minimising the Illegal Killing of Elephants) and ETIS (Elephant Trade Information System) projects; the African Elephant Specialist Group; the African Elephant Fund and other similar funds; and carrying out censuses of forest populations.

Given the economic and ecological importance of elephants, and the fact that they have such large demands in terms of living space, there is a strong logic that by conserving elephants successfully, you will automatically help conserve the multitude of other species sharing their range, as well as a considerable degree of

ecosystem-level functionality. Recognising the 'multiplier effect' of conserving key flagship species is not new, but that in no way negates its validity or importance. Indeed, at least two leading conservation NGOs explicitly target key elephant ranges in their current programmes for that reason (AWF and International Fund for Animal Welfare or IFAW).

It is recommended that the European Commission also adopts this approach, but targets the very biggest populations in each region as an initial priority. Many selection criteria could be used but the simpler one's approach is the better, provided it remains meaningful. The argument here is that the bigger the population, the easier it will be to keep the rate of mortality (heavily influenced by poaching) below the birth rate. Put another way, the biggest populations represent the species' best hope looking far into the future.

Some might argue that the biggest populations need the least attention, but this assumes an unwarranted complacency as to their resilience because even these can crash with alarming speed, as recent events in Tanzania have shown (see Section 1.2.1 in Chapter 5), and recent history provides several examples of formerly huge populations disappearing.

The need to distinguish and include the biggest populations from each region is necessitated both by the genetic variation across the range (there may in fact be two or even three species), and a desire to use the elephant to help conserve examples of the very different types of ecosystem it lives in, which range from forests to semi-deserts.

Table 1 gives a summary of East Africa's elephant numbers, from which it is predictable that the biggest populations will be in Tanzania and Kenya. The data given is for 2012/13 as posted on the website [70], from which full details at the individual population level may be obtained.

The five biggest elephant populations in Eastern Africa, whose ranges might be termed Very Important Elephant Areas (VIEAs), are those shown in Table 2. As in any selection process, the decision on where to place a cut-off threshold is to an extent arbitrary. In this case, choosing the top five represents a subjectively satisfactory reconciliation between a necessary and realistic limit (big populations by definition will be expensive to protect), and the populations that really do stand out head and shoulders above the others. Working from the combined number of Eastern Africa's Definite and Probable elephants (143 825), the five populations listed are the only ones that exceed 7 200 – or 5 % of the regional total – in number [71]. While it is suggested that other regions should also keep their selection of VIEAs to a maximum of five, the cut-off point in percentage terms will differ from one to another.

All of the five populations listed above use an ecosystem made up of a mosaic of protected and unprotected areas, as shown in Figure 5 for Ruaha-Rungwa. All of them are sufficiently important to be assured of being included among those considered a priority for area-based interventions (see Section 5.3.1).

Table 1. Elephant numbers in Eastern Africa by country (2012/13) based on predictions of their range

Country	Definite	Probable	Possible	Speculative
Eritrea	96	0	8	0
Ethiopia	628	0	220	912
Kenya	26 365	771	3 825	5 299
Rwanda	11	17	54	0
Somalia	0	0	0	70
South Sudan	1 172	5 882	5 882	0
Tanzania	95 351	10 278	10 927	900
Uganda	2 223	1 031	903	385
Totals	**130 859**	**12 966**	**16 700**	**7 566**

The data presented are those published on the AED website in December 2014, but which have since been updated. Note that totals for the Definite, Probable, and Possible categories are derived by pooling the variances of individual estimates, as described at http://www.elephantdatabase.org/reliability. As a result, totals do not necessarily match the simple sum of the entries within a given category.

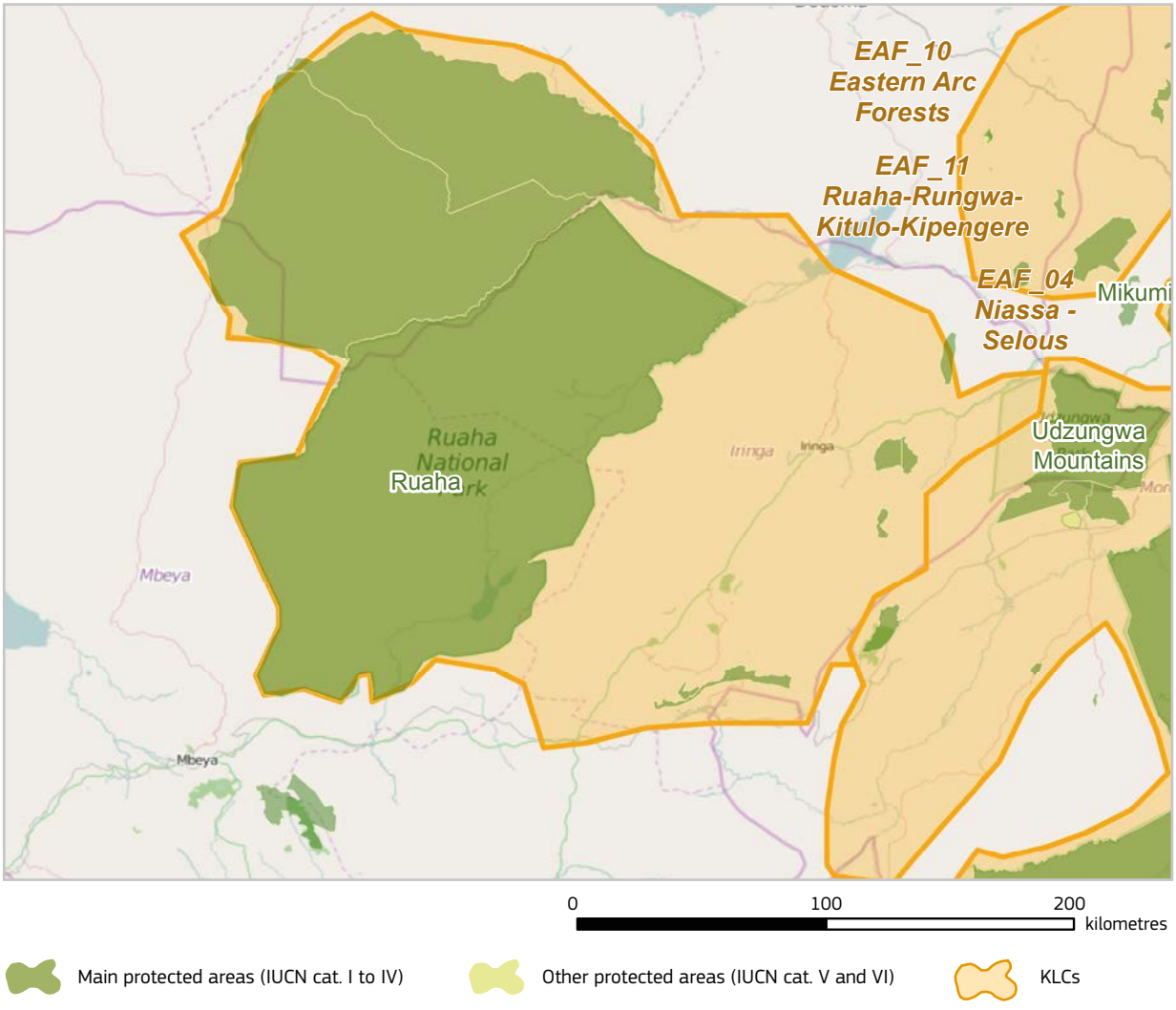
([70]) http://www.elephantdatabase.org/

([71]) Most of the populations cited have been much reduced since this data was collected and collated, but irrespective of their actual size today, their ***relative*** size and importance is probably unchanged.

Table 2. Very Important Elephant Areas in Eastern Africa by population size (2012/13)

Name of Population/Ecosystem	Country	Population estimate
Mikumi-Selous-Niassa Corridor[72]	Tanzania	44 828
Ruaha-Rungwa	Tanzania	32 025
Moyowosi-Kigosi	Tanzania	13 143
Tsavo	Kenya	12 182
Laikipia-Samburu	Kenya	7 415

Figure 5. The Ruaha-Rungwa-Kitulo-Kipengere KLC



([72]) A census of the Selous GR in November 2013 showed a 67 % decline in the four years since the previous count (see Section 1.2.1 of the elephant chapter in Chapter 5), not enough to disqualify the overall population but probably moving it to No 2 in this list. NB: however the area remains emphatically a VIEA as the population in the contiguous area of Mozambique, estimated at 12,000 in 2011, is not included in these figures.

^

Kenya Wildlife Service staff release a female white rhino from a cage at Nairobi National Park during the translocation of 10 rare white rhinos from the drought stricken Lake Nakuru National Park in the Rift valley.

5.2.2 Rhino and other 'iconic species'

Rhino conservation is a crosscutting issue relevant to both Eastern and Southern Africa. As such, the topic has a stand-alone chapter in Chapter 5 of this report in which a set of relevant actions recommended for European Commission support are presented and from which all the rhino range states of Eastern Africa stand to benefit.

The recommendation to develop a forensic lab for Eastern Africa in Kenya was prompted by a KWS lab's pre-existing efforts to acquire a capacity to undertake DNA analysis of rhino horn (see Section 3.2.2 above).

Compared to elephants, rhinos have considerably less ecological impact, and nowhere near as extensive range requirements. Consequently it is not possible to generate an equivalent 'multiplier effect' argument for giving their needs matching priority.

However, they are considerably more endangered and as such do have very significant 'existence value', in western perception especially. They also have economic value deriving from their status as a tourism attraction and as a potential, if controversial, source of revenue (through sport hunting and horn trade). As such, rhinos must be included among a set of globally iconic species of similar concern, all of which should benefit from the EU programme if possible; others with equivalent existence and economic values are the great apes, the big cats and wild dogs.

Consequently the presence of these species is deemed particularly relevant to the selection of areas most deserving of support (see Section 5.3 below). Action on behalf of locally iconic and other endangered species is discussed in Section 5.3.3 below.

5.3 Areas: Key Landscapes for Conservation

If one applies a consideration of multiple benefits and popular appeal to a selection of areas in Eastern Africa (protected or otherwise) most deserving of support, one concludes that the selection should start with any area that satisfies at least one of these criteria:

- qualifies (subjectively) as representative of a 'last great intact ecosystem/wilderness area';
- represents the most viable, fully functioning remnant of a particular ecotype;
- contains an abundant and diverse assemblage of animals on a 'pleistocene scale';
- features a unique migratory phenomenon;
- supports one of Eastern Africa's five biggest elephant populations;
- has 'outstanding universal value' according to its status as a World Heritage Site.

Obviously the more of these criteria an area can satisfy, the more important and deserving of support it becomes. Few individual PAs are able to satisfy even one of these criteria, but certain complexes of PAs that are contiguous, or are in close proximity to each other, can. PA complexes, therefore, are a dominant feature of the landscapes most deserving of support identified in the next section.

An analysis to demonstrate that a selection based on such simple criteria can indeed deliver multiple benefits follows in Section 5.3.3. As such, they represent spectacular, still viable examples of Africa's wildlife and wild places that are of such outstanding importance and value that they should be conserved at all costs and in principle forever. They are referred to both here and in all other chapters as **Key Landscapes for Conservation or KLCs**. Section 5.3.4 concludes with a description of the various ways in which KLCs could actually be supported.

5.3.1 East African Key Landscapes for Conservation (inland)

Table 3 and Figure 6 show the inland areas of Eastern Africa qualifying as KLCs against one or more of the basic criteria posed above, and identified as priorities under the current review. Some of those listed are TFCAs (see Section 3.4.2), while others lie entirely within a single country. Further detail with regard to the nature and importance of each KLC may be found elsewhere in this report as indicated in Table 4. In addition, the Appendix lists all the PAs to be found in each KLC, with supplementary information also given in Table 5 of the summary document – Synthesis.

Considering the rigorous criteria involved in attaining WHS status, its inclusion as a qualifying criterion for KLCs is important. Combining this with the other KLC criteria, one can be very confident that, between them, the KLCs selected not only host a very high percentage of the region's biodiversity, but also do so where it has the best chance of survival in perpetuity. As generally large areas, they also preserve ecosystem service functions to the greatest possible extent.

Even so, purists will reasonably object that very many important areas are excluded, including certain TFCAs, national parks and other PAs, Ramsar sites, Important Bird Areas and so on. While further analysis would show that several of these are also captured by the proposed KLCs, the fact remains that a limit must be set somehow. Bearing in mind that the other three regions have generated lists of similar magnitude, delivering meaningful support to approximately 70 KLCs incorporating some 300 PAs in total is already a massive challenge. Nevertheless, there is no reason why other areas – new WHSs in particular – may not in future be recognised as KLCs and be equally eligible for priority EU support (see also Section 5.3.3).

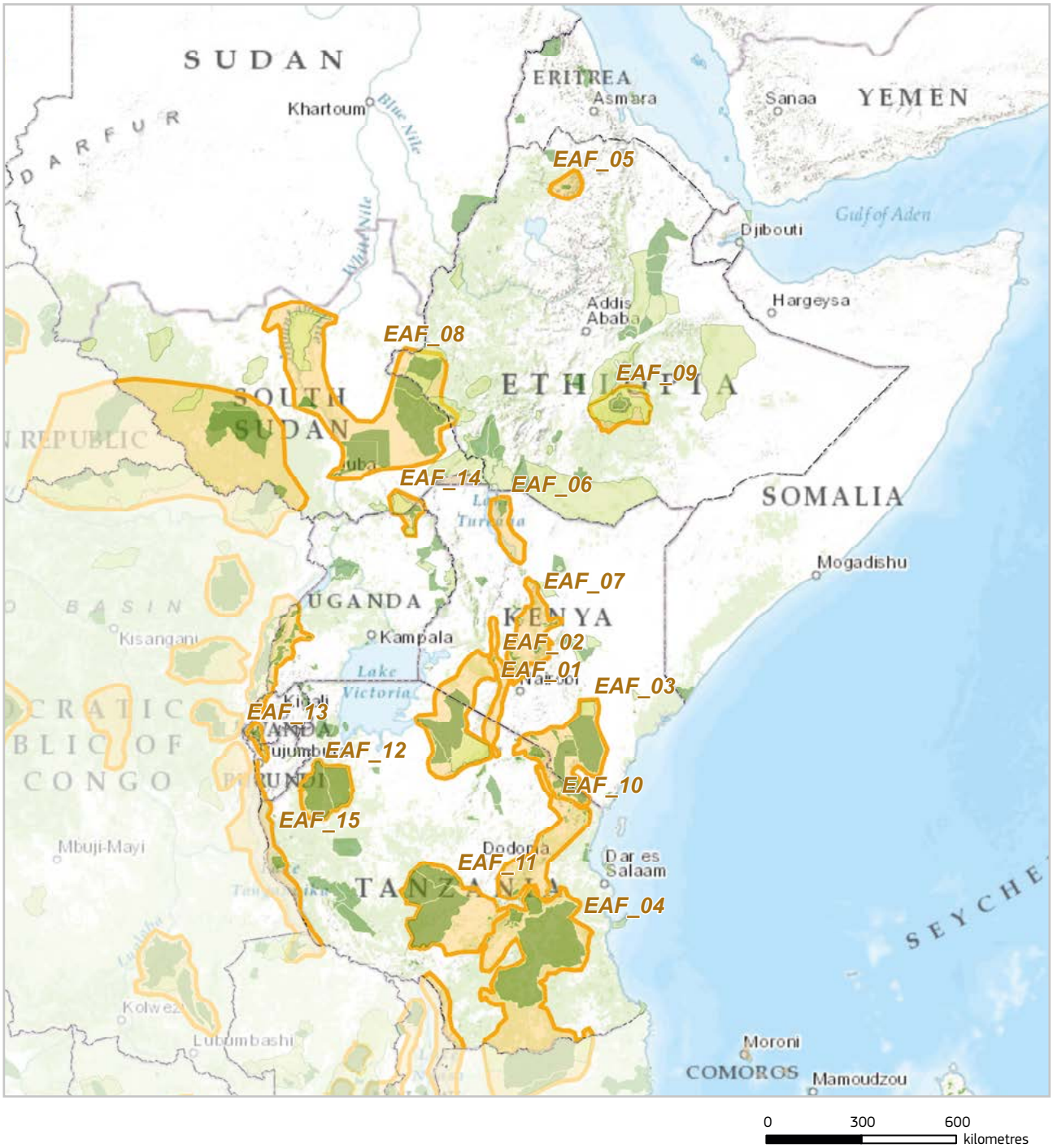
It is strongly recommended that the EU gives initial priority to supporting the KLCs listed both here and in other chapters (see summary Table 5 in the summary document – Synthesis). The various ways in which this could be done are outlined in Section 5.3.4 below.

Table 3. Proposed list of inland KLCs for Eastern Africa

Name of KLC	Countries	Extensive wilderness	Remnant ecotype	Pleisto-cene abundance	Unique migration	VIEA	WHS	Tenta-tive WHS
Mara-Serengeti-Ngorongoro*	KE, TZ	√		√	√		2	1
Greater Virunga*†	CD, RW, UG	√		√			3	1
Rift Valley Lakes WHS-Natron*	KE, TZ	√		√	√		1	2
Greater Kilimanjaro*	KE, TZ	√		√		√	1	3
Selous-Niassa*†	TZ, MZ	√		√		√	1	
Simien Mountains	ET		√				1	
Lake Turkana National Parks WHS	KE	√					1	
Greater Mt Kenya	KE	√		√		√	1	
Sudd-Badingilu-Boma-Gambella*	ET, SS	√		√	√			1
Bale Mountains	ET	√						1
Lakes Tanganyika and Malawi*†	TZ, BI, CD, ZM & TZ, MW, MZ		√				1	2
Eastern Arc Forests*	TZ, KE		√					1
Ruaha-Rungwa-Kitulo-Kipengere	TZ	√		√		√		
Moyowosi-Kigosi	TZ	√		√		√		
Nyungwe-Kibira*	RW, BI	√	√					
Imatongs-Kidepo*	SS, UG	√	√					
Lantoto-Garamba*†	SS, CD	√				√	1	

* Denotes a TFCA; *† Denotes a TFCA shared by two regions.

Figure 6. Map of proposed KLCs in the Eastern African region



EAF-01 Mara-Serengeti-Ngorongoro
EAF-02 Rift Valley Lakes WHS-Natron
EAF-03 Greater Kilimanjaro
EAF-04 Niassa-Selous
EAF-05 Simien Mountains
EAF-06 Lake Turkana
EAF-07 Greater Mt Kenya
EAF-08 Sudd-Badingilu-Boma-Gambella
EAF-09 Bale Mountains
EAF-10 Eastern Arc Forests
EAF-11 Ruaha-Rungwa-Kitulo-Kipengere
EAF-12 Moyowosi-Kigosi
EAF-13 Nyungwe-Kibira
EAF-14 Imatongs-Kidepo
EAF-15 Lake Tanganyika

Wildebeest move across the floor of Ngorongoro crater, Tanzania.

Table 4. Text sections, boxes and maps providing further information on each KLC

Name of KLC	Text section	Box	Map
Mara-Serengeti-Ngorongoro*	1.3		Figure 2
Greater Virunga*†	3.4.2; and Chap. 3: 5.1.1		
Rift Valley Lakes WHS-Natron*	1.5; 3.4.2		
Greater Kilimanjaro*	1.1	2	Figure 2
Selous-Niassa*†	1.3	7	Figure 4
Simien Mountains	1.1	2	
Lake Turkana National Parks WHS	1.5		
Greater Mt Kenya	1.1	1; 2	
Sudd-Badingilu-Boma-Gambella*	1.3; 1.5	11	Figure 3
Bale Mountains	1.1	2; 3	
Lakes Tanganyika and Malawi*†	1.5	10	
Eastern Arc Forests*	1.2.1	4	
Ruaha-Rungwa-Kitulo-Kipengere	1.2.1; 5.2.1		Figure 5
Moyowosi-Kigosi	5.2.1		
Nyungwe-Kibira*	1.2.2; 3.4.2		
Imatongs-Kidepo*	1.2.1		
Lantoto-Garamba*†	3.4.2; and Chap. 3: 5.1.1		

* Denotes a TFCA; *† Denotes a TFCA shared by two regions.

The 1 000 km-long Tana River gets most of its water from the forested catchments of the Mount Kenya and Aberdare 'water towers'. Tana water supports most of Kenya's important power and urban water needs, including over 90 % of Nairobi city's requirements. The Tana River delta features on Kenya's List of Tentative World Heritage sites.

5.3.2 East African Key Landscapes for Conservation (coastal/marine)

Although most coastal PAs in Eastern Africa have been established in relation to a specific biophysical feature, such as a coral reef, there is no reason why a more holistic, KLC-type approach cannot also be used to identify coastal-marine areas or complexes of outstanding biodiversity and value. Although relevant work has been undertaken in Eastern Africa, few of the areas of apparently greatest importance have obtained either formal recognition or direct support to date.

The marine World Heritage Sites closest to Eastern Africa are the Aldabra Atoll (Seychelles) and iSimangaliso Wetland Park (South Africa). Only one coastal area features in the Lists of Tentative WHSs submitted by East African countries and that is the small Jozani Forest-Chwaka Bay area on Zanzibar (Tanzania). However, some coastal wetlands have been recognised under the Ramsar Convention, notably the Rufiji Delta (Tanzania) and the Tana Delta (Kenya).

The most recent work to identify coastal complexes of outstanding importance has been undertaken by IUCN's Eastern and Southern Africa Regional Programme Office in the course of developing a programme entitled Resilient Coasts, which also covers the 'southern' country of Mozambique[73]. Five areas have been proposed for support under this programme. These include the three locations within the region of Eastern Africa that had been put forward previously as sites of outstanding universal value to be considered for listing by UNESCO's World Heritage Centre[74], namely:

- the Quirimbas-Mnazi Bay complex, northern Mozambique coast/southern Tanzania coast;
- Bazaruto-Tofo in Inhambane Province, southern Mozambique coast;
- the Lamu Archipelago-Tana Delta complex[75], northern Kenya coast.

In addition, the IUCN study recommends a further two sites that provide valuable ecosystem services, namely:

- Rufiji Delta-Mafia Island complex, Tanzania (see also Box 12);
- Kenya south coast complex (Msambweni, Funzi Bay-Ramisi River Estuary, Vanga).

In terms of the present chapter's scope, consideration must also be given to outstanding areas in the Red Sea and Gulf of Aden. A major EU-funded study of the coast of Sudan conducted in 2007 developed a proposal for the Tentative Listing of a serial WHS called the Sudanese Red Sea Marine PA Network, a complex that includes both the Sanganeb Atoll Marine NP and the Dungonab Bay-Mukkawar Island Marine NP[76]. Eritrea hosts another important area, the Dahlak Archipelago, part of which is designated a marine NP but not as yet proposed for WHS status. EU-funded studies of the Somali environment carried out some years ago identified several coastal areas of conservation potential, but circumstances in that country continue to preclude any meaningful development effort[77].

(73) Samoilys M., G.W. Maina, J.E. Church, B. Mibei, M. Monjane, A. Shah, D. Mutta and M. Pabari (2013). Situation analysis to understand the resilience of the coastal ecosystems of eastern Africa, IUCN ESARPO, Nairobi.
(74) Obura D.O., J.E. Church and C. Gabrié (2012). Assessing Marine World Heritage from an Ecosystem Perspective: The Western Indian Ocean, World Heritage Centre, United Nations Education, Science and Cultural Organisation (UNESCO). 124 pp.
(75) The Tana Delta also features on Kenya's List of Tentative WHSs.
(76) Equipe Cousteau (2008). Towards developing Integrated Coastal Zone Management in Sudan. Phase I: Survey for the ICZM of the Red Sea Coast of Sudan.
(77) IUCN (2006). Country Environmental Profile for Somalia, IUCN Eastern Africa Regional Programme Office, Nairobi.

Grevy's Zebra, a subspecies of zebra endemic to northern Kenya.

Table 5. Potential coastal-marine KLCs for Eastern Africa

Name	Countries
Mnazi Bay-Quirimbas	Tanzania, Mozambique
Lamu Archipelago-Tana Delta	Kenya
Dahlak Archipelago	Eritrea
Red Sea Marine PA Network	Sudan
Rufiji Delta-Mafia Island	Tanzania
South coast complex	Kenya
Jozani Forest-Chwaka Bay	Tanzania

Table 5 summarises the East African areas with identified potential to be coastal KLCs in accordance with the concept promoted in this report. In the short term, the most appropriate strategy for the European Commission would be to offer support to IUCN's Resilient Coasts Programme, since much of the groundwork has been laid. In the longer term, support can be developed for areas in the Red Sea and Gulf of Aden whose littoral states are inherently harder to work in.

5.3.3 Multiple benefits

Tables 6 and 7 show how the conservation of the large, diverse and intact ecosystems identified here as KLCs automatically satisfies other important considerations, thus confirming the 'multiple benefits' premise. Table 6, for example, shows how all the important iconic species of global concern will benefit from the selection.

Legitimate concern might be raised that the rather simplistic emphasis given in KLC selection to the most obviously charismatic megafauna means that locally iconic and/or other rare and endangered species are excluded. It has not been possible as part of the present study to develop full species lists for each of the proposed KLCs, but the text sections within this report cited in Table 4 indicate just how many species of great local concern and importance are in fact catered for in the selection. Other examples include Grevy's zebra (*Equus grevyi*), the core of whose very restricted distribution falls within KLC8; Rothschild's giraffe is a rare sub-species restricted to KLC3; KLC9 incorporates the most important area for the locally iconic Nile lechwe (*Kobus megaceros*); and so on.

Nonetheless, there are inevitably some important species which range outside the initial selection of KLCs presented here. Perhaps the most notable exclusions are some from truly arid areas and coastal forest species, such as the primates detailed in Box 5 and the hirola antelope[78], which is also mentioned in Section 1.2.3. As indicated earlier however, the list of KLCs should be seen as flexible not fixed, and open to the addition of new WHSs in particular. It is notable in this context that a 'Tana delta and forest complex' features on Kenya's List of Tentative WHSs, so the chances are very high that this area will 'automatically' qualify as a KLC in due course.

([78]) In fact the hirola is effectively covered under the Greater Mount Kenya KLC because the NRT-managed conservancy it ranges in, although physically separated from the others, could still benefit from any support programme to the Greater Mount Kenya KLC.

Table 6. Representation of iconic flagship species in selected inland KLCs

Name of KLC	Countries	Elephant	Rhino	Great Apes	Big Cats	Wild Dog
Mara-Serengeti-Ngorongoro*	KE, TZ	√	√		√	√
Greater Virunga*†	CD, RW, UG	√		√	√	√
Rift Valley Lakes WHS-Natron*	KE, TZ		√		√	√
Greater Kilimanjaro*	KE, TZ	√	√		√	√
Selous-Niassa*†	TZ, MZ	√	√		√	√
Simien Mountains	ET					
Lake Turkana National Parks WHS	KE					
Greater Mt Kenya	KE	√	√		√	√
Sudd-Badingilu-Boma-Gambella*	ET, SS	√	?		√	√
Bale Mountains	ET					
Lakes Tanganyika and Malawi*†	TZ, BI, CD, ZM & TZ, MW, MZ			√		
Eastern Arc Forests*	TZ, KE	√				
Ruaha-Rungwa-Kitulo-Kipengere	TZ	√	?		√	√
Moyowosi-Kigosi	TZ	√	?		√	√
Nyungwe-Kibira*	RW, BI	√		√		
Imatongs-Kidepo*	SS, UG	√			√	√
Lantoto-Garamba*†	SS, CD	√	?	√	√	√
ALL COMBINED		**√**	**√**	**√**	**√**	**√**

* Denotes a TFCA; *† Denotes a TFCA shared by two regions.
Country abbreviations (ISO-2): BI – Burundi; CD – Democratic Republic of Congo; ET – Ethiopia; KE – Kenya; MW – Malawi; MZ – Mozambique; RW – Rwanda; SS – South Sudan; TZ – Tanzania; UG – Uganda; ZM – Zambia.

As such, the Tana delta and several other 'high value' areas could already have been selected as KLCs, and are only omitted from the present list as a matter of initial prioritisation. It is hoped that locally perceived shortcomings in the KLC selection will help motivate the concerned stakeholders to get their areas' profile raised (by upgrading to NP or WHS status, for example) and to raise dedicated funds for their proper management and protection. **Indeed, in view of their potential as KLCs, the EU should support the preparation of application dossiers for tentative WHSs as part of its strategic approach.**

Table 7 shows how the initial selection captures at least one representative example of every major ecotype found in the region, as well as areas providing critically important watershed protection services.

5.3.4 Scope of possible actions in KLCs

The level of investment required will vary greatly according to a KLC's present condition, and any pre-existing level of investment from government and/or other external sources. Depending on this, assistance would centre on helping to prepare (or update), and then implement, General Management Plans. Where several PAs make up a KLC, these GMPs could either be at the level of an individual PA, or at an integrated level for the whole KLC. In the latter case especially, the plans will look beyond the borders of formal PAs and plan for the eco-friendly development of the (mostly) communal areas in the interstices between them. Consequently, any of the following activities would be eligible for support in KLCs:

- supporting the establishment and functioning of a high-level Steering Committee;
- provision of technical assistance (resident advisors, and/or consultants);
- co-management contracts;
- outright management contracts (e.g. with African Parks);
- general management planning;

An adult male lion in the Maasai Mara Game Reserve, Kenya. In many parts of Africa, particularly West and Central Africa, but also in parts of Eastern Africa, lion populations are declining severely. The most important causes are indiscriminate killing in defense of human life and livestock, habitat loss, and prey base depletion.

Table 7. Representation of all Eastern African ecotypes in selected inland KLCs

Name of KLC	Countries	Freshwater lakes	Soda lakes	Wetlands	ASAL	Savannah	Bushland	Miombo woodland	Important watershed	Afro-alpine	Highland forest	Lowland forest	Coastal forest
Mara-Serengeti-Ngorongoro*	KE, TZ					√	√		√		√		
Greater Virunga*†	CD, RW, UG	√		√		√	√		√	√	√	√	
Rift Valley Lakes WHS-Natron*	KE, TZ		√	√		√	√						
Greater Kilimanjaro*	KE, TZ	√		√		√	√		√	√	√		
Selous-Niassa*†	TZ, MZ						√	√	√				
Simien Mountains	ET								√	√	?		
Lake Turkana National Parks WHS	KE	√	√		√	√	√						
Greater Mt Kenya	KE				√	√	√		√	√	√		
Sudd-Badingilu-Boma-Gambella*	ET, SS			√		√	√					?	
Bale Mountains	ET								√	√	√		
Lakes Tanganyika and Malawi*†	TZ, BI, CD, ZM & TZ, MW, MZ	√		√									
Eastern Arc Forests*	TZ, KE								√		√	√	√
Ruaha-Rungwa-Kitulo-Kipengere	TZ			√		√	√	√	√		√	√	
Moyowosi-Kigosi	TZ			√		√	√	√					
Nyungwe-Kibira*	RW, BI								√			√	
Imatongs-Kidepo*	SS, UG					√	√		√		√	√	
Lantoto-Garamba*†	SS, CD					√	√					√	
ALL COMBINED		**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**	**√**

* Denotes a TFCA; *† Denotes a TFCA shared by two regions.

A British army paratrooper instructs Kenya Wildlife Service rangers in anti-poaching techniques.

- strengthening management through capital investment in buildings, roads, vehicles and other equipment;
- strengthening management by defining and meeting training needs at all levels;
- establishing performance standards and monitoring procedures, e.g. the Spatial Monitoring and Reporting Tool (SMART);
- securing strategic corridors;
- ecological and biological management of habitats and species (including research and monitoring, translocations, forest rehabilitation/restoration);
- ensuring GMPs address climate change adaptation;
- developing business plans for enhanced revenue;
- improving law-enforcement strategies and capacity through additional manpower, training and equipment;
- mitigating HWC and HEC, including fencing and improved compensation schemes;
- controlling invasive species;
- supporting CBNRM (whether consumptive or not);
- promoting improved/complementary livelihood strategies (both pastoral and agricultural) including innovative NGO approaches to livelihood developments and wildlife conservation;
- developing PES and REDD+ projects within the KLC;
- conducting local education and awareness campaigns;
- strengthening family planning services throughout the KLC;
- early engagement of all stakeholders in the process of integrated land-use planning;
- ensure the private sector respects international treaties and standards, such as the Ramsar Convention, the World Heritage Convention, the Organisation for Economic Cooperation and Development (OECD) guidelines for international companies;
- fighting corruption.

5.4 Institutions: Strengthening sectoral management and coordination

5.4.1 Regional

At the time that its Regional Indicative Programme (RIP) for 2014-2020 under the 11th EDF was being finalised, the EU was considering support to the following interventions under its EAC/NRM component:

- strengthening EAC policy and procedures for the establishment and management of TFCAs;
- developing a new course at the East African regional College of African Wildlife Management for PA wardens;
- developing an East African regional forensics laboratory for wildlife crime.

Whether or not they feature in the final RIP, these interventions remain worthy of EU support. Consequently the first two are discussed in the paragraphs below, while the forensic laboratory is presented in Chapter 5, Section 3.9.3.4.

TFCA policy and procedures

It is evident from the selection of KLCs proposed for support that the successful development and application of the concept of TFCAs is very important to the conservation of key ecosystems in Eastern Africa. Unfortunately the level of political commitment and support for TFCAs is still weak in the region, but the EAC, its Secretariat and its NRM Protocol provide a sound platform on which this could be developed (see Section 3.4.2).

Accordingly it was proposed under the RIP process that Eastern Africa should develop a *Protocol on Wildlife Conservation and Law Enforcement*, modelled closely on that adopted by the SADC. This met resistance from the EAC Secretariat on the grounds that the draft *Eastern Africa Tourism and Wildlife Protocol* was already too far advanced to be significantly altered. This is unfortunate because as it stands the draft Protocol is deficient in terms of provisions for TFCAs (see Section 3.1.3). Having been in the pipeline since 2009, a reluctance to admit to serious flaws now is understandable. The compromise suggested by the EAC Secretariat was to allow the Protocol to go ahead as is and, in a parallel move, augment it with an Agreement, MoU or some other similar instrument whose formal adoption – unlike a Protocol proper – could be fast-tracked.

Whilst not carrying the weight of a Protocol, an *Eastern Africa Agreement on Wildlife Conservation and Law Enforcement* is far better than nothing in terms of providing a strong platform for TFCA co-management in the region. Accordingly, EU support is anticipated for all that this would entail, including consultation, adoption and supervision of implementation. The latter would centre on widening the remit and capacity of the units and staff responsible for wildlife affairs to provide a permanent focal point within the EAC Secretariat to catalyse, coordinate and sustain the TFCA initiative.

Irrespective of whether or when a much stronger policy environment and support apparatus for TFCAs in the EAC might emerge, **it is recommended that the EU assists the EAC in preparing a regional TFCA Development Plan as soon as possible, followed by support for its implementation in one or more priority TFCAs that are also KLCs**. The range of inputs that could be involved is as listed in Section 5.3.4 above.

Warden training at the College of African Wildlife Management, Moshi, Tanzania

A need has been identified to re-constitute the availability of a comprehensive training course in Eastern Africa at the College of African Wildlife Management (CAWM), which is tailored to the needs of wardens-in-charge of PAs and geared to contemporary law-enforcement challenges in particular (see Section 3.4.3)[79].

A draft curriculum has already been prepared by the college, and EU support for its refinement and delivery has been requested under the RIP. Since it is unlikely that everything needed to initiate and run the programme could be met from that source, **supplementary EU support is recommended, especially with regard to scholarships to enable selected officers to attend**. It can be noted here that the European Commission has provided very similar support to CAWM in the past[80].

5.4.2 National

Programmes supporting sectoral reform (including policy and legal), institutional restructuring and strengthening of management authorities (including the design or re-design of PA systems) are very cost-effective conservation investments at the national level because all PAs, and all wildlife (whether in PAs or not), stand to benefit.

It is recommended therefore that the European Commission sets aside resources to enable it to support national-level sectoral, institutional and/or PA system reforms on an ad hoc, if-and-when requested basis, and advertises its willingness and ability to act in this way.

Countries identified in this report as being in need of such support are, in order of priority (based on the degree of perceived mismatch between biodiversity richness and overall management capacity): Ethiopia, Tanzania (transformation of the Wildlife Division into the Tanzania Wildlife Authority), Kenya (possible merger of Wildlife and Forest Services), Sudan and – if conditions ever permit – Somalia.

Finally, the importance of supporting and strengthening civil society organisations (local communities, community-based organisations) should not be overlooked as they are often vital in catalysing public engagement in biodiversity conservation. In Eastern Africa, civil society plays a pivotal role in conservation, especially capacity building of both government and local communities and the development of models, and catalysing appropriate actions by mandated government agencies.

(79) Interestingly, TRAFFIC in Eastern Africa has recently entered into a partnership arrangement with CAWM to help strengthen its delivery of wildlife law-enforcement training.
(80) *The Wildlife Management Training Project* implemented in the late 1990s, but which was implemented through the SADC. The newly proposed programme would be implemented through the EAC.

Table 8. Summary of key features of the Eastern African KLCs

Name of proposed KLC	Countries (ISO2 code)	Size (km²)	Ecotype/biome	Protected areas	Special features/significance
Mara-Serengeti-Ngorongoro	KE, TZ	25 000	Savannah	• Maasai Mara NR (KE) • Serengeti WHS/NP (TZ) • Maswa GR (TZ) • Grumeti GR (TZ) • Ikorongo GCA (TZ) • Loliondo GCA (TZ) • Ngorongoro WHS/CA (TZ) • + conservancies • + whole Mara Catchment (mostly KE)	• Major plains game migration • Large carnivores • Elephant, rhino • Unique crater
Greater Virunga (overlaps with Central African region)	CD, RW, UG	15 000	Albertine Rift mid altitude and Montane forest East Sudanese savannah Wetlands	• Virunga WHS/NP (CD) • Volcans NP (RW) • Mgahinga NP (UG) • Queen Elizabeth NP (UG) • Bwindi WHS/NP (UG) • Semuliki NP (UG) • Ruwenzori WHS/NP (UG) • Kibale NP (UG) • Kasyoha-Kitomi FR (UG) • Kalinzu-Maramgambo FR (UG) • Kayumbura WR (UG)	• Albertine Rift Ecoregion • 3 WHSs • Entire mountain gorilla population and important chimpanzee populations • Majority of Albertine endemics • Exceptional tourism potential • Protection of vital freshwater fish stocks • Watershed protection
Rift Valley Lakes WHS – Natron	KE, TZ	c. 320	Soda lakes	• Lake Bogoria NR (KE) • Lake Nakuru NP (KE) • Lake Elementeita NWS (KE) • Soysambu Conservancy (KE) • Lake Natron (TZ) • + catchment areas	• Serial World Heritage Site • Flamingos, water birds • Rhino
Greater Kilimanjaro	KE, TZ	c. 40 000	Montane, forest, savannah	• Kilimanjaro WHS/NP (TZ) • Chyulu NP (KE) • Amboseli NP (KE) • Tsavo West NP (KE) • Tsavo East NP (KE) • South Kitui NR (KE) • Taita Hills FRs (KE) • Mkomazi NP (TZ) • + conservancies and WMAs	• Glaciated mountain • Montane endemics • Carnivores • Very important elephant area, rhinos
Selous-Niassa (overlaps with Southern African region)	TZ, MZ	96 200	Miombo woodland Wetlands Savannah	• Selous WHS/GR (TZ) • Niassa NR (MZ) • Mikumi NP (TZ) • Udzungwa NP (TZ) • Kilombero GCA (TZ) • + WMAs, conservancies and hunting blocks	• Migration corridor • Very important elephant area • Buffalo, hippo, possibly rhino and many other animals

Name of proposed KLC	Countries (ISO2 code)	Size (km²)	Ecotype/biome	Protected areas	Special features/significance
Simien Mountains	ET	c. 5 000	Montane	• Simien NP	• Montane endemics, gelada baboon, wolf, ibex
Lake Turkana National Parks WHS	KE	1615	Lake, desert	• Sibiloi NP • Central Island NP • South Island NP • Turkana GR	• Fossil sites • Desert species
Greater Mt Kenya	KE	c. 25 000	Montane Forest Savannah	• Mt Kenya-Lewa Downs WHS/NP/FR • Samburu NR • Buffalo Springs NR • Shaba NR • Aberdare NP • + NRT Conservancies	• Glaciated mountain • Alpine flora • Forests to arid savannah • Very important elephant area, rhino, Grevy's zebra and other game
Sudd-Badingilu-Boma-Gambella	ET, SS	250 000	Savannah Wetland	• Zeraf GR (SS) • Shambe NP (SS) • Badingilu NP (SS) • Boma NP (SS) • Gambella NP (ET) • + other satellite PAs	• Major plains game migration
Bale Mountains	ET	c. 5 000	Montane, forest	• Bale Mountains NP • Mena-Angetu FR • + other PAs	• Alpine flora, montane endemics
Lakes Tanganyika and Malawi (overlaps with Southern and Central African regions)	TZ, BI, CD, TZ, ZM, MW, MZ	63 000	Freshwater lakes, forest	• Mahale Mountains NP (TZ) • Gombe Stream NP (TZ) • Sumbu NP (ZM) • Lake Malawi WHS/NP (MW)	• Endemic fish fauna • Chimpanzees
Eastern Arc Forests	KE, TZ	c. 10 000	Highland forest	• Udzungwa NP (TZ) • Usambara Mts FRs (TZ) • Pare Mts FRs (TZ) • Taita Hills FRs (KE)	• Endemics • Primates
Ruaha-Rungwa-Kitulo-Kipengere	TZ	c. 25 000	Miombo woodland Southern highland forest	• Ruaha NP • Muhezi GR • Kizigo GR • Rungwa GR • Mbomipa WMA • Umemarua WMA • Kitulo NP • Mpanga Kipengere GR • Mt Rungwe NR	• Very important elephant area and other game • Forest, montane grassland and endemics

Name of proposed KLC	Countries (ISO2 code)	Size (km²)	Ecotype/biome	Protected areas	Special features/significance
Moyowosi-Kigosi-Burigi-Akagera	TZ	c. 41 000	Miombo woodland Wetlands	• Moyowosi GR • Kigosi GR • Burigi GR • Akagera NP	• Very important elephant area and other game. • Malagarasi and Akagera rivers and extensive swamps, lakes
Nyungwe-Kibira	RW, BI	1 400	Mid-altitude forest	• Nyungwa NP (RW) • Kibira (BI)	• Forest and endemics
Imatongs-Kidepo	SS, UG		Highland forest and savannah	• Imatong Central FR (SS) • Agora FR (UG) • Kidepo GR (SS) • Kidepo NP (UG)	• Forest and endemics • Savannah
Lantoto-Garamba (overlaps with Central African region)	SS, CD	See Central Africa	Northern Congolian forest Savannah mosaic	• Garamba WHS/NP (CD) • Lantoto NP (SS) • + contiguous *Domaines de Chasses*	• Very important elephant area, buffalo, hippo and many other important species
Eastern Africa total		**c. 600 000**		**82***	

(*) Excluding WMAs, conservancies and hunting blocks

Country abbreviations (ISO-2): BI – Burundi; CD – Democratic Republic of Congo; ET – Ethiopia; KE – Kenya; MW – Malawi; MZ – Mozambique; RW – Rwanda; SS – South Sudan; TZ – Tanzania; UG – Uganda; ZM – Zambia.

Note: The difference in the surface area total compared with the one presented in the Synthesis is due to a) adjustments in the estimations of surface areas of certain KLCs and b) the fact that surface areas for shared landscapes are only counted once.

Figure 7. Protected areas in the Eastern African region