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CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Seventeenth meeting of the Conference of the Parties
Johannesburg (South Africa), 24 September – 5 October 2016

AN IUCN SITUATION ANALYSIS OF TERRESTRIAL AND FRESHWATER FAUNA IN WEST AND CENTRAL AFRICA

This document has been submitted by the Secretariat at the request of IUCN, in relation to agenda item 30 on *Wildlife crime enforcement support in West and Central Africa*[*].

[*] *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

An IUCN situation analysis of terrestrial and freshwater fauna in West and Central Africa

David P. Mallon, Michael Hoffmann and Philip J.K. McGowan
with contributions from Matthew J. Grainger, Fabrice Hibert and Nathalie van Vliet

Occasional Paper of the IUCN Species Survival Commission No. 54

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The authors of this report contributed in the following ways:

DPM[1] led Chapters 1 and 2 and contributed substantially to 3, 7 and 8;
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PJKM[3] led Chapters 5, 6 and 9, and contributed substantially to 3.

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Front cover: Bushmeat items on display following seizures from markets in Yaoundé, Cameroon, including parts of gorillas, monkeys, pangolins, turtles, tortoises, crocodiles, snakes, monitor lizards, antelopes, rodents and hornbills from 45 live animals, 228 carcasses plus 42 assorted animal parts. © Eva Paule Mouzong
Back cover: A herd of African Elephants *Loxodonta africana* in Zakouma National Park, Chad. © Jean Labuschagne

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Contents

Foreword

As Africa's natural resources account for 17 per cent of global forest cover, 10 per cent of global freshwater, 25 per cent of the world's mammal species, and 22 per cent of the world's plant species, its ecosystems and biodiversity must be sustainably managed to ensure the inclusive and sustainable development of the continent.

The International Union for Conservation of Nature's situation analysis on West and Central Africa makes clear that the loss of biodiversity in those regions is being largely driven by extensive habitat loss and degradation – due to unsustainable logging, urbanization, agricultural expansion and overexploitation – as well as climate change, the introduction of invasive alien species, and illegal hunting and trade of wildlife.

Within the last decade, species such as the Black and White Rhinoceroses have already been lost from the region, and it is anticipated that more species may follow if current trends are not reversed. According to the Convention on International Trade in Endangered Species, up to 90 per cent of elephant mortality in Central Africa is due to poaching.

One of the key findings of the 2014 UNEP-INTERPOL Rapid Response Assessment, *The Environmental Crime Crisis; Threats to Sustainable Development from Illegal Exploitation and Trade in Wildlife and Forest Resources*, highlights that for East, Central and West Africa, the net profits from dealing and taxing unregulated, illicit or illegal charcoal combined is estimated at US$ 2.4–9 billion, compared to US$ 2.65 billion worth of street value heroin and cocaine in the region. The cost to Africa of unsustainable wildlife exploitation is not restricted to terrestrial systems alone. The Africa Progress Report puts the estimated worth of illegal, unreported and unregulated fishing off the coast of West Africa at US$ 1.3 billion per year.

However, despite the many challenges faced by West and Central African countries in addressing biodiversity loss, countries in the region have also made progress in biodiversity conservation, including through the successful establishment of the network of marine managed areas, which stretch over 23 sites in six West African countries.

Strengthening capacity for the sustainable management of wildlife in the context of sustainable development in West and Central Africa demands joint efforts by all relevant stakeholders at national, regional and international levels, from local communities to policy and decision-makers. Such efforts need to recognize the value of natural resources to local and national wealth and sustainable growth. Acknowledging the importance of Africa's wildlife as a foundation for sustainable development is an essential step towards a robust post-2015 development agenda.

Ibrahim Thiaw
United Nations Assistant Secretary-General
Deputy Executive Director, United Nations Environment Programme (UNEP)

Executive summary

1. The 22 countries of West and Central Africa are physically and politically diverse. The biodiversity importance of the region is well established: for example, the Upper Guinea forests, the Afromontane forests of the Nigeria and Cameroon border and the Albertine Rift, and the Congo Basin feature prominently as conservation priorities. But this natural heritage is under tremendous pressure. A human population of ~450 million in 2013 is projected to rise to >600 million in a little over a decade, in parallel with rapid rates of urbanization (>3% for nearly all countries). With the exception of Liberia, all West and Central Africa countries achieved independence from colonial powers less than half a century ago; civil strife, political instability, and violent conflict is widespread, and the region has been a centre of coup activity. Sixteen countries are classed by the United Nations as Least Developed Countries and 19 of them fall in the bottom 20% on the Human Development Index. Governance in-region is generally considered weak or ineffective, with 18 countries ranked in the bottom half of countries on the Corruption Perception Index.

2. The region as a whole is home to 2,471 amphibian, bird and mammal species[1], with ~10% threatened with extinction; of >1,600 species of freshwater fishes known to occur, ~17% are threatened. Among these, medium- to large-sized vertebrates have experienced substantial reductions in populations across the region, but particularly in West Africa. Two species of rhinoceros, Black Rhino *Diceros bicornis* and White Rhino *Ceratotherium simum*, while surviving elsewhere on the continent, have disappeared from the region within the last decade; the last-known, wild Scimitar-horned Oryx *Oryx dammah* were seen in the 1980s and the species is now Extinct in the Wild. Gambia (8), Mauritania (7), Senegal (5), and Mali (5) have lost five or more of their historically native large mammal species. Furthermore, species or subspecies that have global populations now down to only a few 100 individuals in the wild, include Addax *Addas nasomaculatus*, Dama Gazelle *Nanger dama* (<250), Cross River Gorilla *Gorilla gorilla diehlii* (<300), and Dryad Monkey *Cercopithecus dryas* (<200). Regional subpopulations of African Wild Dog *Lycaon pictus*, Lion *Panthera leo*, Cheetah *Acinonyx jubatus*, Giraffe *Giraffa camelopardalis*, and Giant Eland *Tragelaphus derbianus* are all Critically Endangered due to low population size and decline. Other, formerly widespread species or subspecies like African Elephant *Loxodonta africana*, Korrigum *Damaliscus lunatus korrigum*, Lelwel Hartebeest *Alcelaphus buselaphus lelwel*, White-backed Vulture *Gyps africanus*, and two species of sawfish (*Pristis* spp.) have experienced dramatic declines across the region.

3. A total of 2,186 national protected areas have been identified in the region currently covering around 9.1% and 10% of terrestrial area in West Africa and Central Africa, respectively. There has been a marked increase in coverage since the late 1960s. Approximately 90% of these protected areas are in West Africa, where they are small and dominated by reserves outside IUCN categories I–IV (e.g. the protected area networks of countries like Nigeria and Côte d'Ivoire are dominated by classified forests with an unclear management status). Protected areas in Central Africa tend to be larger and are spread across all management categories. In total, only 209 protected areas have been assigned an IUCN management category, although some "Not Reported" sites likely correspond to IUCN category II (e.g., most of Gabon's new national parks). In addition, 188 protected areas have international designations, including 17 World Heritage sites under the "biodiversity" criteria; 10 of these are on the World Heritage in Danger list, and 11 have been assessed as "Critical" in a recent independent evaluation. International sites increase the area under protection, on paper, to 12.0% in West Africa and 12.6% in Central Africa. NGO-led efforts have previously identified 16 sites known to hold the last remaining populations of highly threatened species, nine of them in Cameroon, and more than 300 sites important for the persistence of avian biodiversity. This study identifies 337 sites of value for the conservation of medium- to large-sized, terrestrial threatened and Near Threatened vertebrates, of which nearly one-quarter are unprotected at the national level.

4. The decline of wildlife in West Africa, in particular, can be attributed to extensive habitat loss (with forest patches now highly fragmented), exacerbated by immigration and increasing human densities, incurred primarily through wide-scale clear-cutting to replace forests for agriculture. Recent (1990–2010) deforestation rates have been estimated at three times those in Central Africa. Central African forests remain relatively intact, but roughly one-third of forests are in logging concessions. However, there is evidence that, where appropriately managed, logging concessions can have beneficial impacts. Meanwhile, agricultural activities are expanding in line with the region's recognized cultivation potential for many key crops. The region has been, and continues to be, subject to extensive and increasing exploitation of its mineral and oil reserves, involving both large commercial, open-cast operations and artisanal activites; mining operations already have led to the downsizing and degazettement of protected areas, including one World Heritage site. Even where forests remain intact, bushmeat hunting, especially for ungulates, is prevalent and off-take rates in some cases are not sustainable. These activities are

[1] Reptiles have not yet been fully assessed across the entire region, only in West Africa.

often exacerbated by extractive operations that open up avenues into previously inaccessible areas. Illegal wildlife trade involving ivory and, more recently, pangolin scales, to supply international markets, is further driving wildlife declines.

5. Existing national-level legislation relating to wildlife and wider biodiversity is inadequate, although the degree to which it is considered so varies. The weakness of many national legal frameworks hinders their ability to fulfil obligations to international agreements (all countries are Parties to CBD, CITES, World Heritage, and Ramsar; for CMS, Central African Republic has not ratified and Sierra Leone is not yet a Party). For example, only four countries are considered to have legislations in place that generally meet the requirements for CITES, and 11 are presently subject of notifications concerning suspension of trade in one or more species. Most countries (Liberia excepted) have legal systems that were established by colonial powers. Virtually all countries have legislation concerning hunting regulations. However, it appears difficult to determine the legal basis (and its applicability) for protected species, and thus it is not possible to be certain that there is true legal provision for the range of threatened species that require such protection.

6. Protected area coverage is not on target to meet the 17% required under Aichi Target 11. While half of countries have on paper already met national coverage targets, others (especially Mauritania, Liberia, Gambia and Mali) fall well short. More importantly, many sites important for biodiversity remain unprotected in the region, including more than one-third of Alliance for Zero Extinction sites and three-fifths of Ramsar sites. The effectiveness of protected area management has been assessed in a range of ways. Available evidence from biological indicators of performance, including deforestation and wildlife population trends, suggests that while protected areas have seen declines of large wildlife species, they still harbour the best blocks of habitat and, in some cases, the last remaining populations of vertebrates. However, the overriding conclusion is that actual management is weak almost everywhere, in large part due to inadequate resources. Other challenges, that vary in severity from country to country, include pressures from rural communities for land or other resources, corruption and poaching by armed gangs.

7. The available evidence suggests that while trophy hunting makes an important (albeit controversial) contribution to the *de facto* protected area estate in some countries, such as Cameroon and Central African Republic, its overall potential to contribute to wildlife conservation in the region is limited. There is very limited, if any, immediate potential for large-scale expansion in West Africa. Similarly, there may be unrealistic expectations placed on nature-based tourism to provide incentives for conservation, especially since only a handful of countries have the wildlife populations and political stability to support it. Without a considerable turn-around in infrastructure, security and wildlife-viewing opportunities, ecotourism is likely to remain highly under-developed compared with elsewhere on the Continent. Finally, despite considerable effort and investment, fully devolved Community-based Natural Resource Management initiatives to manage wildlife resources are scarce and the potential remains largely unrealized in West and Central Africa.

8. Despite considerable pressures, tremendous complexity, and regional instability, there is an excellent track record of civil society organizations supporting, and assuming a mandate for, wildlife conservation interests in the region. Most large, inter-governmental organizations have a regional head-office or a substantial presence in the region, and there are several large, and well-funded, regional initiatives in second or subsequent phases, including the USAID-funded Central Africa Regional Program for the Environment. NGOs are very active, and most of the larger, international NGOs have a significant (and sustained) presence in one or more countries. Such investments have made considerable contributions to supporting protected area infrastructure and helping to establish new protected areas. Nonetheless, limited evidence suggests that NGO investment (particularly in West Africa) lags behind East and Southern Africa. This pattern also seems to be reflected in international biodiversity aid spending; West and Central Africa, for example, receive proportionally less funding from the Global Environment Facility than Southern and East Africa (perhaps due to poor performance in project implementation).

9. This Situation Analysis was undertaken to inform responses to several resolutions made at the 5th World Conservation Congress in 2012 about the plight of large vertebrates in West and Central Africa. It draws on a wide range of information to provide information on the status of these species, important sites, pressures, legislation, the effectiveness of protected areas, and both community-based incentives for conservation and institutional responses. The overriding conclusion is of substantial wildlife declines and inadequate responses to either long-standing pressures or rapidly escalating threats that have emerged in recent years. Species extinctions have been recorded nationally and, in extreme cases, from the region as a whole and more are predicted to follow at all levels. There are many reasons why responses have been inadequate and addressing the scale of civil unrest, poverty and natural resources extraction, to name but three pressures, will require substantial and consolidated efforts. One issue that should be addressed as a matter of urgency is the inconsistency and mismatches between datasets that are seen as global standards, including those on protected areas, sites identified through global processes and the species they contain, and national legislation. Harmonizing these datasets would allow scarce resources to be targeted with much greater efficiency.

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This report is a synthesis of a tremendous amount of work done by many dedicated conservation professionals working in-region often under trying circumstances. It is dedicated to all those who have given their lives fighting for the wildlife of West and Central Africa.

Acronyms and abbreviations

(Note that this Situation Analysis uses ISO3166-1 three-letter country codes except in the case of Central African Republic, Democratic Republic of Congo and Republic of Congo, where abbreviations are used as shown below).

ACP	Africa, Caribbean and the Pacific
BIOPAMA	Biodiversity and Protected Areas Management Programme (www.biopama.org)
CAR	Central African Republic
CARPE	Central African Regional Programme for the Environment (http://carpe.umd.edu)
CBD	Convention on Biological Diversity (www.cbd.int)
CBFP	Congo Basin Forest Partnership (http://pfbc-cbfp.org/home.html)
CBNRM	Community-based Natural Resource Management
CEM	Commission on Ecosystem Management
CEPF	Critical Ecosystem Partnership Fund (www.cepf.net)
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora (www.cites.org)
CMS	Convention on the Conservation of Migratory Species of Wild Animals (www.cms.int)
COMIFAC	Central African Forests Commission (www.comifac.org)
COP	Conference of the Parties
CPI	Corruption Perception Index (http://cpi.transparency.org/)
DRC	Democratic Republic of Congo
EBA	Endemic Bird Area
ECOFAC	Programme de Conservation et Utilisation des Ecosystèmes Forestières en Afrique Centrale
ECOWAS	Economic Community of West African States (www.ecowas.int)
ESA	US Endangered Species Act (www.usaid.gov)
EU	European Union (www.europa.eu)
FAO	Food and Agriculture Organization (www.fao.org)
GEF	Global Environment Facility (www.thegef.org)
IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services (www.ipbes.net)
IUCN	International Union for Conservation of Nature (www.iucn.org)
LDC	Least Developed Country
OFAC	Observatoire des Forêts d'Afrique Centrale (www.observatoire-comifac.net)
PACO	le Programme pour l'Afrique Centrale et Occidentale (IUCN)
PAPACO	PAPACO – IUCN Program on African Protected Areas and Conservation (http://papaco.org/)
POWPA	Programme of Work on Protected Areas (www.cbd.int/protected)
RAPAC	Réseau des Aires Protégées d'Afrique Centrale (www.rapac.org)
RAPPAM	Rapid Assessment and Prioritization of Protected Areas Management
ROC	Republic of Congo
SSC	Species Survival Commission
UNEP	United Nations Environment Programme (www.unep.org)
UNESCO	United Nations Educational, Scientific and Cultural Organization (www.unesco.org)
USAID	United States Agency for International Development (www.usaid.gov)
USFWS	United States Fish and Wildlife Service (www.fws.gov)
WAZA	World Association of Zoos and Aquariums (www.waza.org)
WCC	World Conservation Congress
WDPA	World Database on Protected Areas (www.protectedplanet.net)

1. Introduction

1.1 Background

1.1.1 Rationale

All Parties to the Convention on Biological Diversity (CBD), including the European Union (EU), recognize the prevention of the extinction of known threatened species as a key target (Aichi Target 12). At the last IUCN World Conservation Congress (WCC5) held in Jeju, Republic of Korea, in September 2012, IUCN called on all funding agencies, including the public and private sectors and civil society, to give increased support to prevent extinctions and to continue recognizing the importance of long-term funding and investment for species conservation. This call came in a context of dramatic wildlife declines across Africa, and particularly in West and Central Africa, which prompted several motions by leading conservation and research institutions to be tabled and adopted at WCC5.

The key resolution (WCC-2012-Res-022[2]) calls for support for regional initiatives to conserve mammal diversity in West and Central Africa making specific mention of massive declines in a number of species including elephants, rhinos, primates, carnivores and ungulates. Resolution WCC-2012-022 specifically "requests the IUCN Director General, the IUCN Species Survival Commission (SSC) and the IUCN Commission on Ecosystem Management (CEM), to provide policy support to these new regional species initiatives and to bring them to the attention of range states and international donors, like the United Nations Environment Programme, the African Development Bank, the World Bank and the Global Environment Facility".

Related resolutions adopted at WCC5 were:

- support for national and regional initiatives for the conservation of large mammals in the Sahara (WCC-2012-Res-023);
- enhancing anti-poaching and wildlife resource protection efforts, using rhino and elephant as indicators (WCC-2012-Res-024);
- conservation of African elephants (WCC-2012-Res-025);
- protection of the Okapi Wildlife Reserve and communities of the Ituri Forest in the Democratic Republic of Congo (WCC-2012-Rec-157).

Despite numerous reports documenting serious declines in specific locations and specific countries or focusing on individual species across West and Central Africa, a holistic overview of the current situation for wildlife across the region is lacking. Such an overview is needed to: (i) allow the conservation community to tackle the problem at the regional policy level, (ii) provide key information to donors looking for concrete and efficient solutions to the crisis, and (iii) help a variety of donors to allocate funding according to well established priorities. These needs are fully in line with sector context of the ACP Secretariat and the European Commission in relation to biodiversity conservation which guides the goal and objectives of the BIOPAMA Programme.

1.1.2 Objectives

The objectives of the Situation Analysis were to: i) summarize currently available information on the medium- to large-bodied terrestrial and freshwater vertebrate fauna of West and Central Africa; ii) document the primary impacts and drivers of wildlife loss in the region; and iii) to briefly review existing conservation measures and effectiveness. As with other IUCN Situation Analyses (e.g. MacKinnon *et al*. 2012), this report intentionally is silent on recommendations; rather, it should serve as an evidence base for those stakeholders empowered to make or influence decisions and policies in the region to aid in "*halting and reversing the declining trends of mammals, and biodiversity in general, in the region*" (WCC-2012-Res.022).

The study is set in the context of existing international commitments of countries, especially under the CBD (Aichi Biodiversity Targets), other Conventions such as the Convention on Migratory Species (CMS), in particular its agreements covering the region, the Convention on International Trade in Endangered Species (CITES), Ramsar, UNESCO World Heritage Convention, and other relevant organizations. It will also contribute to the design and content of the Reference Information System that will be developed by the European Commission's Joint Research Centre (EC-JRC) in the context of BIOPAMA, and it is hoped to the objectives and activities of regional initiatives, such as the Réseau des Aires Protégées d'Afrique Centrale (RAPAC).

1.1.3 Structure and preparation of the report

In addressing the objectives of the study, the report reviews the status and trends of medium-to large-sized vertebrates in the region on a species-by-species basis, providing details on a country-by-country basis for a handful of high-profile taxa (Chapter 2); details the nationally protected areas and internationally and independently identified sites in the region, especially those likely to have some value for conserving these species (Chapter 3); and provides a high-level review of the major threats to biodiversity across the region (Chapter 4). The chapters are designed and intended to be complementary: for example, while Chapter 4 provides a high-level overview of threats and pressures across the region, Chapter 2 sometimes provides more details on species-specific threats. The study also provides detailed reviews of implementation and effectiveness of at least two major responses to wildlife declines: legislation (Chapter 5) and protected areas (Chapter 6). The final two chapters are

[2] http://portals.iucn.org/docs/iucnpolicy/2012-resolutions/en/WCC-2012-Res-022-EN%20Supporting%20regional%20initiatives%20to%20conserve%20mammal%20diversity%20in%20West%20and%20Central%20Africa.pdf

more general in nature: Chapter 7 investigates the potential role of incentive-based activities for conserving wildlife, and Chapter 8 summarizes responses in place by the many institutions working or investing in the region.

There is an enormous volume of information, published and unpublished, available on the extensive region covered by this Situation Analysis. Summarizing and synthesizing this information presents tremendous problems of clarity and manageability, and the results have therefore been split into two documents: a main report (this document) and Supplementary Material containing additional background material, tables and figures. Even then, it has been necessary to make difficult decisions concerning what to include and leave out, while striving to present an authoritative and cohesive whole. There are evidently tremendous biases in information available, with detailed site-level population estimates published for some species, and only rudimentary anecdotal information for others. Wherever possible, reference is made to the most recent literature and data available (especially literature published within the last 15 years), but in many cases, reliable recent data are lacking necessitating reference to results published in the 1990s or even earlier. Unfortunately, some very recent information could not be incorporated into the final version of the report; for example, just as the report was being finalized, OFAC released *The Forests of the Congo Basin – State of the Forest 2013* report. There is also much conflicting information. Attaining a meaningful and defensible synthesis from all these data is challenging, and despite best efforts errors in interpretation or presentation of results likely remain.

The first draft of this report was prepared by a team of four consultants. An initial call for information was made by the IUCN Director General, with a specific request for information on: 1) published or unpublished census figures or long-term trends of globally threatened or Near Threatened vertebrates in the region, from protected areas or otherwise; 2) national / sub-national laws or legislation in place that regulate biodiversity, land-use planning, and / or environmental impact assessments, and any gaps in national / sub-national policy/law; 3) existing or planned external policies / guidelines / investments that currently / could positively or negatively affect wildlife populations (e.g., development or private banks); and 4) evidence of socio-economic consequences of wildlife declines at a national or sub-national level. A good deal of information was received, albeit overwhelmingly concentrated on the first of these items. Unfortunately, not all of it could necessarily be used or cited, given the limitations of space. The first draft of the report was circulated widely for consultation, with an open invitation for comments on interpretation of data and presentation of results, incorrect or missing information, and any suggestions for improvements. Subsequently, a revised draft was prepared taking account of all these comments.

As far as possible, all information presented in this report has been attributed to source, whether published or unpublished. Figures, in particular, represent a mix of both previously published, and newly created for the purposes of this report. In the case of figures previously published, the original source is provided; in the case of figures newly created, the source/s of the data used or analysed are provided.

1.2 Regional context

1.2.1 The project region

West and Central Africa was defined on the basis of East (1988–1990) and other IUCN publications and here comprises 22 countries. West Africa is taken to include: Benin, Burkina Faso, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo. Central Africa is taken to include: Cameroon, Central African Republic (herein sometimes abbreviated to CAR), Chad, Democratic Republic of Congo (DRC), Equatorial Guinea (including Bioko Island), Gabon, and Republic of Congo (ROC) (Figure 1.1). The project region excludes Annobón Island (Equatorial Guinea), São Tomé & Principé, and Cape Verde, which although politically part of West and Central Africa, do not share the mainland fauna. The project region also covers *de facto* the Cabinda Province, an enclave of Angola which is situated on the Atlantic coast between Republic of Congo and Democratic Republic of Congo, but Angola as a whole is not included. The eastern edge of the region was drawn along the Albertine (Western) Rift, so the Situation Analysis also omits Burundi, although this country is covered by IUCN's regional programme for West and Central Africa.

The region thus defined conforms broadly to conventional definitions of West and Central Africa; e.g. the United Nations regional categorization of 'Western' and 'Middle Africa' includes all the countries listed above, including the oceanic island states, but with the addition of Angola.

1.2.2 Physical geography

The region extends from 27°N (at the northern point of Mauritania) to about 13°30'S on the southern border of Democratic Republic of Congo, and from 17°W on the Atlantic coast to 30°30'E. The region covers 11,503,900 km^2, 39% of the area of mainland Africa (Table 1.1).

Most of West and Central Africa lies below 500 m in elevation (Figure 1.2). The highest point is Margherita Peak (5,109 m) in the Rwenzori Mountains on the eastern border of Democratic Republic of Congo. The Rwenzori contain several other peaks over 4,500 m as well as permanent snowfields and glaciers, but these have lost >80% of their surface area since 1990 and are continuing to shrink (Russell *et al.* 2009, UNEP 2013). A series of other mountains run along the eastern edge of the region, part of the Albertine Rift. These include the Virunga range (a chain of volcanoes, some still active with Karisimbi the highest point at 4,507 m), Mt Kahuzi (3,317 m) and Mt Biéga (2,790 m). Another line of mountains, mainly old volcanoes, runs along the Cameroon-Nigeria border extending into the Gulf of Guinea as a chain of islands. The highest summit is Mount Cameroon (4,095 m) and Pico Basile on Bioko Island is 3,011 m. The Tibesti

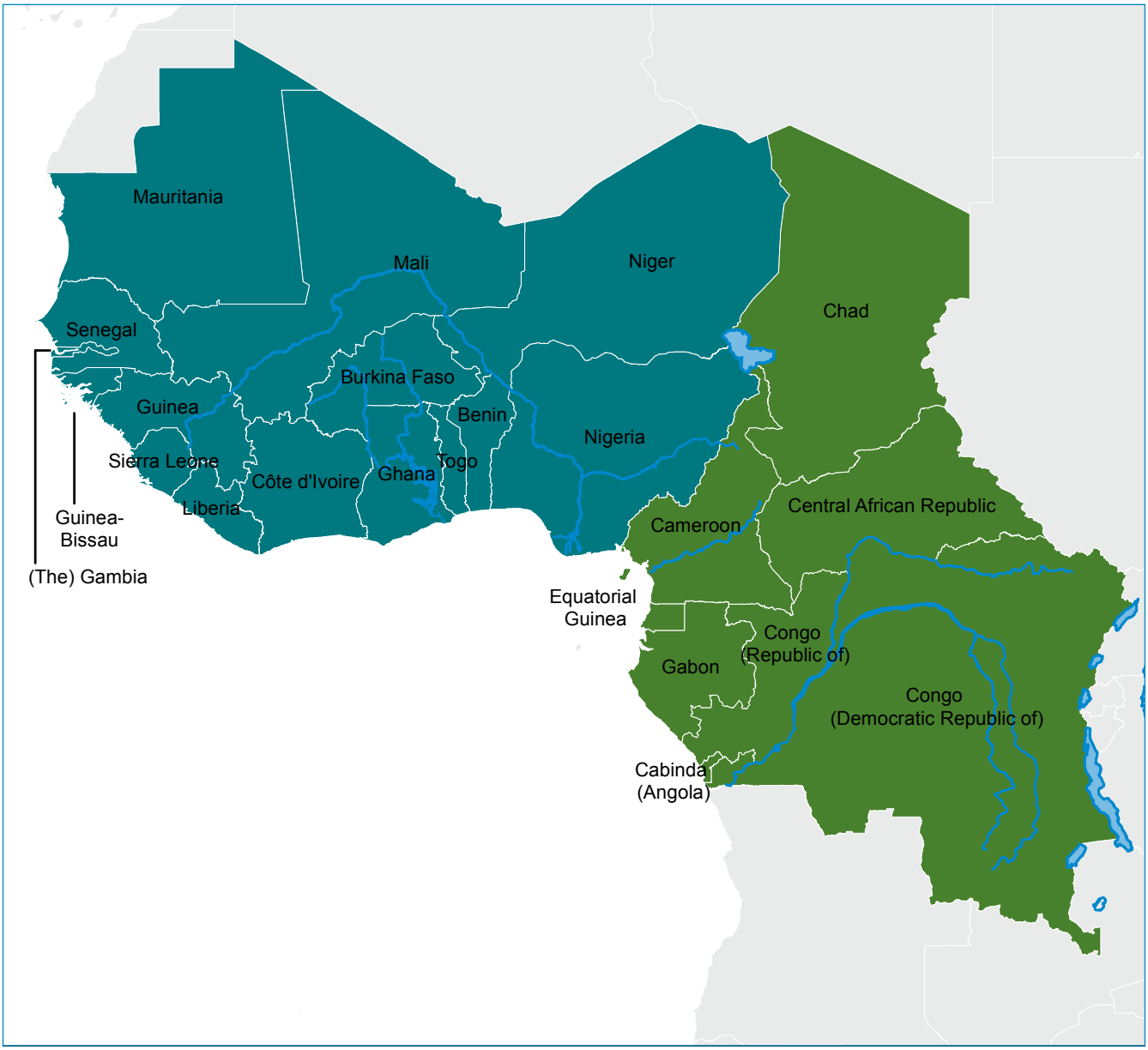


Figure 1.1 Political map of West (dark green) and Central (light green) Africa. Country allocations to region as above.

Mountains in northern Chad reach 3,445 m. Mountains in West Africa and the Cristal Mountains in Gabon-Equatorial Guinea are all below 2,000 m. The Katanga Plateau in south-east Democratic Republic of Congo rises to 1,800 m.

The River Congo is the second largest river in the world in the amount of water it carries, and its basin occupies a large part of the region's area. The River Niger and its main tributary the Benoué is the largest river system in West Africa; the Senegal, Gambia and Volta rivers are also major systems. There is a chain of narrow lakes along the Albertine Rift (Lakes Albert, Edward, Kivu, and Tanganyika). The largest natural lake in the region is Lake Chad, although it has undergone a spectacular drying out in the last 50 years (see Chapter 4). Apart from Lake Tumba in the middle of the Congo Basin and Lake Upemba in the upper Lualaba valley there are few sizeable natural lakes. Lake Volta in Ghana is the largest reservoir in Africa.

1.2.3 Climate

Climatic conditions vary widely across the region, as to be expected from a region that spans hyperarid desert in the north to the equator in the south. Rainfall ranges from 0 to 10,000 mm a year and seasonality increases south to north away from the equator. Climatic shifts during the Pleistocene and the last ice age led to alternating contraction and expansion of forest and arid zones and the creation of refugia that have heavily influenced the evolution and distribution patterns of fauna and flora (Kingdon 1990).

1.2.4 Biogeography

Most descriptions of natural zones in Africa draw heavily on the system of biomes described by Udvardy (1975) and the systematic description of the vegetation of the continent by White (1983). Two recent works of direct relevance to the

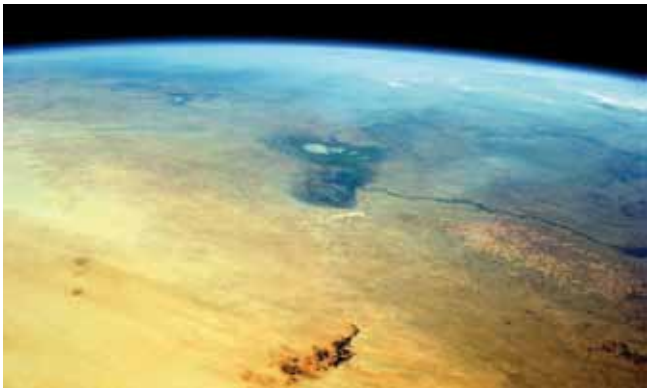
Table 1.1 Countries in West and Central Africa showing area, human population and density (source, human population data: United Nations 2013).

Country	Area (km²)	Human population (2012, except Cabinda)	Density (human population/km²)
West Africa			
Benin	113,000	10,323,000	91.35
Burkina Faso	274,000	16,935,000	61.80
Côte d'Ivoire	322,000	20,316,000	63.10
The Gambia	11,300	1,849,000	163.62
Ghana	239,000	25,905,000	108.39
Guinea	246,000	11,745,000	47.74
Guinea-Bissau	36,000	1,704,000	47.33
Liberia	111,000	4,294,000	38.68
Mali	1,240,000	15,302,000	12.34
Mauritania	1,030,000	3,890,000	3.77
Niger	1,267,000	17,831,000	14.07
Nigeria	924,000	173,615,000	187.89
Senegal	197,000	14,133,000	71.74
Sierra Leone	71,700	6,092,000	84.96
Togo	56,800	6,817,000	120.01
Sub-total	6,138,800	330,751,000	53.87
Central Africa			
Angola (Cabinda)	7,270	260,000[1]	35.76
Cameroon	475,000	22,254,000	46.80
CAR	623,000	4,616,000	7.41
Chad	1,284,000	12,825,000	9.98
DRC	2,345,000	67,514,000	28.79
Equatorial Guinea	28,100	757,000	26.93
Gabon	268,000	1,672,000	6.23
ROC	342,000	4,448,000	13.00
Sub-total	5,372,370	114,086,000	21.28
Total	**11,511,179**	**444,837,000[2]**	**38.64**

[1] 2006 estimate
[2] excludes the older estimate for Cabinda

Situation Analysis are *Important Bird Areas in Africa* (Fishpool & Evans 2001) and *Mammals of Africa* (Happold *et al.* 2013). Both of these described broadly similar systems of biomes and biotic zones respectively. A simplified system of eight major biomes is usually recognized for West and Central Africa: Sahara, Sahel, Sudan-Guinea Savanna, Rainforest, Afromontane, and Zambezian Woodland, Rainforest-Savanna Mosaic and Mangroves. A detailed description of the eight major biomes listed above, including discussion on their biodiversity features, is provided in the Supplementary Material.

WWF ecoregions subdivide the Earth's major biomes into smaller units based on physical and biological features. Burgess *et al.* (2004) described 119 terrestrial ecoregions in Africa, 39 of which occur, wholly or partly, in West and Central Africa (Figure S1.1; Table S2.1). More recently, Sayre *et al.* (2013) produced a revised map of terrestrial ecosystems in Africa, while Linder *et al.* (2013) described statistically defined biogeographic regions for sub-Saharan Africa. Freshwater ecoregions were described separately by Thieme *et al.* (2005) and mapped by Abell *et al.* (2008). There are 37 freshwater ecoregions that lie wholly or partially in West and Central Africa (www.feow.org). Despite the name, these ecoregions



Aerial image (November 2013) of Lake Chad taken from over Niger, looking south. © Stuart Rankin

cover the whole land surface and are not restricted to rivers and lakes.

The region is dominated by the vast West and Central African rainforests, the second largest block of tropical moist forest in the world after the Amazon. The forest block is bounded to the north and south by rainforest-savanna mosaics and then by drier zones. In the north, bands of progressively drier vegetation transition northwards through deciduous woodland, savanna grassland, steppe and desert. To the south, Zambezian woodland occupies most of the Katanga Plateau in the south-east of Democratic Republic of Congo. The Sanaga River in Cameroon is often regarded as the main dividing line between the Congo and Guinean forests. It also divides the primate faunas of the two sub-regions (Oates 2011), but for reptiles the Cross River forms a clearer biogeographic boundary. Other rivers also form biogeographic barriers (e.g. the Niounourou in Côte d'Ivoire and the Congo River itself).

All habitats have been modified by human action to a greater or lesser extent, through the use of fire, wood-cutting, conversion to farmland and other factors. Studies in apparently pristine rainforests have often found ancient traces of cultivation and habitation, such as charcoal, pottery fragments and evidence of settlements (Adams 1994).

1.2.5 Biodiversity importance

The biodiversity importance of the region is well established. Eighty-four Centres of Plant Diversity and Endemism have been identified in Africa (WWF & IUCN 1994). Of these, 35 occur within West and Central Africa: 27 in the Guinea-Congo forests, four in the savanna zone, three in the Zambezian woodland zone of Katanga, Democratic Republic of Congo, and one in the Afromontane biome of Democratic Republic of Congo. Democratic Republic of Congo has also been identified as one of the world's 17 'megadiversity' countries (Mittermeier *et al.* 1997). These are defined based on endemism at species and higher taxonomic levels and one criterion for selection is that the country holds at least 5,000 endemic plant species.

Conservation International has developed two complementary methods of prioritising global biodiversity:

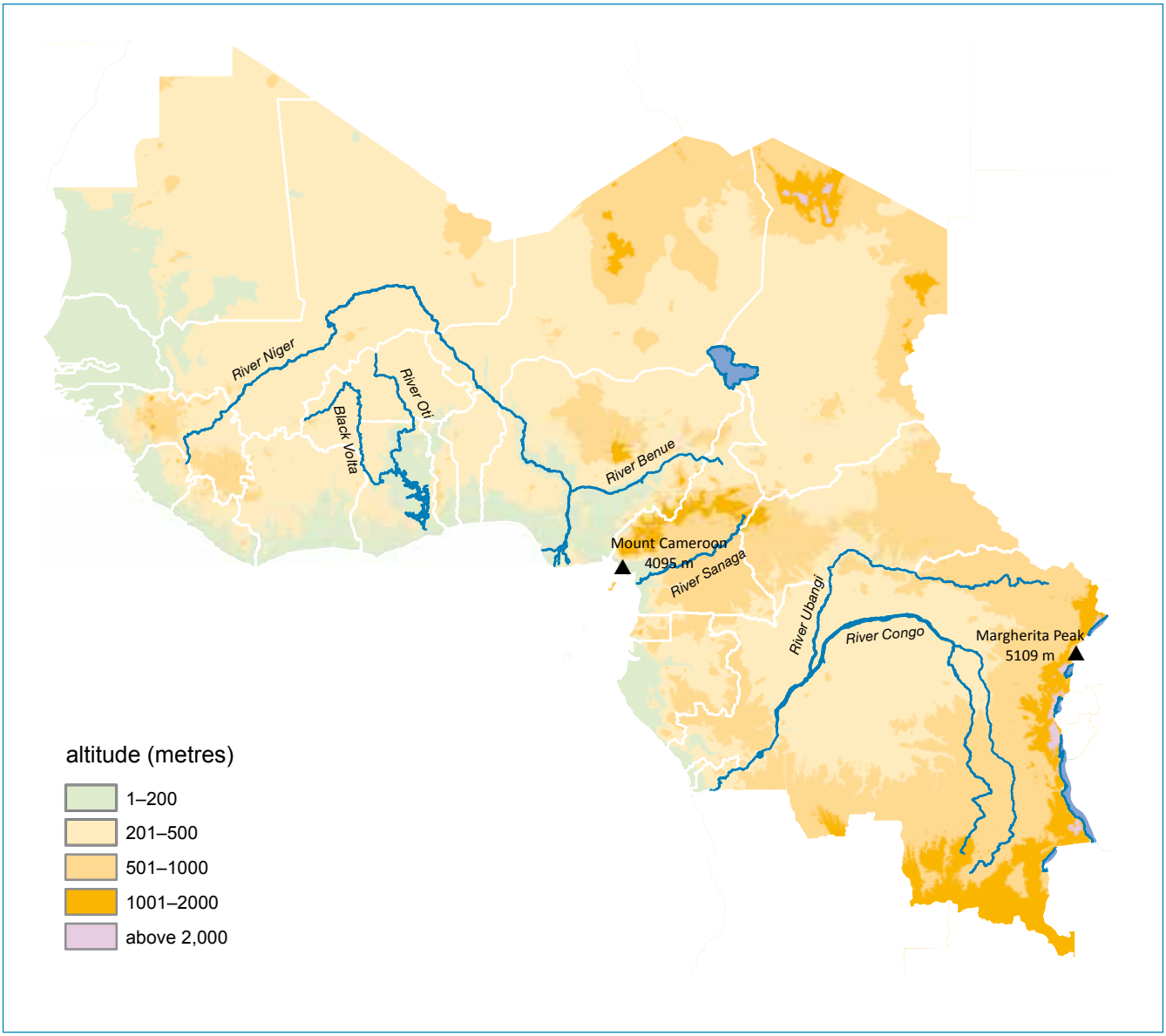


Figure 1.2 Physical map of West and Central Africa.

'high-biodiversity wilderness' areas (Mittermeier *et al.* 2002, 2003) and 'biodiversity hotspots' (Mittermeier *et al.* 2004). Both categorizations depend on defined levels of species endemism (a minimum of 1,500 species of endemic plants). Wilderness areas retain 70% or more of their original habitats intact, while hotspots have lost 70% or more. Two high-biodiversity wilderness areas, identified by Mittermeier *et al.* (2002, 2003), occur within West and Central Africa: (i) the Congo Forests, which cover all the forests of the Congo Basin, extending north to the Benoué ecosystem in the savanna zone of northern Cameroon; and (ii) the Miombo-Mopane Woodlands and Grasslands, which encompasses a large area of south-central Africa including the Katanga Plateau of south-east Democratic Republic of Congo. Similarly, the 34 global hotspots include one wholly and one partially within the region: the Guinean Forests of West Africa, which lie west of the Sanaga River (Bakarr *et al.* 2004) and the Albertine Rift part of the Eastern Afromontane hotspot, along the eastern border of Democratic Republic of Congo. The Albertine Rift harbours more endemic mammals, birds, and amphibians than any other region in Africa.

WWF has identified a 'Global 200' from among its terrestrial, freshwater and ecoregions (Olson & Dinerstein 2002). These harbour exceptional levels of biodiversity and are representative of all the planet's ecosystems. The Global 200 comprises 238 ecoregions (142 terrestrial, 53 freshwater, and 43 marine; (http://worldwildlife.org/publications/global-200), of which 12 terrestrial and seven freshwater ecoregions occur in West and Central Africa. The region contains three Endemic Bird Areas (EBAs) as defined by BirdLife International and eight secondary EBAs (containing one restricted-range species; <50,000 km^2) (Stattersfield *et al.* 1998; Table S2.1).

1.2.6 Human and political geography

1.2.6.1 Population

The total human population in the 22 countries in 2012 was 444,837,000 (United Nations 2013; Table 1.1). Latest projections show that the regional population will increase by an estimated 1.4 times by 2025 and more than double by 2050 when it will reach just over 1 billion (United Nations 2013; Figure 1.3).

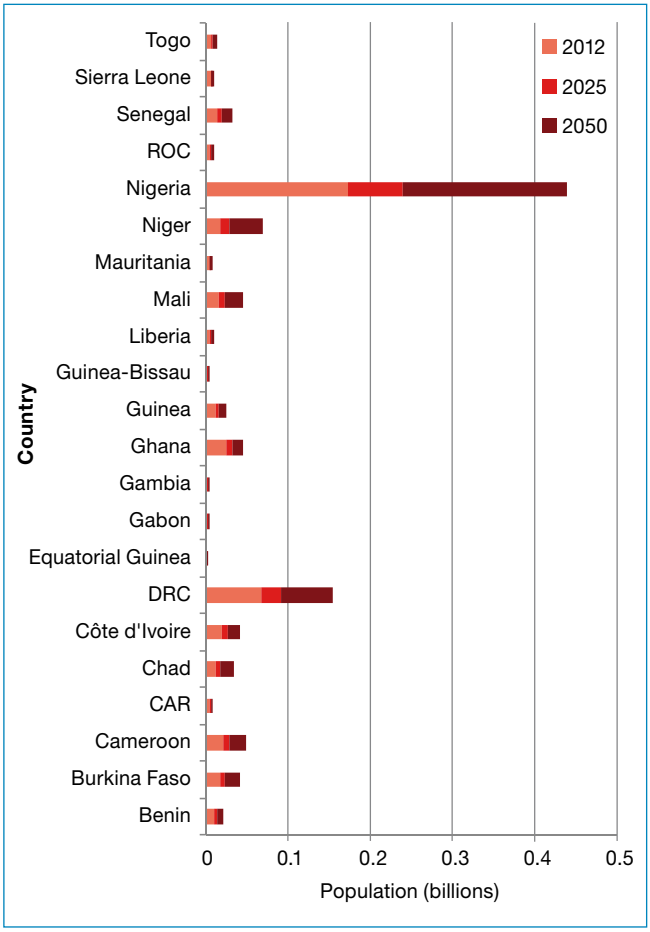


Figure 1.3 Current and projected population estimates (thousands) by country and year (source: United Nations 2013). Separate figures unavailable for Cabinda.

1.2.6.2 Political background

All countries in the region have recent colonial histories and gained their independence between 1957 and 1973. The only exception is Liberia, that was colonized in 1820 as an independent state by former slaves from the Americas. As a result of the colonial history, English, French, Portuguese and Spanish are widely spoken in countries of the region and/or form one of the official languages of most countries. Differences in legal codes and administrative structures also reflect this recent history. Colonial borders, sometimes drawn arbitrarily across ethnic lines, are widely held to have contributed to the political instability that has characterized the region for much of the last 40–50 years. Coups d'état have taken place frequently, while armed conflicts and insurrection have affected many of the countries occasionally driven by problems from outside. Between 1996 and 2001, 188 coup d'états (successful and unsuccessful) and 139 reported coup plots took place in the 48 countries of sub-Saharan Africa, with West Africa the predominant centre of coup activity (McGowan 2003, 2005). In addition to the obvious threat to human life and livelihoods and the hindering of national economic development, these factors also prevent enforcement of wildlife laws and the implementation of conservation action.

1.2.6.3 Economy

The Economic Community of West African States (ECOWAS) was founded in 1975 and comprises 15 countries, including all those in the project region up to Nigeria, except for Mauritania which left the organization in 2000. ECOWAS's mission is to promote economic integration in all fields including social and cultural matters. The ECOWAS Commission and the ECOWAS Bank for Investment and Development (EBID) are its two main institutions. ECOWAS has established a Water Resources Coordination Unit which may influence some biodiversity-related issues.

The West African Economic and Monetary Union (WAEMU) was founded in 1994 to promote economic integration among countries that share the CFA franc as a common currency. It consists of eight states: Benin, Burkina Faso, Côte d'Ivoire, Mali, Niger, Senegal, and Togo plus Guinea-Bissau, the only non-Francophone member. The exchange rate of the CFA franc is tied to the Euro and is guaranteed by the French government.

The West African Monetary Zone (WAMZ) formed in 2000 consists of Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone. Its aim is to establish a strong currency with the eventual goal of merging with the CFA franc. The new currency is being developed by the West African Monetary Institute based in Accra, Ghana.

The Economic Community of Central African States, (ECCAS) was established to promote regional economic co-operation in Central Africa. All the Central African countries covered by the project are members. The Economic and Monetary Community of Central Africa (CEMAC, from its French name: *Communauté Économique et Monétaire de l'Afrique Centrale*) was established by Cameroon, Central African Republic, Chad, Republic of Congo, Equatorial Guinea and Gabon to promote economic integration among countries that share Central African CFA franc.

West and Central Africa contain vast mineral resources, which provide significant actual and potential revenues for the region's countries. However, some countries in the region have often been cited as examples of the so-called 'resource curse' (Sachs & Warner 1995, 2001), a paradox that countries with an abundance of minerals and fuel tend to have lower economic growth and worse development outcomes than countries with fewer natural resources. Besides the extractives industry, timber, cocoa, cotton, rubber and, increasingly, palm oil, are important export products. Fishing, farming and livestock rearing (more prevalent in the north of the region) are important components of local economies

1.2.6.4 Development

The United Nations has identified 48 'least developed countries' (LDCs), 33 of which are in Africa (www.un.org/en/development/desa/policy/cdp/ldc/ldc_list.pdf). Seventeen of the 33 African LDCs (including Angola) lie in West and Central Africa (i.e. all countries except Cameroon, Côte d'Ivoire, Gabon, Ghana, Nigeria, Republic of Congo); thus, 16 out of 22 countries (73%) in West and Central Africa (not including Angola) are classed as LDCs (Table 1.2). West and

Central African countries also generally attain low scores over a range of economic and development indicators such as GDP per capita; percentage of the population living in poverty (defined by the UN as below US$1.25 a day); life expectancy at birth, and mortality under five years of age (Table 1.2). The Human Development Index (HDI) is a composite index that measures average achievement across three dimensions of human development: life expectancy at birth, mean and expected years of schooling, and Gross National Income per capita. On the HDI measure, 12 (52%) countries in West and Central Africa fall within the lowest 10% of 187 countries/territories and 18 (82%) are in the lowest 20% (http://hdr.undp.org/en/content/table-1-human-development-index-and-its-components).

1.2.6.5 Governance

Most countries in the region are presidential republics, with the exception of Democratic Republic of Congo, Senegal, Mali, Mauritania, Burkina Faso and Niger (semi-presidential). The political instability and violence referred to above represents a prime cause of weak or ineffective governance, while lack of effective rule of law, corruption, and lack of accountability and transparency are additional contributory factors. The Corruption Perception Index (CPI) is calculated by Transparency International from the perceived level of corruption in the public sector in each country; only four of the 22 countries are ranked in the top 50% of countries and territories (Table 1.3). TI has contributed to bringing about and bolstering anti-corruption initiatives, such as the OECD Anti-Bribery Convention, UN Convention against Corruption and UN Global Compact. At a local level, traditional governance systems and customary land use rights are important in West and Central Africa, but have frequently been ignored or overridden by formal governing structures (see Chapter 7).

Table 1.2 Economic and human development indicators for West and Central African countries (source: Human Development Index; www.hdr.undp.org). LDC's shown in bold (separate figures for Cabinda not available).

Country	HDI rank[1]	GDP 2011[2]	% in poverty[3]	Life expectancy[4]	Under-5 mortality[5]
Benin	165	1,428	47.3	56.5	115
Burkina Faso	181	1,149	44.6	55.9	176
Cameroon	152=	2,090	9.6	52.1	136
CAR	185	716	62.8	49.1	159
Chad	184	1,343	61.9	49.9	173
Côte d'Ivoire	171	1,649	23.8	56.0	123
DRC	186	329	87.7	48.7	170
Equatorial Guinea[6]	144	32,026	-	51.4	121
Gabon	112	13,998	4.8	63.1	74
Gambia	172	1,873	33.6	58.8	98
Ghana	138	1,652	28.6	64.6	74
Guinea	179	990	43.3	54.5	130
Guinea-Bissau	177	1,097	48.9	48.6	150
Liberia	175	506	83.8	57.3	103
Mali	176	964	50.4	51.9	178
Mauritania	161	2,255	23.4	58.9	111
Niger	187	642	43.6	55.1	143
Nigeria	152=	2,221	68.0	52.3	143
ROC	140	3,885	54.1	57.8	93
Senegal	163	1,737	33.5	59.6	75
Sierra Leone	183	769	53.4	48.1	174
Togo	166	914	38.7	57.5	103

[1] A composite index measuring achievement across three dimensions of human development in 187 countries/territories (2013 figures).
[2] Gross Domestic Product per capita in 2011 in US$ (at 2005 purchasing power parity). Very high = 32,931; High = 11,572; Medium = 5,203; Low = 1,621.
[3] Percentage of the population living below the international Poverty Line (US$1.25/day).
[4] At birth, data for 2012. Very high = 73.4; High = 64.8; Medium = 61.4; Low = 50.1.
[5] Data for 2010. Number of deaths <5 years of age per 1,000 births. Very high = 6; High = 18; Medium = 42; Low = 110.
[6] General Assembly resolution 68/L.20 adopted on 4 December 2013, decided that Equatorial Guinea will graduate three and a half years after the adoption of the resolution.

Table 1.3 Corruption Perception Index (CPI) 2013 (source: Transparency International).

Country	Rank (out of 177)	Score (max 100)	Country	Rank (out of 177)	Score (max 100)
Angola	153	23	Guinea	150=	24
Benin	94=	36	Guinea-Bissau	163=	19
Burkina Faso	83=	38	Liberia	83=	38
Cameroon	144=	25	Mali	127=	28
CAR	144=	25	Mauritania	119=	30
Chad	163=	19	Niger	166=	34
Côte d'Ivoire	136=	27	Nigeria	144=	25
DRC	154=	22	ROC	154=	22
Equatorial Guinea	163=	19	Senegal	77=	41
Gabon	106=	34	Sierra Leone	119=	30
Gambia	127=	28	Togo	123=	29
Ghana	63	46			

2. What are the status and trends of wildlife?

2.1 Introduction

Species are fundamental components of biodiversity (Mace 2004) and remain widely recognized and used, notwithstanding the variety of concepts proposed to identify them (e.g. Frankham *et al*. 2012). Ecosystems are defined in large part on the basis of their constituent species, and species units form the basis for the CITES Appendices, the Convention on Migratory Species, national legislation, and official lists of threatened taxa. Many species also represent an important economic resource providing animal protein and other forms of livelihood support such as through wildlife tourism. Iconic species are frequently employed in awareness and fundraising campaigns and – in a flagship role – as emblems for conservation at landscape or ecosystem scales. Many species also have great cultural, social and aesthetic value.

2.2 Methods

This Situation Analysis covers medium- to large-sized terrestrial and freshwater vertebrates occurring in West and Central Africa (as defined in Chapter 1), with an emphasis on species assessed in the higher categories of threat on the IUCN Red List. The IUCN Red List of Threatened Species™ is both the most authoritative and widely used tool in estimating extinction risk and the world's most comprehensive information source on the global conservation status of species. Species assessed are assigned to one of eight categories, with species assessed as 'Critically Endangered', 'Endangered', and 'Vulnerable' collectively referred to as 'Threatened'. Species in these three categories plus 'Near Threatened' are the focus of this study. However, a small number of species assessed as 'Least Concern' or 'Data Deficient' are also included. Only one species in West and Central Africa, the Scimitar-horned Oryx *Oryx dammah*, is categorized as Extinct in the Wild.

In many cases, the regional status of a species differs from its global status and in most cases is worse in West and Central Africa. Where regional assessments are available they are referred to in the individual species summaries. A few recent and provisional assessments that have not yet been formally published are indicated in the text. In addition, reference is also made to those cases where species are globally Least Concern, but a highly threatened subspecies occurs in the region.

All amphibians, birds, mammals, and freshwater fishes have been assessed comprehensively on the IUCN Red List. For reptiles, assessments are completed for West Africa, but ongoing in Central Africa. Taxonomy is dynamic as improved techniques of molecular genetic analysis produce new insights into evolutionary history and taxonomic relationships; consequently, the results and analysis presented here reflect current understanding of taxonomy as published on the 2014.1 IUCN Red List, unless otherwise indicated. IUCN Specialist Groups and Red List Authority coordinators were consulted wherever necessary on Red List updates and taxonomic issues – details are included in the sections that follow.

Rather than establish an arbitrary body-size cut-off for what constitutes a medium- to large-sized vertebrate, the primary criterion was those species where the primary threats are direct hunting, persecution or live-capture or other forms of exploitation leading to mortality or removal of the species from the wild.

Species summaries in the sections that follow are based on the Red List accounts and recent publications, including unpublished 'grey' literature and input received during the consultation stage. Only for a few species are up-to-date, robust and accurate overall population estimates available. Generally, the available information consists of site information and estimates dating from a range of time periods and collected using different methodologies; for most species, too, only parts of their range have been sampled. Attaining a meaningful synthesis from all these data is often challenging, and the absence of long-term monitoring programmes using standardized methodologies over extensive areas is evident.

2.3 Amphibians

2.3.1 Introduction

There are 437 amphibian species in West and Central Africa (as assessed on the IUCN Red List). Some species occur across the whole region, but there are clear differences between the amphibian faunas of West Africa and Central Africa, with the Cross River providing the main dividing line (Penner *et al.* 2011). The Cameroon Highlands contain many restricted-range endemic species and are one of the

The Goliath Frog Conraua goliath *(EN) is the largest frog species in the world, attaining as much as 3 kg in weight.* © Ignacio de la Riva

two areas of mainland Africa with the highest diversity of amphibians (Hansen *et al.* 2009, Penner *et al.* 2011). Sixteen species are Critically Endangered, 46 are Endangered, and 32 Vulnerable; a further 29 species are considered Near Threatened, with the remaining 216 species Least Concern and 98 Data Deficient (Figure S2.1). The number of species assessed in the three threatened categories on the Red List is thus 94 (21.5%), compared with about 25% of all amphibians in the Afrotropical region and more than 30% of all amphibian species on the IUCN Red List (Stuart *et al.* 2004, 2008). However, it should be noted that the increased intensity of harvesting in the region has not yet been factored in to many amphibian assessments, some of which may be expected to change as a result.

Almost all (89%) of the threatened amphibian species in West and Central Africa are endemic to the region and 60 out of 62 species in the two highest categories of threat are endemic (the exception being Albertine Rift species). Of these 62 species, 33 (53%) occur in the Cameroon Highlands, thus underlining the exceptionally high importance of that region for the conservation of amphibian diversity.

Habitat loss and degradation are ongoing, due to drainage, forest clearance and conversion to agriculture, among other factors and these are likely to present the principal threat to amphibians in West and Central Africa (Stuart *et al.* 2008). The many very restricted range endemics that occur in the region are particularly susceptible to these factors. The chytrid fungus *Batrachochytrium dendrobatidis,* which has devastated populations of amphibians worldwide, does not yet appear to have had a serious impact in the region: all 793 specimens from West Africa that were tested proved negative (Penner *et al.* 2013; and see Section 4.2.11). A potential future threat may come from invasive species: African Common Toad *Amietophrynus regularis,* a savanna species, was reported present in degraded forest habitats at two study sites in Republic of Congo, and was considered to be moving in to the area along new logging roads (Jackson *et al.* 2007).

Frogs and toads have always been used in the region for food, medicine and cultural purposes (see e.g. Pauwels *et al.* 2003, Gonwouo & Rödel 2008, Mohneke *et al.* 2011). However, in recent years, harvesting of amphibians has intensified markedly, particularly in West Africa (Mohneke *et al.* 2009, 2010, Onadeko *et al.* 2011). Some species are also exported for the international pet trade; e.g. 2.4 million African dwarf frogs *Hymenochirus* spp. were officially imported into the USA in 1998–2002 (Mohneke *et al.* 2009). In the Albertine Rift region (including part of eastern Democratic Republic of Congo), 49 amphibian species were identified as important for use, but 92% of these were for the pet trade (Carr *et al.* 2013).

In many parts of West Africa, frogs are consumed locally and in some areas dried or smoked frogs are traded commercially in large volumes and sold in 'frog markets' (Mohneke *et al.* 2010). Research into patterns of amphibian utilization in Burkina Faso, Benin and Nigeria showed that use in Burkina Faso was principally local, but in northern Benin and Nigeria,

Table 2.1 Amphibian species recorded as being utilized in West and Central Africa[1] including IUCN Red List category, with listing on CITES Appendices (as of 14 September 2014), EU Wildlife Trade Regulation Annexes or the US Endangered Species Act.

Species	Common name	IUCN Red List	Other[2]	Uses
Afrixalus orophilus		VU		Pets
Amietophrynus maculatus		LC		Food
Amietophrynus regularis		LC		Food
Amietophrynus superciliaris	African Giant Toad	LC	CITES I EU B	Medicine, pets, food
Amietophrynus xeros		LC		Food
Conraua derooi	Togo Slippery Frog	CR		Food
Conraua goliath	Goliath Frog	EN	ESA-T	Food, pets
Hemisus marmoratus		LC		Food
Hildebrandtia ornata		LC		Food
Hoplobatrachus occipitalis	Crowned Bullfrog	LC		Food
Hylarana galamensis		LC		Food
Hyperolius nitidulus		LC		Food
Kassina fusca	Brown Running Frog	LC		Medicine
Leptopelis bufonides		LC		Medicine
Leptopelis notatus		LC		Food, medicine
Phrynobatrachus francisci		LC		Food
Phrynobatrachus natalensis		LC		Food
Ptychadena bibroni	Broad-banded Grass Frog	LC		Food, medicine
Ptychadena mascareniensis		LC		Food
Ptychadena oxyrhynchus		LC		Food, medicine
Ptychadena pumilio		LC		Food
Ptychadena schillukorum		LC		Food
Ptychadena tellini		LC		Food
Ptychadena tournieri		LC		Food
Ptychadena trinodis	Dakar Grass Frog	LC		Food, medicine
Pyxicephalus adspersus	African Bullfrog	LC		Food, pets
Pyxicephalus edulis	Crowned Bullfrog	LC		Food, pets
Tomopterna cryptotis		LC		Food
Trichobatrachus robustus	Common Hairy Frog	LC		Food,
Xenopus fraseri	Fraser's Clawed Frog	LC		Food, pets
Xenopus muelleri	Muller's Platanna	LC		Food
Xenopus ruwenzoriensis	Uganda Clawed Frog	DD		Food
Xenopus vestitus	Kivu Clawed Frog	LC		Food
Xenopus wittei	De Witte's Clawed Frog	LC		Food

[1] Sources: Pauwels *et al.* 2003, Gonwouo & Rödel 2008, Mohneke *et al.* 2011, IUCN Red List 2014, E. Morris *in litt.* 2014.

[2] EU Wildlife Trade Regulation Annex A or B; USFWS Endangered Species Act: E = endangered, T = threatened.

huge quantities of frogs were collected for sale in markets in southern Nigeria. In one sample, 32 frog collectors in south-west Nigeria were estimated to harvest a total of 2,738,610 frogs annually and at another site in Benin, 30 collectors obtained ca. 450,000 frogs in a two-month period. In one region of Nigeria, tadpoles were collected as well as adult frogs (Mohneke *et al.* 2009). Harvesting of tadpoles by damming small highland streams is relatively common in Cross River State, Nigeria, and Cameroon, and is assumed to have a major impact (A. Dunn *in litt*. 2014). If the harvest figures cited above are representative, it implies that the regional offtake of amphibians may be in the tens – or hundreds – of millions annually. Anecdotal reports of reduced availability of certain species have already been reported from some localities.

In the absence of targeted monitoring programmes, but also due in part to the cryptic nature of amphibian ecology, it is impossible to make an accurate estimate of species-specific population declines or assess the sustainability or otherwise of harvests. However, the high volume of uncontrolled harvest and ever-growing demand for bushmeat, combined with the effects of habitat loss and degradation, render it highly likely that many amphibian populations are under intense pressure and some species may soon meet the thresholds for a higher category of threat.

Larger species are the most sought-after, such as *Hoplobatrachus occipitalis* and *Conraua goliath* (the latter, however, having a limited range). Other species reported to be consumed frequently include *Xenopus fraseri, Xenopus muelleri, Pyxicephalus edulis, Ptycahdena* spp. and several others (Table 2.1).

2.3.2 Species summaries

Togo Slippery Frog *Conraua derooi* CR
Known only from the Togo-Volta Highlands of Togo and eastern Ghana, this species had not been seen since the 1960s and was regarded as possibly extinct (Rödel & Schiøtz 2004). The species was rediscovered during surveys in southern Ghana in 2005 and Togo in 2007 (Hillers *et al.* 2009). Most sites where it has been found to survive are surrounded by human settlements and thus vulnerable; the Atewa Mountains may represent the only viable location (Ofori-Boateng *et al.* 2012). It should be noted that the current IUCN Red List assessment dates from 2004, and as a result of a more recent calculation of the extent of occurrence, the Togo Slippery Frog may be reassessed as Endangered (E. Morris *in litt*. 2014). This species remains threatened by habitat destruction and modification and capture for food. Further field surveys and awareness work among local communities are under way, funded by the IUCN SOS Fund, Conservation Leadership Programme and others (Ofori-Boateng *et al.* 2012).

Goliath Frog *Conraua goliath* EN
This is the largest frog in the world, attaining 3 kg in weight. It is a rainforest species, distributed from the lower Sanaga River in south-west Cameroon south through Equatorial Guinea. It is harvested for food and regarded as a delicacy in some areas; in the Nkongsamba region of Cameroon, special traps have been developed to catch it. In addition it is exported for the pet trade and for 'frog racing', despite the fact that it travels poorly and does not thrive in captivity. Habitat loss and sedimentation of rivers are other likely threats (Amiet 2004). There are reports that the government of Equatorial Guinea imposed an annual export limit of 300 but there is no information on the level of international trade. There are no estimates of population size for either of the two range countries, but an overall decline of ≥50% over three generations (15 years) due to overharvesting has been estimated and forms the basis of the current Red List assessment (Amiet 2004). No targeted conservation programmes are in place, but populations in formal protected areas may receive incidental protection through less intensive levels of exploitation.

African Giant Toad *Amietophrynus superciliaris* LC CITES I
Has a disjunct distribution in the Upper Guinea Forest, Lower Guinea Forest, and eastern Democratic Republic of Congo and the forms in each of these locations may represent distinct taxa (Barej *et al.* 2011). In the past it was harvested for the pet trade and was included in Appendix I of CITES as a result. Low-level illegal trade may be continuing. The West African form is considered to be possibly threatened (Hillers & Rödel 2007), given that it is found exclusively in large, healthy forests, which are under heavy pressure. It is exploited for medicine in eastern Democratic Republic of Congo (Carr *et al.* 2013) and for medicine and even for food in West Africa (Mohneke *et al.* 2010).

2.4 Birds

2.4.1 Introduction

In total, 1,371 species of birds occur in West and Central Africa, including resident, breeding, migrant, wintering and vagrant species. The region contains three primary Endemic Bird Areas (EBA) as defined by BirdLife International and eight secondary EBAs (containing one restricted-range species; <50,000 km^2) (Stattersfield *et al.* 1998). There are also 331 Important Bird and Biodiversity Areas (IBAs), with the highest numbers in Ghana, Cameroon and Nigeria (Fishpool & Evans 2001). Over 90% of bird species in West and Central Africa are assessed on the IUCN Red List as Least Concern and 11 species (1%) are Data Deficient. Only 69 species, fractionally over 5%, are assessed in a threatened category, a smaller proportion than for mammals, reptiles and amphibians; three of these are Critically Endangered and 26 Endangered (Figure S2.2). Of the three Critically Endangered species, occurrence of Northern Bald Ibis *Geronticus eremita* is marginal – it no longer breeds in Mauritania and is Regionally Extinct in Senegal (BirdLife International 2014) and Sociable Lapwing *Vanellus gregarius* is a Palearctic vagrant to Mali (Borrow & Demey 2004). The third species, Liberian Greenbul *Phyllastrephus leucolepis,* was described from two forest patches 20 km north-west of Zwedru in Liberia in 1985 (Gatter 1997), but there have been no subsequent records. Recent searches in the Cavalla Forest, where the specimens were obtained

(Molubah & Garbo 2010, Phalan *et al.* 2013) have failed to find the species. Genetic research is under way to confirm the specific identity of *P. leucolepis* or establish whether it is in fact an aberrant form of Icterine Greenbul *P. icterinus* (BirdLife International 2014).

West Africa is of global importance for migratory and wintering waterbirds. Outstanding sites that harbour very high numbers of migratory and wintering waterfowl include Banc d'Arguin in Mauritania (2.75 million birds in winter), the Senegal River Delta (Mauritania / Senegal), the Inner Niger Delta in Mali, Lake Chad and Hadejia-Nguru wetlands in Chad and Nigeria, the Saloum Delta (Senegal) and Bijagós Archipelago (Guinea-Bissau) (see Chapter 3). There are thousands of smaller wetlands distributed across the Sahel that are of importance to birds and local people (Mullié *et al*. 1999). In Niger alone, ca. 1,000 isolated wetlands are estimated to hold 1.2 million waterbirds in January and February (Brouwer & Mullié 2001). In six coastal countries of West Africa, 46 Critical Sites for migratory waterbirds have been identified (BirdLife International 2013c); the 10 sites holding the highest numbers of birds are listed in Table S2.2 and the top 10 species of migratory waterfowl are in Table S2.3. Many passerines also winter or migrate through West and Central Africa, among them Aquatic Warbler *Acrocephalus paludicola*, whose global population virtually all winters in West Africa (BirdLife International 2013a). The impacts of wide scale changes in land use in the Sahel on migratory and wintering are discussed by Adams *et al*. (2014).

Severe declines of large birds (ostrich, cranes, raptors, bustards) have been recorded across the Sahara, Sahel and Sudan-Guinean savanna zones (Rondeau & Thiollay 2004, Thiollay 2001, 2006a,b,c), while a collapse of large raptor populations outside PAs in Burkina Faso was reported by Thiollay (2007).

One model for addressing the many information gaps in knowledge of the birds of West and Central Africa is provided by the West African Bird Data Base (www.wabdab.org), a rare example of an online public-access database in the region. The database is available in English and French and also contains information on species in local languages.

2.4.2 Species summaries

Vultures

Seven species of vultures occur across the Sahel and savanna zones of West and Central Africa, six of them threatened (Table 2.2). The one non-threatened species, Palm-nut Vulture *Gypohierax angolensis,* may also be declining, but this is mitigated in part by the spread of palm oil plantations that provide a food source, though not the large trees needed for nesting (BirdLife International (2014). All the other species have suffered significant declines across the region, directly from overexploitation for food and traditional medicine (meat, fat, brains, head, feet and feathers) and indirectly due to the severe depletion of wild ungulates, secondary poisoning from carburofan and other toxins inserted into animal carcasses to kill mammalian predators, and changes in methods of carcass disposal (Rondeau & Thiollay 2004, Thiollay 2001, 2006a, 2006b, 2006c, 2007, Ogada & Buij 2011). Vulture parts are used in traditional medicine in northern Nigeria and drive a regional trade from surrounding countries (Saidu & Buij 2013). Vulture declines across Africa were discussed at a Pan African Vulture Summit in 2012 (Botha *et al*. 2012). The importance of protected areas in the Sahel for two species of vultures, *Gyps rueppellii* and *Torgos tracheliotis*, was reported by Wacher *et al*. (2011).

Martial Eagle *Polematus bellicosus* VU

Widespread in drier zones throughout the region but sparse, though apparently declining, in West Africa (Thiollay 2006c).

Beaudouin's Snake-eagle *Circaetus beaudouini* VU

Occurs across the Sahel and Sudan-Guinea savanna zones from southern Mauritania to Uganda. The global population was estimated to be >10,000 (BirdLife International 2013a).

Table 2.2 Resident vulture species in the Sahel and savanna zones[1].

Species		IUCN Red List	Remarks on observed declines
White-backed Vulture	*Gyps africanus*	EN	>90% decline in West Africa; disappeared in Ghana except Mole NP; likely extinct in Nigeria (BirdLife International 2014)
Rüppell's Vulture	*G. rueppellii*	EN	Some colonies in Mali declined by 96% (BirdLife International 2013a); encounter rates in Burkina Faso, Mali and Niger declined by >95% between 1971–73 and 2003–2004 (Thiollay & Rondeau 2004)
Hooded Vulture	*Necrosyrtes monachus*	EN	Average decline of 62% (45–77%) in West Africa (Ogada & Buij 2011)
Egyptian Vulture	*Neophron percnopterus*	EN	West African populations appear to have suffered a significant decline (BirdLife International 2014)
Lappet-faced Vulture	*Torgos tracheliotis*	VU	In Burkina Faso, declined by ca. 97% outside PAs and ca. 39% inside PAs over 30 years (Thiollay & Rondeau 2004)
White-headed Vulture	*Trigonoceps occipitalis*	VU	Severe declines across West Africa; only four records in Niger since 1995, all in Gadabeji GR (BirdLife International 2014)
Palm-nut Vulture	*Gypohierax angolensis*	LC	

[1] Cape Vulture *Gyps coprotheres* is a vagrant to southern DRC.

Roadside counts between Senegal and Niger revealed a decline of 86–93% over 30–35 years (Thiollay 2006c) and it was believed to be declining across the region more than a decade ago (Demey & Borrow 2002).

Tawny Eagle *Aquila rapax* LC

Formerly common, but now rare outside protected areas (Thiollay 2006c).

Bateleur *Terathopius ecaudatus* NT

Widespread across the region but declining. Numbers in Nigeria have fallen by 50% in 30 years and it is now found only in protected areas; a decline was also documented in Côte d'Ivoire (BirdLife International 2014).

Pallid Harrier *Circus macrourus* NT CITES II CMS II

Winter visitor to semi-desert, scrub, savanna and wetland habitats in the Sahel and Sudan-Guinea savanna zones of West and Central Africa. It is undergoing a moderately rapid overall decline (BirdLife International 2014).

Lesser Flamingo *Phoeniconias minor* NT

Breeding in Mauritania at Aftout es Saheli, in the Senegal River Delta, was confirmed by Moreno-Opo *et al.* (2013).

Marbled Teal *Marmaronetta angustirostris* VU

Winters at Lake Chad, the Hadejia-Nguru wetlands in Nigeria the Inner Niger Delta, Mali, and the Senegal River Delta. Numbers and movements of this species in West Africa are poorly known.

Ferruginous Duck *Aythya nyroca* NT

Widespread and numerous across the Sahel zone in winter. Lac Fitri in Chad harbours up to 3,800 birds and important concentrations occur at other sites in West Africa.

Hartlaub's Duck *Pteronetta hartlaubii* LC

This species is a near endemic to West and Central Africa. Although assessed as Least Concern, it is considered to be in decline overall and is now rare in West Africa where fewer than 1,000 were believed to remain in 1996 (BirdLife International 2014). It is also poorly known, with few recent data available on current distribution and abundance.

Ostrich *Struthio camelus* LC

Globally assessed as Least Concern, but regarded as very rare in Central Africa (if it survives there) and Regionally Extinct in West Africa (BirdLife International 2014), although a small number possibly occur in Ferlo Nord Reserve, Senegal (T. Abaigar *in litt*. 2014). It was extirpated west of Chad (Thiollay 2006c). In Chad, no evidence of its presence was found on a 2011 survey of Ouadi Rimé-Oaudi Achim Game Reserve (Wacher *et al.* 2011). There is a captive breeding programme in Niger involving three sites, holding ca. 50 birds in total. One of them at Kelle is managed in cooperation with the Sahara Conservation Fund. In Central Africa, a small population survived at least until recently in Waza NP, northen Cameroon (Loth *et al*. 2003) and 241 censused in Zakouma NP, Chad in 2014 (Antonínová *et al*. 2014).

Grey Crowned-crane *Balearica regulorum* EN CITES II

Within West and Central Africa it occurs only in south-east Democratic Republic of Congo where there may be 5,000 birds (Beilfuss *et al.* 2007). It is rapidly declining throughout its range due to harvesting of birds and eggs and live capture for the pet trade and habitat degradation (Morrison 2009, BirdLife International 2013a). Listed in CITES Appendix II since 01/08/1975.

Black Crowned-crane *Balearica pavonina* VU CITES II

Distributed across the Sahel and Sudan-Guinea savanna zones as far as north-east Democratic Republic of Congo (and extending into Ethiopia and Kenya). There are two subspecies which have both declined rapidly due to drainage, habitat loss, capture and trade of live birds (Beilfuss *et al.* 2007) as well as use of body parts in traditional medicine (Williams *et al.* 2003). Thirty-eight 'Crane Sites' were identified by Williams *et al.* (2003) of which 27 lie within the project region from the lower Senegal River to north-east Central African Republic. Country population estimates for 2000/2001 are listed in Table S2.4. Global population size was estimated at 42,000, down from earlier estimates of 65,500–77,500 (Williams *et al.* 2003). Waza NP in Cameroon was one of the most important breeding sites with a population estimate of 7,000 in 2002 (Loth *et al*. 2003). There is a recent sighting of >5,000 in Chad (J. Brouwer *in litt*. 2014). Up to 860, representing 1.7% of the global population, have been recorded at Gâat Mahmoûdé in Mauritania (BirdLife International 2013a). Listed in CITES Appendix II since 01/08/1985. Following a CITES Significant Trade Review, trade from Guinea is currently suspended (K. Morrison, *in litt*. 2014). Between 2000 and 2010, over 500 wild-caught birds were exported, most of them from Sudan (UNEP-WCMC 2012).

Wattled Crane *Bugeranus carunculatus* VU CITES II

In the region, it only occurs in south-east Democratic Republic of Congo where the population was estimated at ca. 500 by Beilfuss *et al.* (2007). The global population is small and declining rapidly (BirdLife International 2014).

Shoebill *Balaeniceps rex* VU

In the region it occurs only in the swamps and wetlands of south-east Democratic Republic of Congo. The global population is small and declining due to hunting, disturbance and drainage. The population in Democratic Republic of Congo was estimated at <1,000 in 2002 (BirdLife International 2014). One bird was recorded on an aerial survey of Upemba NP (WCS 2009).

Bustards

Seven species occur in West and Central Africa (Table S2.5). African Houbara *Chlamydotis undulata* only occurs in northern Mauritania. Its numbers have been greatly reduced across its range, in large part through hunting by falconers. Large-scale reintroduction programmes in Algeria and Morocco funded by falconry interests in the Gulf are restoring populations and these may in time expand into Mauritania. Arabian Bustard *Ardeotis arabs*, Nubian Bustard *Neotis nuba* and Denham's Bustard *N. denhami* inhabit Saharan steppe, arid grasslands and open savanna woodland

Arabian Bustard Ardeotis arabs *(NT) in Niger, just south of Termit.* © John Newby/SCF

across the north of the region while Denham's also occurs in the savanna zone of south-east Democratic Republic of Congo. In the north, all bustard species are threatened by overhunting and believed to be in decline (BirdLife International 2014). Vehicle surveys in Mali in 2004 found no bustards at sites where they had been numerous in 1970s (Thiollay 2006c). Arabian Bustard was formerly common in the Lake Chad region of Nigeria, but is now believed to be extinct there and none were found on vehicle transects covering several hundred kilometres in Mauritania in 2012 (BirdLife International 2014). Ouadi Rimé-Ouadi Achim Game Reserve in Chad provides an important wet-season dispersal area for Denham's Bustard and Nubian Bustard was also observed there in 2011 (Wacher *et al.* 2011). Termit & Tin Toumma National Nature Reserve (TTNNR) hosts the biggest population of Arabian and Nubian Bustards in Niger. A few Arabian Bustards remain in Gadabedji Faunal Reserve and the periphery of the TTNNR. A few Nubian Bustards occur between Taguedoufat-Gadafawa and the Aïr & Ténéré National Nature Reserve. Both species are threatened by poaching in these areas; although there are anti-poaching patrols the reserve is huge and difficult to protect (Rabeil 2014, T. Rabeil *in litt*. 2014). Three further species are assessed as Least Concern: Savile's Bustard *Lophotis savilei* occurs across the north of the region, east to Sudan; and Black-bellied Bustard *Eupactis melanogaster* and White-bellied Bustard *Eupodotis senegalensis* are widely distributed in sub-Saharan Africa.

Congo Peafowl *Afropavo congensis* VU

Endemic to Democratic Republic of Congo and the only representative of the Family Phasianidae in Africa. The population is declining due to habitat loss, mining, occupation, civil war and is estimated at 3,500–15,000 (BirdLife International 2014). It is caught in snares and the eggs are collected. No current targeted conservation programmes are in place, but it probably benefits from reduced levels of snaring in some PAs. However, around 20 birds per year are caught around Salonga NP. Important sites are Maiko NP and probably Salonga NP. It also occurred in Kahuzi-Biéga NP and Okapi Wildlife Reserve 25 years ago (Hart and Upoki 1997) and may well still occur at both sites. Important numbers may be present in the Lomako Yokokala Faunal reserve (Dupain *et al*. 1996). Very poor knowledge of its ecology hinders conservation efforts for the species (Mulotwa *et al.* 2010).

Mount Cameroon Francolin *Pternistis camerunensis* EN

Has a very small range on the south-east and north-east slopes of Mt Cameroon with the population estimated at 600–1,700 mature individuals and declining due to burning and habitat degradation (BirdLife International 2014). It occurs in Mount Cameroon NP (582 km^2).

Nahan's Francolin *Ptilopachus nahani* EN

Has a very small and fragmented range in eastern Democratic Republic of Congo and western Uganda and is declining due to deforestation and habitat degradation. It is uncommon in Ituri Forest but there may be 45,000 in Democratic Republic of Congo overall (BirdLife International 2014).

Ring-necked Francolin *Scleoptila streptophora* NT

The main area of distribution lies outside the region, in Uganda, Tanzania, Rwanda, and Burundi. A small disjunct population is found in Cameroon, but there are no recent records or information on its current status there (BirdLife International 2014).

White-breasted Guineafowl *Agelastes meleagrides* EN

Endemic to the Upper Guinea Forest, but severely reduced and fragmented due to habitat destruction and hunting. The population estimate of 85,000–115,000 made by Gartshore *et al.* (1995) may still be accurate (BirdLife International (2014). Country estimates are: Liberia: >10,000 (Gatter 1997) and a 'healthy population' in Cavalla Forest (Phalan *et al.* 2013); Côte d'Ivoire (5,700–8,700 in Taï NP; Waltert *et al.* 2010).

Grey-necked Picathartes *Picathartes oreas* VU

It is distributed from Nigeria through southern Cameroon, Equatorial Guinea and Gabon to Republic of Congo and the extreme south of Central African Republic. The range is fragmented and most colonies number only 10–15 birds. The total population is estimated at <10,000 mature individuals and is declining (BirdLife International 2014). Country estimates were provided by Bian *et al.* (2006). Nigeria (Cross River State): ca. 1,000 and declining; Cameroon: <4,000 and declining; Gabon <1,000 and stable; Equatorial Guinea (mainland and SW Bioko) <500 and stable; Central African Republic: recorded in Dzanga-Ndoki Reserve; Republic of Congo: recently recorded in the north-west where there may be a few hundred in the Dzanga Trinational area (Cassidy *et al.* 2010). The species depends on caves and rock overhangs for nesting and in Cross River forests, hunters frequently use

White-necked Picathartes Picathartes gymnocephalus *(VU), an Upper Guinea rainforest endemic.* © Michael J. Andersen

these sites as camps resulting in a lowered nesting rate, and they also harvest eggs and fledglings (Atuo *et al*. 2014).

White-necked Picathartes *Picathartes gymnocephalus* VU CITES I

Endemic to the Upper Guinea Forest, where its range is now very fragmented. According to Thompson *et al.* (2004) it occurs in: Côte d'Ivoire (six sites); Ghana (seven sites); Guinea (six sites); Liberia (six sites) and Sierra Leone (18 sites). Thought to be extinct in Ghana, but rediscovered in 2003. At least 1,000 were estimated in Liberia (Gatter 1997) and 1,800 in Sierra Leone (Anon 2008). In Guinea, now only in Foutah and Simandou (S. Regnaut, *in litt*. 2014). The global population is estimated to be far less than 10,000 mature individuals and declining (BirdLife International 2014). Although primarily impacted by habitat loss (especially from commercial logging operations), some opportunistic egg collecting and trapping with noose traps and wire snares may occur (for zoos and pet trade).

African Grey Parrot *Psittacus erithacus* VU CITES II

Occurs in the moist forest zone of West and Central Africa, extending a short way into Angola, Burundi, Rwanda, Kenya and Uganda. It is also found in gardens and other habitats close to the forest. Assessed as Vulnerable on the IUCN Red List because of the high level of harvest for the international pet trade and the extent of habitat loss. The species has been listed in CITES Appendix II since 1981. In 2012, BirdLife recognized *P. timneh* (in the Upper Guinea Forest) and *P. erithacus* (in Lower Guinea and the Congo Basin) as separate species.

African Grey Parrots are very popular in captivity owing to their highly developed capability to mimic the human voice and other sounds and they are the third most internationally-traded, wild-harvested bird. Large numbers are exported and there is small regional pet trade, mainly in Nigeria. African Grey Parrots are also hunted locally for feathers, heads and meat for use in traditional medicine and ceremonies.

According to the CITES trade database, a total of 272,279 live African Grey Parrots were exported from 19 countries in West and Central Africa in 2003–2012 (Table 2.3). Several countries did not report any exports in several years and it is unclear if this reflects a lack of exports or a lack of reporting. Numbers recorded in legal international trade are considered to represent only a small proportion of the total extracted from the wild and there is a high volume of illegally traded birds. In addition, capture and pre-export mortality due to poor handling and husbandry reaches 30–66% of birds caught (Fotso 1998, McGowan 2001) and Waugh (2010) estimated that pre-trade mortality in captured birds in Cameroon may be as high as 90%. Overharvesting also results from poorly based quotas; ineffective management and regulation of trade, including exceeded quotas, and a widespread illegal, unreported trade due to weak enforcement. The total number taken from the wild may thus have exceeded 1 million birds (BirdLife International 2013b). Large numbers of African Grey Parrots are bred in captivity around the world and the World Parrot Trust has called on CITES to cease issuing quotas for wild-caught birds.

The 2006 CITES Review of Significant Trade showed that exports from 1994 to 2003 represented a harvest of potentially up to 21% of the wild population annually. In addition, between 1990 and 2000, forest loss has been estimated to be 31% and 26% in Côte d'Ivoire and Nigeria, respectively. Democratic Republic of Congo was the major exporter in the region 2003–2013 (117,855 birds). In 2013, CITES issued a Notification to the Parties (2013/051) requesting verification of all export permits of the species from Democratic Republic of Congo. Cameroon is also a major exporter and the legal trade in African Grey Parrots based on the current annual export quota is worth around US$3 million. This high value drives the illegal trade and the development of complex illegal networks of trappers, trades and exporters.

In Cameroon, many are caught in the main *bai* in Lobéké NP where African Grey Parrots congregate in large numbers to use salt or mineral licks. Lobéké forms part of the Sangha Trinational transboundary protected area, so it is likely that some of the birds caught there originate in adjoining areas of Central African Republic and Republic of Congo. A population status review and management plan for the species in Cameroon has been submitted to the CITES Standing Committee (Tamungang & Cheke 2012).

A regional workshop on 'Strengthening Capacity for Monitoring and Regulation of International Trade of African Grey Parrot' organized in conjunction with BirdLife International and CITES was held in September 2013 in Monrovia to develop an African Grey Parrot regional management plan for Cameroon, Côte d'Ivoire, Democratic Republic of Congo, Liberia and Sierra Leone. A workshop on African grey parrots in Cameroon was convened by WCS in early 2014.

Brown-cheeked Hornbill *Bycanistes cylindricus* VU

Endemic to the Upper Guinea Forest. It has been recorded in southern Guinea; Loma Mountains, Gola Rainforest and

Table 2.3 Legal exports of African Grey Parrots (genus *Psittacus*; live birds) from West and Central Africa between 2003 and 2012 (source: CITES trade database; www.cites.org).

Country	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
P. erithacus											
Benin	185	153	31	11	3	7	9	3	8	14	**424**
Burkina Faso	3	1		1	1		1				**7**
Cameroon	11,113	17,465	17,053	4,300	4,715	708	10	302	200	53	**55,919**
CAR	7	3	2,900	850	2,732	2,797	652	9	3		**9,953**
Chad	71	161		10	3	1					**246**
Côte d'Ivoire	4,789	3,911	2,607	1,401	3	10	8	6			**12,735**
DRC	15,326	19,028	15,986	10,787	4,976	8,578	12,158	9,904	8,221	1,2891	**117,855**
Equatorial Guinea	736	487	272	2							**1,497**
Gabon	45	60	54	10	10	10	19	37	22	5	**272**
Ghana	6	3	1	2	1	1	5	1			**20**
Guinea	552	2,335	2,735	3,595	210	1,010	1,250	1,440	720	220	**14,067**
Guinea-Bissau	2				2		2				**6**
Liberia		575	1,422					11			**2,008**
Mali					1	1	1	1	30	1,040	**1,074**
Nigeria	1	4	400				1	1			**407**
ROC	9,243	7,092	8,773	606	273	968	2,548	1,004	2,974	4,529	**38,010**
Senegal	203	206	132	10	4	1	1	4	2		**563**
Sierra Leone	1,900	1,750	1,100				2	2			**4,754**
Togo	7	11	4		26	13	13	10	3	1	**88**
P. timneh											
Benin	4	3	2								**9**
Côte d'Ivoire	2,643	2,640	2,151		3	6			5	2	**7,450**
Guinea	700	850	201	400	20	660	800	250	300	50	**4,231**
Liberia		450	30								**480**
Mali						100					**100**
Senegal	2	2	100								**104**
Total	**47,538**	**57,190**	**55,954**	**21,985**	**12,983**	**14,871**	**17,480**	**12,985**	**12,488**	**18,805**	**272,279**

Western Area Peninsula Forest National Parks, Sierra Leone; high forest throughout Liberia (Gatter 1997); southern Côte d'Ivoire, including Taï NP where it was reported to be abundant (Gartshore 1995); Ghana, where it is declining rapidly; and perhaps Togo where there is one unconfirmed record. It is declining due to hunting and habitat degradation (BirdLife International 2014). No population estimates are available.

Yellow-casqued Hornbill Ceratogymna elata VU

Widely distributed across West Africa to Cameroon, but declining due to hunting and habitat loss. It occurs in the following countries (population estimates where available from BirdLife International 2013a): Senegal – very small range; Mali; Guinea (ca.420); Guinea-Bissau; Sierra Leone (62); Liberia (2,385); Côte d'Ivoire (3,871); Ghana (817); Togo (a few records); Benin; Nigeria (c.1,625); Cameroon (2,790). The total population is estimated at 12,500 (BirdLife International 2014).

Southern Ground-hornbill *Bucanetes leadbeatteri* VU

Occurs only in south-eastern Democratic Republic of Congo within the project region. No recent information on population size or trend is available.

Bannerman's Turaco *Tauraco bannermanni* EN CITES II

Endemic to montane forest in the Bamenda Highlands of Cameroon. Numbers in its remaining stronghold, Kilum-Ijim forest, were estimated at 2,000–3,000 (Forboseh & Ikfuingei 2001). It is threatened by habitat loss (forest clearance) and is hunted for its feathers which are used for ceremonial purposes (BirdLife International 2014).

Itombwe Nightjar *Caprimulgus prigoginei* EN

Only known from one specimen obtained in the Itombwe Massif in 1955 but may be more widespread on the basis of calls heard in Republic of Congo, Gabon and Cameroon (BirdLife International 2014).

Congo Bay-owl *Phodilus prigoginei* EN

Known from two records on the Itombwe Massif, one specimen in 1951 and one caught in a mist-net in 1996; possible sightings and similar calls reported in Rwanda indicate that it may occur more widely (BirdLife International 2014).

2.5 Mammals

2.5.1 Introduction

The mammals of West and Central Africa include many iconic species such as Western and Eastern Gorillas, Chimpanzee, African Elephant, Common Hippopotamus, Giraffe, African Buffalo, Lion, Leopard, and Cheetah and several prominent species endemic to the region, such as Okapi, Pygmy Hippopotamus and Bonobo. There is great diversity of primates and forest antelopes, also including many endemic and near endemic species. There are 663 species of mammals in West and Central Africa as assessed on the IUCN Red List, not including one or two recently described species such as the Lesula *Cercopithecus lomamiensis* (Hart *et al*. 2012).

One species is Extinct in the Wild (Scimitar-horned Oryx *Oryx dammah*) and two species of rhinoceros are both Regionally Extinct: Western Black Rhino *Diceros bicornis longipes* was declared extinct in 2011, while there have been no reported live sightings of any Northern White Rhino *Ceratotherium simum cottoni* since 2006, or their signs since 2007, despite an intensive systematic ground search in 2008. In total, 93 species (14%) are threatened, 460 (69%) are Least Concern and 79 (11.9%) are Data Deficient (Figure S2.3). These figures take into account a few reassessments that have not yet been published on the IUCN Red List website. Thirteen species are Critically Endangered, nine of them endemic to West and Central Africa: besides the Regionally Extinct Western Black Rhino, these include two antelopes and four primates (described in further detail below) and five highly range-restricted small mammals (two shrews, two rodents, one bat). The last species, Mediterranean Monk Seal *Monachus monachus,* occurs only at the north-west edge of the project region but this site represents its most important extant breeding colony. Seventy per cent of the Endangered species in West and Central Africa are also restricted range endemic or near-endemic small mammals.

Using global assessments may understate the regional situation as is the case especially in West Africa, where the status of several widespread large mammals is worse than elsewhere (and in a very small handful of cases actually better). Some subspecies and regional populations that have been assessed separately on the IUCN Red List in West Africa are indicated in Table 2.4. In Central Africa, the Lelwel Hartebeest *Alcelaphus buselaphus lelwel* is Endangered while the nominate subspecies of Ogilbyi's Duiker *Cephalophus ogilbyi* is Vulnerable.

Mammals, especially large and medium-sized species, are highly valued for their meat and other products and in many parts of the region bushmeat provides a major source of protein for human consumption (see Section 4.2.3). Shooting and indiscriminate snaring are prevalent throughout the forest zone and accelerating harvest rates put increasing pressure on populations of primates and forest antelopes in particular. The availability of 4WD vehicles and semi-automatic weapons greatly increased the destructive power of hunting in open areas, whether for meat, trophies or sport,

Table 2.4 Regional and global Red List status of selected, non-primate, mammal species in West Africa.

Species	Global IUCN Red List	Regional Red List in West Africa	
Lycaon pictus	EN	West Africa sub-population	CR
Panthera leo	VU	West Africa sub-population	CR
Acinonyx jubatus	VU	*A. j. hecki*	CR
Giraffa camelopardalis	LC	*G. c. peralta*	CR
Tragelaphus derbianus	LC	*T. d. derbianus*	CR
Cephalophus ogilbyi	LC	*C. o. brookei*	VU
Redunca fulvorufula	LC	*R. f. adamauae*	EN
Kobus kob	LC	*K. k. kob*	VU
Oreotragus oreotragus	LC	*O. o. porteousi*	EN
Damaliscus lunatus	LC	*D. l. korrigum*	VU
Alcelaphus buselaphus	LC	*A. b. major*	NT

and this lethal combination has resulted in a catastrophic decline of large mammals across the Sahel and Sahara zones in the north of the region (Durant *et al.* 2011, 2013). All large species in the savanna zone have also undergone marked declines. The reduced prey base adversely impacts carnivore numbers. Primates, elephants and antelopes play an important role in seed dispersal and local extirpations or reduced populations have implications for forest regeneration, species composition and structure.

2.5.2 Species summaries

African Elephant *Loxodonta africana* VU CITES I (all regional populations) CMS II

Forest and savanna elephants have been described as taxonomically and functionally distinct (Rohland *et al.* 2010, Ishida *et al.* 2011). However, the IUCN SSC African Elephant Specialist Group (AfESG) continues to recognize one species, though acknowledging the different challenges for forest and savanna elephant conservation; some points from the "Statement on the Taxonomy of extant *Loxodonta*" (AfESG 2003) remain to be answered and there remains the practical problem of where to draw the geographical dividing line between the two potential species (Blanc 2008), although ongoing work is lending clarity to the issue. This is Africa's largest land mammal and an iconic species with an important ecosystem role in dispersing forest seeds and maintaining open areas of bush. Worryingly, in recent years, poaching has been increasing at catastrophic rates across the region, and Africa in general, and the threshold of sustainability may have been crossed.

Two CITES-mandated elephant programmes collate information on elephants, poaching and the illegal ivory trade. Monitoring the Illegal Killing of Elephants (MIKE) is managed by the CITES Secretariat, and collects information on trends in elephant poaching across African (and Asian) range states. The objective of MIKE is to establish a standardized monitoring system (currently in place at 60 sites in 31 African elephant range states) and to measure trends in the illegal killing of elephants. The Elephant Trade Information System (ETIS) is managed by TRAFFIC, on behalf of the CITES Parties, and serves as an information system to track illegal trade in ivory and other elephant products. Unlike MIKE, its aim is to record

Table 2.5 West and Central Africa regional and national population estimates[1] for African Elephant in 2012 (source: Elephant Database / IUCN SSC African Elephant Specialist Group; www.elephantdatabase.org).

Country	Definite	Probable	Possible	Speculative	Range Area (km²)	% of Regional Range	% of Range Assessed
West Africa							
Benin	916	48	188	0	13,672	8	53
Burkina Faso	4,477	320	320	200	19,874	11	71
Côte d'Ivoire	211	254	155	547	33,986	19	63
Ghana	857	344	138	58	23,715	14	42
Guinea	0	64	37	57	1,524	1	75
Guinea Bissau	0	0	7	13	1,346	1	100
Liberia	25	99	99	1,363	15,977	9	63
Mali	344	0	0	0	31,881	18	100
Niger	85	0	17	0	2,683	2	100
Nigeria	0	0	108	667	22,968	13	37
Senegal	1	0	0	9	1,090	1	100
Sierra Leone	0	0	80	135	1,804	1	59
Togo	4	0	61	0	5,032	3	74
Sub-total	7,107	942	938	3,049	175,552	100	65
Central Africa							
Cameroon	775	1,079	2,150	10,045	120,510	12	39
CAR	1,019	113	113	1,040	81,041	8	97
Chad	454	0	2,000	550	149,443	15	26
ROC	7,198	30,979	11,071	0	141,302	14	40
DRC	1,668	3,036	5,099	4,130	276,209	27	45
Equatorial Guinea	0	0	700	630	15,023	1	13
Gabon	4,996	30,511	12,103	29,642	221,706	22	94
Sub-total	16,446	65,104	26,310	46,037	1,005,234	100	55
Total	**23,553**	**66,046**	**27,248**	**49,086**	**1,180,786**	-	-

[1] 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.

and analyse levels and trends in illegal trade, rather than the illegal killing of elephants. The AfESG, together with Asian Elephant Specialist Group, maintains the African and Asian Elephant Database. Five comprehensive updates have been published for African Elephants in 1995, 1998, 2002, 2007 and provisionally in 2013–2014 (http://elephantdatabase.org). Over the last 4–5 years, IUCN has been working closely with CITES and TRAFFIC to provide integrated reporting on the status of elephants, poaching, and the illegal ivory trade.

Two publications summarize the situation globally, providing comprehensive and up to date information on elephant populations, levels of illegal killing and the illegal trade in ivory: these are *Elephants in the Dust* (UNEP, CITES, IUCN, TRAFFIC 2013) and a report produced for the African Elephant Summit held in Gaborone, Botswana, in November 2013 (CITES, African Elephant Specialist Group, TRAFFIC 2013). For West and Central Africa, two recent studies have been produced, one analysing the declines in savanna elephants (Bouché *et al*. 2011) and another modelling declines in forest elephants (Maisels *et al*. 2013a).

Levels of poaching and the illegal ivory trade began to increase in the mid-2000s, following an easing in the 1990s, then surged dramatically from around 2006–2008; there was also a shift in trade dynamics from small seizures to major shipments, indicating the involvement of commercial level poaching and organized crime. The trend in 2012 appeared to be levelling off compared to 2011, but remains unsustainably high (UNEP, CITES, IUCN, TRAFFIC 2013, CITES, African Elephant Specialist Group, TRAFFIC 2013).

The 2012 population estimates by country are provided in the 2013 Provisional African Elephant Status Report (www.elephantdatabase.org/preview_report/2013). Elephant population estimates in West and Central Africa for 2012 are <24,000 definite and 66,000 probable, less than 90,000 combined (Table 2.5). Central Africa holds 16% of the total African Elephant population and West Africa less than 2%. Two caveats are necessary. First, the Elephant Database includes figures from studies conducted at different time periods, some dating back several years and which may no longer be accurate. Second, a large number of reports and estimates have been submitted to the database and are awaiting review by the Data Review Working Group (http://www.elephantdatabase.org/population_submissions). In September 2014, these included 84 assessments from 16 countries in West and Central Africa,

some dating from as long ago as 2006. Moreover, while some of these assessments have been published, the majority have the data restricted by the provider. It is, therefore, quite problematic to provide fully accurate up-to-date estimates for each country, with a few exceptions (see below).

For forest elephants, modelling of the largest survey dataset ever assembled (80 foot surveys, covering 13,000 km and 91,600 person-days of fieldwork) indicated that 62% of the population and 30% of the range had been lost in the nine years 2002–2011 (Maisels *et al*. 2013a). An updated analysis including the data from 2012 and 2013 suggests that by the start of 2014 the decline was 65% since 2002 (S. Strindberg & F. Maisels *in litt*. 2014). The population is now less than 10% of its potential size and occupies less than 25% of its potential range. Of the remaining forest elephants, 95% are in Central Africa and 5% in West Africa. About 50% of the surviving elephants are in Gabon, and <20% in Democratic Republic of Congo, despite these countries covering 13% and 62% of the total forest area, respectively. In 2011, less than 2% of the Central African forest contained elephants at high density. Even for Gabon, in 2011 high density populations were found in only 14% of the forest (a decline of over 18% between 2002 and 2011). No high density areas remained in Democratic Republic of Congo. It is likely that ca. 95% of the forests in Democratic Republic of Congo are almost empty of elephants, a country historically thought to have held the highest numbers.

Based on these modelled figures, national population estimates that take into account the declines during 2002–2011 are: Cameroon, 7,000; Republic of Congo, 20,000; Central African Republic, 2,000; Democratic Republic of Congo, 19,000; and Gabon, 52,000 (Maisels *et al*. 2013a). Murai *et al*. (2013) estimated 800 in Equatorial Guinea.

For savanna elephants, Bouché *et al.* (2011) analysed ground and aerial counts over 40 years in the Sahel and Sudanian savanna zones, focusing on protected areas with known elephant populations. The results suggested at least a 50% fall in numbers in 40 years and these declines mainly predate the big surge in poaching that began in 2009. In most of the historic range in that region, elephants were no longer present; only 23 populations survive, half of them <200 individuals. In the savanna zone there are two main clusters: a western group concentrated in a radius of 425 km in Benin, Burkina Faso, Côte d'Ivoire, Ghana, Mali, and Niger and an eastern pool more or less within the Lake Chad Basin in Nigeria, Cameroon and Chad. They are separated by about 800 km (Bouché *et al*. 2011). There are isolated populations in protected areas such as Yankari Game Reserve (estimated 300–350) in Nigeria. Bouché *et al*. (2011) suggest climate change and the increasing frequency of droughts as a major threat to elephant populations in the Sudano-Sahelian region. Aerial surveys in Zakouma NP, Chad, in 2014 counted 443 elephants inside the national park, plus a few more in surrounding areas (Antonínová *et al*. 2014).

PIKE (Proportion of Illegally Killed Elephants) is an index that measures the proportion of illegally killed elephants to the total of carcasses found in MIKE sites. Levels in West Africa are high, with the 2012 score at 0.8 (meaning 80% of carcasses encountered are illegally killed), indicating a net decline in the African elephant population, at least at MIKE sites (Figure 2.1). Central Africa consistently shows the highest level of poaching since the MIKE programme began in 2006, with PIKE index scores of 0.9 recorded in 2011 (Figure 2.1; UNEP, CITES, IUCN, TRAFFIC 2013). The latest ETIS cluster analysis identifies Congo, Cameroon, Democratic Republic of Congo, Republic of Congo, Gabon and Nigeria as important states in the illegal ivory trade (see also Section 4.2.3), while Benin, Equatorial Guinea, Liberia, Senegal and Togo have never submitted any elephant product seizure information to ETIS (UNEP, CITES, IUCN, TRAFFIC 2013). Human-elephant conflict at the edges of protected areas in which elephants occur also continues to be a major problem in West Africa.

The original range of the African Elephant covered all countries in West and Central Africa, but it is now extinct in at least Gambia and Mauritania, where the last population in the Assaba Mountains disappeared in the 1980s (Figure 2.2). In West Africa the largest elephant population can be found in the transboundary WAPOK complex in Benin, Burkina Faso, Niger and Togo. Only three comparable surveys have been conducted there in the last five years and show no discernible change in numbers (CITES 2014).

Although the situation for elephants across West and Central Africa is undeniably poor, it is not universally negative. The Gourma elephant population in Mali is the most northerly in the world. These elephants range over a large area (c. 32,000 km^2) making a long circular migration and spending most of their time in dense thicket, which renders population census problematic (S. Canney *in litt*. 2014). Mark-recapture methodology was used in 2004–2006 to estimate population size, and this produced a 2006 estimate of 483–774 (Canney *et al*. 2007). Until 2012 no illegal killing had been reported, but from January 2012 to May 2014, eight elephants were killed, seven for ivory and one for meat (S. Canney *in litt*. 2014). The biggest threats to this population are uncontrolled use of natural resources and rising pressure on pasture, water and firewood. The Mali Elephant Project aims to protect key habitats along the whole migration route and is working with communities to create livelihood incentives for elephant conservation (http://www.wild.org/where-we-work/the-desert-elephants-of-mali/). Taï NP in Côte d'Ivoire has retained the largest West African Forest elephant population.

In Zakouma NP, Chad, introduction of stringent anti-poaching measures has resulted in a decline in elephant poaching, from 128 killed in 2008–7 in both 2011 and 2012 to zero in 2013 (Antonínová *et al*. 2014). Surveys in 2005, 2008, and 2012 in Odzala-Kokoua NP in Republic of Congo showed there had been no elephant decline 2005–2012 (Maisels *et al*. 2013b).

In 2010, the African Elephant Action Plan (AEAP) was adopted by a consensus of all African elephant range States. An African Elephant Fund was been put in place to help finance implementation of the AEAP and has given a

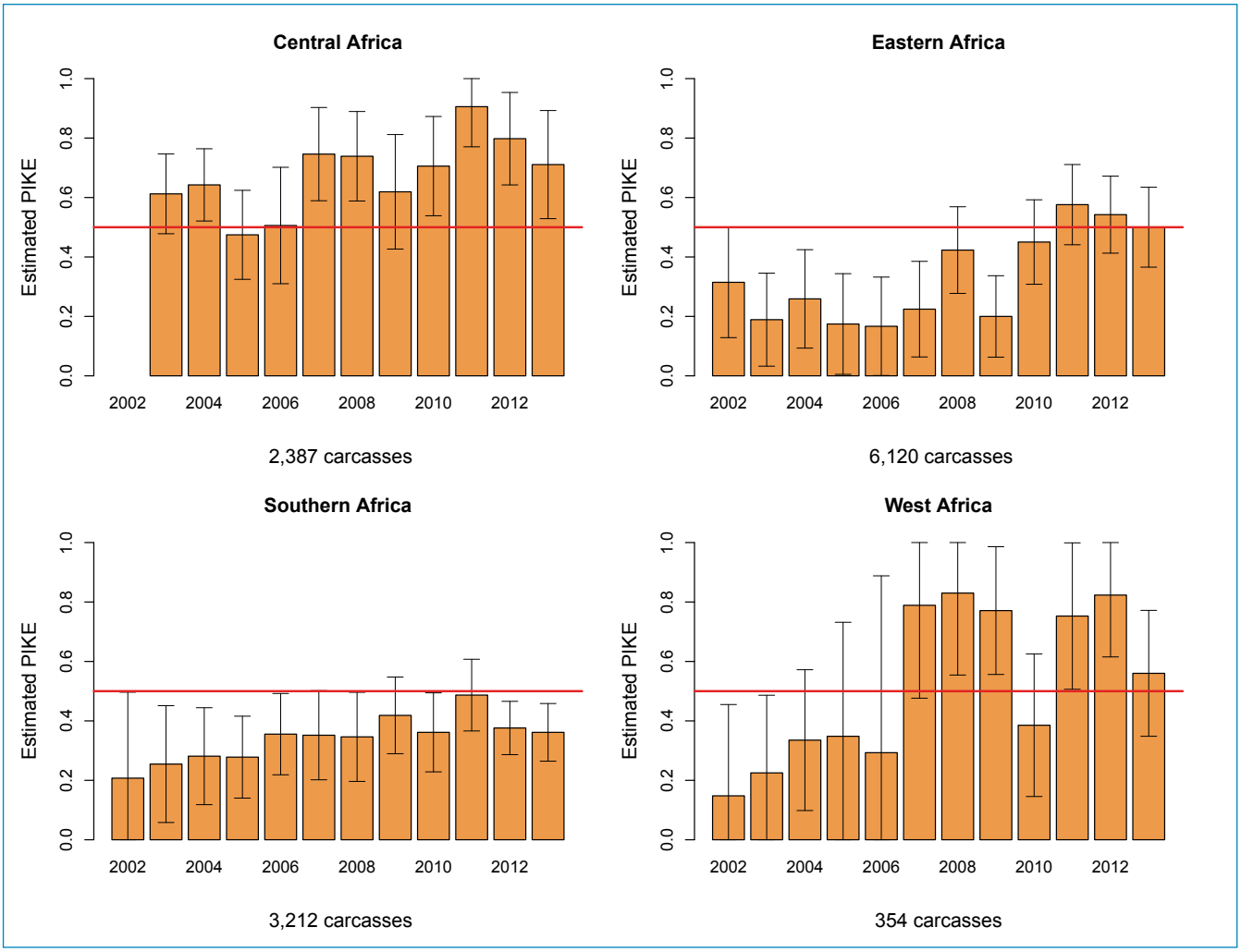


Figure 2.1 Proportion of illegally killed elephants at African MIKE sites in West and Central Africa compared with East and Southern, with 85% confidence intervals. The numbers of carcasses on which the graphs are based are shown at the bottom of each graph (source: CITES 2014).

number of grants through two funding rounds. A Strategy for the Conservation of Elephants in Central Africa (2005) has been formulated. The Strategy for the Conservation of West African Elephants, first published in 2003, and revised in 2005, formed the basis for the Convention on Migratory Species West African Elephant Memorandum of Understanding (2005). National action plans have been developed by Benin (2005); Burkina Faso (2003); Cameroon (2010); Côte d'Ivoire (2004); Ghana (2000); Guinea (2008); Guinea-Bissau (2000); Niger (2010); and Togo (2005). Mali and Senegal have plans under development.

Ivory poaching and trade are a major concern for CITES and a number of recommendations have been agreed at meetings of the CITES Standing Committee meeting (SC65) and the Conference of the Parties (COP 16). These include requirements for the main countries involved to demonstrate the actions they are taking to reduce pressures on elephants. (Summary details available at http://www.iisd.ca/vol21/enb2184e.html. An international summit meeting to discuss the elephant crisis took place in Gaborone, Botswana on 2–4 December 2013, and agreed 14 Urgent Measures. The summary record of the meeting is available from cmsdata.iucn.org/downloads/aes_final_summary_record_1.pdf

West African Manatee *Trichechus senegalensis* VU CITES I CMS I

Near-endemic to the region, distributed from southern Mauritania to Angola. Manatees occur in coastal waters, mangroves, estuaries, rivers and inland lakes. Some inland populations are isolated (e.g. Lake Volta, Ghana, and Inner Niger Delta, Mali). Numbers are declining overall. Manatees are hunted for meat, skin, oil (for medicine), and bones. They are caught in large mesh nets or special box traps, and killed by spearing; they also suffer incidental mortality in fishing nets. There is a CMS Action Plan (CMS 2006) and a Conservation strategy (Dodman *et al*. 2008). The country summaries that follow are based on Perrin (2001), the *West African Manatee Action Plan* (Dodman *et al.* 2008) and the IUCN Red List Assessment (Powell & Kouadio 2008). The species was transferred to CITES Appendix I from Appendix II at the 16th Conference of the Parties in March 2013 (COP16 Prop.13).

Primates

West and Central Africa is a critical region for global primate conservation: 64 species occur, 23 of them threatened. These include four of the world's six species of great apes (Hominidae); two of them are endemic to the region and

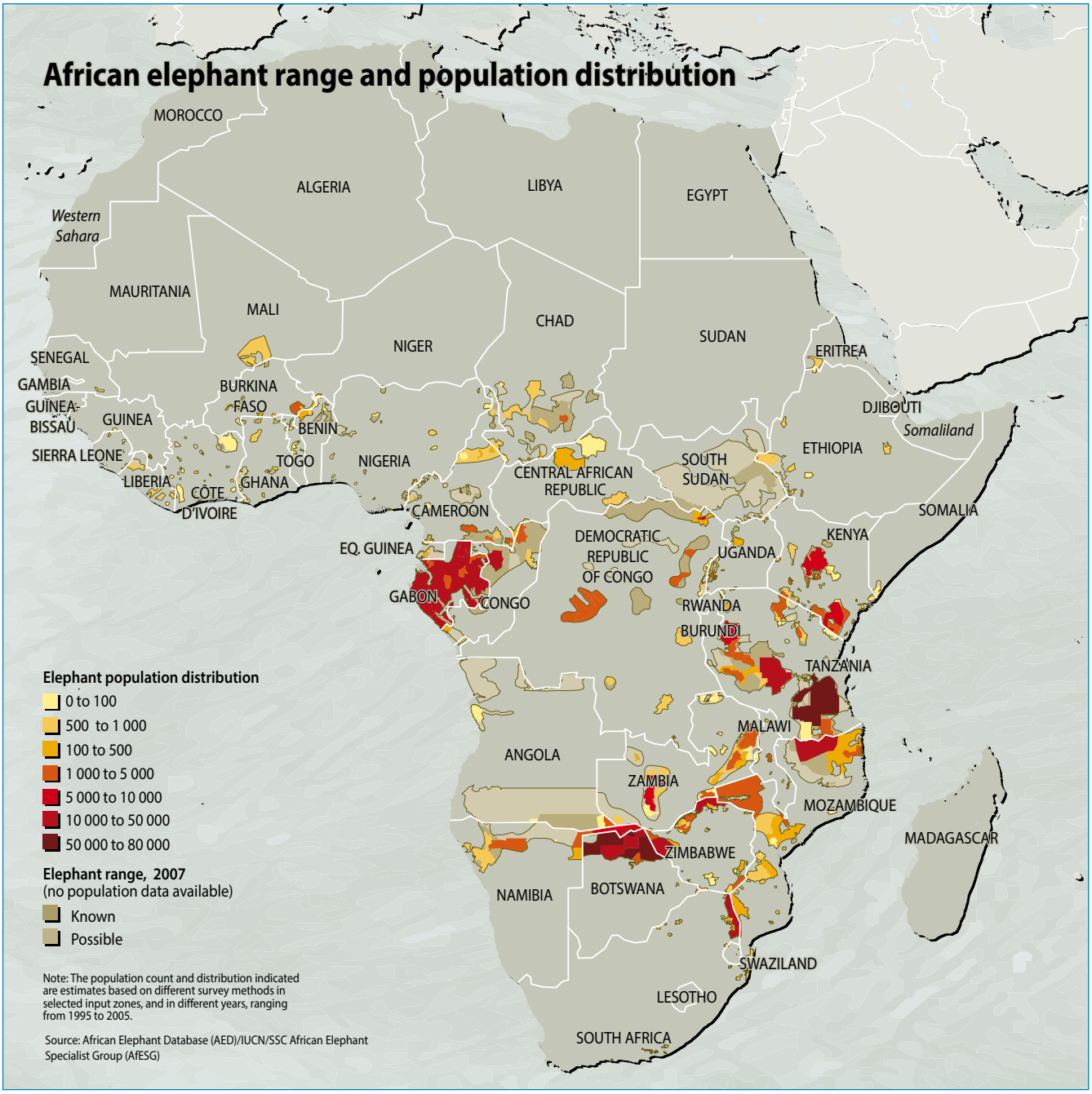


Figure 2.2 African elephant distribution in West and Central Africa (source: Elephant Database / IUCN SSC African Elephant Specialist Group (AfESG); reproduced from UNEP, CITES, IUCN, TRAFFIC 2013).

two are near-endemic. The distribution share by country for Gorillas and Chimpanzees is shown in Table S2.6).

Western Gorilla *Gorilla gorilla* CR CITES I CMS I

Endemic to the region (including Cabinda province of Angola). One subspecies is confined to the Nigeria-Cameroon border and the other occurs from Cameroon through Central Africa.

Western Lowland Gorilla *G. g. gorilla* CR

Distributed from the Sanaga River in Cameroon, south to the mouth of the Congo River and across to the Ubangui River. There is a small population in the Ebo Forest, Cameroon, north of the Sanaga River. The total population is estimated at ca. 150,000 in a total range of 791,425 km^2; over 93% of the range lies in Cameroon, Gabon and Republic of Congo (Funwi-Gabga *et al.* 2014; Table S2.6). Priority landscapes holding the majority of the population of both Western Lowland Gorillas and Central Chimpanzees were described by Tutin *et al*. (2005) and subsequently updated (IUCN 2014). These will be the focus of conservation action for these two taxa for the next 10 years.

Disease, poaching and logging are the main threats (Tutin *et al*. 2005, Walsh *et al.* 2008, Williamson *et al*. 2013). Ebola has caused heavy mortality in gorillas and chimpanzees since the first recorded outbreak in 1994, notably 5,000 were lost in Republic of Congo (Bermejo *et al*. 2006) and thousands in Gabon (Walsh *et al*. 2003; and see section 4.2.11). Gorillas are protected in all range countries, but remain susceptible

West African Manatee *Trichechus senegalensis* status by range country

Mauritania: Only found in the Senegal River and recorded in Diawling NP. Dams and locks present obstacles to movement from the main channel into other wetlands.

Senegal: Occurs in the Gambia River, upstream to Niokolo-Koba NP; the delta of the Senegal River in Djoudj NP; in the Saloum Delta Biosphere Reserve, and Saloum Delta National Park, and Basse Casamance National Park and wetlands bordering Guinea-Bissau.

Gambia: Present on the coast and along the Gambia River but has declined because of hunting and habitat destruction (Powell 1996).

Guinea-Bissau: The Bijagós Archipelago, including Orango NP and Bolama-Bijagós Biosphere Reserve, is a key area with sizeable numbers occurring. A survey in 2005 found manatees also present in the Gêba River, the Cacheu River and the Mansoa River (Silva *et al.* 2006). There is a National Conservation Plan (Silva *et al.* 1999).

Guinea: Found in Sangareyah Bay and in mangroves at the mouths of the Konkouré and Soumba rivers. Separate populations occur in headwaters of the major rivers in the highlands.

Sierra Leone: Surveys in 2005 showed it was still well represented in the estuary of the Sierra Leone River, the two Scarcies River estuaries, Yawri Bay and Sherbro Islands (Winden & Siaka 2005). Manatees may damage rice fields during the rainy season. The southern part of the coast from Shenge to Sulima is expected to contain the highest numbers.

Liberia: Present in most suitable coastal wetlands, but in reasonable numbers probably only in Lake Piso and the Cavalla River. Also known in the lower St. Paul, Mesurado, Moro, St John, Cestos and Senkwehn rivers – rapids prevent them from moving far upstream (Powell 1996). Lake Piso Multiple Use Protected Area is formally protected.

Côte d'Ivoire: Occurs along the whole coastal strip (Akoi 2004). Numbers were estimated at well below 850 individuals by Roth & Waitkuwait (1986). Populations have declined, despite awareness campaigns. Only manatee populations in lagoon complexes of Tagba-Makey-Tadio-Niouzoumou, the Bandama River, N'gni, Bolo and Niounourou in Fresco have experienced relatively positive growth.

Ghana: Occurs in coastal areas, the rivers Dayi, Asukawkaw, Obusum, Sene, Digya and Oti. They are also found in the River Tano, the lagoons and swamps associated with the lower Volta and in Lake Volta itself.

Togo: Known in Lake Togo where there are two concentrations: in the south and at the junction between the lake and the River Haho.

Benin: Sporadically distributed in estuaries, coastal lagoons, large rivers and freshwater lakes.

Nigeria: Found along most of the coastal areas and in the Niger Delta, where it is widespread. Present in Lake Kainji and the Benue River and most of its tributaries (Powell 1986, Obot 2002).

Mali: The main areas of occurrence are the River Niger including wetlands of the Inner Niger Delta, the River Bani and River Senegal, upstream to the Felou falls. Manatee hunting is practised by all ethnic groups along the river, employing various hunting methods, such as large-meshed nets, spears, hooks, platforms, baited traps, firearms, and lines with hooks.

Niger: Occurs along the Niger River including in the transboundary W Park. Surveys in 2006 identified about 10 sites that have the potential to be designated as manatee sanctuaries (Ciofolo & Sadou 1996, Louis 2003). However, according to fishermen along the River Niger in W Park, most of the sites where manatees could be easily caught during the last decade are now empty, but they still occur at some sites along the boundary with Benin (T. Rabeil, *in litt.* 2014).

Cameroon: According to a questionnaire survey in 1989, manatees were still abundant and their density appeared to be high in Korup, Mamfe and Edea (Grigione 1996). Manatees occur throughout the whole coastal region (Powell 1996). The Douala-Edea Wildlife Reserve on the south bank of the Sanaga River mouth is a key site, including LakeTissongo. Manatees are found in the upper Cross River and the Benoué River from the Faro River to Lake Léré (Powell 1996).

Chad: The Lake Chad Basin population appears to be extinct (Salkind 1998) and manatees now occur only in the south-west in Lakes Léré and Tréné and nearby wetlands.

Gabon: May support one of the highest densities of manatees in Africa (Powell 1996). Recorded in Gabon River, Mondah Bay, the Ogooué River and interconnecting lakes as well as coastal lagoons and the southern reserves of Setté Cama, Gamba and Petit Loango.

Equatorial Guinea: Present in the coastal areas of the mainland but absent from Bioko. The main areas of occurrence are in the Muni and Cogo estuaries. Bolobo (2001) reported that the Rio Muni supported an appreciable population.

ROC: Occur in the Conkouati lagoon near the border with Gabon, Lake Nanga, and the river Loémé south of Pointe-Noire. Manatees occur within Conkouati-Douli NP.

DRC: Present only in the small coastal strip (ca. 40 km) and tidal waters of the lower Congo River.

to illegal shooting and snaring by bushmeat hunters. Logging poses a threat through loss of forest habitat and construction of logging roads that fragment habitat and open up remote areas to exploitation by poachers. Industrial agriculture is set to be an emerging threat: much of the Central African forest zone is suitable for palm oil production (Wich *et al.* 2014) and without holistic land-use planning, large areas of habitat may be lost to wildlife (see Chapter 4).

Cross River Gorilla *G. g. diehlii* CR

Confined to a small area of highlands in the upper Cross River basin in Nigeria and Cameroon. This is the most northern and western gorilla population, situated ca. 300 m from the nearest Western Lowland Gorilla population and 200 km from an isolated gorilla population in the Ebo Forest of Cameroon, whose taxonomic identity is unknown (Dunn *et al*. 2014). The range covers an estimated 12,000 km^2 from the Afi Mountain Wildlife Sanctuary in the west to Kagwene Gorilla Sanctuary in the east. Nigeria has four key sites including one transboundary, and 85–115 individuals; Cameroon has nine sites with 132–194, giving a total estimate of 218–309 (Oates *et al.* 2007, revised in Dunn *et al.* 2014). The six largest populations number 20–30 individuals. The outlook for the Cross River Gorilla has become more positive through a better understanding of the range and habitat, and new surveys that have shown the area of distribution is twice as large as was previously thought. Warren *et al.* (2008) surveyed forests in the Takamanda-Mone Landscape, south-west Cameroon and found the species in five new sites. Cross River gorillas gain some protection from their rugged, high forest habitat. Ebola virus has not been found so far, but is still a potential risk to the population. Seven

Western Lowland Gorilla *G. g. gorilla* status by range country

Angola (Cabinda): Occurs in Maiombe massif in the north (including Maiombe NP).

Cameroon: Important populations occur in Dja Bisphere Reserve, Campo Ma'an NP, Lobéké NP, and Nki NPs, Mengamé Gorilla Sanctuary (Tutin *et al.* 2005). Maisels *et al.* (2013c) reported about 1,000 gorillas in Deng-Deng NP, and Maisels *et al.* (2014) about 2,500 in Boumba Bek NP in 2012.

CAR: Occurs in Dzanga-Ndoki NP and Dzanga Sangha Forest Reserve (estimated number of gorillas in 2011/2012 is in the order of 1,312–4,619 weaned individuals; Princée 2013), and Ngotto Classified Forest.

Equatorial Guinea: Over 3,000 were estimated to occur in 2011 (Murai *et al*. 2013).

Gabon: Numbers fell by 56% between 1983 and 2000 (Walsh *et al.* 2003). The Mayombe massif in the south-east is an important site, with 1,169 (642–2,128 95% CI) gorillas and Chimpanzees combined estimated in a 1,682 km^2 survey area by Aba'a *et al.* (2011). Important ape populations also occur in Birougou, Ivindo, Lopé, Moukalaba-Doudou, and Waka National Parks (Abitsi 2006, Aba'a & Bezangoye 2007, Maisels *et al.* 2008, 2010a, Bezangoye & Maisels 2010, Kuehl *et al.* 2010).

ROC: The area between the Gabon–Congo border and the Sangha River including the Odzala-Kokoua and Ntokou-Pikounda National Parks holds over 90,000 gorillas; the area comprising the Nouabalé-Ndoki NP, Lac Télé Community Reserve and the logging concessions between them contain a further 40,000 or so. Rainey *et al.* (2010) reported a high density of apes just to the east of the Lac Télé Community Reserve with gorilla density estimated at 5.3 individuals/km^2 (2.7–10.2 95% CI). An updated analysis for the same site (Iyenguet *et al.* 2012) estimated 2.9 individuals/km^2 and a gorilla population of 3,009 (1,749–5,175 95% CI). In the south, the Conkouati-Douli NP holds just under 1,000 gorillas (Vanleeuwe 2014).

Lowland Gorilla Gorilla gorilla *(CR) in Mbeli Bai in Nouabalé-Ndoki National Park, Republic of Congo.* © Thomas Breuer / WCS

animals were recorded killed by poachers in 2009–2013. The largest population is in the contiguous Okwangwo Division of Cross River NP, Nigeria, and the adjacent Takamanda NP in Cameroon (Oates *et al.* 2007, Dunn *et al.* 2014). Okwangwo Division of Cross River NP is now threatened by a new bridge (supported by the World Bank) across the park boundary river, to improve connection between the enclaved villages to the outside world (J. Oates *in litt*. 2014). In September 2014, the Prime Minister of Cameroon signed a Ministerial Decree establishing the Tofala Hill Wildlife Sanctuary covering an area of 80.9 km² and home to a population of 20–30 gorillas.

Eastern Gorilla *G. beringei* EN CITES I CMS I

A near-endemic to Democratic Republic of Congo, its range extends a short way into Uganda and Rwanda.

Mountain Gorilla *G. b. beringei* EN

Occurs in the Virunga Mountains along the border between Democratic Republic of Congo and Rwanda and Uganda, with a second subpopulation (considered by some a distinct subspecies) in Bwindi Impenetrable National Park, further east in Uganda. The current population size is estimated at 880 individuals based on genetic analysis, an increase of 26% since 1983 (Gray *et al.* 2013). Total range size is calculated as 785 km^2 (Funwi-Gabga *et al.* 2014). Population growth was reportedly higher in habituated groups, which are found mainly on the eastern side of the range, as lack of security has inhibited wildlife tourism in Democratic Republic of Congo. In Virunga NP there has been a resurgence in poaching and killing of gorillas as well as a sharp increase in timber extraction for illegal charcoal production. In 2007, at least eight gorillas were shot dead in three incidents in Virunga NP (Williamson & Fawcett 2008). Virunga NP remains a key site but management and conservation activities have been severely hampered by the presence of illegal armed groups: over 120 rangers have been killed in clashes with poachers and militias during the last 30 years.

Grauer's or Eastern Lowland Gorilla *G. b. graueri* EN CITES I CMS I

Endemic to Democratic Republic of Congo, from the Lualaba River east to the Albertine (Western) Rift and south to the Itombwe Massif (Maldonado *et al.* 2012, Williamson & Butynski 2013). The current population is ca. 2,000–10,000 individuals (Nixon *et al.* 2012 in Maldonado *et al.* 2012). In 1995, the population was estimated at 16,900 (Hall *et al.* 1998) but has been reduced and fragmented (Hart & Liengola 2005, Hart *et al.* 2007). Many populations have disappeared in the last 30 years (comparing Schaller 1963 and Hall *et al.* 1998); for example, Itombwe lost about half of its subpopulations between 1960 and 1996 (Omari *et al.* 1999). Grauer's Gorilla now survives in four broad clusters: Maiko NP; Tayna-Walikale region (including Tayna NR, Kisimba-Ikolo NR and Usala Forest); Kahuzi-Biéga region (KBNP and Kasese Forest); Itombwe Massif (including Itombwe Natural Reserve). There are also a few isolated subpopulations in Masisi (possibly extinct), the KBNP highlands, and on Mount Tshiabirimu in Virunga NP. Maiko and Kahuzi-Biéga NP are the most important sites. There is little recent information because the high level of insecurity in eastern Democratic Republic of Congo has hindered research and field surveys (e.g., the southern part of Maiko NP is occupied by Simba rebels and the northern sector has not been surveyed since 1994 because of illegal

mining linked to armed militias). There are only six Grauer's Gorillas left in Virunga NP. However, an increase in numbers has been reported in the highland sector of Kahuzi-Biéga NP following intensified protection (WCS 2010). Illegal mining activities increase demand for bushmeat, including consumption of gorillas and illegal capture of infants (and concomitant killing of group members), which has increased substantially since 1998. At present, there is no commercial logging in Grauer's Gorilla range, but there are continuous low-level extractive activities (charcoal production, bamboo harvesting and wood cutting), which put further stress on the habitat (Plumptre *et al*. 2003, Robbins & Williamson 2008).

Chimpanzee *Pan troglodytes* EN CITES I

Chimpanzees are discontinuously distributed across West and Central Africa from southern Senegal through the forest belt north of the Congo River, extending into western parts of East Africa. The four recognized subspecies all occur in the project region and three are confined to it. The total population is estimated to be 274,160–457,230 (aggregated from the subspecies totals, below; Table 2.6). The main threats are habitat destruction and degradation, poaching for meat, the pet trade and disease (including Ebola haemorrhagic fever). Ebola has killed Chimpanzees in Côte d'Ivoire (Formenty 1999), and repeated epidemics have caused dramatic declines of ape populations in remote protected areas in Gabon and Republic of Congo (Huijbregts *et al.* 2003, Walsh *et al.* 2003). Recent surveys have not always distinguished between the nests of Chimpanzees and gorillas, but the pooled density of apes in several large areas has declined by 50–90% following Ebola epidemics (Tutin *et al.* 2005, Lahm *et al.* 2006).

Western Chimpanzee *P. t. verus* EN

Formerly distributed in nine countries of West Africa, from Senegal to Nigeria. Kormos *et al*. (2003) estimated the population to number 21,300–55,600 individuals. More recent surveys have revised this estimate to 18,960–59,290 (Table 2.6). About two-thirds of the remaining representatives of this subspecies are thought to occur in Guinea, Sierra Leone and Liberia. A national survey of Western Chimpanzees in Sierra Leone by Brncic *et al*. (2010) found a population larger than anticipated, and was estimated to number 5,500 individuals (3,100–10,400 95% CI). However, it should be noted that previous surveys were restricted to national parks, while recent surveys were also carried out outside protected areas. In Liberia, the population was estimated at more than 7,000 individuals (4,260–11,590 95% CI), with an estimate of 1,500 in Sapo NP (Tweh *et al*. in press). Guinea is regarded as the stronghold of this subspecies, but has not been fully surveyed since 1998; surveys are ongoing, but the population may be in excess of 17,000 (S. Régnaut, *in litt*. 2014). A study in southern Guinea-Bissau reported a 30% loss of habitat 1986–2003; the estimated population size in the Cantanhez region using three density scenarios was 376–2,632 (Torres *et al*. 2010). Recent work in Côte d'Ivoire revealed that 90% of western chimpanzees disappeared between 1990 and 2007 (Campbell *et al.* 2008a) and other countries in the region may have lost their chimpanzee populations at a comparable rate (Williamson *et al.* 2013). Senegal is thought to have only a few hundred individuals remaining in the south-east of the country and a recent survey has demonstrated their presence in Ghana where it was thought to be extinct (Danquah *et al*. 2012). However, they are likely extinct in Benin, Burkina Faso, Gambia and Togo. Western Chimpanzees occur in many prominent protected areas, such as Outamba-Kilimi NP and Gola Rainforest NP (Sierra Leone), Haut Niger NP and Nimba Reserve (Guinea), Sapo NP (Liberia), Taï NP (Côte d'Ivoire) and others.

Nigeria-Cameroon Chimpanzee *P. t ellioti* EN

Occurs in eastern Nigeria, including the Niger Delta, and Cameroon north of the Sanaga River. The population is estimated to number 3,500–9,000 individuals (Morgan *et al.* 2011). The largest population (perhaps 1,500) is found in Gashaka-Gumti NP, Nigeria (Oates *et al.* 2003); in Cameroon the largest populations are in Mbam and Djerem NP (at least 500), the proposed Ebo NP, and Banyang Mbo WS (Morgan *et al*. 2011).

Central Chimpanzee *P. t. troglodytes* EN

Distributed from Cameroon south of the Sanaga River to the Congo and Ubangui rivers. Almost 90% of the range lies in Cameroon, Gabon and Republic of Congo, with smaller areas in Equatorial Guinea, Central African Republic and Cabinda, with a relict population in Democratic Republic of Congo (Table S2.6). A decade ago, the population was estimated at 70,000–116,500 individuals (Kormos *et al*. 2003). In Equatorial Guinea (Rio Muni), Murai *et al*. (2013) estimated a population of 7,824 (3,703–14,441 95% CI). It occurs in many protected areas.

Eastern Chimpanzee *P. t. schweinfurthii* EN

Occurs from the Ubangui River in Central African Republic and Democratic Republic of Congo across to western Uganda, Rwanda and western Tanzania, with relict populations in Burundi and South Sudan; 82.5% of the range is situated in Democratic Republic of Congo (Funwi-Gabga *et al.* 2014). A recent population modelling exercise produced an estimate in the region of 200,000–250,000 individuals (Plumptre *et al.* 2010), which is higher than the earlier estimate of 76,400–119,600 by Kormos *et al*. (2003).

Bonobo *Pan paniscus* EN CITES I

Endemic to the forests of central Democratic Republic of Congo, from south and east of the Congo and Lualaba rivers to the Kasai/Sankuru rivers in the south (Fruth *et al.* 2008). However, less than 33% of the potential range has been surveyed. There is no robust population estimate, but the population is believed to be a minimum of 15,000–20,000 individuals (IUCN & ICCN 2012). Three main blocks have been identified where nests were most abundant: Lokofa, Iyealima, and Lomela (Hart *et al.* 2008, Liengola *et al.* 2009, Maisels *et al.* 2010b). Bonobos occur in small populations whose gene flow is determined by riverine barriers. They are threatened by hunting, lack of security, disturbance, and expansion of agriculture. Salonga NP is a key site but is not fully secure. Between 2003 and 2006, evidence of hunting was recorded in 51% of survey grids in Salonga and bonobo mortality as a direct consequence of hunting were recorded; hunting pressure was considered to be high in the north and east of the park (Hart *et al.* 2007). Poaching

Eastern Chimpanzee *P. t. schweinfurthii* status by range country

CAR: Few recent surveys have taken place. No sign was found of Chimpanzees in the Bangassou area, except on an island in the Ubangui River, during a survey in 2003–2004 (E. Williamson *in litt.* 2014). Occurs in Zémongo Faunal Reserve.

DRC: There are seven priority populations. The Okapi Wildlife Reserve is the largest protected area containing Eastern Chimpanzees and has the largest population, estimated at 6,000–7,000 in 2005–2007 (Vosper *et al.* 2012). A large, continuous population in the Bili-Uele region of northern DRC was reported by Hicks *et al.* (2014).

Table 2.6 Chimpanzee *Pan troglodytes* population estimates (sources: Kormos *et al.* 2003 and references therein, unless otherwise indicated).

Population	Population estimate (number of individuals)	Reference / Notes
P. t. verus		
SEN	200–400	
MLI	1,600–5,200	
GNB	600–1,000	
GIN	8,100–29,000	
SLE	3,100–10,400	Brncic *et al.* (2010)
LBR	4,260–11,590	Tweh *et al.* (in press)
CIV	800–1,200	Campbell *et al.* (2008a)
GHA	300–500	
BEN	Regionally Extinct	
BFA	Regionally Extinct	
GMB	Regionally Extinct	
TGO	Regionally Extinct	
Sub-total	18,960–59,290	
P. t. ellioti		
NGA		Largest population (1,500) in Gashaka-Gumti NP
CMR		Main populations in Mbam and Djerem NP, proposed Ebo NP and Banyang Mbo Wildlife Reserve
Sub-total	3,500–9,000	Morgan *et al.* (2011)
P. t. troglodytes		
GAB	27,000–64,000	
CMR	31,000–39,000	
ROC	10,000	
GNQ	3,700–14,440	Murai *et al.* (2011)
AGO (Cabinda)	<1,000	
CAR	<1,000	
DRC	<1,000	
Sub-total	73,700–130,940	
P. t. schweinfurthii		
DRC, CAR, South Sudan	170,000–ca. 250,000	Plumptre *et al.* (2010)
Burundi	450	Plumptre *et al.* (2010)
Rwanda	275	Plumptre *et al.* (2010)
Tanzania	2,750	Plumptre *et al.* (2010)
Uganda	5,000	Plumptre *et al.* (2010)
Sub-total	~178,000–258,000	Plumptre *et al.* (2010)
Total	**274,160–457,230**	

of Bonobos increased dramatically as a result of ongoing civil wars and unrest (IUCN & ICCN 2012). Habitat suitability modelling showed that Bonobo nests were found further from agricultural areas and forest edge density, leading to a prediction that they avoid fragmented forests and areas of high human activity (Hickey *et al*. 2013).

Black Colobus *Colobus satanas* VU CITES II

There are two subspecies: *C. s. satanas* is endemic to Bioko Island; *C. s. anthracinus* occurs from south of the Sanaga River in Cameroon through Equatorial Guinea, western and central Gabon and western Congo (Oates 2011). There are two separate populations on Bioko. In Gabon it is known in Massif du Chaillu, Lopé NP and Monts-de Cristal-Minkébé area (Fleury & Brugière 2013). The species is rare or absent where logging has been extensive. In mainland Equatorial Guinea, its range had already been reduced to one-third of its former size by 1967 (Oates *et al.* 2008a). No overall population estimate is available. The highest density populations are thought to be in Lopé Reserve, Gabon, where a population of approximately 50,000–55,900 individuals was estimated by Brugière (1998). Hearn *et al.* (2006) reported that *C. s. satanas* on Bioko declined by >60% between 1986 and 2006 due to an increase in shotgun hunting. *C. s. satanas* occurs in Pico Basilé NP and Gran Caldera and Southern Highlands Scientific Reserve on Bioko. *C. s. anthracinus* is found in Lopé NP (Gabon). It formerly occurred in Douala-Edea Reserve (Cameroon), but habitat there is now highly degraded (E. Greengrass *in litt*. 2014).

Western Black-and-white Colobus *Colobus polykomos* VU CITES II

Endemic to the West African forest zone from southern Senegal, Guinea-Bissau, Guinea, Sierra Leone and Liberia east to the Sassandra River in Côte d'Ivoire (Oates *et al.* 2008b). No estimate of population size is available. It is common where protected from hunting (e.g. 47–50 individuals/km^2; Korstjens & Galat-Luong 2013). By weight it is the second most abundant primate in bushmeat markets around Taï NP (Refisch & Koné 2005). It occurs in many other PAs throughout its range.

White-thighed Colobus *Colobus vellerosus* VU CITES II

Ranges from central Côte d'Ivoire to the western edge of Nigeria, extending north in gallery forests into the savanna zone. Very rare in Togo though less so in Benin (Campbell *et al*. 2008b), and has become rare in several protected areas in Ghana. Its status in Burkina Faso is unclear (Ginn & Nekaris 2014) and it may now be extinct in Nigeria (Oates *et al*. 2008c). Populations have been greatly reduced though hunting for meat and skins (Oates 2011). It occurs in Comoé NP (Côte d'Ivoire), Fazao-Malfakassa NP (Togo) and Mole, Bui and Digya NPs (Ghana). Well protected in Boabeng-Fiema Monkey Sanctuary in Ghana, where it is venerated by local people and where the population was estimated at 275 individuals in 2007 (Saj & Sicotte 2013). It has declined in Comoé NP (Fischer *et al.* 2000).

Olive Colobus *Procolobus verus* NT CITES II

Endemic to West Africa and distributed discontinuously from southern Sierra Leone and Guinea to just east of the

Niger River in Nigeria (Oates 2011, Oates & Korstjens 2013). Believed to be declining due to the conversion of forest to farmland and its range is fragmented (Oates 2011). Occurs on Tiwai Island WS, Gola Rainforest NP (Sierra Leone), Sapo NP (Liberia), Taï NP (Côte d'Ivoire), Lama Forest Reserve (Benin), and Ankasa Conservation Area (CA), Bia CA, and Kakum NP (Ghana).

West African Red Colobus *Procolobus badius* EN CITES II

Three subspecies are recognized (Butynski *et al*. 2013): *P. b. temminckii* occurs in Gambia, southern Senegal, Guinea-Bisssau, western Guinea and north-west Sierra Leone; *P. b. badius* from south-east Guinea through Liberia to the Nzi-Bandama river system in Côte d'Ivoire; and Miss Waldron's red colobus *P. b. waldroni*, assessed as Critically Endangered, occurs from the Nzi-Bandama river system to south-west Ghana (no animals have been seen alive since the late-1970s and it may now have been extirpated; Oates *et al*. 2000, Oates 2011). High densities (even up to 880 individuals/km^2) have been reported but these figures come from protected areas and the species is subject to heavy hunting pressure elsewhere: it is particularly vulnerable because it is large, brightly coloured and noisy, and occurs in small groups.

Pennant's Red Colobus *Procolobus pennantii* CR CITES II

Three subspecies are recognized: *P. p. pennantii* is endemic to Bioko, where it is probably now limited to <300 km^2 within Gran Caldera and 510 km^2 in Southern Highlands Scientific Reserve; there are no recent reports from Pico Basile NP (Cronin *et al*. 2014). *Procolobus p. epieni* (Critically Endangered) occurs in a very small area of the Niger Delta, while *P. p. bouvieri* has a small range in Republic of Congo on the north-west side of the River Congo. Once thought possibly extinct (*Oates et al*. 2000), it now may be more common than was once thought (Butynski *et al*. 2013); the first documented photograph was taken in Ntokou-Pikounda NP in Republic of Congo in early 2015. *Procolobus p. epieni* is regarded as a full species by Oates (2011) and other authors.

Preuss's Red Colobus *Procolobus preussi* CR CITES II

Has a very restricted range in southern Cameroon, just extending into south-east Nigeria. The largest numbers are found in Korup NP, Cameroon and the contiguous area of the Oban Division of Cross River NP in Nigeria. There is a second population in the Makombe-Ndokbou-Ebo forest block (Oates 2011).

Eastern Red Colobus *Procolobus rufomitratus* LC CITES I

There are nine subspecies, seven of them in Democratic Republic of Congo and extending into Central African Republic and Republic of Congo. Of those assessed and occurring in the study region, *P. r. tholloni* occurs south of the Congo River and west of the Lomami, and is assessed as Near Threatened (Oates *et al*. 2008d).

Sooty Mangabey *Cercocebus atys* VU CITES II

Endemic to the Upper Guinea Forest. *C. a. atys* occurs from southern Senegal and Guinea-Bissau to the Nzo-Sassandra rivers in Côte d'Ivoire and *C. a. lunulatus* (often regarded as a full species, e.g. Butynski 2013) from the Nzo-Sassandra to the Volta River in Ghana and in southern Burkina Faso (Oates *et al.* 2008e, Oates 2011). *Cercocebus a. atys* is uncommon and local in Guinea-Bissau and widely hunted throughout for meat; it occurs in Taï NP, Tiwai WS; Sapo NP and the Gola forests (Oates 2011). *Cercocebus a. lunulatus* is rare and is at least Endangered (J. Oates *in litt*. 2014); it has been recorded in Comoé NP, Marahoué NP and a number of smaller sites in Côte d'Ivoire and Ankasa Resource Reserve, Ghana (Oates 2011, Butynski 2013).

White-collared Mangabey *Cercocebus torquatus* VU CITES II

Endemic to the region, occurring in coastal forests of southern Nigeria, Cameroon, Equatorial Guinea, Gabon, and Congo. Apparently always rare, but no population estimate is available (Oates 2011). Its large size, semi-terrestrial habits and loud calls render it relatively conspicuous and susceptible to hunting, especially with dogs, and snaring (Maisels *et al.* 2007). It is recorded in Okumu NP, Oban Division of Cross River NP (Nigeria), Korup NP, Banyang Mbo WS and proposed Ebo NP (Cameroon), Mayumba NP (Gabon) and Conkouati-Douli NP (Republic of Congo) (Maisels *et al.* 2007, Oates 2011).

Golden-bellied Mangabey *Cercocebus chrysogaster* DD CITES II

This is a very poorly known species with a small range in the swamp and flooded forests of Central Democratic Republic of Congo, south-east of the Congo River. Population size is unknown but suspected to be fragmented and declining; hunting is the main threat based on the numbers seen in bushmeat and pet markets in Kinshasa (Ehardt & Butynski 2013). Research into its status is urgently needed.

Mandrill *Mandrillus sphinx* VU CITES I

Endemic to the region, and distributed from south of the Sanaga River in Cameroon through Equatorial Guinea, western Gabon, and south-western Congo to the Kouilou River. Distribution to the east is limited by the Dja River in Cameroon and the Ivindo and Ogooué Rivers in Gabon. No overall population estimate is available but evidence suggests a population decline in recent years. It is generally rare, and has been locally extirpated. The largest remaining populations are probably found in Gabon: seven individuals/km^2 were estimated in Lopé NP (Oates & Butynski 2008a, Abernethy & White 2013). Mandrills occur in 14 PAs, representing ca. 13% of the range (Abernethy & White 2013). It also occurs in the Mayombe massif in south-east Gabon which is not a protected area, but where hunting and snaring pressure is low (Aba'a *et al.* 2011). The most immediate threat is posed by hunting for meat (which is highly prized in Gabon). Commercial bushmeat hunters pose a particular threat to populations which are close to main roads and towns.

Drill *Mandrillus leucophaeus* EN CITES I

There are two subspecies: *M. l. poensis* is endemic to Bioko, occurring on the southern third of the island with an extent of occurrence <800 km^2; *M. l. leucophaeus* occurs between the Cross and Sanaga rivers in south-east Nigeria and south-west Cameroon. Both are listed as Endangered (Oates & Butynski 2008b). The historic range is estimated to cover

50,000 km² but now only around half that area is available and this is fragmented into 11 habitat patches, most of them in Cameroon (Schaaf *et al.* 2013). Over-hunting has caused particularly marked declines in Nigeria and on Bioko.

Black Mangabey *Lophocebus aterrimus* NT CITES II

Occurs in Democratic Republic of Congo south of the Congo River, extending into northern Angola. Two subspecies are recognized (Gautier-Hion 2013). No population estimates are available; however, it is common in Salonga NP and is the most abundant primate at Lomako (73 individuals/km²) and 69/km² were recorded at a second site (Gautier-Hion 2013).

Guinea Baboon *Papio papio* NT CITES II

The range covers >200,000 km² in West Africa (Senegal, Gambia, Mauritania, eastern Mali, Guinea, Guinea Bissau and western Sierra Leone). In Senegal, 100,000 individuals were estimated to occur in 8,000 km² in 1982 (Galat-Luong & Galat 2013). It is reportedly still common in many parts of the range (e.g. Gambia and south-eastern Guinea-Bissau). In Senegal, outside Niokolo-Koba NP, this species has undergone widespread declines as a result of extensive agricultural expansion, tree-felling, and direct hunting for crop protection and for meat. In the past, large numbers were exported for laboratory use, particularly from Senegal (Oates *et al.* 2008f). It has been reintroduced to Saloum NP in Senegal (Galat-Luong & Galat 2013). In Mauritania, the northern edge of their range, small relict populations occur in the mountains of the south in association with *gueltas*, permanent rock pools (Brito *et al*. 2010).

Preuss's Monkey *Cercopithecus (Allochrocebus) preussi* EN CITES I

There are two subspecies: *C. p. preussi* is restricted to a small area of montane and submontane forests in western Cameroon and eastern Nigeria; *C. p. insularis* occurs on Bioko Island. The Bioko subspecies has declined by over 55% between 1986 and 2006 (Oates 2008) and it is unlikely that they now number >1,000 individuals (Butynski 2013b). No estimate of the nominate species is available, but it is uncommon and populations are fragmented. It occurs in several protected areas (Butynski 2013b).

L'hoest's Monkey *Cercopithecus lhoesti* VU CITES II

It ranges from eastern Democratic Republic of Congo, east of the Lualaba River, through the Ituri Forest and south to the Itombwe Massif and into Rwanda and western Uganda. It is widespread within lowland forests but only locally common (e.g. Okapi Wildlife Reserve). No estimates of population size are available. In addition to Okapi FR it occurs in Virunga NP and the highland sector of Kahuzi-Biéga NP (Hart *et al.* 2011). It is susceptible to habitat loss and bushmeat hunting.

Sun-tailed Monkey *Cercopithecus (Allochrocebus) solatus* VU CITES II

Endemic to central Gabon. Recent research has shown that its distribution extends further east, west and south than thought and its extent of occurrence may be c. 18,000 km² rather than the 11,000–12,000 km² originally estimated (Coad *et al*. 2010). It occurs in Forêt des Abeilles, part of Lopé NP and has been seen close to Monts Birougou NP and Waka NP (Coad *et al*. 2010). No estimates of population size are available. At Makandé Field Research Station, the density was estimated as 25 individuals/km² by Gautier & Brugière (2013). There is no recent evidence of a direct population decline as a result of human activities (Oates & Bearder 2008).

Dryad Monkey *Cercopithecus dryas* CR CITES II

Known only from the Kokolopori Forest, Democratic Republic of Congo, in four apparently isolated populations. Surveys indicate that the total population is ca. 200 individuals (Butynski 2013c).

Diana Monkey *Cercopithecus diana* VU CITES I

Occurs in the Upper Guinea Forest from south-east Guinea to south-west Ghana. There are two subspecies (sometimes elevated to species level; Butynski *et al*. 2013): *C. d. diana* is found from Guinea to the Sassandra River, Côte d'Ivoire, and *C. d. roloway* ranges from the Sassandra to the River Pra in

Drill *Mandrillus leucophaeus* status by range country

Bioko: Population is estimated at 3,000–4,000 individuals (Schaaf *et al.* 2013) and has declined by a little over 30% between 1986 and 2006 (Hearn *et al.* 2006). Drills occur in Pico Basile NP and Gran Caldera and Southern Highlands Scientific Reserve (Oates 2011).

Nigeria and Cameroon: 3,000–6,000 individuals were estimated in 1998 (Schaaf *et al.* 2013). Astaras *et al.* (2008) estimated 1,130 in Korup NP. Drills are severely threatened by habitat loss and are hunted for meat, often using dogs; all members of a group are often shot *en masse.* It occurs in Cross River NP, Afi Mountain Wildlife Sanctuary and Mbe Mountains (Nigeria) and Korup NP, Takamanda NP, and Ebo NP in Cameroon. Morgan *et al.* (2013) estimated 300–700 in the proposed Ebo NP. It only occurs in closed canopy forest and never near villages, thus becoming vulnerable to forest clearance and settlement expansion.

In mainland Africa, the Drill Mandrillus leucophaeus *(EN) occurs only in Nigeria and Cameroon.* © Bethan Morgan

Ghana, and possibly once as far as western Togo (Oates 2011). *Cercopithecus d. diana*: in Taï NP, Côte d'Ivoire, the population was estimated at 97,000 individuals (N'Goran *et al.* 2012) and it can be abundant where not hunted, e.g. 48–75 individuals/km^2 in Taï, 44–46/km^2 in Tiwai sanctuary and 71/km^2 in Gola Rainforest NP (Sierra Leone) and it is the second most abundant species in Sapo NP, Liberia (Oates 2011). *Cercopithecus d. roloway*: has been declining for 40 years and Oates (2011) proposed that its Red List status should be Critically Endangered. It is very rare in Côte d'Ivoire: Oates (2011) recorded it present at only one site, Tanoé Forest, but since also recorded in Dassioko Sud Forest Reserve in 2011, though not during 12 months of monitoring in 2012 (Gonedelé Bi *et al*. 2014); in Ghana, recent surveys have located small numbers in swamp habitats in Kwabre forest, adjacent to Tanoé forest in Côte d'Ivoire and it may survive in Ankasa Resource Reserve (McGraw & Oates 2014).

Owl-faced Monkey *Cercopithecus hamlyni* VU CITES II

Ranges from eastern Democratic Republic of Congo, east of the Congo River to the Albertine Rift and into Rwanda. *C. h. hamlyni* occurs throughout, and *C. h. kahuziensis* occurs in the bamboo zone of Mt Kahuzi (Hart *et al.* 2013). It is common in Okapi Faunal Reserve, Kahuzi-Biéga NP and the adjacent Kasese area. A cryptic species, difficult to census, and no overall population estimate is available; 5.3–6.7 individuals/km^2 have been reported in different sectors of Kahuzi-Biéga NP (Hart *et al.* 2013).

Sclater's Monkey *Cercopithecus sclateri* VU CITES II

Endemic to southern Nigeria, from the eastern Niger Delta to the Cross River, and north to Enugu and Ebonyi States. No population estimate is available (Oates 2011). Rare in many places due to habitat loss, but common in some other sites. It does not occur in any protected areas (Oates & Baker 2013).

Red-eared Monkey *Cercopithecus erythrotis* VU CITES II

Occurs in moist forest from the Cross River in Nigeria to just south of the Sanaga River, Cameroon (*C. e. camerunensis*) and also the island of Bioko, Equatorial Guinea (*C. e. erythrotis*). It is the most common of seven species of monkey on Bioko (Butynski & Kingdon 2013) and the population is estimated at >20,000 individuals, a decline from >30,000 estimated in 1986 (Hearn *et al.* 2006). About 1,025 carcases are sold annually at markets around Korup NP, Cameroon (Linder 2008). It is still relatively common in some areas, and is adept at concealment. It occurs in Korup NP, Takamanda NP, Mt Cameroon NP, the proposed Ebo NP and Banyang-Mbo WS in Cameroon; Cross River NP, Afi Mountain WS and Mbe Mountains in Nigeria; and Pico Basilé NP and Gran Caldera and Southern Highlands Scientific Reserve on Bioko (Oates 2011).

White-throated Monkey *Cercopithecus erythrogaster* VU CITES II

Distributed in coastal forest in southern Togo, Benin and Nigeria, east to the Niger Delta. In Togo it is only found in Réserve National de Togodo (310 km^2) and in Benin in Lama Forest (20 km^2), Lokoli Forest and small patches in the lower Ouémé River valley, some of which are sacred groves (Campbell *et al*. 2008b, Oates 2013). It has become rare in much of the range due to hunting, but remains common where pressure is low. Population estimates are >3,400 individuals in the core zone of Okomu NP, Nigeria, and 300–800 in Lama Forest, Benin (Oates 2011, 2013).

Lesula *Cercopithecus lomamiensis* Not Evaluated

This is a recently described species from near Lohumonoko on the west bank of the Lomami River, Democratic Republic of Congo; it has not yet been formally assessed for the IUCN Red List, but provisional indications are that it may be Vulnerable (Hart *et al.* 2012).

Carnivores

Fifty-seven species of carnivore occur in West and Central Africa, including high-profile species such as Lion, Leopoard, Cheetah and African Wild Dog. Fifteen species are endemic and five near-endemic, all of them among the smaller species. Five of these species are endemic to the Upper Guinea Forest. Three are threatened (all VU), one is Near Threatened and three are Data Deficient (Table 2.7). Although many small carnivore species are considered to be at lower risk of extinction, a number feature prominently in bushmeat markets across the region (e.g., Colyn *et al*. 2004, Djagoun & Gaubert 2009, Doughty *et al*. 2015).

African Wild Dog *Lycaon pictus* EN CMS II

Formerly widely distributed in the savannas and rainforest-savanna mosaics of West and Central Africa. It is now extremely rare with only a handful of resident populations known to remain. In West Africa, it is considered Regionally Critically Endangered and the population in Niokolo-Koba NP and buffer zones (about 25,000 km^2) is likely to be no more than 50–100 individuals, while that in the WAPOK complex of protected areas in Benin, Burkina Faso and Niger is unlikely to number more than 20, and where there has not been a confirmed observation for 20 years (Woodroffe & Sillero-Zubiri 2013). Presumed to be extirpated in Gashaka Gumti NP in Nigeria, as in Cameroon (De Iongh *et al*. 2011), but may still occur in Kainji Lake NP (A. Dunn *in litt*. 2014). In Central Africa, presence in low numbers is confirmed in Bahr Salamat in southern Chad and Bamingui-Bangoran-Manovo-Gounda-St Floris in northern Central African Republic (IUCN/SSC 2012, Woodroffe & Sillero-Zubiri 2013, Durant *et al.* 2014). However, it is considered extinct in the rainforest-savanna mosaics of the southern Congo Basin (Henschel *et al*. (2014b) and no longer occurs in Katanga, south-east Democratic Republic of Congo (WCS & ICCN 2009).

Striped Hyaena *Hyaena hyaena* NT

Formerly distributed sparsely and irregularly across the Sahel and savanna zones, but declining. The population in the whole of Africa was estimated at 2,450–7,850 (about 50% of the global total); in the region, only Burkina Faso, Cameroon and Niger were considered to have >100 animals (Hofer & Mills 1998, Wagner 2013).

Lion *Panthera leo* VU CITES II

Lions formerly occurred widely in West and Central Africa outside the rainforest and desert zones. Lions are declining across Africa as a whole and by some estimates have lost ca. 75% of their former continental range due to the effects

Table 2.7 Endemic and near-endemic carnivores (not treated separately) in West and Central Africa (and see Do Linh San *et al.* 2013 for a review).

Species		IUCN Red List	Distribution[1]
HERPESTIDAE			
Bdeogale nigripes	Black-footed Mongoose	LC	From Cross River through Congo Basin north of the Congo River
Crossarchus alexandri	Alexander's Cusimance	LC	Congo Basin forest, east of the Congo River and south of the Ubangui River; also western Uganda
Crossarchus ansorgei	Ansorge's Cusimance	LC	Congo Basin forest, south and west of the Congo – Lualaba rivers; one record from Angola
Crossarchus obscurus	Common Cusimance	LC	Upper Guinea Forest
Crossarchus platycephalus	Cameroon Cusimance	LC	Lower Guinea Forest from Benin to southern CAR and ROC
Herpestes (Xenogale) naso	Long-nosed Mongoose	LC	Congo Basin forests from Cross River east; also Niger delta
Liberiictis kuhni	Liberian Mongoose	VU	Upper Guinea Forest (SE Liberia, SW Côte d'Ivoire)
Mungos gambianus	Gambian Mongoose	LC	Guinea woodland zone from Senegal to Nigeria
MUSTELIDAE			
Aonyx congicus	Congo Clawless Otter	LC	Congo Basin forests, extending into Angola and East Africa
VIVERRIDAE			
Genetta bourloni	Bourlon's Genet	NT	Upper Guinea Forest. Very poorly known
Genetta cristata	Crested Genet	VU	Lower Guinea forest between Cross and Sanaga rivers (Nigeria-Cameroon)
Genetta johnstoni	Johnston's Genet	VU	Upper Guinea forest
Genetta pardina	Pardine Genet	LC	Senegal to Ghana
Genetta piscivora	Aquatic Genet	DD	DRC, from east of Congo River to the Albertine Rift. Very poorly known
Genetta poensis	King Genet	DD	Patchy distribution in forests from Liberia to ROC, including Bioko
Genetta servalina	Servaline Genet	LC	Congo Basin from south of the Sanaga River, extending into East Africa
Genetta thierryi	Hausa Genet	LC	West African Savanna zone from Gambia to Cameroon
Genetta victoriae	Giant Genet	LC	DRC. NE of the Congo River; also recorded in Semliki Forest, Uganda and in Rwanda
Poiana leightonii	West African Linsang	DD	Upper Guinea Forest (Liberia and Côte d'Ivoire)
Poiana richardsonii	African Linsang	LC	Congo Basin Forest (including Bioko)

[1] follows Kingdon & Hoffmann (2013c)

of habitat loss, severe declines in prey and retaliatory or preventative killing (Riggio *et al.* 2013). The status of Lions in West Africa has long been even worse and the regional status was classified as Critically Endangered by Bauer & Nowell (2004), a status that it retains today (Henschel *et al*. 2014a). Lions are likely to be extinct now in the rainforest-savanna mosaics of the Congo Basin (Henschel *et al*. 2014b). Lion numbers in West and Central Africa were estimated at 3,783 individuals by Chardonnet (2002) and 1,785 by Bauer & van der Merwe (2004) (Table 2.8). A conservation strategy for the lion in West and Central Africa has been produced (IUCN SSC Cat Specialist Group 2006) and workshops have been held to initiate development of national lion strategies and action plans in Benin, Cameroon and Senegal (De Iongh *et al*. 2014).

Henschel *et al.* (2014a) surveyed 13 protected areas >500 km^2 across West Africa and collated evidence of Lion presence in a further eight protected areas (Table 2.8). Lions were confirmed as present in only four of these, and possibly present in two more. These authors estimated that only 406 (273–605) Lions remain in West Africa, of which <250 are considered 'mature individuals'. Around 350 of the 400 (87.5%) Lions occur in the W-Arly-Pendjari (WAP) complex of protected areas, shared between Burkina Faso, Niger and Benin (Henschel *et al.* 2014a). Confirmed Lion range is estimated at 49,000 km^2, or 1.1% of the historical range in West Africa. The importance of conserving the remaining animals has been emphasized by research demonstrating their distinctiveness from other African Lions based on craniometry (Mazak 2010) and molecular genetics (Bertola *et al.* 2011, Dubach *et al.* 2013), the latter showing they are closer to Asian Lions that to those of southern and eastern Africa and contain unique haplotypes.

The largest continuous area of distribution in the region is in south-east Chad and eastern Central African Republic. Lions no longer occur in Katanga in south-eastern Democratic Republic of Congo (USFWS & WCS 2009). Twenty Lion Conservation Units (LCU) have been identified in West and Central Africa (IUCN 2006; only three are Class I, 13 Class II and four Class III (Table S2.7).

Common Leopard *Panthera pardus* NT CITES I

Formerly widely distributed across the region, but has undergone a marked range reduction in the Sahel, West African savanna and forest zones (Henschel *et al.* 2008a, Hunter *et al.* 2013). Reportedly eliminated from the coastal zone of West Africa by 1945; gone from most of the forest reserves in south-west Cameroon by the early 1980s and confirmed from only one site recently (Henschel 2009). In Gabon, densities are much higher inside PAs. Leopards have been camera trapped and tracks were recorded in the Benoué ecosystem in northern Cameroon (De Iongh *et al.* 2011); recently camera trapped in Chinko area of eastern Central African Republic (www.chinkoproject.com) and recorded in Odzala-Kokua NP, Republic of Congo (Henschel *et al*. 2014b). Recorded in Sapo NP (Liberia), Okapi Wildlife Reserve (Democratic Republic of Congo) and likely still present at many forest sites. No longer occurs in Upemba NP, southern Democratic Republic of Congo (WCS & ICCN 2009). No estimates of population size or abundance are available from any country within the region covered by the Situation Analysis.

African Golden Cat *Caracal aurata* NT (due to be uplisted to VU in 2015) CITES II

Has a disjunct distribution in the Upper Guinea Forest and the forests of Lower Guinea from eastern Nigeria through the Congo Basin into N Angola, SW Ethiopia, Kenya, Uganda, and Rwanda (Henschel *et al*. 2008b, Ray & Butynski 2013, Bahaa-el-din *et al*. 2015). It is perhaps the most poorly known species of wild cat in Africa and is not often seen in the wild due to secretive and cryptic behaviour, although field studies in Gabon and Uganda have shown that they can be locally common (Bahaa-el-din *et al*. 2015). However, they are vulnerable to snaring and skins are frequently encountered among hunters and in bushmeat markets (Ray & Butynski 2013, Bahaa-el-din *et al*. 2015); the bushmeat trade also is having an impact on many of the African Golden Cat's prey species. Protected areas where it has been recorded include: Gola Rainforest NP, (Sierra Leone), Mount Nimba Reserve and Mount Nimba Strict NR (Côte d'Ivoire, Guinea), Sapo NP (Liberia), Taï and Comoé NPs (Côte d'Ivoire), Gashaka-Gumti NP (Nigeria), Dja Faunal Reserve (Cameroon), Batéke, Ivindo, Loango, Lopé, Mayumba, and Moukalaba-doudou NPs (Gabon), Odzala and Nouabale-Ndoki NPs (Congo), Dzangha-Ndoki NP (Central African Republic) and Virunga NP (Democratic Republic of Congo) (updated from Henschel *et al.* 2008b, Ray & Butynski 2013) and Lomako Yokokala Faunal Reserve, Demoractic Republic of Congo (J. Dupain, *in litt*. 2014).

Cheetah *Acinonyx jubatus* VU CITES I

The form occurring in north-west Africa *A. j. hecki* is assessed as Critically Endangered (Durant *et al.* 2008). Formerly widely distributed in the drier biomes of West and Central Africa and in the Zambezian Woodland zone of the south. Cheetahs have undergone substantial declines across Africa and even more drastic declines in the Sahara and Sahel and in West Africa (Durant *et al.* 2008, 2014). A range-wide priority setting exercise (IUCN SSC 2012) considered that resident populations in West and Central Africa survive only in the Adrar de Ifoghas in northern Mali (contiguous with the Hoggar mountains in Algeria); the W transboundary complex (Benin, Burkina Faso, Niger), south-eastern Chad and possibly in two National Nature Reserves in Niger – Aïr & Ténéré and Termit-Tin Toumma. Numbers in all sites are considered to be low. In northern Chad, the Cheetah was not recorded in Ouadi Rimé-Oudai Achim Faunal Reserve during field surveys (Monfort *et al.* 2003), but may still be found in the Ennedi Massif (J. Newby pers. comm. in Durant *et al.* 2008). In Cameroon now regarded as extinct in the Benoué ecosystem (De Iongh *et al.* 2011).

Sand Cat *Felis margarita* NT CITES II

Distributed sporadically from the Sahara to Central Asia and Pakistan. In West Africa, it has been recorded at a very small number of sites in Mauritania and the Termit massif, Niger, though it may be under-recorded; there is no information on abundance (Mallon *et al.* 2008, Sliwa 2013).

Mediterranean Monk Seal *Monachus monachus* CR CITES I; CMS I

The global range covers the Mediterranean and north-west Atlantic, only just reaching the region covered by the Situation Analysis in northern Mauritania, where, however, the only large extant breeding colony is found at Ras Nouadhibou / Cap Blanc. It is a vagrant to Senegal and Gambia. In the early 1990s, the Mauritanian population numbered ca. 317 individuals, but an outbreak of mobillivirus caused large-

Lion *Panthera leo* status by range country

Senegal: A small relict population survives in Niokolo-Koba NP in the south-east.

Guinea: Potentially still present in Haut-Niger NP and Kankan Faunal Reserve (Henschel *et al.* 2014a).

Cameroon: Estimated that 50 individuals occurred in Waza NP in the far north and 150–250 are estimated in the Benoué complex (Benoué, Faro and Bouba Njida NPs and surrounding hunting zones in Cameroon) extending into Gashaka Gumti NP in Nigeria (IUCN 2006). Camera trap evidence was obtained in Benoué by De Iongh *et al.* (2011).

Chad: The main population occurs in Zakouma NR.

CAR: Found in a wide area of the east including St Floris-Gounda-Manovo NP, and Zémongo NP-Chinko/Mbari landscape and adjacent hunting zones.

Nigeria: Isolated populations occur in Yankari GR and Kainji Lake NP.

Gabon: Formerly occurred in the forest-savanna mosaic of the south. Considered likely extinct (Henschel *et al.* 2014b), until a young male was observed in the Batéké Plateau NP in early 2015.

ROC: Reported on the Batéké plateau (Chardonnet 2002), but no evidence of Lion presence found there by Aust & Nkulu (2005). Last recorded in Odzala-Kokua NP, but now likely extinct there (Henschel *et al.* 2014b).

Table 2.8 Reported national Lion *Panthera leo* population estimates in West and Central Africa.

Country	Chardonnet (2002)	Bauer & Van der Merwe (2004)	Henschel *et al.* (2014)
West Africa			
Guinea	27	200	?
Guinea-Bissau	10	30	0
Mali	21	50	0
Senegal	156	60	16 (0–54)
Benin	325	65	356 (246–466)
Burkina Faso	444	100	
Niger	47	70	
Côte d'Ivoire	100	30	0
Ghana	15	30	0
Nigeria	85	200	34 (23–63)
Togo	transients	0	0
Sub-total	1,230	835	406 (250–587)
Central Africa			
Cameroon	415	260	
CAR	986	300	
Chad	520	150	
DRC	556	240	
ROC	60	0	
Gabon	20	0	
Sub-total	2,553	950	NA
Total	**3,783**	**1,785**	

scale mortality and the surviving population was estimated at only 103 individuals in 1998 (Forcada *et al.* 1999). About 150 individuals occurred in 2007 (Martínez-Jauregui *et al.* 2012) and 250 in 2013 (CBD-Habitat: www.monachus.es; 15 July 2014). Monk seals were formerly killed for their skins. Today, one of the main threats to recovery is interaction with fisheries and the use of suboptimal reproduction sites (Gonzalez 2006, Gonzalez & Fernandez de Larrinoa 2013). Other threats include the destruction of, and disturbance at, breeding sites and hauling-out caves. Conservation guidelines (Johnson & Lavigne 1998) and an Action Plan (Gonzalez 2006) have been produced. The breeding colony lies within Cap Blanc Integral Reserve and a no-fishing area, part of Banc d'Arguin World Heritage Site.

Pangolins

Four species of pangolins occur in West and Central Africa. All are widely exploited for bushmeat and used in rituals and traditional medicine, where various parts of the animal, including the scales, heart, intestines and head, provide ingredients to treat a wide range of ailments and conditions (Angelici *et al*. 1999, Akpona *et al.* 2008, Soewu & Ayodele 2009). Increasing demand, rising affluence and increasing prices have driven a sharp upsurge in hunting for the international trade. The presence of African species in trade to Asia was noted in 2008 (Challender 2011) and this trade appears to be growing, particularly to China and Viet Nam: seizures to date have included scales in quantities of 1–115 kg and one seizure of 100 white-bellied pangolin skins (Challender & Hywood 2012). The overall volume of trade from Africa and the proportion originating in West and Central Africa are not currently known, but the development over the last few years of commercial-scale trade in pangolin parts, mainly scales, and involving all four species of African pangolin, between Africa and Asian markets, is an alarming trend (Challender *et al*. 2014).

More than 200,000 pangolins (mainly of Asian species) were seized between 2000 and 2013 which is likely to represent only a fraction of those being traded illegally (Challender 2014). In June 2012, the EU banned imports of White-bellied Pangolin *Phataginus tricuspis* from Guinea based on doubts about the sustainability of the trade (SRG 2012).

A meeting in Singapore convened by the IUCN/SSC Pangolin Specialist Group and Wildlife Reserves in July 2013 concluded that all eight pangolin species (four Asian, four African) were more threatened than ever by illegal trade for meat and medicinal use of their scales. These threats have escalated over the years, with illegal trade contributing significantly to the problem in part driven by the rising prices paid on the black market and rapid economic growth in Asia that has resulted in soaring demand.

The four African pangolin species have recently been reassessed as Vulnerable (two from LC and two from NT, although this uplisting is at least partly due to generation length having been under-estimated previously; IUCN SSC Pangolin Specialist Group *in litt*. 2014). CITES issues quotas for international trade (www.cites.org), but the illegal harvest and exports are considered to considerably exceed declared totals. Pangolins occur in many protected areas but not all of these confer effective protection. An action plan covering all species was recently developed (see Challender *et al*. 2014).

Long-tailed Pangolin *Phataginus tetradactyla* VU CITES II

Endemic to forests in West and Central Africa and strictly arboreal. It is thus less common in bushmeat markets than other pangolins: for example, 335 kg of this species were found compared with 2,053 g for White-bellied Pangolin and 5,019 kg of giant pangolin at five markets in Gabon (Kingdon & Hoffmann 2013a).

White-bellied Pangolin *Phataginus tricuspis* VU CITES II

Distributed in forested habitats across West and Central Africa to Angola and Zambia and is the most common pangolin species in the region (Kingdon & Hoffmann 2013b). It is intensively harvested for meat and medicine; in Cameroon, it was the fourth most common species in bushmeat markets (Fa *et al.* 2005) and the fifth most common in Equatorial Guinea (Kümpel *et al.* 2006).

Giant Pangolin *Smutsia gigantea* VU CITES II

Discontinuously distributed in moist tropical forests of West Africa from Senegal to Ghana and again from the Sanaga River across the Congo Basin (Kingdon *et al.* 2013). It formed about 10% of all pangolins in the Kisangani bushmeat markets (Colyn *et al.* 1987), but in Gabon it was twice as numerous as white-bellied pangolin and 15 times more numerous than tree pangolin (Kingdon *et al.* 2013). Fa *et al.* (1995) noted that bushmeat market surveys on Bioko were misleading as only 10% of giant pangolins taken were sold in markets. In Liberia, only 25% were sold because hunters preferred to eat the meat themselves.

Ground Pangolin *Smutsia temminckii* VU CITES II

This is a savanna woodland species that is widespread in Africa but limited to central Chad and northern Central African Republic in West and Central Africa (Swart 2013). It is known to be exploited but no figures relevant to the region are available.

White Rhinoceros *Ceratotherium simum* NT

The northern subspecies, *C. s. cottoni*, formerly ranged across southern Chad, eastern Central African Republic and north-eastern Democratic Republic of Congo (plus South Sudan and NW Uganda). Its last known population was in Garamba NP in Democratic Republic of Congo, but no animals have been seen since 2006 and no signs found since 2007 and the subspecies is now considered extinct in the wild (Emslie 2012a).

Black Rhinoceros *Diceros bicornis* CR

The Western Black Rhino *D. b. longipes* was formerly distributed across the eastern part of the Sudanian-Guinea Savanna. It was last known in northern Cameroon, but is now considered extinct (Emslie 2012b). The southern subspecies *D. b. minor* once occurred in south-east Democratic Republic of Congo, but became extinct by the end of the 1960s.

Common Hippopotamus *Hippopotamus amphibius* VU CITES II

Widely distributed in West and Central Africa, except for Mauritania and Liberia. Common Hippos are not common in West Africa where they are mostly found in fragmented populations in the lower reaches of rivers and estuaries, the Bijagós Archipelago off Guinea-Bissau, and in larger inland rivers and some lakes. The largest population of the species in West and Central Africa is probably in Faro River (J. Dupain *in litt*. 2014), but Guinea and Guinea-Bissau also have large populations. Only about 40 individuals remain in Gambia, where many were formerly shot by farmers in realiation for crop damage (Clarke 1953). In Senegal, they occur in the River Gambia upstream to Niokolo-Koba NP. Common Hippos have become rare in the Inner Niger Delta, Mali (Wymenga *et al.* 2007). In Chad, the species was common in Lake Chad in the 1950s, but numbers have since dwindled; it is still found in Zakouma NP in the south-east. In Central Africa, it is found more widely in large rivers and also in coastal areas in Gabon. The population in the region in 2004 was estimated at 8,740–14,840, excluding Republic of Congo and Chad (Table 2.9). This represents a marked recent decline. For example, an aerial census of Virunga NP in eastern Democratic Republic of Congo in 1988 showed 22,875 hippos (Lewison & Oliver 2008) yet the population for the entire country in 2004 was only 2,000–4,000. Overexploitation and habitat loss are the main threats. In Gabon, they occur along the coast and up the Ogooué River. Common Hippos were formerly widespread across Democratic Republic of Congo and most numerous in the east (Lewison & Oliver 2008), but have undergone substantial declines, as noted above.

Pygmy Hippopotamus *Choeropsis liberiensis* EN

The nominate subspecies is endemic to the Upper Guinea Forest in Côte d'Ivoire, Guinea, Liberia and Sierra Leone. The subspecies *C. l. heslopi* was recorded in Nigeria some 1,800 km to the east, but there have been no records of it since 1945. Populations have disappeared from many sites and become fragmented owing to loss and degradation of forest cover (Mallon *et al.* 2011, Robinson 2013).

Transboundary populations occur along the Cavally River between Liberia and Côte d'Ivoire (Grebo National Forest on the Liberian side and Cavally and Goin Débé Classified Forests on the Ivoirian side); in the Greater Gola landscape (Gola Rainforest National Park in Sierra Leone and proposed Gola Forest National Park in Liberia), and possibly Wonegizi (Liberia) and Ziama (Guinea).

The global population was estimated at a maximum of a few thousand individuals by Eltringham (1993) and 2,000–3,000 in the IUCN Red List (Lewison & Oliver 2008), but estimates based on extrapolations from transects using faecal counts produced a much higher figure, <10,000, for Taï NP alone (Roth *et al*. 2004). Despite methodological issues associated with extrapolation, the total population is probably larger than the earlier estimates, albeit nonetheless declining (Robinson 2013).

Table 2.9 Common Hippopotamus *Hippopotamus amphibius* population estimates in West and Central Africa (for 2004) and key sites (source: adapted from IUCN SSC Hippo Specialist Group; www.moray.ml.duke.edu/projects/hippos/country.html).

Country	Numbers[1]	Trend	PAs and other sites[2]
Benin	300–500	Declining	Pendjari NP; "W" NP; Pendjari HZ; Djona HR; Wari Maro FR; Mt. Koufee FR
Burkina Faso	500–1,000	Declining	W NP; Arly FR; Deux Bales FR; Bala BR, Soula Lake
Cameroon	500–1,500	Unknown	Benoué NP; Faro NP; Kalamaloué NP; Pangar-Djerem HR; L. Lagdo; L. Maga; Korup NP
CAR	850	Declining	Andre Felix NP; Bamingui-Bangoran NP; Manovo-Gounda-Saint Floris NP; Yata-Ngaya FR; Gribingui FR; Koukourou FR; Lobaye River
Chad	?	Stable	Zakouma NP; Lake Iro, Lake Chad, Chari River, Manda NP, Binder Lere FR; Logone River
Côte d'Ivoire	300–400	Declining	Marahoué NP; Mont Sangbé NP;River Sassandra mouth; Comoé NP
DRC	2,000–4,000	Declining	Garamba NP; Kundelungu NP; Salonga NP; Upemba NP; Virunga NP; Lomako and Maringa rivers.
Equatorial Guinea	100	Unknown	Rio Campo
Gabon	250	Declining?	Wonga-Wongue NP; Moukalaba FR; Sette-Cama FR
Gambia	40	Declining?	River Gambia NP
Ghana	400–500	Declining?	Bui NP; Digya NP; Mole NP
Guinea	1,000–2,000	Declining	Badiar NP in wet season; Haut Niger NP; tributaries of the Niger, e.g. Niandan River/Kouya branch
Guinea-Bissau	1,000–2,000	Declining	Orango Islands NP, Corubal River, Rio Cacheu NP, Bijagós Archipelago
Mali	<200	Unknown	Boucle du Baoulé NP, Inner Niger Delta
Niger	100	Declining	"W" NP; Ayorou (formerly the largest in Niger)
Nigeria	300	Declining	Kainji Lake NP; Kwiambana GR; Yankari GR
ROC	?	?	Odzala NP
Senegal	500	Stable	Niokolo-Koba NP
Sierra Leone	100	Declining	Outamba-Kilimi NP; Tiwai GS
Togo	300–500	Unknown / stable	Kéran NP; Togodo GR
Total	**8,740–14,840**		

[1] Numbers are mainly broad estimates and may refer to different time periods.

[2] BR = Biosphere Reserve; BR = Game Reserve; FR = Faunal Reserve; GS = Game Sanctuary; HR = Hunting Reserve; NP = National Park; WS = Wildlife Sanctuary.

Pygmy Hippopotamus *Choeropsis liberiensis* status by range country

Guinea: Restricted to the forest zone in the south-east where there are recent records from Ziama Biosphere Reserve, Diécké Forest Reserve, Mont Béro Reserve, and Tinzou Community Reserve, which is in the process of establishment. Pygmy hippos formerly occurred in Déré Forest on the border with Liberia but this area has been converted into farmland and a short survey by the NGO Sylvatrop in 2009 found no evidence of pygmy hippo presence (Mallon *et al.* 2011).

Sierra Leone: Klop *et al.* (2008) recorded signs inside Gola Rainforest National Park and its immediate surroundings, the main stronghold. They also occur along the Moa River, including Tiwai Island. A recent report of Pygmy Hippos along the Seli River close to Kafogo indicates that there may be other small populations in the country. Unconfirmed reports exist of Pygmy Hippos within Outamba-Kilimi NP (Mallon *et al.* 2011, Robinson 2013).

Liberia: It is assumed that Pygmy Hippos once occurred throughout the country but current distribution is restricted to the south-east and north-west, coinciding with the remaining blocks of closed forest, as well as a small part of the Nimba region in the far north. In the south-east there are confirmed recent records from Sapo NP, adjacent areas and the Dugbe River to the north; Krahn-Bassa National Forest to the north-west of Sapo NP; Grebo National Forest and sites to the south and west; and along Kia Creek in Maryland/River Gee counties, including the proposed Grand Kru-River Gee Protected Area. In 1998, Pygmy Hippo signs were abundant in the forests between the Cestos and Senkwehn rivers (Robinson & Suter 1999) and it is likely they still occur although there have been no field surveys since then. In the northwest, they occur in and around the Gola National Forest (due to be gazetted as a National Park) and along the Morro River which forms the Sierra Leone-Liberia border. Pygmy Hippos have also been recorded in Wonegizi National Forest in the north. The main populations are isolated from each other by extensive areas of unsuitable habitat (FFI & FDA 2013).

Côte d'Ivoire: Most of the original forest cover has been destroyed. By far the most important site is Taï National Park and adjacent protection zone including N'Zo Faunal Reserve. Pygmy Hippos are also present in Cavally and Goin Débé Classified Forest on the border with Liberia, and Azagny NP in the south-centre of the country (Roth *et al.* 2004, Mallon *et al.* 2011). Fragments of remaining suitable habitat across the historical distribution described in Roth *et al.* (2004) may support very small numbers.

Giraffe *Giraffa camelopardalis* LC

Giraffes were once widespread across the savanna zones of West and Central Africa, but have been severely depleted. Latest population estimates for Central Africa are: Cameroon (<660 individuals; most in Waza NP and the Benoué-Faro-Bouba Njida complex); Central African Republic (<170; in two hunting zones close to Bamingui Bangoran NP); Chad <1,000 (most in Zakouma NP, a few in the Maya Kebbi region), and Democratic Republic of Congo (<80; in Garamba NP and adjacent hunting zones) giving a total of <1,910 (Marais *et al.* 2012a,b, 2013a,b; www.giraffeconservation.org). In Zakouma NP, Chad, 934 were counted on an aerial survey in 2014 (Antonínová *et al*. 2014). In West Africa, giraffes are extirpated in Mauritania, Guinea, Senegal, Mali and Burkina Faso and survive only in Niger (which contains the only population of the West African giraffe; see below).

West African Giraffe *Giraffa camelopardalis peralta* EN

Recent studies have confirmed that this is a distinct subspecies, if not a species, and it does not occur anywhere except south-west Niger in the wild. There are two animals from Niger in zoos in Abuja, Nigeria (A. Dunn *in litt*. 2014). It survives only on the Fakara Plateau (Kouré, Fandou), Dallo Bosso and an intermediate zone in the northern Sudanian savanna zone of south-western Niger with a total range covering about 15,000 km² (Boulet *et al.* 2004, Suraud *et al*. 2012). These animals originated in Mali and ca. 15 individuals moved to Niger during the El Niño-driven drought of 1983–1984. The population numbered 50 in 1996 and had increased to ca. 220 in 2009 as a result of positive action by the government, IUCN and NGOs and awareness programmes that reduced poaching almost to zero, as well as a lack of natural predators (Suraud *et al*. 2012). Giraffes share the habitat with the local people in an unusual example of human-giraffe cohabitation. There are indications that population growth is allowing reverse movement back towards Mali (S. Regnaut, *in litt*. 2014).

Okapi *Okapia johnstoni* EN

Endemic to lowland forests of central, northern and eastern (Democratic Republic of Congo). Most of the range lies east of the Congo River, from Maiko Forest north to the Ituri Forest, Virunga NP and Mont Hoyo, then west through the Rubi, Tele and Ebola river basins, extending north towards the Ubangi River. Okapi have a much smaller range to the west and south of the Congo River, extending from the west bank of the Lomami River west to the upper Lomela and Tshuapa basins (Hart 2013). Known strongholds are the Ituri and Maiko Forests, the forests of the upper Lindi, Maiko and Tshopo basins and the Rubi-Tele region in Bas Uele (Hart 2013). Confirmed records are concentrated in and around protected areas, mainly reflecting survey effort. Insecurity in eastern Democratic Republic of Congo over the past two decades has restricted field surveys. Okapi are secretive and their occurrence can easily go undetected, especially at low densities.

Monitoring in the Okapi Wildlife Reserve (OWR) showed a 43% decline in numbers between 1995 and 2007 and a ranger patrol records suggested a further 47% decline 2008–2012. The OWR has until recently been the best protected site and the rate of decline here is likely to have been at least equalled in other parts of the range. There are reported declines or extirpations in other parts of the range and habitat loss and degradation has been ongoing since 1980 (ICCN & ZSL 2013). Based on that, the Okapi's Red List status was reassessed as Endangered in 2013 (Mallon *et al*. 2013).

An Okapi conservation strategy workshop held in Kisangani in May 2013 concluded that the greatest threats to okapi were the presence of armed groups, illegal occupation of protected areas, poaching, and habitat destruction. The OWR (14,000 km²) and Maiko NP (10,800 km²) support significant populations, but numbers in both sites have declined. A small population still occurs in the Watalinga

Forest (1,100 km^2) in the northern sector of Virunga NP, but currently receives no protection due to the presence of armed militias. Okapi have also been recorded in the nearby Mont Hoyo Reserve (200 km^2). Okapi occur in Rubi-Tele Hunting Reserve (ca. 9,000 km^2) though the precise legal status of this site is unclear, and in Abumombanzi Reserve in Gbadolite district of North Ubangi at the north-west end of the distribution), as well as the proposed Lomami NP which is currently undergoing the process of official gazettement (ICCN & ZSL and 2013). In June 2012, a group of armed poachers attacked the headquarters of the Okapi Conservation project at Epulu in the Okapi Wildlife Reserve, killing six people including two rangers, also killing 13 captive okapi that were used as 'ambassadors' to raise awareness, and destroying buildings and equipment.

Bongo *Tragelaphus eurycerus* NT

The lowland subspecies, *T. e. eurycerus,* has a disjunct distribution, ranging in West Africa from Sierra Leone to Benin and in Central Africa from southern Cameroon, southern Central African Republic, Gabon, Republic of Congo and Democratic Republic of Congo to southern Sudan. West African populations are declining throughout much of their range, although most of the central Africa populations still maintain their historical distribution (Elkan & Smith 2013). East (1999) estimated the total population at 28,000 individuals, with populations fragmented in the west and higher numbers in Central Africa. Elkan & Smith (2013) noted that these estimates were based on extrapolations so should be treated with care, but said the total population is likely to be in the thousands. East (1999) estimated that 60% of bongos occurred in protected areas, but Elkan & Smith (2013) reported that highest densities in Central Africa occurred in logging concessions. Bongo are threatened by indiscriminate snaring, as is the case with most forest ungulates, but taboos against consuming Bongo meat exist in parts of Central African Republic, Republic of Congo and Cameroon (Elkan 2003).

There are no current conservation initiatives focused on Lowland Bongo. Bongo occur in Tiwai Island reserve (Sierra Leone); Sapo NP (Liberia); Taï NP (Côte d'Ivoire); Kakum NP (Ghana); Lobeke NP (Cameroon); Dzangha-Ndoki NP (Central African Republic), Odzala and Nouabale-Ndoki NPs (Republic of Congo); Ivindo and Minkébé NPs (Gabon) Okapi Wildlife Reserve and Virunga NP (Democratic Republic of Congo) (East 1999, Elkan & Smith 2013). Bongo are documented as present in Ziama NP, and Diécké, Mont Béro and Kounonkan Classified Forests (Guinea; Brugière 2012), although they were not recorded during a rapid assessment survey of Diécké and Mt. Béro classified forests (Barrie & Kanté 2006). Bongo are also found in hunting zones in Cameroon and Central African Republic where they are a popular target of international trophy hunters.

Western Derby Eland *Tragelaphus derbianus derbianus* CR

The former range of the western subspecies (which included Mali, Guinea, Gambia and possibly E Guinea-Bissau; East 1999) is now restricted to Niokolo-Koba NP in Senegal where ca. 170 individuals may survive. Sporadic reports from Badiar area of Guinea may refer to a relict population or to animals migrating from Niokolo-Koba. Two small semi-captive breeding populations have been established in the privately owned Bandia and Fathala reserves in western Senegal and have increased to ca. 100 in total. A conservation strategy was developed at a workshop in Senegal in January 2013 (Brandlová *et al*. 2013).

The eastern subspecies *T. d. gigas* is found in Central Africa in Cameroon and Central African Republic where they are relatively numerous. In Cameroon, its distribution is centred on Bouba Njida NP, surrounding hunting zones and Benoué and Faro NPs. In Central African Republic it is still found in Zémongo NP-Chinko ecosystem and hunting zones. Giant Eland is a much sought after trophy species and hunting zones appear to provide useful buffers that contribute to its conservation.

Western Mountain Reedbuck *Redunca fulvorufula adamauae* EN

A small isolated population is confined to uplands on the Nigeria-Cameroon border. In Cameroon it occurs in the Adamaoua Mountains and in rocky areas between Faro and Bouba Njida NPs. In Nigeria it is found in the Gotel Mountains of the east, including upland grasslands within Gashaka-Gumti NP (East 1999). Based on a small sample size there may be a few hundred individuals in the NP, but it has retreated from some parts probably owing to illegal cattle grazing from the Cameroon side and poaching (Nicholas 2004b).

Buffon's Kob *Kobus kob kob* VU

Formerly widespread in the savanna zone from Senegal to Central African Republic; now extinct in Gambia, Sierra Leone and possibly Mauritania (East 1999, Fischer 2013). A total of 56,660 individuals was estimated by East (1999), but it is declining and confined to protected areas. Uganda Kob *K. k. thomasi* (LC) still survives in north-eastern Democratic Republic of Congo, in Garamba and Virunga National Parks.

Upemba Lechwe *Kobus leche anselli* CR CITES II

This isolated subspecies (formally described only in 2005 as a distinct species) is assessed as Critically Endangered due to a rapid decline in numbers; <1,000 individuals now remain (IUCN SSC Antelope Specialist Group 2008). It may still occur in Upemba NP.

Puku *Kobus vardonii* NT

In the region occurs only in south-east Democratic Republic of Congo where a few still occur in Upemba NP (USFWS & WCS 2009).

Western Klipspringer *Oreotragus oreotragus porteousi* EN

This is an isolated form of an otherwise widespread species with a restricted range in Nigeria and formerly in Central African Republic. Klipspringers occur on the rocky edges of the Jos plateau and similar habitat in Gashaka Gumti NP, where sightings and sign are reported as widespread above 1,200 m and where it is not hunted, unlike on the Jos Plateau, where it is seen in bushmeat markets (Nicholas 2004a, 2004b). It was once present in suitable habitat at two sites in the west and north of Central African Republic.

The nominate subspecies (LC) is recorded from Kundelungu and Upemba NPs in south-east Democratic Republic of Congo (East 1999); there is no recent information on its status there.

Korrigum *Damaliscus lunatus korrigum* VU

The western form of a once widespread African savanna species. Numbers are now very reduced in the region; extirpated in Mauritania, Gambia, Senegal and Mali, and possibly Togo, by overhunting and competition with cattle (Sayer 1982, East 1999). Korrigum currently survive only in the WAP complex, Waza NP and the Faro-Benoué-Bouba Njida complex in Cameroon, with a few reaching eastern Nigeria seasonally (East 1999, Chardonnet 2004). Status in Ghana unclear, but they may survive in the north. The subspecies *D. l. tiang* (LC) occurs in southern Chad and northern Central African Republic (Chardonnet 2004).

Western Hartebeest *Alcelaphus buselaphus major* NT

Once widespread across the Sudan-Guinea savanna zones from Senegal to the Logone River in SW Chad. Some 24,500 individuals were estimated by East (1999), but numbers are much lower now and it has been eliminated from most of the western savannas outside protected areas. It occurs in Niokolo-Koba NP (Senegal), the WAP complex, Mole NP (Ghana) and Yankari Game Reserve (Nigeria). The important population in Niokolo-Koba (East 1999) has declined drastically, along with several other large grazers and browsers, resulting in the encroachment of bush into former open areas, rendering the habitat unsuitable for this species. Now extirpated in Gambia.

Lelwel Hartebeest *Alcelaphus buselaphus lelwel* EN

Formerly distributed from south-east Chad and northern Central African Republic eastwards to south-east Ethiopia, Kenya and Tanzania. Like Western Hartebeest, they have undergone dramatic declines in the last 30 years especially. They are now reduced to a few protected areas, including Zakouma NP in Chad, where 2,187 individuals were counted in a 2014 aerial survey, a 24% increase in three years (Antonínová *et al*. 2014). There is no recent info from Central African Republic or Garamba NP in Democratic Republic of Congo.

Addax *Addax nasomaculatus* CR CITES I CMS I

Formerly occurred across the Sahara, including northern Chad, Mali, Mauritania and Niger. The only viable wild population (200–250 individuals) is in Termit & Tin-Toumma National Nature Reserve, Niger. This population seems to be stable, according to the data from ongoing monitoring, despite the recent development of oil exploration activities (T. Rabeil *in litt*. 2014). Small populations may survive, in Djourah, western Chad; and possibly at Majabat Al Koubra along the Mali/Mauritania border where there are regular local reports but have been no confirmed sightings for several years. However, in early March 2007, fresh tracks of about 15 Addax were seen in central Mauritania, an area where they had not been reported for over 20 years (Newby & Wacher 2008, Newby 2013). There is a large, well-managed captive population.

Scimitar-horned Oryx *Oryx dammah* EW CITES I CMS I

Formerly occurred across the Sahel and sub-desert zones; range countries within the region were: Mauritania, Senegal, Mali, Niger, Burkina Faso, Nigeria and Chad. It declined rapidly due to overhunting, drought and habitat degradation and disappeared from the wild by about 1989. In Ouadi Rimé-Ouadi Achim Faunal Reserve, Chad, >3,500 were present in up to 1978 (Newby 1980) but had dwindled to a few dozen by 1988 (Dixon *et al.* 1991). There is a large and well-managed captive population. A project to reintroduce the species into Ouadi Rimé-Ouadi AchimFaunal Reserve, Chad, is being co-ordinated by the Sahara Conservation Fund (SCF) and Environment Agency Abu Dhabi (EAD), with first animals expected to be released in 2015. A semi-captive population derived from captive-bred animals has been established in the Katané enclosure in Ferlo Nord Reserve, Senegal, with a view to eventual release into the wild.

Roan Antelope *Hippotragus equinus* LC

The Roan Antelope formerly occurred very widely in the savanna woodlands and grasslands of sub-Saharan Africa, but has been eliminated from large parts of its former range. Although not currently assessed as threatened, the species bears mentioning because, remarkably, it is one of the few species that remains locally common in West and Central Africa, while in eastern and southern Africa, the species is now rare. This is probably due to its ability to withstand illegal hunting pressures better than many other large herbivores, especially the water-dependent and more sedentary species, which are more exposed to poaching (East 1999, Chardonnet 2013). However, some populations in West Africa are in sharp decline, such as those in Comoé NP where numbers declined by about 70% between 1978 and 1998 (Fischer & Linsenmair 2001), Niokolo-Koba NP, Senegal (Galat *et al*. 1992, Renaud *et al*. 2006), and Mole NP, Ghana (Wildlife Divison 2005, Bouché *et al*. 2006). The populations in Pendjari NP, Benin (Sinsin *et al*. 2002), Cameroon and Central African Republic (Chardonnet 2013) appear to be more stable, as is the population in W Park, Niger, which may be increasing (T.Rabeil *in litt*. 2014). In Zakouma NP, Chad, 749 individuals were counted on an aerial census in 2014 (Antonínová *et al*. 2014).

Gazelles

Four species of gazelles occur across the arid zones of West and Central Africa. The impact of hunting has grown rapidly during the last 50 years due to the combination of four-wheel drive vehicles and powerful modern firearms. Uncontrolled slaughter in the Sahara and Sahel zones, including by hunting parties from the Gulf region, has caused drastic reductions in abundance and distribution of gazelles and other desert antelopes (Durant *et al*. 2012, 2014). One species of gazelle may have already disappeared from the region and a second is close to extinction in the wild.

Slender-horned Gazelle *Gazella leptoceros* EN CITES I CMS I

This is a Saharan species that has undergone extensive declines. Though it formerly occurred in northern Mali, northern Niger and northern Chad, there have been no confirmed records from the southern side of the Sahara

in recent years (Beudels & Devillers 2013; T. Rabeil, pers. comm. 2014).

Dorcas Gazelle *Gazella dorcas* VU CMS I

Widespread across Sahara and Sahel zones of Mauritania, Senegal, Mali, Niger, Burkina Faso, Nigeria, Chad and formerly Nigeria. Dorcas Gazelle numbers have been greatly depleted by uncontrolled hunting and the species is far less abundant than formerly, but it is adaptable and resilient and remains the most numerous desert gazelle in the region (Dragesco-Joffé 1993, IUCN SSC Antelope Specialist Group 2008, Wacher *et al*. 2010). Recent surveys indicate ca. 7,000 individuals in Ouadi Rimé-Ouadi Achim Faunal Reserve (Wacher *et al*. 2011).

Red-fronted Gazelle *Eudorcas rufifrons* VU CMS I

Distributed in a narrow band across the southern Sahel and northern savanna zones from Mauritania and Senegal to Chad. The population was estimated at ca. 20,000 individuals by East (1999), but some of the larger subpopulations are known to be much smaller now. It is suffering a continuing decline because of hunting and habitat loss and degradation and it occurs in scattered populations with low numbers (Scholte & Hashim 2013). It is recorded from W NP (Niger), Zakouma NP (Chad), Kalamoulé and Waza NPs (Cameroon), and Ferlo Nord reserve (Senegal). Also in Senegal, there are small populations in Boundou reserve (T. Rabeil, *in litt*. 2014) and the Tambacounda region (T. Abaigar *in litt*. 2014). Red-fronted Gazelle was listed in Appendix I of CMS at COP 11 in November 2014.

Dama Gazelle *Nanger dama* CR CITES I CMS I

Formerly widespread and numerous across the Sahel from the Atlantic coast to Sudan, west of the Nile, and in lower parts of mountain massifs in the Sahara (Hoggar, Tibesti and others); its former status north of the Sahara is unclear. Dama Gazelle has undergone a rapid decline, especially since the 1960s, due to overhunting for meat and sport and it is also affected by habitat degradation and drought. Currently, <250 mature individuals are thought to survive, in five small subpopulations, all within the region; a small semi-captive population has been established in Ferlo Nord Reserve, Senegal (RZSS/IUCN ASG 2014).

Dama Gazelle *Nanger dama* status by range country

Niger: 50–60 individuals are estimated to occur in Termit & Tin Toumma National Nature Reserve in eastern Niger. In Aïr and Ténéré NNR in the north the population may be 20–50 (Rabeil 2014).

Mali: a few were recorded at two locations in south Tamesna, in the east of the country (Lamarque *et al.* 2007); there is no recent information.

Chad: The largest remnant subpopulation is found in Ouadi Rimé-Ouadi Achim Faunal Reserve in north-central Chad, centred on an 1,100 km^2 area in the centre of the reserve; a few occur in the unprotected Manga region north of Lake Chad (Wacher & Newby 2014).

Dama Gazelle Nanger dama *(CR) in the Manga, Chad.*
© John Newby / SCF

Duikers

Fourteen species of duiker are present in the region, eight of them endemic and five near-endemic (Table 2.10). All except two inhabit moist forest and all are wholly or partially frugivorous thus playing an important role in seed dispersal. A further species *Philantomba walteri,* formerly considered a population of *P. maxwelli*, has been described from the Dahomey Gap (Colyn *et al*. 2010), but has not yet been assessed for the IUCN Red List. Duikers are heavily harvested for bushmeat throughout the region and feature prominently in bushmeat markets. The two small *Philantomba* species are especially heavily harvested but appear resilient to current harvest levels (Van Vliet *et al*. 2007). One species is Endangered and one species and one subspecies are Vulnerable (see below). The other 12 species are listed currently as Least Concern. However, snaring and shooting continue to increase in response to rising demand for bushmeat, and declines and local extirpations of several duiker species have been reported from sites across the region. Further, while some duiker species show at least some adaptability to living in disturbed habitats, many are dependent on forest habitat and may therefore be subject to the effects of habitat loss in the region. The overall status of many duikers is almost certainly deteriorating and the Red List status of some species may change during the 2015 reassessment for mammals. There are no targeted conservation programmes, but duikers occur in numerous protected areas, several species frequently co-occurring at individual sites. Detailed accounts of all duiker species are available in Wilson (2001) and Kingdon & Hoffmann (2013).

Zebra Duiker *Cephalophus zebra* VU CITES II

Endemic to the Upper Guinea Forest, occurring in high forest, adjoining secondary forest and mountain forests (in Liberia it is known as 'mountain deer'). Numbers were estimated at 28,000 (East 1999) and 15,000 (Wilson 2001).

Jentink's Duiker *Cephalophus jentinki* EN CITES I

Endemic to the Upper Guinea Forest of Sierra Leone, Liberia and western Côte d'Ivoire up to the Niouniourou River. It prefers high forest but will use adjoining areas of secondary forest. It is generally rare and densities are low compared to other duiker species, judged by frequency of occurrence in bushmeat market and camera trap records. East (1999) estimated a total population size of 3,500 and Wilson (2001) a population of 2,000.

Ogilby's Duiker *Cephahlopus ogilbyi* LC

Endemic to the region, occurring in four disjunct populations. Three subspecies (now often elevated to species level) have

Zebra Duiker *Cephalophus zebra* status by range country

Sierra Leone: Reported in Gola Rainforest National Park by Hoppe-Dominik (2013).

Liberia: Most common in in central and eastern Liberia including Sapo NP (Hoppe-Dominik 2013).

Guinea: Recorded in Ziama NP (Bützler 1994, Brugière 2012; but see Hoppe-Dominik 2013).

Côte d'Ivoire: occurs in the west up to the Niouniourou River, primarily in Taï NP (possibly 2,000) and adjacent forest reserves (Hoppe-Dominik 2013).

Jentink's Duiker *Cephalophus jentinki* status by range country

Sierra Leone: Recently recorded in Gola Rainforest National Park (Ganas & Lindsell 2010) and the Western Area Peninsula Reserve (170 km^2) just outside Freetown (Garriga & McKenna 2012). Also recorded in the Loma Mountains, Mokanji Hills and Tinyi Hills (Hoppe-Dominik 2013b).

Guinea: Listed at four sites: Ziama NP, Diécké Classified Forest, Déré Classified Forest (now highly degraded) and Mont Nimba Strict Nature Reserve (Bützler 1994, Brugière 2012) on the basis of local sightings and reports.

Liberia: Known in Sapo NP, Grebo Forest on the eastern border, Krahn-Bassa forest and along the Senkwehn River (Hoppe-Dominik 2013b).

Côte d'Ivoire: occurs in Taï NP, and Doda, Cavally-Gouin, Scio, Hana and Rapid Grah classified forests (Hoppe-Dominik 2013b).

been named, two of which, Brooke's Duiker *C. o. brookei* and the nominate subspecies are assessed as Vulnerable (IUCN Antelope Specialist Group 2008) and in CITES Appendix II. The former's distribution is restricted to the Upper Guinea Forest from eastern Sierra Leone to south-west Ghana (Kingdon 2013). It has not been recorded in Guinea (Brugière 2012). Numbers were estimated at 5,000 by East, and declining (1999). The nominate subspecies occurs on Bioko Island, and then in south-east Nigeria and south-west Cameroon, with numbers estimated at ~12,000 by East, also declining (1999). Key protected populations include Sapo and Taï NPs (*C. o. brookei*) and Korup and Cross River NPs (*C. o. ogilbyi*).

Barbary Sheep *Ammotragus lervia* VU CITES II CMS II

Distributed sporadically in mountains and rocky hills of the Sahara and northern Sahel. Within the region it occurs in Mali (Idrar des Ifoghas); Mauritania (Adrar), Niger (Aïr mountains, Termit massif); and Chad (Tibesti and Ennedi). The global population has been estimated at 5,000–10,000 individuals (Casinello *et al.* 2008, Casinello 2013). No estimates of the regional population size are available and very few field surveys have been carried out recently.

Straw-coloured Fruit Bat *Eidolon helvum* NT

The largest bat in the region and widely distributed throughout. Large roosts occur in the middle of some cities, e.g. Accra, Lomé and Monrovia. It plays an important role in pollination and fruit seed dispersal. It is heavily harvested for meat in West and Central Africa (Mickleburgh *et al.* 2009). A study in Ghana found the species traded in large numbers

Table 2.10 Duiker (Cephalophini) species in West and Central Africa[1]. Bold denotes species where data indicate an uplisting may be warranted.

Species	Range	Endemic/non-endemic	CITES	Estimated numbers (*sensu* East 1999)	Notes	IUCN Red List
Philantomba maxwelli Maxwell's Duiker	Upper Guinea Forest	Endemic	-	2,137,000		LC
P. monticola Blue Duiker	Lower Guinea Forest, Congo Basin	-	II	7,000,000	Extends to South Africa	LC
Sylvicapra grimmia Common Duiker	Savanna and rainforest-savanna transition zones	-	-	1,660,000	Widely distributed in Africa	LC
Cephalophus zebra Zebra Duiker	Upper Guinea Forest	Endemic	II	28,000		VU
C. leucogaster White-bellied Duiker	Congo Basin Forest, N of Congo River	Endemic	-	287,000	Rare	LC
C. rufilatus Red-flanked Duiker	Savanna and transition zones. Extends into South Sudan	Near-endemic	-	170,000	Extends into South Sudan	LC
C. nigrifrons Black-fronted Duiker	Congo Basin Forest	Near-endemic	-	300,000	Extends into East Africa	LC
C. ogilbyi Ogilby's Duiker	Upper Guinea Forest, Nigeria-Cameroon; Bioko; Gabon-Republic of Congo	Endemic	II	35,000 *C.o.brookei* 5,000; *C.o.ogilbyi* 12,000; *C.o.crusalbum* 18,000	Three subspecies	**LC (one ssp. VU)**
C. weynsi Weyns' Duiker	Congo Basin Forest	Near-endemic	-	188,000	Extends into East Africa	LC
C. callipygus Peters' Duiker	Congo Basin Forest	Endemic	-	382,000		LC
C. niger Black Duiker	Guinea Forest	Endemic	-	100,000		**LC**
C. silvicultor Yellow-backed Duiker	West and Central Africa forests	Near-endemic	II	160,000	Extends to N Angola, Zambia, Kenya	**LC**
C. dorsalis Bay Duiker	Upper Guinea Forest + Congo Basin Forest	Near-endemic	II	725,000	Two subspecies. Extends into Angola	**LC**
C. jentinki Jentink's Duiker	Upper Guinea Forest	Endemic	I	3,500	Endangered	EN

[1] *Philantomba walteri*, not yet assessed on the Red List, occurs in the Dahomey Gap and the Niger delta (Colyn *et al.* 2010)

Bats as bushmeat by range country

Benin: *Eidolon helvum* and other large fruit bats, such as *Epomophorus* spp., are seen in markets, although they are probably not a regular component of the diet.

Cameroon: Bat consumption is negligible, in comparison to other bushmeat, but *E. helvum* is considered a delicacy in the Bomboko area where it is sold for local consumption and to restaurants.

Côte d'Ivoire: *E. helvum* consumption was observed by one correspondent in the 1980s.

Ghana: An estimated minimum of 128,000 *E. helvum* are sold each year, but the true total is probably much larger (Kamins *et al.* 2011).

Guinea: All species of bats are hunted in caves for consumption on special occasions. Fahr *et al.* (2002) noted that cave roosts of *Rhinolophus maclaudi* in Upper Guinea were 'increasingly exploited' and *R. ruwenzorii* roosting in caves were vulnerable to exploitation. Although hunting is carried out only twice per year, a detrimental impact is likely.

Liberia: *E. helvum* is consumed and traded but is the lowest priced bushmeat item and made up only 0.25% of items markets recorded by Anstey (1991).

Mali: Bat consumption was reported at one village near Manantali Dam (Mickleburgh *et al.* 2009).

Nigeria: Halstead (1977) described the harvest of *E. helvum* at the University of Ife where they were shot on a weekly basis October–March, with approximately 12,000 individuals shot in a season, but there was no apparent impact on the colony. Adeola & Decker (1987) found *E. helvum* harvested by rural farmers during the rainy season. Bats were cheap and popular with women from Ife and surrounding areas (Mickleburgh *et al.* 2009).

ROC: Most bat meat is hunted for family consumption, although in the south-west, three out of five market surveys found *E. helvum* at a price lower than any other bushmeat (Wilson & Wilson 1991).

DRC: Colyn *et al.* (1987) tallied 2,475 *E. helvum* and *Epomops franqueti* out of a total of 73,948 items of bushmeat in Kisangani. Bats thus comprised 3.35% of items, but likely a smaller proportion of biomass. *E. helvum* is abundant seasonally in bushmeat markets in Kisangani and *Hypsignathus monstrosus* is also sold there (Mickleburgh *et al.* 2009).

Equatorial Guinea: Heymans (1994) described hunting of *E. helvum* and *Hipposideros* spp., although bats were not among the top 35 species preferred by consumers. On Bioko, *E. helvum* and *Rousettus aegyptiacus* were hunted although they were not the main bushmeat species (Fa 2000).

over a 400-km-long commodity chain that differered in some respects from other species, and suggested that typical bushmeat market surveys may under-record it (Kamins *et al*. 2011). An interview-based study revealed that hunters used several different techniques to kill bats, including shooting, netting, and catapults. Respondents held little belief of disease risk from bats with all hunters reporting handling live bats, saw no ecological value in fruit bats, and associated the consumption of bats with specific tribes (Kamins *et al*. 2014).

Rodents

There are 210 species of rodents in West and Central Africa, 10% of which are listed as threatened on the IUCN Red List (most of these having highly restricted ranges). Four species are an important source of bushmeat throughout the region, all presently listed as Least Concern.

Cricetomys emini Forest Giant Pouched Rat LC

Widely distributed in the forests of West and Central Africa and near-endemic to the region. The species is consumed throughout its range, but it is such an abundant species that this is not considered a major threat, apart from overhunting near urban centres (Ray 2013).

Atherurus africanus Brush-tailed Porcupine LC

Found in forest habitats in West and Central Africa, east to Uganda, Rwanda and Kenya. It is subject to extensive exploitation for human consumption in much of its range (being a ground-dwelling, large-sized rodent, capable of producing up to 2 kg of meat). In Gabon, Nigeria, Cameroon and Congo this is a favoured species in bushmeat markets (Jori *et al.* 1998). In Equatorial Guinea, a survey showed that the wild meat trade relied heavily on the Brush-tailed Porcupine and Blue Duiker *Philantomba monticola*, with these two species accounting for more than 50% of all carcasses brought to markets (Fa *et al.* 1995). Jori *et al.* (1998) report that the meat of this species is also often the most expensive meat in many African cities. They seem to hold their numbers except where pressure from hunting is very high, but the prevalence of this species in bushmeat markets is cause for concern, and requires careful monitoring (Hoffmann & Cox 2008, Happold 2013a).

Two other species of porcupine, Cape Crested Porcupine *Hystrix africaeaustralis* (southern Democratic Republic of Congo) and Crested Porcupine *Hystrix cristata* (Sudan-Guinea savanna zone), are likely to be susceptible to some hunting, but to a far lesser extent than Brush-tailed Porcupine (Happold 2013b, 2013c).

Thryonomys gregorianus Lesser Cane Rat LC

In the region it occurs in eastern Democratic Republic of Congo and as an isolated population in Cameroon (Happold 2013d).

Thryonomys swinderianus Greater Cane Rat LC

Occurs in West and Central Africa to Democratic Republic of Congo, north of the Congo River. This species is a favoured food item and is commonly hunted with dogs in West Africa. It is very common in bushmeat markets, and there have been numerous studies investigating the viability of farming this species to supply demands for protein in West and Central Africa. The very high hunting pressure may be causing declines near large urban centres (Happold 2013e).

2.6 Reptiles

2.6.1 Introduction

As of early 2014, 189 of the 601 reptile species present in the region had assessments published on the IUCN Red List website, most of them West African species, while a further 25 species of tortoises and freshwater turtles were assessed in 2013, giving a total of 214 species with current

Red List assessments. Of these 214, nine are Critically Endangered, eight Endangered, 12 Vulnerable; seven Near Threatened, 126 Least Concern and 52 Data Deficient (Figure S2.4). Reassessments and new assessments in several flagship reptile groups are currently under way. The total number of species assessed in the 'threatened' categories is thus 29 (13.6%).

The taxonomic situation is fluid, as the application of more sophisticated DNA analyses is uncovering cryptic species and field research in poorly known areas is also leading to the description of new species. Böhme *et al.* (2010) described a new species of gecko *Hemidactylus* in Guinea, and Ullenbruch *et al.* (2010) a new species in the Lama Hills, Benin. Research is also clarifying patterns of distribution and status at country level and developing national reptile inventories. For example, recent surveys in Central African Republic found 62 new species of reptile for the country and further extended the distribution of several species already recorded (Chirio & Ineich 2006) and a field survey in the Togo Hills of southern Ghana recorded several new species of reptiles and amphibians for that region (Leache *et al*. 2006). There are concentrations of endemic reptiles in the Cameroon Highlands and in the Katanga, south-east Democratic Republic of Congo especially in the Upemba and Kundelungu regions (Broadley & Cotterill 2004).

Reptiles are heavily harvested, for meat, skins, eggs, medicine, cultural purposes and the international pet trade. Harvest levels are heavy for some species and the extent to which they are sustainable is unclear. Groups particularly affected are marine turtles, crocodiles, pythons, monitors, tortoises and chameleons. However, the range of species exploited is much wider; 37 species of reptile were recorded on sale at the fetish market in Lomé (Togo), the largest in West Africa (Segniagbeto *et al.* 2013). Chameleons dominated the items and Puff Adder *Bitis arietans* specimens were also numerous. Venomous snakes are killed indiscriminately in parts of the region. Destruction and degradation of habitat pose a further threat, especially to species with very restricted ranges, such as in the Cameroon Highlands.

2.6.2 Species summaries

Crocodilians

Three species occur in West and Central Africa. Two are near-endemic and the third may become endemic if proposed taxonomic revisions are confirmed. Crocodiles are widely distributed across the region, with one species extending into arid zones in the north. All populations in the region are listed in CITES Appendix I. All three species are heavily harvested for skins and meat as well as for traditional medicine. Body parts in use include droppings lungs, heart, bones, teeth, and gastroliths (see Pomalégni *et al.* 2010 for further details of crocodile products and their applications). Overfishing has reduced the prey base. Incidental capture and drowning in gill nets, pollution of rivers, habitat destruction (particularly affecting forest species) also have an adverse impact. Commercial harvest on Nile Crocodile have declined as numbers fell below an economically viable level, but hunting may then switch to the two smaller species. However, persecution is not universal throughout the region and at some sites, crocodiles are venerated or actively protected, such as at the well-known Paga ponds in northern Ghana. In West Africa, sacred ponds may represent an important source of protection (Pomalégni *et al.* 2010).

Recent status summaries are available in the IUCN Crocodile Specialist Group (CSG) *Crocodile Action Plan* (Manolis & Stevenson 2010). The West Africa group of the Crocodile SG held meetings in Niger (CSG 2007) and Burkina Faso 2010 (CSG 2010) to report on status. Survey data in West and Central Africa are generally patchy and assessing the status of wild populations in the region is a high priority (Manolis & Stevenson 2010).

Nile Crocodile *Crocodylus niloticus* LC (out of date; currently undergoing reassessment) CITES I

A widespread species across Africa. Taxonomic research strongly suggests that there are two species, with populations west of the Albertine Rift separated as *C. suchus* (Fergusson 2010, Hekkala 2011). Once a decision on taxonomy has been made and confirmed, the two taxa will be assessed separately and the form occurring in West and Central Africa is likely to be Endangered (J.P. Ross, IUCN Crocodile Specialist Group, *in litt*. 2014). In West and Central Africa, it is mainly confined to coasts and large inland water bodies, but relict populations are still present in permanent pools in some mountains of the Sahara and Sahel. Survey data are generally very poor, but reports indicate that populations throughout the region have been heavily depleted. However, there are still areas where this species is abundant: for instance in southern Togo (G.H. Segniagbeto & L.M. Luiselli, unpubl.) or in Aliki Lake (Anambra State, Nigeria; E.A. Eniang, unpubl.).

Slender-snouted Crocodile *Mecistops cataphractus* CR CITES I

Near-endemic to the region, its range extends a short way into Tanzania and Zambia. Populations have become depleted everywhere due to habitat loss, illegal hunting and conflicts with subsistence fisheries. Its Red List status has recently been assessed as Critically Endangered (Shirley 2014). Surveys suggest the species is heavily depleted West Africa, west of the Cross River, but the status is somewhat better in Central Africa (Shirley 2009).

African Dwarf Crocodile *Osteolaemus tetraspis* VU (1996) CITES I

Near-endemic, its distribution extends into northern Angola. It has undergone substantial declines due to commercial bushmeat hunting and habitat loss/degradation (Eaton 2010). It is very important in the commercial bushmeat trade, because it can be transported long distances without refrigeration and it is estimated that tens of thousands are transported to urban centres for bushmeat (Eaton 2010). It is currently not considered as under severe threat and an annual harvest level of 10–20% is considered sustainable (IUCN Crocodile SG *in litt*. 2014).

Pythons

Three species occur in West and Central Africa. Royal Python *Python regius* is a near endemic to West and Central Africa,

Crocodile status by range country

Mauritania: Surveys in 2008–2009 confirmed the presence of *Crocodylus niloticus* at 60 localities in the southern mountains and their possible presence at 11 more. Twenty-seven of these sites were new, representing a 35% increase in the number of known sites (Brito *et al.* 2011). These sites consist of permanent rock pools in mountain wadis (known as *gueltas*). Sites are fragmented and small (mostly < 5 crocodiles observed). In some mountain sites they are effectively protected by the Moor ethnic group. Crocodiles also occur along the Senegal River in the south, where they are hunted for skins, meat and organs, and in Diawling in the Senegal River Delta (Brito *et al.* 2011). *Mecistops cataphractus* is considered to be extinct (Nickel 2003).

Chad: Nile Crocodile has been known to be present at Guelta Archei in the Ennedi mountains in the north-east since the 1930s and a crocodile was photographed there in 2007; reports from two sites in the Tibesti mountains are unconfirmed due to the difficulty in accessability for surveys (Brito *et al.* 2011). The species also occurs in the south, e.g. in Zakouma NP and Lake Chad (where it is declining).

Gambia: Nile Crocodile is still quite widespread (Paziaud 2010) but at very low densities and in habitat that is continuously being degraded (Ingenloff 2010). A remnant population of *Mecistops* was found in the River Gambia NP in 2008 and a very small population of *Osteolaemus* was found in *Raphia* swamp in the River Gambia NP in 2009 (Paziaud 2010). All are threatened by overfishing and incidental mortality in long-line gill nets that are set across most river channels and the mouths of creeks, and by destruction of basking and resting places through the expansion of cultivation along river banks (Ingenloff 2010). They receive some incidental protection on well-monitored chimpanzee islands in River Gambia NP (Shirley 2013).

Senegal: Nile Crocodile is widely but thinly spread and occurs along the River Gambia upstream to Niokolo-Koba NP.

Guinea-Bissau: Very little information is available, but Nile Crocodile is known to occur in coastal areas and the Bijagós Archipelago. *Mecistops* is believed to be extirpated.

Guinea: Nile Crocodiles occur in coastal areas. *Osteolaemus* occurs in the forest zone of the south-east in Ziama NP and Diécké Reserve and in gallery forests in the savanna zone (Rödel & Bangoura 2006).

Liberia: There is little recent information. Kofron (1992) reported all three species present in very small numbers at a few sites but numbers have been reduced by hunting for skins and teeth, used as good luck charms. *Crocodylus niloticus* reportedly occurs in Lake Piso Multiple Use Reserve; *Mecistops* and *Osteolaemus* occur in Sapo NP and *Mecistops* has been recorded in the Wonegizi area in the northwest.

Sierra Leone: All three species occur (Okoni-Williams *et al*. 2004). Surveys in 2013 by the Reptile and Amphibian Program–Sierra Leone (RAP-SL) confirmed the presence of the Dwarf Crocodile in the Loma Mountain and Western Area Peninsula Forest reserves, and the Nile crocodile in Port Loko Creek and the Turtle Islands (E. Aruna, *in litt*. 2014). Threats include trapping, habitat degradation and drowning in fishing nets.

Côte d'Ivoire: On a 2006 field survey in the south, *Crocodylus niloticus* was found at 10 sites, *Mecistops* at three sites and *Osteolaemus* at four sites (Shirley *et al.* 2009).

Ghana: On a 2006 survey, Nile Crocodile was found at 14 sites, *Mecistops* at three sites, including Mole NP, and *Osteolaemus* at three sites, including Owabi Wildlife Sanctuary (Shirley *et al.* 2009). *Osteolaemus* was also recorded in Kyabobo NP in the Togo Hills by Leaché *et al.* (2006). At Paga on the northern border villagers venerate the crocodiles and feed them regularly; as a result they are semi-tame and have become a tourist attraction.

Niger: Nile Crocodile is distributed over the whole country from Lake Chad to the Niger River; it is exploited for skin and meat and in some places for traditional medicine and rituals (Harouna *et al.* 2010). W National Park represents a sanctuary, and 276 individuals were counted there on a recent census though only 2% were on the River Niger itself (Djibey & Maiga 2010).

Burkina Faso: Nile Crocodile occurs in a few places in the south of the country.

Mali: Nile Crocodile occurs along the Niger River, but is now on the verge of extinction in the Inner Niger Delta (Wymenga *et al.* 2007).

Nigeria: Nile Crocodile is widespread, as is *Osteolaemus,* which is the commonest species in the south (Dore 2010). *Mecistops* is extremely rare (G.C. Akani, E.A. Eniang & L.M. Luiselli, unpubl.). Wholesale trapping and open sale of all species of crocodiles occurs, but in the Niger Delta crocodiles receive some protection in sacred pools and from the difficulty in accessing freshwater swamps and mangroves (Dore 2010). In one estimate, 5–40 Narrow-snouted Crocodiles were obtained per week, amounting to several thousand annually (Dore 2010).

Benin: the Nile Crocodile is still quite widely distributed and occurs in Pendjari NP (Ullenbruch *et al.* 2011); W Transboundary Biosphere Reserve, three classified forests and three Ramsar sites (Pomalégni *et al.* 2010). The lowest numbers are found on the borders with Niger and Nigeria where traffic in imported products and sub-products is highest; the greatest numbers occur in 'sacred pools' (Pomalégni *et al.* 2010). Over 2,000 individuals were estimated to occur in W Transboundary Biosphere Reserve by Kpéra et al. 2010b). *Osteolaemus* is found in the Vallée de Sitatunga community reserve in the south (Adje & Credi-Ong 2010) and W Transfrontier Reserve in the north, where numbers were estimated at <500 (Kpéra *et al.* 2010b). *Mecistops* was not found at 88 survey points in W Transfrontier Reserve in the north and local people did not recognise the species (Kpéra *et al.* 2010b). Crocodiles are heavily exploited in places but elsewhere venerated and 'sacred pools' have socio-cultural importance (Kpéra *et al.* 2010a, Pomalégni *et al.* 2010).

Togo: Nile Crocodile is widespread and common in all regions, including suburban Lomé (G.H. Segniagbeto & L.M. Luiselli, unpubl.). *Mecistops* is very rare and possibly extirpated, but one skull was found in 2013 in Lomé fetish market (Segniagbeto *et al*. 2013). People interviewed said that this specimen came from Kpalimé area, in south-western Togo.

Cameroon: Nile Crocodile is restricted to larger water bodies in the forest zone and savanna; it seems to be abundant on the Makone River, but is depleted or extirpated in many parts of the north due to heavy demand for the skin (Gonwouo & LeBreton 2010). *Osteolaemus* is the most common species and found in most southern forests, but is declining under pressure of hunting and habitat loss. It is abundant in in Takamanda NP on the Makone River, the western part of Mount Cameroon, Dibamba River, Dja Faunal Reserve (Gonwouo & LeBreton 2010). *Mecistops* occurs along forested rivers but is the rarest species and there are few records. There is very little information on distribution or status; viable populations may survive in Korup NP, on the Sanaga River, Bibamba River and forests along the border with Congo (Chirio & Lebreton 2007, Gonwouo & LeBreton 2010). Crocodiles are an important source of protein and they are shot, killed with machetes and trapped in wire snares (Chirio & Lebreton 2007, Gonwouo & LeBreton 2010).

CAR: Nile Crocodiles occur in the Ubangui River. *Osteolaemus* occurs in the forested zone of the south. **Gabon:** All three species occur but little detailed information is available. Populations of *Mecistops* are reported in the Ivindo and Ogoué river basins.

Equatorial Guinea: All three species occur but little detailed information is available.

ROC: All three species occur but little detailed information is available. Locally robust populations of *Mecistops* are reported in Lac Télé region.

DRC: Nile Crocodile is widespread (Fergusson 2003). *Mecistops* is recorded from Lake Upemba, Lake Mweru and the Luapula River in the south-east (Woodley & Cotterill 2004) and it is suspected there may be significant populations elsewhere.

its distribution extending into Southern Sudan and western Uganda. African Rock Python *P. sebae* is widely distributed in sub-Saharan Africa. Southern Rock Python occurs in south-eastern Democratic Republic of Congo (regarded by some authorities as a subspecies of *P. sebae*). Pythons are widely hunted for meat, skins and traditional medicine and are exported in large numbers for the international pet trade. Some communities in Ghana and Nigeria hold pythons sacred or have taboos against molesting them (Gorzula *et al.* 1997, Eniang *et al.* 2006). *Python regius* and *P. sebae* are among the five most intensively traded python species worldwide (though the total number of pythons exported from Southeast Asia is far higher than from Africa). Figures from the CITES trade database suggest that ca. 30,000 pythons are exported annually from five countries in the region (Benin, Cameron, Ghana, Nigeria, Togo), exclusively for the pet trade and with numbers of *P. regius* considerably exceeding those of *P. sebae* (Luiselli *et al.* 2012). There is no estimate of the scale of the illegal trade or of the number taken for local use. Exports have declined since 2002 partly due to excessive production of ranched animals and over 35 years the total trade in wild caught and ranched pythons has been below the established quotas, though unexplained declines in *P. regius* populations inside some protected areas have been reported (Reading *et al.* 2010). Heavy trade in skins was reported 25 years ago (Luxmoore *et al.* 1988), causing some local extirpations (Auliya & Schmitz 2010). Large numbers of pythons were seen in in all bushmeat markets visited in southern Benin (Ullenbruch *et al.* 2010).

Tortoises and Freshwater Turtles

Twenty-eight species occur in West and Central Africa (Table 2.11). Three countries are among the top 25 globally for species diversity in this group: Democratic Republic of Congo (14th, 19 species), Republic of Congo (20th, 14 species) and Gabon (25th, 12 species) (Turtle Taxonomy Working Group 2014). A workshop in held in Lomé, Togo in August 2013, assessed 43 African species for the IUCN Red List, resulting in uplisting of several species. The workshop concluded that sharp increases in Red List status from habitat loss and targeted exploitation for bushmeat and consumption in East Asia was a cause of great concern. The workshop assessed 26 out of the 28 species in West and Central Africa, and 40% of these were assigned to a threatened category (Table 2.11). Almost all species in West and Central Africa are subject to uncontrolled, intensive exploitation for food and traditional medicine, and some species are exported in large volumes for the international pet trade. A few of the smaller species may escape heavy exploitation or are consumed only incidentally (e.g. *Pelusios adansonii*; Bour 2008). At a few sites (e.g. in Nigeria), local communities venerate tortoises (Luiselli 2003). All softshell turtle species have become increasingly targeted for food.

Luiselli *et al.* (2013) surveyed nine bushmeat markets in the Niger Delta during 1996–2002 and 2011–2012. The number of traded chelonians significantly decreased, with two species (*Trionyx triunguis* and *Cyclanorbis elegans*) having disappeared completely from the market and one other (*Kinixys erosa*) that had almost disappeared. Three *Kinixys* species were observed on sale in markets in Lomé by Seniagbeto *et al*. (2013) and at least one species has been found in traditional medicine shops markets in China and Hong Kong, indicating that international trade may present an emerging threat. An action plan for African species is under development.

Home's Hinge-back Tortoise *Kinixys homeana* CR (2013 unpublished reassessment) CITES II

Distributed across coastal West Africa to Cameroon and Equatorial Guinea, with outlying populations possibly occurring in eastern Democratic Republic of Congo (this needs confirmation). It is a moist forest specialist that does not occur in plantations or heavily altered forests. Hence, this species is undergoing a rapid decline due to habitat loss, but also to intensive hunting and exports for the pet trade. It was considered unlikely that it could withstand existing levels of pressure for more than 2–3 generations (15 years) by Luiselli *et al.* (2006). The annual harvest was estimated at 236,532 individuals, representing ca. 5.6% of the total population, but these figures were based on surveys in national parks, with low human density and since such areas cover <3% of the range, the real total harvested must be far higher (Luiselli & Diagne 2013). Surveys in bushmeat markets in southern Nigeria in 2013 found that the species was much less common than 10 years earlier, and was completely absent at two markets in the Niger Delta where it was formerly common (Luiselli *et al*. 2013). It was recently reassessed as Critically Endangered (IUCN SSC Tortoise and Freshwater Turtle Specialist Group *in litt*.).

Forest Hinge-back Tortoise *Kinixys erosa* EN (2013 unpublished reassessment) CITES II

Occurs throughout the region in forested habitats and is threatened by exploitation for food and by habitat degradation. It has a much wider distribution range than *K. homeana*. Compared with the former species, it appears more abundant in hilly and montane forests (L.M. Luiselli & T. Diagne unpubl.). This fact is important from a conservation point of view because it minimizes the effects of habitat loss that, in West Africa, is essentially deforestation in the lowlands. It was recently reassessed as Endangered (IUCN SSC Tortoise and Freshwater Turtle Specialist Group *in litt*.). Exactly as for *K. homeana*, surveys in bushmeat markets in southern Nigeria in 2013 found that the species was much less common than 10 years earlier (Luiselli *et al*. 2013).

Bell's Hinge-back Tortoise *Kinixys belliana* VU (2013 unpublished reassessment) CITES II

This smaller tortoise species is subject to harvest for consumption and the international pet trade.

Speke's Hinge-back Tortoise *Kinixys spekii* (DRC only) VU (2013 unpublished reassessment) CITES II

This smaller tortoise species is subject to harvest for consumption and the international pet trade.

Western Hinge-back Tortoise *Kinixys nogueyi* VU (2013 unpublished reassessment) CITES II

This is a widespread species in Guinea savannas and borders of gallery forests, sometimes also occurring in mature forest areas. It is regularly harvested for food in Ghana, Benin,

Nigeria, and Cameroon, and also heavily traded for the pet industry, with exports from Togo, Ghana and Benin. It is the most commonly traded species in some markets in Lomé (Segniagbeto *et al*. 2013). There is evidence that this species is declining, although not at the same higher rates as the two forest species.

African Spurred Tortoise *Centrochelys sulcata* EN (2013 unpublished reassessment) CITES II

This huge species has a very wide geographic range in the dry savannas and Sahel regions of Africa, but has a dramatically scattered area of occupancy, with all wild populations being constituted by just a few individuals. Indeed, this species appears to be extirpated in Cameroon (Chirio & LeBreton 2007), and appears to be exceedingly rare in Nigeria, where it occurs in a very few sites in the extreme north of the country (F. Petrozzi, G.C. Akani, E.A. Eniang & L.M. Luiselli, unpubl.). One main problem in assessing the current status of this tortoise species is that many are kept as semi-captives in Sahelian Africa, and they can easily escape and be observed in apparent wildness. Another problem is the social and political turbulence in much of the Sahel that limits safe scientific research.

Nubian Flapshell Turtle *Cyclanorbis elegans* CR (2013 unpublished reassessment)

This is a very large softshell species that occurs only in large rivers and wide water bodies of West and Central Africa. Its distribution is very scattered, occurring in Ghana, Togo, Benin, and Nigeria. Recent records for this species are very few (less than five in the last 15 years), and this suggests that this species may be on the brink of extinction. Potential threats are hunting of adults for food and consumption of eggs by humans, and perhaps also habitat loss and pollution, especially in Nigeria. In theory, it is likely that some of the same conservation strategies currently used to preserve the giant softshells in Asia, including captive breeding in farms, could work also for this species, but more research is needed.

Senegal Flapshell Turtle *Cyclanorbis senegalensis* VU (2013 unpublished reassessment)

This is a mid-sized species that occurs in large rivers and water bodies, but also in marshes and ponds, of West and Central Africa. Its distribution is scattered, but relatively widespread in Ghana, Togo, Benin, and Nigeria. Threats are hunting of adults for food and consumption of eggs by humans, and maybe also habitat loss and pollution, especially in Nigeria. Ghana, Togo and Benin also export this species for the international pet trade, and this should be monitored in years to come.

African Softshell Turtle *Trionyx triunguis* VU (2013 unpublished reassessment)

This is a very large softshell species that occurs on sea coasts and large rivers and estuaries. It is exceedingly rare in most of West Africa (e.g., in Togo and Nigeria; G.H. Segniagbeto & L.M. Luiselli unpubl.), but surprisingly abundant in Gabon (L. Chirio unpubl.). Recorded in the Sierra Leone River estuary and the Sherbro River Estuary in 2013 (E. Aruna, *in litt*. 2014). Böhme *et al*. (2011) recorded only the second instance of the species in Guinea, in Ziama (the first record being from Haut Niger). Threats are hunting of adults for food and consumption of eggs by humans, and maybe also habitat loss and pollution, especially in Nigeria. In this latter country, the species is found mainly in the River Niger Delta, where oil spills are devastating some of its primary habitats. In West Africa, the species is probably regionally EN or even CR, but given its huge distribution (occurring also in eastern Africa and in the Mediterranean basin) is listed as Vulnerable globally.

African helmeted and mud turtles *Pelomedusa subrufa, Pelusios castaneus, Pelusios cupulatta, Pelusios gabonensis* LC (2013 unpublished reassessments)

Common and widespread species; little conservation concern at the global scale. However, populations can be locally depleted or even extirpated due to overhunting or habitat pollution. Ghana, Togo and Benin annually export high numbers of these turtles for the pet trade, but there is no evidence that this trade is unsustainable at the present time. However, *Pelomedusa subrufa* appears a complex of many species according to recent molecular analyses, and this fact may introduce some conservation issues in years to come.

West African Black Mud Turtle *Pelusios niger* NT (2013 unpublished reassessment)

This is a mud turtle species that is linked to streams and water bodies in the forested regions of coastal West Africa. Most of its natural habitat is currently under heavy exploitation and pollution (for instance, oil spills and deforestation in the River Niger Delta region of Nigeria), and this may introduce a potential threat for this species in the future. However, the species is currently still abundant. It is eaten and hence heavily traded in bushmeat markets, especially because of the large body size compared with other mud turtle species.

Chameleons

Twenty-nine species of chameleon occur in West and Central Africa. There is very high diversity in Cameroon with 14 species, including five endemics in the highlands (Barej *et al.* 2007). There are other very restricted-range species, e.g. *Chamaeleo necasi* which is endemic to relict hill forests in Benin and Togo (Ullenbruch *et al.* 2011). Chameleons are heavily exploited for the international pet trade and for use in traditional medicine and rituals. Chameleons made up >75% of items on sale at the fetish market in Lomé (Togo), the largest in West Africa (Segniagbeto *et al*. 2013). Chameleons are also threatened by destruction and degradation of forests. Togo dominates the chameleon trade in West and Central Africa and along with Benin is the main source of ranched chameleons (Carpenter *et al*. 2004). A review of the global trade in chameleons listed 13 species and a total of 304,642 chameleons exported from four countries in the region 1977–2001: Togo (205,210 individuals); Cameroon (40,862); Benin (31,849) and Ghana (26,7621) (UNEP-WCMC 2010). An unknown proportion of these were captive-bred.

Chamaleo pfefferi is endemic to the Cameroon Highlands. Gonwouo & Rödel (2008) noted that collection around Mount Manengouba for the pet trade had already led to marked

declines of this species. Some populations of *Chamaeleo qudricornis gracilior* in mountain forests of Cameroon have also almost disappeared because of exports for the international pet trade. Hofer *et al*. (2003) said that habitat loss and degradation from logging were the main threats to this species. Fa *et al*. (2006) reported that weak governance and corruption were factors in the high volume of illegal trade in reptiles in Cameroon.

Monitor lizards

Four species, *Varanus griseus, V. niloticus, V. exanthematicus,* and *V. ornatus*, are found in West and Central Africa. All are currently assessed as Least Concern or are not evaluated on the IUCN Red List. All four species are included in CITES Appendix II. Monitors are heavily exploited for their skins, meat and the pet trade. On the CITES trade database, global exports of 1.4 million monitors from 42 species were reported for the period 1975–2005. However, exports of skins for the leather trade were estimated at 2.3 million over the same period (Pernetta *et al.* 2009). In 1975–2005, 647,600 *V. exanthematicus,* 309,759 *V. griseus,* 100 *V. niloticus* and six *V. ornatus* were exported. The volume of illegal trade is unknown. Benin, Ghana and Togo are three of the four countries in Africa exporting the highest numbers of monitors (Table S2.8). Harvest levels of monitors were already regarded as high and unsustainable by Luxmoore *et al.* (1988). In the savanna zone of northern Cameroon, *V. niloticus* is consumed or hunted for meat by some communities but the species was not regarded as in danger by Chirio & Lebreton (2007). *Varanus niloticus* is seen in markets in Benin much more commonly than *V. ornatus,* which is a forest species (Ullenbruch *et al.* 2011). One study reported in Pernetta (2009) noted that in coastal Ghana the harvest level was 50%.

Marine turtles

Five Atlantic species of marine turtles occur in the region from Mauritania to the Republic of Congo (Figure 2.3). All are assessed in a Threatened category on the IUCN Red List at the global level (Table 2.12). However, the relevance of global Red List assessments to sea turtles has been questioned, due to wide variation in trends among subpopulations and a lack of baseline data on others (Seminoff & Shanker 2010) and there is a consensus within the IUCN SSC Marine Turtle Specialist Group that regional level assessments are more appropriate. Regional Management Units (RMU) for all marine turtle species were identified by Wallace *et al*. (2010) (see Table 2.12). The Leatherback has been reassessed on the basis of the RMU approach and is now globally classified as Vulnerable since 2013. The South-east Atlantic

Table 2.11 Tortoises and freshwater turtles occurring in West and Central Africa indicating provisional, unpublished IUCN Red List status (source: taxonomy and provisional listings follow Turtle Taxonomy Working Group 2014) and listing on the CITES Appendices (as of 14 September 2014).

Species		Regional range	IUCN Red List category (provisional)	CITES
Mauremys leprosa	Mediterranean Pond Turtle	Mauritania	NE	II
Centrochelys sulcata	African Spurred Tortoise	Senegal to CAR	EN	II[2]
Kinixys belliana	Bell's Hinge-back Tortoise	CAR, DRC	VU	II
K. erosa	Forest Hinge-back Tortoise	West and Central Africa	EN	II
K. homeana	Home's Hinge-back tortoise	West and Central Africa	CR	II
K. nogueyi	Western Hinge-back Tortoise	Gambia to CAR	VU	II
K. spekii	Speke's Hinge-back Tortoise	DRC	NT/DD[1]	II
Stigmochelys pardalis	Leopard Tortoise	DRC	LC	II
Cyclanorbis elegans	Nubian Flapshell Turtle	Ghana to Chad	CR	-
C. senegalensis	Senegal Flapshell Turtle	West Africa	CR	-
Cycloderma aubryi	Aubrys Flapshell Turtle	Central Africa	VU	-
Trionyx triunguis	African Softshell Turtle	Benin to DRC	VU	-
Pelomedusa subrufa	Helmeted Turtle	West and Central Africa	LC	-
Pelusios adansonii	Adanson's Mud Turtle	Senegal to CAR	LC	-
P. bechuanicus	Okavango Mud Turtle	Southern DRC	LC	-
P. carinatus	African Keeled Mud Turtle	DRC, ROC, Gabon	LC	-
P. castaneus	West African Mud Turtle	West and Central Africa	LC	-
P. chapini	Central African Mud Turtle	Central Africa	LC	-
P. cupulatta	Ivory Coast Mud Turtle	West Africa	LC	-
P. gabonensis	African Forest Turtle	Central Africa	LC	-
P. marani	Gabon Mud Turtle	Gabon, ROC	DD	-
P. nanus	African Dwarf Mud Turtle	DRC	DD	-
P. niger	West African Black Mud Turtle	Nigeria to Gabon	NT	-
P. rhodesianus	Variable Mud Turtle	DRC, ROC	NE	-
P. sinuatus	Serrated Hinged Turtle	DRC	LC	-
P. subniger	East African Black Mud Turtle	DRC	LC	-
P. upembae	Upemba Mud Turtle	Endemic to SE DRC	DD	-
P. williamsi	Williams' Mud turtle	DRC	LC	-

[1] Awaiting further information
[2] Zero quota for wild-caught animals

population of Leatherback, which occurs along the coast of most of West and Central Africa, has been assessed as Data Deficient because no trend data for the largest breeding colony (in Gabon) are available (Tiwari *et al*. 2013).

Sea turtles and their eggs are important sources of food and income, and villagers in some places depend on them to supplement their fishing and crop harvests. In areas with large turtle aggregates, such as Green Turtle feeding or nesting grounds (Equatorial Guinea, Gabon), organised market systems have developed around exploitation of meat, eggs and other products. Demand from large cities has driven more intensive harvests (Formia *et al.* 2003, Girard *et al*. 2014). In the Bay of Corisco, off Equatorial Guinea and Gabon, Green Turtles are actively hunted with harpoons when feeding in seagrass beds.

Turtle products are used in traditional medicine, voodoo, and lucky charms, while the carapace is used to make statuettes and other souvenirs. Powdered skull and bones, blood, organs, male genitalia and fat have a range of medicinal uses, while the flipper claws are used as lucky charms. Some ethnic groups do not interfere with protected turtles, and for the Adan people of Ghana, killing turtles is taboo (Fretey *et al.* 2007).

Significant non-breeding sea turtle habitats in the region include: Green Turtle feeding grounds in Banc d'Arguin, Mauritania (Fretey 2001) and Corisco Bay, Equatorial Guinea/ Gabon (Formia 1999, Formia *et al.* 2003). There is also an important Green Turtle feeding ground at Pointe Indienne in the Republic of Congo (Girard *et al*. 2014). There are Olive Ridley nesting and feeding grounds throughout the Gulf of Guinea (Dontaine & Neves 1999, Fretey 1999, 2001, Tomás *et al.* 1999); and Hawksbill habitat in Equatorial Guinea and Cameroon (Fretey *et al.* 2002). The only significant nesting ground for Hawksbill in West and Central Africa is São Tomé (A. Girard *in litt*. 2014) which lies outside the area covered by the Situation Analysis.

In May 1999, the Convention on the Conservation of Migratory Species of Wild Animals (CMS) organized an international conference for the conservation of sea turtles of the Atlantic coast of Africa in Abidjan, Côte d'Ivoire, with support from the French government, IUCN-France and WWF-West Africa. A Memorandum of Understanding on regional co-operation on sea turtle conservation was also developed. In

Table 2.12 Marine turtles breeding in West and Central Africa.

Species	IUCN Red List	Regional Management Unit[1] with corresponding IUCN Red List category where available
Hawksbill *Eretmochelys imbricata*	CR	Atlantic East; Atlantic South-west
Leatherback *Dermochelys coriacea*	VU	Atlantic South-east (DD); Atlantic North-west (LC)
Green *Chelonia mydas*	EN	Atlantic East; Atlantic South-central
Loggerhead *Caretta caretta*	EN	Atlantic North-east
Olive Ridley *Lepidochelys olivacea*	VU	Atlantic East

[1] *sensu* Wallace *et al.* (2010)

Figure 2.3 Distribution of Green (A), Leatherback (B), and Olive Ridley (C) turtles along the Atlantic coast of Africa. The thick line represents the northern and southern limit of the distribution area of regular nesting activities for each species. Numbers refer to average yearly nesting individuals. Disc size represents the average yearly nest number on a logarithmic scale in major nesting areas (different scales for each map due to differences in average nest number between species) (source: map courtesy of Alexandre Girard – Renatura France – Rastoma).

May 2002, a regional conservation plan for sea turtles was developed, which applies to all countries ranging from the Straits of Gibraltar to the Cape of Good Hope, including all the coastal countries of West and Central Africa. This CMS programme is complemented by Programme Kudu (the vernacular name for sea turtle in several African languages), an umbrella organization aimed at co-ordinating and supporting the activities of national groups In turn, Kudu was divided into three networks: TOMAO (Tortues Marines d'Afrique de l'Ouest) from Mauritania to Guinea; WASTCON (West Africa Turtle Conservation Network) from Sierra Leone to Nigeria, and PROTOMAC (Protection des Tortues Marines d'Afrique Centrale) from Cameroon to Republic of the Congo. PROTOMAC no longer operates and is being replaced by RASTOMA, a new network for Central African sea turtle conservation. A regional office and database have been established in Libreville, Gabon, with assistance from Coopération Française and the EU's ECOFAC programme. USFWS programme of grants and Spain-UNEP LifeWeb Sea Turtle Marine Protected area Network covers Guinea, Sierra Leone and Cape Verde. www.spain-unepforpas.org

Marine turtle status by range country

Mauritania: surveys are being conducted to verify reports of Green and Loggerhead Turtle breeding along the 750 km of coast (USFWS 2011).

Senegal: nine Green Turtle nesting beaches were discovered in the Saloum Delta in 2007; Green Turtles also nest at the mouth of the Senegal River in the north of the country.

Guinea-Bissau: There are significant Green Turtle nesting beaches in the Bijagós Archipelago (Catry *et al.* 2002). Around 7,000–9,000 Green Turtle nests are laid per year at the globally important site of Poilão Island, with a few hundred more on surrounding islands. Informal interviews all over the coastal zone suggest that sea turtle populations have markedly declined within living memory (Catry *et al.* 2002, 2009).

Sierra Leone: All five species nest, with the highest numbers on the Turtle and Sherbro Islands. Olive Ridleys nest on almost all nesting beaches while most Leatherbacks use beaches on the Turtle and Sherbro Islands. The Reptile and Amphibian Programme-Sierra Leone (RAP-SL) is working with locals on nesting beach and bycatch monitoring (E. Aruna, *in litt*. 2014).

Liberia: Preliminary surveys showed heavy levels of harvest annually (Siakor *et al.* 2000). Green, Leatherback, Loggerhead and Olive Ridley Turtles all nest. In south-east Liberia, turtles nest all along the coast from Sinoe to Maryland county where a survey showed that >95% of nests were poached and there was a thriving market for turtle meat and products in the towns of Greenville and Harper (Liberia Sea Turtle Project 2003).

Côte d'Ivoire: Leatherback and Olive Ridley Turtles breed and Green Turtle does so sporadically. Adults and eggs are extensively harvested for consumption, with up to 100% of eggs taken at some sites and estimates of many hundreds of adults killed annually (Peñate *et al.* 2007). There may be 700 nests of Leatherback Turtle along the 18 km of Mani beach (USFWS 2011).

Benin: Turtles are not actively hunted but there is some artisanal use of turtle oil, meat and shell from incidental mortalities (Dossa *et al.* 2007).

Equatorial Guinea: Bioko Island has one of the most important Leatherback breeding colonies in West Africa and Green Turtles also nest in large numbers; Olive Ridleys and Hawksbill nest in small numbers, and there are important beaches at Rio Campo on the mainland (Butynski, 1996, Tomás *et al.* 1999, 2010, Fortes *et al.* 1998, USFWS 2011). In 2006–2010, 2,767 Leatherback females were estimated (Rader *et al.* 2006). On Bioko Island, Equatorial Guinea, the mean number of nests recorded on five nesting beaches monitored between 2000/2001 and 2004/2005 was 3,896 individuals (2,127–5,071) (Rader *et al.* 2006, Tomás *et al.* 2010).

Gabon: The largest Leatherback breeding colony in the world is centred on Gabon, extending into ROC, with up to 30% of the global population and 40,000 nesting females estimated by Witt *et al.* (2011) and 47,000 by WCS (2013; www.wcs.org/saving-wild-places/ocean/congo-basin-coast-seascape.aspx). Green, Hawksbill and Olive Ridley Turtles also breed. All species are threatened by collection of eggs and adults, incidental mortality in fishing nets, and habitat disturbance and degradation, such as pollution, development, erosion, lighting, debris and logs. The Gabon Sea Turtle Partnership, or Partenariat Tortues Marines du Gabon, was created in 2005 as a network of all sea turtle projects in Gabon (Gabon Sea Turtle Partnership 2013; www.seaturtle.org). The government designated two national parks in 2002, to protect globally important nesting beaches. Five protected areas safeguard important sea turtle habitat: Pongara NP, Akanda NP, Loango NP, the Gamba Complex of Protected Areas (including Moukalaba-Doudou NP) and Mayumba National Marine Park which borders Conkouati-Douli National Park in ROC. Gabon protected all sea turtles in 2011.

ROC: Olive Ridley and Leatherback Turtles nest along 170 km of coast, of which c. 60 km lies within Conkouati-Douli NP (CDNP). There were 402 Leatherbacks and 302 Olive Ridleys on 37 km of patrolled beach in CDNP 2005–2006. On sandy beaches stretching south to Conkouati-Douli NP, Renatura has undertaken nest monitoring of most of the suitable sites in the nesting season (from September to March) since 2003 (Girard & Breheret 2013). At sites that are not monitored or patrolled, most or all eggs and adults are harvested. Trawl nets, artisanal gill nets and beach seine nets also present a threat, especially to breeding females (Bal *et al.* 2007). Breeding female Leatherbacks numbered c. 150 individuals in 2003–2004, increased to 450 in 2005–2007 and declined to just under 50 by 2009–2010, while Olive Ridleys declined from ca. 600 to ca. 300, despite protection efforts (Girard & Breheret 2013).

DRC: There are turtle breeding beaches along the 40 km strip of Atlantic coast but few details of the number breeding are available. Kashita *et al.* (2014) reported 85 Olive Ridley, 37 Leatherback and 8 Green Turtles harvested at one site. Olive Ridley nests on a regular basis at a low level (1–2 nests/km of beach/year) and more sparsely some Leatherbacks can be observed nesting on the northern part of the coastline, mainly at Tshiende beach. Bycatch surveys revealed the presence of juvenile green turtles, and anecdotally Hawksbill and Loggerhead (the two last at juvenile stages) (Mbungu & Girard 2013).

Angola (Cabinda): Leatherback and Olive Ridley breed, Green Turtle is unconfirmed (Weir *et al.* 2007).

2.7 Freshwater fishes

The status and distribution of freshwater biodiversity in West and Central Africa, including fishes, were recently assessed in an exercise by IUCN's Freshwater Biodiversity Unit (Smith *et al*. 2009, Brooks *et al*. 2011). Information from those two reports is summarized here. The freshwater assessments defined the two regions on the basis of catchments and freshwater ecoregions, so their boundaries differ somewhat from those used in this Situation Analysis. In the freshwater assessments, Western Africa excludes much of northern Mauritania and part of Mali, but includes Chad and parts of Central African Republic and Cameroon (as well as small areas of Algeria and Sudan). Central Africa also covers parts of north-east Angola and north-east Zambia.

In West Africa, 553 species of freshwater fish have been recorded (including 10 introduced species) from 170 genera and 57 families; 55.4% of these are endemic to the region (Laleye and Entsua-Mensah 2009). Smith *et al*. (2009) assessed 521 species for the IUCN Red List. Sixteen are categorized as Critically Endangered, 44 Endangered, 77 Vulnerable, 56 Near Threatened, 273 Least Concern and 77 Data Deficient (Figure S2.5A). Thus 137 species (26.3%) are in a threatened category, a relatively high proportion. Most of the Data Deficient species are known from only a few localities and/or the threats are unknown. Areas with the highest species richness are: the Niger Delta; lower Chari River (Lake Chad Basin); upper Niger River; coastal streams from Guinea to western Liberia; lower coastal drainages of south-east Cote d'Ivoire; upper Black Volta (Burkina Faso); Pra River (Ghana), Ogun River (western Nigeria), and upper and lower Cross River (Nigeria-Cameroon). The two main centres of endemism are upper Guinea (coastal drainages of Guinea, Sierra Leone and western Liberia) and the Niger Delta. Other areas containing concentrations of endemic species are: the upper part of the Inner Niger Delta; coastal drainages of eastern Cote d'Ivoire and western Ghana; and the Ogun River of western Nigeria. The Niger Delta also contains the highest concentration of threatened species in West Africa and it follows from the above that this area holds great importance for freshwater fish conservation.

In Central Africa, 1,327 species of freshwater fish are considered to occur (Stiassny *et al*. 2011). Of these, 1,207 have been assessed for the IUCN Red List, of which 933 (77.3%) are endemic. Fish diversity in Central Africa is very high compared with the rest of sub-Saharan Africa (except for the hyper-diverse Great Lakes region). Twenty-six species are categorized as Critically Endangered, 64 Endangered, 90 Vulnerable, four Near Threatened, 749 Least Concern and 274 Data Deficient (Figure S2.5B). In total, 180 species are in a threatened category (14.9%), a much lower proportion than in West Africa. Out of the 26 species listed as Critically Endangered, 23 (21 cichlids) occur in the Western Equatorial Crater Lakes freshwater ecoregion, which consists of 36 small lakes in the Cameroon Highlands, underlining once again the high importance of this area for biodiversity conservation. The highest levels of species richness are found along the main channels of the Congo and Ubangui rivers. The highest numbers of endemics also occur in the main channels of the Congo, Ubangui/Uele rivers in Democratic Republic of Congo and the Sangha River in Republic of Congo.

A female Largetooth Sawfish Pristis pristis *(CR) with a total length of 5.1 m landed at Kartong, Gambia, on June 1975. Once common in the Gambia River during 1970s and found several hundred kilometres upriver, extending into Senegal, sawfish are now on the verge of extinction.* © Nigel Downing

The large number of species (23%) assessed as Data Deficient indicates that much remains to be learned about the freshwater fish fauna of Central Africa. Ongoing research continues to produce new findings; for example, a project in Salonga National Park, reported finding 152 species of fish, including potentially new species that are under investigation (Monsembula & Stiassny 2013).

A few chondrichthyan species are also known to occur in freshwater habitat (e.g., in rivers and lakes), and two species of sawfish, the Smalltooth Sawfish *Pristis pectinata* and Largetooth Sawfish *P. pristis*, both Critically Endangered, occur in the region. Formerly widespread, both have declined dramatically due to incidental capture, particularly in trawls and gillnets (Harrison & Dulvy 2014, Leeney & Downing in press). The former species is known from one confirmed record for the region in the last 10 years (Sierra Leone in 2003), with unconfirmed records (*Pristis* sp.) from only two other countries (Guinea-Bissau in 2011, Mauritania 2010). The latter species is known only recent unconfirmed records (*Pristis* spp.) from only two countries (Guinea-Bissau in 2011, Mauritania in 2010). Sawfish appear on the West African CFA franc (both notes and coins) and have a deep cultural history (Robillard & Séret 2006), but at present are in danger of disappearing from West Africa.

2.8 Conclusions

A basic issue encountered in compiling this chapter is the variability in the quantity and quality of information available. Data on presence and population size are available for many species, especially larger mammals and those that are more straightforward to detect. However, a lot of ecological data that has been collected is not accessible, either because it has not been released by enviromental impact assessment consultants, commercial companies, agencies

and researchers, or because reports are stored on paper or in a non-standard format. Collating and comparing data are hindered by variations in methodology, study design and observer effort, while population estimates are often based on raw counts, so confidence intervals cannot be calculated. There are few examples of robust monitoring programmes in place – apart from MIKE – at sufficiently wide spatial and temporal scales to enable reliable assessments to be made of the rate and scale of species declines (see also Chapter 6). Nevertheless, the available data are sufficient to show the main regional trends.

In summary, one species (Scimitar-horned Oryx) has already become Extinct in the Wild, while others, such as the two rhinoceros species, have disappeared from the region entirely. Several extirpations and possible extirpations of large mammals that have occurred at national level are shown in Table 2.13. In fact, across West and Central Africa, there is a consistent pattern of large-scale, ongoing declines in species' population sizes and distributions, affecting most medium- to large-bodied vertebrate species and many smaller ones as well. Alongside the depleted numbers and loss of whole subpopulations there is a concomitant, but unquantified, loss of intraspecific genetic diversity and local ecological variation: weakened gene pools may not only affect reproductive fitness, but also reduce the adaptive potential needed to meet new and emerging threats such as climate change. These losses of species and populations also have a deeper, adverse impact on ecosystems and ecological processes: forest elephants, duikers and many primates play an important role in seed dispersal so reduced abundance of these species has implications for forest structure and tree species composition. Further, the reduction in large ungulate biomass in savanna habitats may cause lions and other large predators to switch to domestic livestock as an alternative, thereby exacerbating human-wildlife conflict.

Pressure on habitats and natural resources is increasing. Harvest rates appear to be accelerating, and in many cases are likely to be unsustainable. If this downward trajectory is not slowed and ultimately halted, the long-term viability of many species in West and Central Africa is in question, as well as the well-being of the human communities that rely on them. The principal factors driving these declines are considered in Chapter 4.

Table 2.13 Large mammal extirpations in West and Central Africa by country. Grey cells indicate known countries of historical occurrence. RE = Regionally (i.e., at the national level) Extinct; ? = Possibly RE. Primary sources: East (1999), Kingdon & Hoffmann (2013c,d), Henschel *et al.* (2014), IUCN Red List (2014), Elephant Database / IUCN SSC African Elephant Specialist Group (AfESG), and this study.

	MRT	SEN	GMB	GNB	GIN	SLE	LBR	CIV	GHA	BEN	TGO	MLI	BFA	NER	NGA	TCD	CMR	CAR	GNQ	GAB	ROC	DRC
Loxodonta africana	RE	?	RE	?		?					RE			?								
Ceratotherium simum																RE		RE				RE
Diceros bicornis															RE	RE	RE					RE
Panthera leo		?		RE				RE	RE		RE	RE		RE						?	?	?
Acinonyx jubatus	?	RE		RE	RE	RE		RE	RE		?				RE		RE	?				?
Lycaon pictus	RE		RE	?	?	RE		?	RE		?	?			?		RE			RE		?
Giraffa camelopardalis	RE	RE			RE							RE	RE		RE							?
Addax nasomaculatus	RE											RE				RE						
Oryx dammah	RE	RE[1]										RE	RE	RE	RE	RE						
Nanger dama	RE	RE[1]											RE		RE							
Gazella leptoceros												?		?		?						
Alecelaphus buselaphus			RE																			
Damaliscus lunatus	RE	RE	RE						?		?	RE										
Syncerus caffer			RE	?							?											
Tragelaphus derbianus			RE	?	?							?			?							
Tragelaphus spekii										?	RE			RE								
Kobus ellipsiprymnus			RE																			
Redunca redunca								?			?											
Kobus kob	?		RE			RE																
Oreotragus oreotragus																		?				
Total RE (including PE)	**7(9)**	**5(7)**	**8**	**2(6)**	**2(4)**	**3(4)**	**0**	**2(4)**	**3(4)**	**(1)**	**3(8)**	**5(8)**	**3**	**3(5)**	**2(6)**	**4(5)**	**3**	**1(2)**	**0**	**1(2)**	**(1)**	**2(6)**

[1] Population re-established in fenced enclosures in Ferlo-Nord Wildlife Reserve

3. Which sites are important for threatened vertebrates?

3.1 Introduction

Site-based conservation action is essential if wildlife is to survive in the wild (Boyd *et al*. 2008). Understanding the most appropriate places for conservation, in terms of wildlife value and conservation potential, has been subject to a great deal of conceptual work in the last two decades and a range of prioritization schemes are now available. However, identifying a network of sites that have the potential to deliver secure populations is constrained by significant inadequacies in the most basic of information on sites that are considered to have wildlife value. For example, and perhaps most fundamentally, although protected areas are widely and routinely stated to be 'cornerstones' of biodiversity conservation, documentation of their key characteristics (boundaries, size and date of establishment) is lacking in a surprisingly large number of cases. Easy access to the key biodiversity features for each site is also lacking. Second, national protected area networks have rarely been developed in a holistic way that begins with a full systems review. The usual process is for sites to be identified and designated at different times and for different reasons; sometimes opportunistically and in isolation; or sometimes for sets of sites to be so identified. The result is that adequate representativeness of key species and habitats is rarely achieved in full at either national or regional level.

A wide range of approaches has been used to identify the most important sites for wildlife conservation. Large-scale global prioritization schemes such as biodiversity hotspots and WWF's Global 200 Ecoregions were mentioned in the Introduction (Section 1.2.5). While these highlight the global biodiversity significance of parts of West and Central Africa, they cover very extensive areas and are not intended as practical management units. The longest standing approach to site-based conservation is the legal designation of nationally protected areas. Although the oldest protected areas in West and Central Africa are more than 80 years old (indeed, Virunga National Park, established in 1925, is Africa's oldest), the pace of designation has increased significantly in recent decades (as globally: Bertzky *et al*. 2012), both in terms of number of sites and total extent (Figure 3.1). The Convention on Biological Diversity's Aichi Target 11 is to enure that statutory coverage of national terrestrial protected areas rises to 17% by 2020 (http://www.cbd.int/sp/targets/rationale/target-11/; and see Chapter 6 for further discussion).

The legislation underpinning the designation of protected areas in each country is documented and publicly available (e.g. FAO/IUCN/UNEP 2014), but the development of the precise legal basis for many, if not most, of these areas can be difficult to determine (Section 5.5) and the specific legal instruments for each site may not be easily accessible (see Supplementary Information). For example, a site may be listed before its formal protected status has passed through the full legal process.

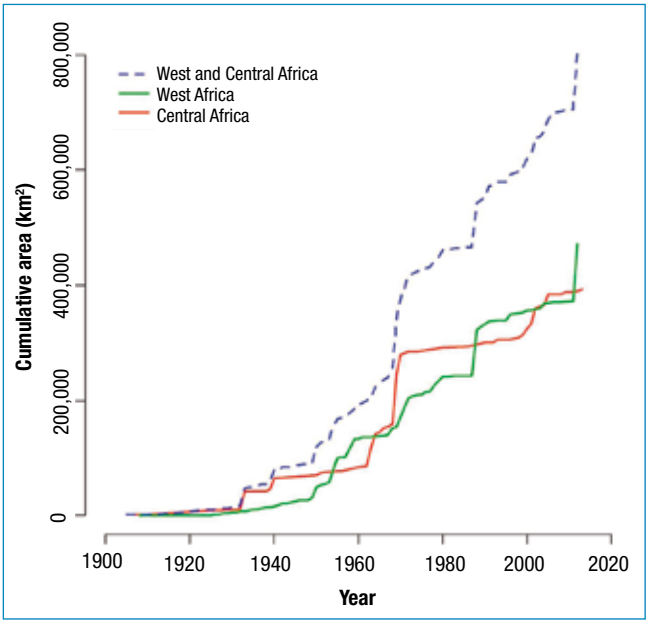
A second suite of sites have been designated as a result of international agreements such as the Ramsar Convention, UNESCO Man and Biosphere (MAB) programme and World Heritage Convention (see below, and Chapter 5). Although MAB and WH sites (WHS) are for the main part based on protected areas, these international designations do not automatically imply that the site has full legal national protection. The same consideration applies to Ramsar sites, many of which receive no formal protected status.

In addition, further sets of sites have been identified by non-governmental organizations on the basis of their importance for specific taxa, such as Alliance for Zero Extinction (AZE) sites, Important Bird and Biodiversity Areas (IBAs), and others. All these types of site may overlap fully or partially with legally protected areas while others have no formal protection at all.

Consequently, many individual protected areas are also recognized under other inter-governmental or NGO designations (MAB, Ramsar, IBA and so on); indeed, a single site could in theory have up to five designations. In several such cases of overlapping designations, the boundaries used are different and may cover a larger area than the protected area on which they are based.

This Chapter, therefore, seeks to synthesize this information and, building from the review of status and trends in wildlife presented in Chapter 2, highlight the important sites for

Figure 3.1 Growth in the cumulative area (in km²) of nationally protected areas (1900–present) (data source: World Database on Protected Areas, August 2014 release; see Methods below). The recent sharp increase in West Africa (and indeed in total) is due to the gazettement of a single protected area in 2012 – the 97,000-km² Termit Tin Toumma National Nature Reserve in Niger.



conserving the wildlife species that are the subject of this Situation Analysis.

3.2 Methods

The first objective was to compile an overall inventory of sites in West and Central Africa, including all: i) nationally protected areas; ii) sites identified as important for biodiversity through inter-governmental processes (Biosphere Reserves, World Heritage Sites, Ramsar Sites); and iii) sites identified as important for biodiversity for NGO-led initiatives (Important Bird and Biodiversity Areas or IBAs and Alliance for Zero Extinction Sites or AZEs). Information on nationally protected areas, and on those with international designations (MAB, World Heritage and Ramsar), was compiled from the World Database on Protected Areas (WDPA August 2014 release), where these sites are recorded. These data were supplemented by some information from the online databases of UNESCO-MAB, Ramsar and World Heritage. Information on IBA and AZE sites was obtained from the AZE online database and from BirdLife International, respectively.

Unless otherwise mentioned, analyses reporting area or total numbers were conducted based on the following methodology. The WDPA polygon attribute table was merged with the WDPA point attribute table and sites listed as anything other than "National" under "Designation type" and "Designated" under "Status" were excluded. Duplicates were identified and removed where there was a clear spatial overlap (using ArcGIS) or where the site details ("Name", "Reported Area", "Status Year", "ISO" or "IUCN Category") were the same. Where there were discrepancies between duplicate sites in terms of reported area or status year, the WDPA polygon layer was treated as the default. Where there was no reported area in the WDPA polygon area, but a reported area in the point layer, then the value in the WDPA point layer was used.

Approximately 2,374 sites in West and Central Africa are listed on the WDPA, including 2,186 nationally designated protected areas and 188 with formal international designations. It is difficult to provide a definitive figure because of some database anomalies (such as the same site being listed more than once under slightly different names). This study made no attempt to resolve anomalies between the status of a site as reported on WDPA relative to the relevant government documents. WDPA classifies sites as terrestrial or marine, but all those in West and Central Africa were considered here because in the majority of cases some coastal marine sites also harbour species such as sea turtles, crocodiles, West African Manatee *Trichechus senegalensis* and Common Hippopotamus *Hippopotamus amphibius*, among others. A very large number of the protected areas listed in the WDPA comprise forest reserves of some type (classified forest, forest reserve, national forest) in which wildlife protection is secondary to their primary aim. Most of these sites do not have an IUCN category reported, although almost all of them correspond to IUCN category VI protected areas. Most of these sites have been omitted from the final inventory here, except where there was evidence that the focal species of this Situation Analysis (see Chapter 2) were present. Some hunting zones and hunting reserves were excluded for the same reason. In addition to nationally protected areas and internationally designated sites, there are 321 identified Important Bird and Biodiversity Areas and 16 Alliance for Zero Extinction sites in the region.

3.3 Nationally designated sites

3.3.1 Protected areas

IUCN defines a protected area as: *"A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values* (Dudley 2008, 2013). IUCN has also developed a system for categorising protected areas according to their management goals and governance (Box 3.1) and these are now widely understood and applied when identifying the primary purpose of land under statutory management, even if an IUCN category is not formally assigned.

A total of 2,186 nationally designated protected areas are catalogued in the WDPA for West and Central Africa (Table 3.1). However, the database is not complete, and a very small number of additional sites are not currently included in the WDPA (see country summaries below). Further, many sites proposed, but not yet formally gazetted, are also not included in the WDPA. A very wide range of names are applied to individual protected areas[3] and the same term may be used in different countries to refer to sites with different legal statuses and/or management objectives, often leading to confusion. As noted above, the precise status of a few sites listed is unclear, where the full legal process of gazettement has not been completed, or cannot be traced; in addition, a few sites may have been submitted to WDPA by NGOs or community organizations rather than by a government agency.

Of the 2,186 sites, 209 have been categorized in IUCN management categories I–IV (Table S3.1 and Table S3.2). For the remaining sites (~90%), no IUCN category has been reported to WDPA by the national government responsible. In the majority of cases these sites are protected forests that are likely to have a management status matching IUCN category VI. However, this is not always the case and the

[3] Including Bird Reserve, Botanical Reserve, Chimpanzee Reserve, Classified Forest, Collaborative Fishery Management Area, Community Forest, Community Reserve, Community Reserve, Community Wildlife Reserve, Conservation Area, Fauna and Flora Reserve, Forest Reserve, Game Production Reserve, Game Reserve, Game Sanctuary, Gorilla Sanctuary, Hunting Area, Hunting Reserve, Hunting Zone, Integral Wildlife Reserve, Integrale Nature Reserve, Marine Protected Area, National Forest, National Nature Reserve, National Reserve, Natural Monument, Natural Reserve, Nature Reserve, No or Non - Hunting Forest Reserve, North Migration Zone, Partial Elephant Reserve, Partial Faunal Reserve, Partial Wildlife Reserve, Presidential Reserve, Primate Nature Reserve, Private Reserve, Reforestation Area, Reserve, Resource Reserve, Sanctuary, Scientific Reserve, South Buffer Zone, Special Reserve, Strict Nature Reserve, Total Wildlife Reserve, Wetland Reserve, Wildlife Management Area, Wildlife Reserve, Wildlife Sanctuary.

Box 3.1 IUCN protected area management categories and governance types (Dudley 2008, 2013)

Ia Strict nature reserve: Strictly protected areas set aside for biodiversity and also possibly geological/ geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values.

Ib Wilderness area: Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition.

II National park: Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities.

III Natural monument or feature: Areas set aside to protect a specific natural monument, which can be a landform, sea mount, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove.

IV Habitat/species management area: Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category.

V Protected landscape or seascape: Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

VI Protected areas with sustainable use of natural resources: Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims.

management category of some sites listed as National Park, whose status corresponds to category II, is similarly Not Reported (e.g. as in Gabon) (Table S3.1). Even where legal status of a protected area is clear, its boundaries may be imprecisely defined or not clearly demarcated on the ground, hindering effective management. Furthermore, formal designation of a site on its own does not confer adequate protection on the ground: protected area networks throughout West and Central Africa generally suffer from a serious lack of financial and material resources and some are little more than 'paper parks' (see Chapter 6).

The configuration of protected area systems differs between West Africa and Central Africa in characteristics such as number of protected areas and their mean size (Table 3.1). More than 90% of sites are in West Africa (and half of these, in turn, are in Nigeria; Table S3.1), and yet, on paper,

Table 3.1 Summary of national protected areas in West and Central Africa (data source: World Database on Protected Areas, August 2014 release).

	West Africa	Central Africa
Number of protected areas legally designated (n=2,186)	2,013	173
Number of protected areas legally designated for which size has been formally reported (n=1,060)	900	160
Total extent (km^2) (for PAs with formally reported area)	545,655	539,007
Mean size (km^2) (for PAs with formally reported area)	606 ± 4,131	3,369 ± 7,550
PAs as proportion of land area in region	9.16%	10.04%
Number PAs in IUCN Category I–IV (n=209)	126	83
Total extent (km^2) of PAs in IUCN Category I–IV where area is formally reported	364,986	366,511
Mean size (km^2) of PAs in IUCN Category I–IV where area is formally reported	2,920 ± 10,678	4,470 ± 99,557

Ecoguard camp at Ivindo National Park, Gabon. © Nathalie van Vliet

actual percentage coverage of land area is marginally higher in Central Africa (9.2% *cf.* 10% for West and Central, respectively). The coastal countries of West Africa have a constellation of many relatively small protected areas, contrasting with the less numerous (but larger) protected areas in the inland countries of West Africa (Mali, Burkina Faso, Niger) (Figure 3.2A), such as Termit Tin Toumma National Nature Reserve (97,000 km^2) in Niger – the largest protected area in Africa (declared in 2012). Protected areas in Central Africa also tend to be less numerous and larger.

Several sites are also contiguous and it is often the case that a site in IUCN category I or II is adjoined by one or more sites in a lower category, thereby increasing the effectiveness of the overall site cluster. One example of this is provided by Taï National Park in Côte d'Ivoire and the adjacent N'Zo Partial Faunal Reserve (IV) to its north and Haute Dodo Classified Forest to the south. Central African Republic also has some very extensive contiguous protected area clusters, while in Benin, Burkina Faso and Cameroon, hunting zones are often grouped around national parks (see Section 7.2).

3.3.2 Hunting zones

In Africa as a whole, areas officially designated for trophy hunting occupy 1,400,000 km^2, representing 22% more than the aggregate area of formal protected areas (Lindsey *et al*. 2007). Seven countries in West and Central Africa have designated big game hunting zones that cover a total of ~253,000 km^2 (Table 3.2). Some of these sites may correspond to IUCN category VI and some to category IV, assuming their main objective is nature conservation (UICN/PACO 2009). In other cases, hunting zones or concessions may be allocated for a defined period of time and are not therefore designated 'protected areas'. Areas for hunting of 'small game' (mainly birds and Common Warthog *Phacochoerus africanus*) are not included here. In Benin, Burkina Faso, Cameroon and Central African Republic, hunting zones are clustered around national parks or other protected areas where they may provide *de facto* buffer zones. The relevance of trophy hunting to biodiversity conservation in West and Central Africa is discussed in Chapter 7.

Table 3.2 Designated hunting zones[1] in West and Central Africa (adapted from UICN/PACO 2009) and WDPA.

Country[2]	Area covered by Hunting Zones (km^2)	Notes
West Africa		
Benin	3,940	3.5% of the country's area. Concentrated in peripheral zones of W and Pendjari NPs
Burkina Faso	9,338	3.4% of the country's area. Most in the south-east around W NP
Mali	8,819	Nine sites
Central Africa		
Cameroon	39,830	8.4% of the country's area. Large block in the north around Benoué, Bouba Njida and Faro NPs
CAR	196,035	31.5% of the country's area. Several sites along the border with Chad and in NE are being abandoned. There is a cluster around Zémongo NP in the east. However, in reality, only one-third of the area designated is actually used for hunting.
DRC	70,909	Ten sites, largest 32,148
Gabon	6,196	Four sites including two category IV

[1] Big game hunting only

3.3.3 Other types of site

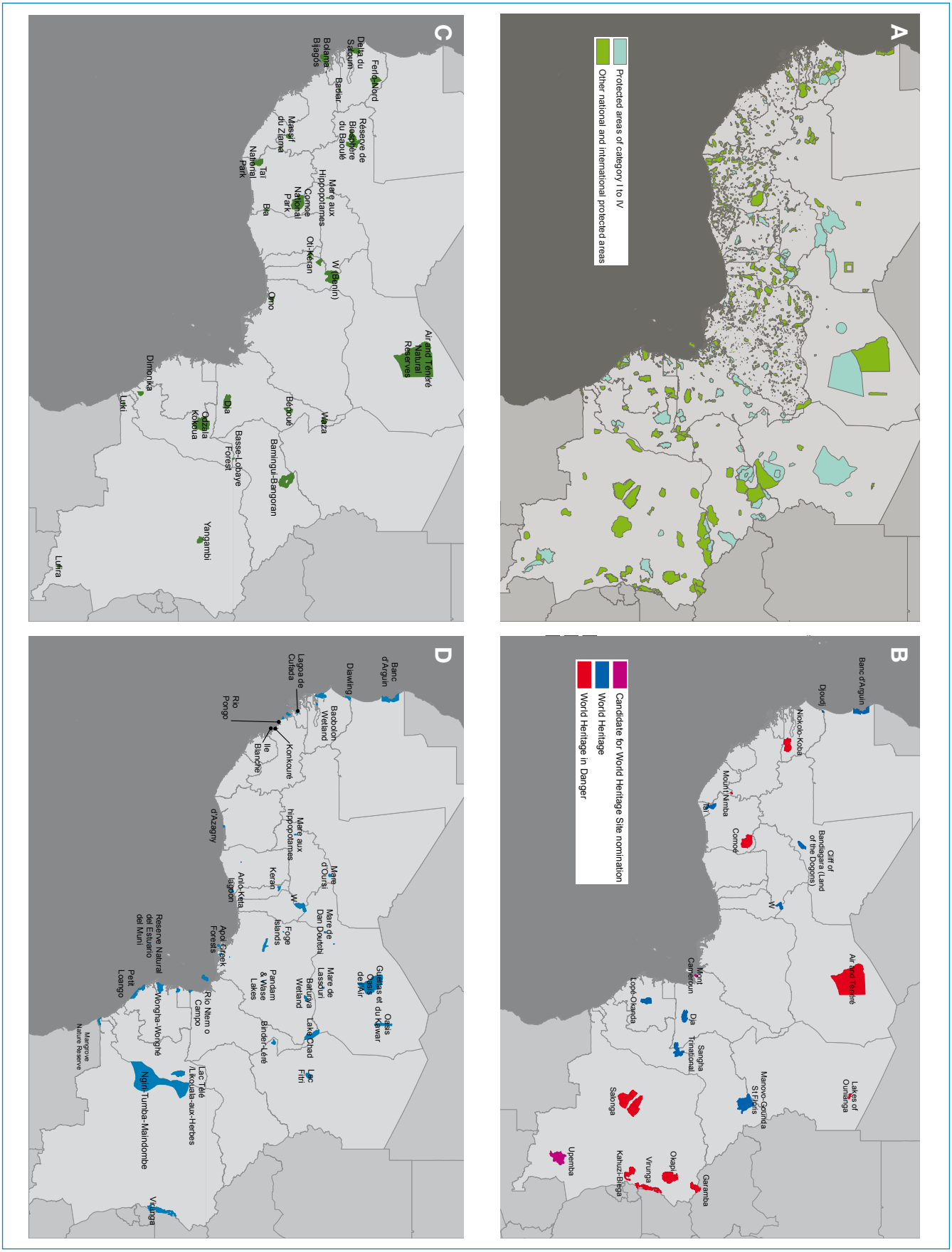
Some less formal site protection arrangements are also in operation. Firstly, community involvement in reserve and other site management is increasing across West and Central Africa at a range of scales. A small number of sites with significant formal community involvement in management are included in the WDPA. In addition to these, several community nature reserves are managed for an individual species or other elements of biodiversity, but are not integrated into national government protected area systems and so are not included on international lists of sites. Wechiau Hippo Sanctuary in Ghana is one example of such a site (see Chapter 7 for further details of this and similar sites). Cultural taboos prohibiting exploitation of certain species operate locally across the region, resulting in effective protection at the site level, including of some threatened vertebrates such as crocodiles and primates. Second, some logging and mining companies may impose strict contols on access to, and exploitation of resources within, their concession areas (see Chapter 4). This can potentially result in protection of habitats and threatened species, depending on the degree of control of snaring and hunting. Such sites also do not fit into established protected area categories and consequently do not feature in official lists or protected area networks. Data on the size and protection of such sites are not readily easily available making it difficult to assess their effectiveness.

3.4 Inter-governmental identification of sites

3.4.1 World Heritage Sites

The World Heritage List reflects the world's cultural and natural diversity of outstanding universal value, according to the 1972 World Heritage Convention (Section 5.3.1). There are 17 formally designated World Heritage sites inscribed under the "biodiversity criteria" (ix and x) in the region (Figure 3.2B; Table S3.3), plus two on natural landscape criteria (vii and viii). One of these, Taï National Park (Côte d'Ivoire), has been identified as being among the 100 most irreplaceable protected areas (of 173,461 such areas) for the conservation of the world's amphibian, bird and mammal species (Bertzky *et al*. 2013, Le Saout *et al*. 2013). Two additional protected areas in the region, Mount Cameroon National Park (Cameroon) and Upemba National Park (DR Congo), are also on this list of irreplaceable sites, but are not World Heritage Sites. Both would probably meet the Outstanding Universal Value criterion under the Convention, and so extending World Heritage recognition to these "candidate

Figure 3.2 A) Distribution of protected areas in West and Central Africa (source: World Database on Protected Areas, August 2014 release). B) Distribution of the World Heritage sites in West and Central Africa, indicating those "in Danger" and sites identified as potential candidates for World Heritage status based on their outstanding universal value (Source: Bertzky *et al*. 2013, Le Saout *et al*. 2013). C) Distribution of Biosphere Reserves in West and Central Africa (source: http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/africa/). D) Distribution of Ramsar Sites in West and Central Africa (Source: http://ramsar.wetlands.org/Database/).



sites" through the nomination for the World Heritage list is strongly encouraged. The same applies to the Itombwe Massif in Democratic Republic of Congo, part of which was designated as a natural reserve in 2006 but whose precise current legal status remains unclear.

Ten (of the 17) biodiversity World Heritage Sites are inscribed by UNESCO on the World Heritage in Danger List (see Section 5.6.4), including all five sites in Democratic Republic of Congo and two of the three sites in Côte d'Ivoire. At a global level, 10 of the 18 natural World Heritage Sites that are on the World Heritage in Danger List are situated in West and Central Africa (see Section 5.3.1). An independent assessment of the status of natural World Heritage Sites has been carried out by IUCN (Osipova *et al*. 2014), classifying them into four categories. Eleven of the 17 "biodiversity" sites in West and Central Africa fell into the lowest category 'Outlook Critical'; three (four) as 'Significant concerns'; two (three) as 'Good with some concerns'and none in the highest category (Table S3.3).

3.4.2 Biosphere Reserves

Biosphere reserves are sites established by countries and recognized under the international UNESCO Man and the Biosphere (MAB) Programme (launched in 1972) to promote sustainable development based on local community efforts and sound science. They are identified according to several criteria including the importance of the ecosystem and biodiversity conservation function, and as such can be considered as sites of international conservation importance (see: http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/).

The World Network of Biosphere Reserves currently contains 621 sites in 117 countries, including 12 transboundary sites. In West and Central Africa, there are currently 32 Biosphere Reserves, including transboundary sites (Figure 3.2C; Table S3.4). World Heritage sites and MAB sites are identified on a wide range of criteria, so in a small number of cases may not be of high importance for threatened vertebrates.

3.4.3 Wetlands of International Importance (Ramsar sites)

Ramsar sites are a response to an intergovernmental convention that has been in force since December 1975 (see Section 5.3.4). There are 137 sites in West and Central Africa (Figure 3.2D; Table S3.5), with most in Guinea, Burkina Faso, Niger and Nigeria and Republic of Congo (Table 3.3). These sites are primarily of high conservation importance for threatened waterfowl and other aquatic species, but these may include manatee and crocodiles. A number of sites are also listed as important for terrestrial mammals, or support rare or threatened vertebrate species. Ramsar sites in West and Central Africa also vary greatly in size: several are <20 km^2 whereas 10 sites exceed 10,000 km^2. None of these 10 large sites has more than a small proportion of their total area under formal protection and some are completely unprotected. Three of the 10 sites are also IBAs, but the remaining seven have not been identified by other site-based conservation programmes (Table 3.Sx). The largest sites are the Inner Niger Delta in Mali (41,195 km^2), Grands Affluents in Republic of Congo (>59,000 km^2) and Ngiri-Tumba-Maindombe in Democratic Republic of Congo (>65,000 km^2). The latter two sites lie north and south of the Congo River, respectively, and together cover a significant part of the Congo Basin flooded and swamp

Salonga National Park in Democratic Republic of Congo, one of the country's five World Heritage sites listed under the "biodiversity" criteria and a World Heritage Site in Danger. © WCS / Fiona Maisels

Table 3.3 Number of Ramsar sites (and number totally or partly protected) and their combined extent per country (data source: http://www.ramsar.org/doc/sitelist.doc; as at 13 May 2014).

Country	No. sites (No. protected or partly protected)	Total extent (km²)
Angola (Cabinda)	0	-
Benin	4 (2)	11,794
Burkina Faso	15 (7)	6,525
Cameroon	7 (1)	8,271
CAR	2 (1)	3,763
Chad	6 (1)	124,051
Côte d'Ivoire	6 (3)	1,273
DRC	3 (3)	74,356
Equatorial Guinea	2 (2)	1,130
Gabon	9 (7)	28,185
Gambia	3 (3)	312
Ghana	6 (1)	1,784
Guinea	16 (2)	64,224
Guinea-Bissau	2 (0)	10,860
Liberia	5 (1)	959
Mali	4 (0)	42,046
Mauritania	4 (2)	12,406
Niger	12 (2)	43,176
Nigeria	11 (6)	10,767
ROC	10 (6)	113,353
Senegal	5 (4)	1,000
Sierra Leone	1 (0)	2,950
Togo	4 (3)	12,104
Total	**137 (57)**	**575,289**

forests. Protection under national law is not a precondition for designation as a Rasmar site, and consequently some Ramsar sites may have no legal protection at the national level. The information contained in the World Database of Protected Areas (www.protectedplanet.net) and in the Ramsar Convention database is inconsistent with regards to the protection status of some sites. The results of this Situation Analysis suggest that, in total, of 137 sites in the region, at least 57 are recorded as having some level of national protection (Table S3.5).

3.5 Sites identified through other global processes

3.5.1 Alliance for Zero Extinction (AZE) sites

Formed in 2000, and launched globally in 2005 (Ricketts *et al*. 2005), the Alliance for Zero Extinction (AZE) engages non-governmental biodiversity conservation organizations working to prevent species extinctions by identifying and safeguarding the places where species evaluated as Endangered or Critically Endangered under IUCN Red List criteria are known to be restricted to single remaining sites (i.e. containing at least 95% of the known population) (see: http://www.zeroextinction.org).

In West and Central Africa, 16 AZE sites covering 31 species have been identified in six countries (Table 3.4; Figure 3.3A). Nine of these sites, covering 18 species, are situated in Cameroon with all but one of them in the Cameroon highlands. Mount Oku in Cameroon is listed for five species, Mount Nimba for four species and Mount Cameroon and the Itombwe Massif are each listed for three species. Only two AZE species are medium- to large-sized terrestrial or freshwater vertebrates (Dryas Monkey *Cercopithecus dryas* and Mount Cameroon Francolin *Pternistis camerunensis*), but all these sites have potential importance for species that are the subject of this analysis. Some AZE sites are already designated as protected areas while others are partly protected or not protected. AZE area figures are not provided on the AZE website but can be inferred where they coincide with established PAs.

3.5.2 Important Bird and Biodiversity Areas

Important Bird and Biodiversity Areas (IBAs) are areas recognized as being globally important for the conservation of bird populations. The programme was developed by BirdLife International (see: http://www.birdlife.org/), which has identified more than 12,000 sites globally to date. IBAs have been identified using explicit criteria and thresholds, incorporating both vulnerability and irreplaceability

Figure 3.3 A) Distribution of Alliance for Zero Extinction sites in West and Central Africa (data source: www.zeroextinction.org). B) Distribution of the Important Bird and Biodiversity Areas in West and Central Africa (data source: BirdLife International). For IBA site codes, see Table S3.6.

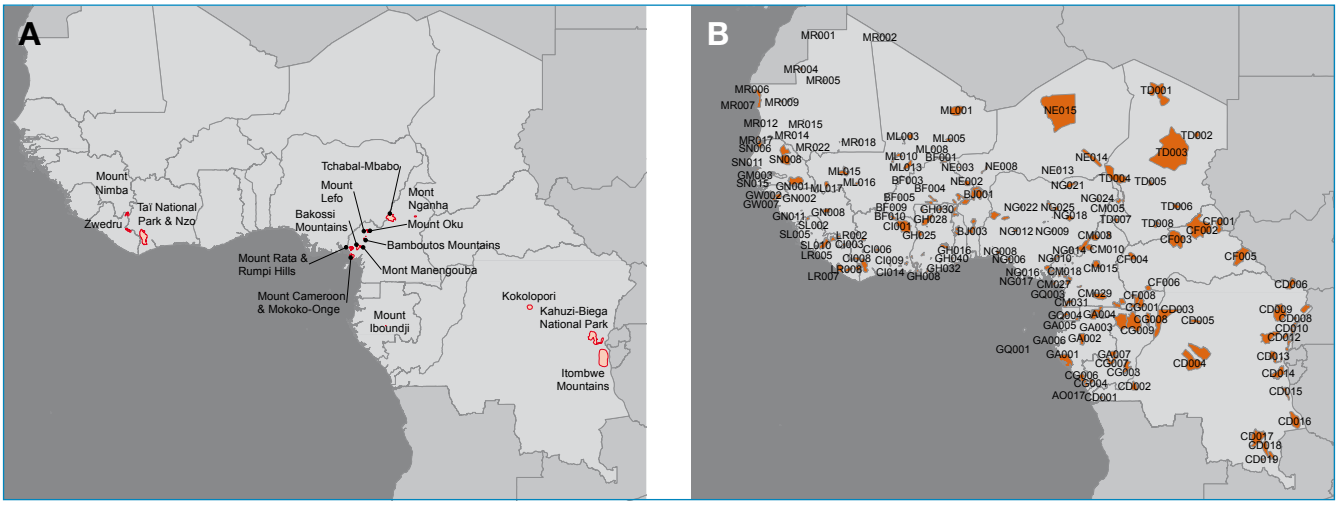


Table 3.4 List of Alliance for Zero Extinction Sites identified in West and Central Africa, with protected area status and size, where known (data sources: http://www.zeroextinction.org/ and World Database on Protected Areas, August 2014 release).

Site	Country/ies	Species	Protection status
Mount Nimba	Côte d'Ivoire, Guinea, Liberia	*Nimbaphrynoides liberiensis*	Partly protected. CIV: Mt Nimba Reserve (1a; 50km²); GIN: Mt Nimba Strict Nature Reserve (1a; 130 km²) LBR: East Nimba Nature Reserve (135 km²)
		Hyperolius nimbae	
		Arthroleptis crusculum	
		Hipposideros lamottei	
Zwedru	Liberia	*Phyllastrephus leucolepis*	Unprotected. Proposed as a National Park (637 km²)
Taï NP and N'Zo Faunal Reserve	Côte d'Ivoire	*Amietrophrynus taiensis*	Tai NP (II; 3,300 km²) N'zo Partial Faunal Reserve (IV; 950 km²)
		Hyperolius nienokuensis	
Mont Nganha	Cameroon	*Astylosternus ngahanus*	Unprotected
Tchabal-Mbabo	Cameroon	*Cardioglossa alsco*	Partly protected? Tchabal-Mobabo Wildlife Reserve (3,166 km²), proposed as NP
Mount Oku	Cameroon	*Wolterstorffina chirioi*	Partly protected. Oku Sanctuary (10 km²) is proposed as a National Park
		Xenopus longipes	
		Lophuromys dieterleni	
		Hylomyscus grandis	
		Lamottemys okuensis	
Mount Cameroon and Mokoko-Onge	Cameroon	*Sylvisorex morio*	Partly protected. Mount Cameroon NP (IUCN II; 581 km²)
		Otomys burtoni	
		Pternistis camerunensis	
Bamboutos Mountains	Cameroon	*Leptodactylodon axillaris*	Unprotected
Mount Manengouba	Cameroon	*Cardioglossa trifasciata*	Unprotected. Proposed as a National Park (87 km²)
		Leptodactylodon erythrogaster	
Bakossi Mountains	Cameroon	*Leptodactylodon wildi*	Bakossi Mountains NP (IUCN II; 293 km²) within Bakossi Forest Reserve (>5,000 km²)
		Hyperolius dintelmanni	
Mount Lefo	Cameroon	*Lophuromys eisentrauti*	Unprotected
Mount Rata and Rumpi Hills Forest Reserve	Cameroon	*Alexteroon jynx*	Partly protected Rumpi Hills Sanctuary proposed (456 km²)
		Myosorex rumpii	
Mont Iboundji	Gabon	*Werneria iboundji*	Unprotected
Itombwe Mountains	DRC	*Hyperolius leleupi*	Partly protected Itombwe Natural Reserve (IUCN category not reported, 6,009 km²), status unclear.
		Caprimulgus prigoginei	
		Phodilus prigoginei	
Kokolopori	DRC	*Cercopithecus dryas*	Partly protected in Kokolopori Bonobo Reserve (3,740 km²)
Kahuza-Biega NP	DRC	*Dendromus kahuziensis*	Protected (IUCN II; 6,689 km²)

(Fishpool & Evans 2001). IBAs have been considered the avian subset of the emerging Key Biodiversity Areas concept (Langhammer *et al.* 2007).

The region hosts 321 Important Bird and Biodiversity Areas occupying at least 759,321 km² (Table 3.5; Figure 3.3B; and see Table S3.6). There are 232 IBAs covering at least 291,552 km² in West Africa and 89 IBAs in Central Africa covering at least 467,767 km². Although some IBAs are already protected areas under national legislation, many are not. Based on data contained in the World Bird and Biodiversity Database held by BirdLife International, 145 sites in West Africa (63%) and 56 sites in Central Africa (63%) have more than half of their area protected. While some countries have 100% of IBAs formally protected, others do not (Table 3.5). IBAs are identified on the basis of four criteria: presence of globally threatened species; an assemblage of restricted range species; an assemblage of biome-restricted species, and congregatory species. Therefore, IBAs in West and Central Africa have mainly been identified on the presence of bird species that are outside the immediate remit of this Situation Analysis; however, many IBAs may nonetheless be important to ensure the survival of other threatened vertebrate species for which they were not originally identified. A 2014 assessment by BirdLife International identified 15 IBAs in West and Central Africa as 'in Danger' (http://www.birdlife.org/datazone/info/IBAsInDanger; see Table S3.6).

Eighteen IBAs occupy more than 9,000 km², many of which are already also national protected areas (Table S3.6) or World Heritage Sites. Large sites that have only partial or no formal protection are: Aguelhok (Mali), Lake Chad (Nigeria, Chad; small part protected), Marungu highlands (Democratic Republic of Congo) and Tibesti massif (Chad; small part protected).

3.6 Landscapes and transboundary sites

The importance of larger sites was referred to in section 3.3.1. However, even large sites, including clusters of sites, may still be too small to harbour viable populations of larger species or ensure fully-functioning, dynamic ecosystems. Conservation planning at the landscape scale seeks to address this by encompassing much more extensive areas that are better able to ensure the long-term persistence of viable populations of larger species, ensure connectivity

Table 3.5 The number of Important Bird and Biodiversity Areas and their protection status in West and Central Africa (data source: BirdLife International; and see Table S3.6). Countries with less than 50% of IBAs protected are highlighted in grey.

Country	Number of IBAs	Area (km²)	Protected or partly protected[1]
West Africa			
Benin	6	14,901	6
Burkina Faso	10	16,279	7
Côte d'Ivoire	14	23,221	14
Gambia	13	586	7
Ghana	40	16,076	35
Guinea	18	7,079	18
Guinea-Bissau	8	7,578	5
Liberia	9	6,303	3
Mali	17	28,692	5
Mauritania	24	17,906	4
Niger	15	83,431	4
Nigeria	27	32,469	17
Senegal	17	25,799	9
Sierra Leone	10	6,149	8
Togo	4	5,085	3
Sub-total	232	291,554	145
Central Africa			
Angola (Cabinda)	1	400	1
Cameroon	33	42,056	15
CAR	8	73,842	6
Chad	8	146,490	6
DRC	19	135,894	12
Equatorial Guinea	4	3,540	4
Gabon	7	23,875	4
ROC	9	41,670	8
Sub-total	89	467,767	56
Total	**321**	**759,321**	**200**

[1] Where more than 50% of the site is known to be protected (see Table S3.6)

between designated protected areas, safeguard dispersal corridors between core populations and natural migration routes, and enhance resilience to the effects of climate change. Since international borders rarely coincide with ecosystem boundaries, transboundary sites and landscapes assume great importance. For example, Diawling NP in Mauritania and Djoudj Bird Reserve in Senegal lie on opposite sides of the Senegal River Delta and the joint site is recognized as a Man and Biosphere Reserve. The W complex (Benin, Burkina Faso and Niger) is a full transboundary reserve and also forms part of the more extensive WAPOK cluster of sites. Other transboundary landscapes in West and Central Africa that have been formally designated as World Heritage Sites or Man and Biosphere Reserves are the Sangha Trinational and TRIDOM complex. Others are subject to an official government agreement, such as the Greater Virunga Transboundary Cooperation (GVTC), covering the Greater Virunga Landscape (see Table 3.6).

Some landscapes also may be identified on an operational level by an NGO, such as the Zemongo-Chinko/Mbari landscape in eastern Central African Republic. Others are planned at a larger scale following spatial analysis of land use, biodiversity value and habitat suitability, and consisting of a cluster of protected areas and the intervening landscape matrix that is important in ensuring connectivity. A prime example in West and Central Africa is the set of 12 priority landscapes in the Congo Basin forest identified by by CARPE (seven transboundary, one wholly in Gabon and four in Democratic Republic of Congo; Figure S3.1).

3.7 Sites important for medium- to large-sized vertebrates

To identify those sites considered to have value for the conservation of medium- to large-sized terrestrial vertebrates (as considered in this Situation Analysis), the presence of threatened and Near Threatened large- and medium-sized vertebrates at each site documented above was determined by consulting the same sources that contributed to the summaries provided in Chapter 2 (see References). These sources included IUCN Red List accounts, peer-reviewed literature, IUCN action plans, and unpublished reports. In addition, for MAB reserves the accounts in the report on the *World Network of Biosphere Reserves 2010: Sites for Sustainable Development* (Anon [2010]) were searched for information about species of interest. For sites listed as Ramsar sites, the Ramsar database was searched using the country name as the search term. (http://ramsar.wetlands.org/Database/AbouttheRamsarSitesDatabase/tabid/812/Default.aspx). For those sites identified as Important Bird and Biodiversity Areas (IBAs), the BirdLife IBA country account in Fishpool & Evans (2001) as well as on the BirdLife Datazone (http://www.birdlife.org/datazone/site/search) was searched for information about other threatened or endemic wildlife.

Site-specific species lists were restricted as far as possible to confirmed, recent records of occurrence and are not based on assumptions derived from overlaps between species' geographic range polygons and site boundaries. Species considered to no longer occur at a site are likewise excluded (e.g. the two species of rhinoceros). Thorough surveys covering a wide range of taxa have not been conducted at many sites, leaving a large number of knowledge gaps to be filled and coverage varies spatially and temporally. These should, therefore, be regarded as minimum species lists.

As a result, 337 sites have been identified (Table S3.7) as of some importance for medium- to large-sized terrestrial vertebrate diversity in West and Central Africa. This list of sites includes all 17 "biodiversity" World Heritage sites, 14 of the 16 AZE sites (the two not included are Mount Lefo and Mount Nganha, both unprotected), and 196 IBAs. The majority (257 sites) have some level of national protection, although this still leaves a quarter of sites with no formal protection. The list excludes most forest reserves and other protected areas in IUCN category VI or protected areas with no category reported where wildlife protection is secondary

Table 3.6 Principal landscapes and transboundary sites in West and Central Africa.

Name	Countries	Size (km²)	Protected areas (size in km²)	Notes
Gamba-Mayumba-Conkouati	Gabon, ROC, Cabinda (Angola)	34,258 (CARPE) plus Maiombe NP 1,200	GAB: Loango NP (1,536); Moukalaba-Doudou NP (5,028); Mayumba NP (800); Iguéla Hunting Area; Moukalaba Hunting Area (200); Ngové-Ndogo Hunting Area; Ouanga Plain Wildlife Reserve; Mayombe massif (2,476, unprotected) ROC: Conkouati-Douli NP (5,050)	CARPE
Monte Alen-Monts de Cristal	Equatorial Guinea, Gabon	27,600	GNQ: Monte Alén NP (2,000); Altos de Nsork NP (400); Rio Muni Estuary Reserve (700) Piedra Nzas Natural Monument (190) GAB: Monts de Cristal NP (1,200)	CARPE
Lopé-Chaillu-Louesse	Gabon	35,000	Lopé NP (4,970); Waka NP (1,070); Birougou NP (69)	CARPE
Dja-Odzala-Minkebe (Tridom)	Cameroon, Gabon, ROC	141,000	CMR: Boumba-Bek NP (3,093); Nki NP (2,383); Dja Faunal Reserve (5,260) Gabon: Minkébé NP (7,567); Ivindo NP (3,002); Mwagna NP (1,165) ROC: Odzala-Koukoua NP (12,500)	CARPE
Sangha Tri-National	CAR, Cameroon, ROC	36,236	CAR: Dzanga-Ndoki NP (1,251); Dzanga-Sangha Special Reserve (3,101) CMR: Lobéké NP (430) ROC: Nouabalé-Ndoki NP (4,190)	CARPE WHS
Leconi- Batéké -Lefini	Gabon, ROC	35,164	GAB: Batéké Plateau NP (2,050) ROC: Léfini Wildlife Reserve (1,250) Proposed Ogooué Lekiti NP (4,230)	CARPE
Lac Télé-Lac Tumba	DRC, ROC	126,440	DRC: Mabali Scientific Reserve (19); Tumba Lediima Nature Reserve (7,411) ROC: Lake Télé Community Reserve (4,400)	CARPE Ramsar (Lac Tumba, DRC)
Salonga-Lukenie-Sankuru	DRC	102,847	Salonga NP (17,300)	CARPE
Maringa-Lopori-Wamba	DRC	106,013	Lomako-Yokokala Faunal Reserve (3,600)	CARPE
Maiko-Tayna-Kahuzi-Biega	DRC	67,121	Maiko NP (10,000); Kahuzi-Biega NP (6,600); Tayna Gorilla Reserve (886)	CARPE
Ituri-Epulu-Aru	DRC	33,188	Okapi Wildlife Reserve (13,700)	CARPE
Greater Virunga Landscape	DRC (Rwanda, Uganda)	15,155 (CARPE)	DRC only: Virunga NP (7,727); Rutshuru Hunting Domain (642)	CARPE (part)
Korup- Cross River	Cameroon, Nigeria	3,160	CMR: Korup NP (1,260) NGA: Cross River NP (Oban Hills Division) (1,906)	
Takamanda-Cross River	Cameroon, Nigeria	>9,500	CMR: Takamanda NP (676); Kagwene Gorilla Sanctuary (20); Mone Forest Reserve (538) NGA: Cross River NP (Okwangwo Division) (8,000); Afi Mountains Sanctuary (100); Mbe Mountains Community Reserve (86)	
Senegal River Delta	Mauritania, Senegal	6,417 (core 954)	MRT: Diawling NP (130) SEN: Oiseaux de Djoudj NP (160)	Delta du Fleuve Sénégal Transboundary MAB Reserve
Niokolo-Badiar	Senegal, Guinea	>2,000	SEN: Niokolo-Koba NP (900); Falémé Hunting Zone GIN: Badiar NP (382); Ndama Classified Forest (670); Badiar Sud Classified Forest (73)	WHS (Niokolo-Koba NP)
WAPOK complex	Benin, Burkina Faso, Niger, Togo	31,231	BEN: W NP; Pendjari NP and adjoining hunting zones BFA: W NP; Arly NP, including Arly Faunal Reserve; Kourtiagou Partial Faunal Reserve; Madjoari Faunal Reserve; Pama Partial Faunal Reserve; Singou Faunal Reserve; W NP NGA: W NP; Tamou Total Faunal Reserve TGO: Oti-Mandouri FR; Kéran NP	W Region MAB Reserve Pendjari MAB Reserve Oti Kéran/Oti Mandouri MAB Reserve
Greater Gola landscape	Liberia, Sierra Leone	>5,000	LBR: Gola National Forest (proposed NP; 884); Foya Forest Reserve (1,646); Kpelle National Forest (1,748) SLE: Gola Rainforest NP (710); Tiwai Island Wildlife Sanctuary (12)	
Mount Nimba	Côte d'Ivoire, Guinea, Liberia	310	CIV: Mont Nimba Strict Nature Reserve (50) GIN: Mont Nimba Strict Nature Reserve (125) LBR: East Nimba Nature Resere (135)	WHS (Mont Nimba SNR; CIV, GIN) Monts Nimba MAB Reserve (GIN)
Ziama-Wonegizi	Guinea, Liberia	>3,276	GIN: Ziama Classified Forest (1,190) LBR: Wonegizi National Forest (1,374); North Lorma National Forest (712)	Ziama MAB Reserve
Sapo-Taï	Côte d'Ivoire, Liberia	>9,000	CIV: Tai NP (3,300); N'Zo Partial Faunal Reserve (950); Cavally & Goin-Débé Classified Forests (2,119); Haute-Dodo Classified Forest LBR: Sapo NP (1,504); Grebo Forest (proposed NP; 971); Zwedru (proposed NP; 637); Grand Kru-River Gee proposed NP (1,351)	WHS (Taï NP)
Benoué-Faro-Bouba Njida Ecosystem	Cameroon, Chad, Nigeria	>14,000	CMR: Benoué NP (1,800); Faro NP (3,300); Bouba Njida NP (2,200); hunting zones TCD: Sena Oura NP (750); Binder Léré Faunal Reserve (1,350) NGA: Gashaka-Gumti NP (6,730)	

to their primary aim. The exception was where there was evidence that populations of the focal speciesof this Situation Analysis were present. Although even small sites may harbour important populations of Critically Endangered or Endangered species, sites <10 km^2 also have been omitted, except where they contain marine turtle breeding beaches that may be critical even at very small sizes.

All these sites should be fully assessed against the full set of criteria for identifying Key Biodiversity Areas, once these criteria are finalized. However, even at this provisional stage, it is apparent that 189 (ca. 56%) the 337 sites considered to be of particular importance in harbouring populations of highly threatened species are highly likely to qualify as KBAs through meeting the thresholds for criterion A1 (populations of CR, EN and VU species; these sites are shown in bold in Table S3.7).

We preface this list with three important caveats: first, it should necessarily be seen as a preliminary, not comprehensive; second, there is a need for further information on each site before their relative importance and priority can be fully understood, and third, these sites have been identified based on their importance for large- and medium-sized terrestrial and freshwater vertebrates only, not for conservation of the full spectrum of biodiversity.

This study also identified a further five sites (Table 3.7) that are neither legally protected nationally nor designated through any other inter-governmental or NGO-led process that support populations of threatened medium- and large-sized vertebrates.

3.8 Country summaries

The country summaries that follow aim to provide a brief synopsis of national protected areas, internationally designated protected areas, as well as other key sites, based on information contained in the World Database on Protected Areas (WDPA; August 2014 release) and from other sources already noted above.

Angola (Cabinda)
The Maiombe massif in the north-east is remote and relatively undisturbed. It has been declared as a national park and the Vice President of Angola opened the main inspection post of the national park in November 2013, but its formal status is not yet recorded in the WDPA. It is also recognized as an IBA. Maiombe forms part of the Conkouati-Mayumba transboundary landscape, with Republic of Congo and Gabon (Table 3.5).

Benin
The two largest national protected areas are W NP and Pendjari NP (both IUCN category II) in the north of the country; W NP is part of the W transboundary reserve and both form part of the WAPOK complex (see Table 3.5), together with the hunting reserves that adjoin them. The WAPOK complex represents one of the largest and most important areas of remaining habitat in the Guinea-Sudan savanna zone. There are four Ramsar sites.

Burkina Faso
The majority of the country's nationally protected areas are classified forests with no IUCN management category reported. There are three (IUCN category II) national parks, one of which (W) forms part of the W transboundary Biosphere reserve and together with Arly Faunal Reserve is part of the much larger WAPOK complex. Nazinga ranch close to the southern border with Ghana is a State-managed reserve that contains African Elephant *Loxodonta africana* and other large mammals, and includes a hunting zone. Mare des Hippopotames (IUCN category IV) is also a Biosphere Reserve. There are 15 Ramsar sites.

Cameroon
There are eighteen national parks (17 in IUCN category II and one, Douala Edéa, in category IV) in Cameroon situated in all major vegetation zones from the Sahel (Waza NP) to the rainforest of the south (Korup, Takamanda, Dja, and others). Three national parks (Bouba Njida, Faro, and Benoué), together with surrounding hunting zones, make up an extensive landscape in the savanna zone. Lobéké NP in the south-east is a component of the Sangha Trinational World Heritage Site. Cameroon's national parks and other wildlife reserves protect important populations of many species of threatened vertebrates, including African Elephant, Lowland Gorilla *Gorilla gorilla*, Chimpanzee *Pan troglodytes* and others. The Cameroon highlands harbour exceptional species diversity, as recognized by the designation of a number of Ramsar sites, IBAs and no fewer than nine AZE sites, but only a small part is legally protected.

Central African Republic
The national protected area system includes four national parks (IUCN category II) and seven faunal reserves (IUCN category IV). Dzanga-Ndoki NP and Dzanga-Sangha Special Reserve in the extreme south are constituent parts of the Sangha Trinational World Heritage Site. Bamingui-Bangoran

Table 3.7 Sites not previously identified as being important for threatened vertebrates, emerging from this study.

Country	Site	Area (km^2)	Species
Chad	Manga	c. 4,000	*Gyps rueppellii* EN, *Torgos tracheliotus* VU, *Ardeotis arabs* NT, *Neotis nuba* NT, *Nanger dama* CR, *Gazella dorcas* VU
Côte d'Ivoire	Tanoé Forest	120	*C. diana roloway* VU, *Cercocebus atys lunulatus* VU, *Colobus vellerosus* VU, *Procolobus badius waldroni* (?) CR, *Pan troglodytes verus* (?) EN
Niger	Fakara Plateau	15,000	*Giraffa camelopardalis peralta* EN
Gabon	Mayombe massif	2,476	*Loxodonta africana* VU, *Gorilla gorilla* EN, *Pan troglodytes* EN, *Mandrillus sphinx* VU
Liberia	Cestos-Senkwehn forests (Proposed NP; 803 km^2)		*Choeropsis liberiensis* EN, *Cephalophus jentinki* EN, *Cephalophus zebra* EN

and Manovo-St Floris-Gounda National Parks – the latter is also a World Heritage site – are large and contiguous faunal reserves and hunting zones, potentially protecting very extensive tracts of the Guinea-Sudan savanna, but protection overall is ineffective and the parks have suffered huge declines in wildlife (Bouché *et al*. 2012; and see Table 6.6). Andre Félix National Park and adjoining Yata-Ngaya Faunal Reserve are contiguous with Radom NP in South Sudan, but they have been reported as effectively devoid of significant wildlife (Fay *et al*. 1990, Stuart *et al*. 1990). The recent political instability and lack of security is likely to have led to a further deterioration in protection across the country. There are two Ramsar sites.

Chad

There are three national parks in IUCN category II and seven faunal reserves in IUCN category IV; the national parks and faunal reserves were all declared before 1975, with the exception of Sena Oura NP which was created in 2009 as a transboundary site with Bouba Ndjida in Cameroon (Brugière & Scholte 2013). Zakouma NP in the south-east hosts important populations of many large mammals. Its population of African Elephant rapidly declined, but has since stabilized, as has the the status of other species, following imposition of strict protection measures (Antonínová *et al*. 2014; and see Table 6.6). Ouadi Rimé-Ouadi Achim Faunal Reserve retains extensive sahelian grasslands and is the proposed site for reintroduction of Scimitar-horned Oryx; one of the last remaining herds of Dama Gazelle *Nanger dama* is also found here. The Tibesti massif in the north of the country is unprotected, though the whole range is an IBA. Lake Chad in the south-west is a Ramsar site, but is unprotected (there are five other Ramsar sites). The Ennedi massif in the north-east also supports Barbary Sheep *Ammotragus lervia* and Dorcas Gazelle *Gazella dorcas*, as well as a relict desert population of Nile Crocodile in Fada Archei Faunal Reserve.

Côte d'Ivoire

The national protected area system includes eight national parks (all IUCN category II). Taï NP and adjoining N'Zo Partial Faunal Reserve (jointly an AZE site) protect one of the most important remaining tracts of Upper Guinea Forest, and form the centre of a cluster of sites including Cavally, Goin-Débé and Haut Dodo classified forests, which harbour highly threatened species including Pygmy Hippo *Choeropsis liberiensis*, Jentink's Duiker *Cephalophus jentinki* and Zebra Duiker *C. zebra*, Chimpanzee and several other primates. Only 13 (of more than 200 national protected areas) sites have been assigned an IUCN management category.

Democratic Republic of Congo

The country's national park system includes several large, important sites such as Okapi Wildlife Reserve, Salonga NP, Garamba NP, Kahuza-Biega NP (recognized as an AZE site), Maiko NP, Virunga NP that protect extensive tracts of Congo Basin lowland and montane forests and threatened vertebrates, as well as Upemba and Kundelungu NPs in the Zambezian woodland biome on the Katanga Plateau in the south-east. Some of these sites also have World Heritage Site status, but all are on the WHS 'in Danger' list. The proposed

Dorcas Gazelle Gazella dorcas *(VU) in Ouadi Rimé-Ouadi Achim Faunal Reserve, Chad.* © John Newby/SCF

Lomami NP (8,050 km^2) and associated buffer zone that contain Okapi *Okapia johnstoni,* Bonobo *Pan paniscus* and Congo Peafowl *Afropavo congensis*, among other threatened species, was due be gazetted in 2014. All sites in the eastern part of the country are under threat from illegal armed militias, rebel groups and criminal gangs, severely hampering patrolling and other conservation efforts. The Itombwe Massif (also an AZE site) would potentially meet criteria for WH status on the outstanding universal value criterion (section 3.4.1). Part of it is apparently covered by a reserve of some type and it has been proposed as a national park, but its current legal status is unclear. A string of IBAs along the eastern highlands highlight the importance of the western side of the Albertine Rift for biodiversity. Ten hunting zones together cover 70,000 km^2. The enormous Ndombe-Tumba Ramsar site extends over 65,000 km^2 of the Congo Basin swamp and flooded forest.

Equatorial Guinea

Of 13 national protected areas listed in the WDPA, one is situated on the island of Annobón which lies outside the scope of the Situation Analysis. Bioko Island contains two sites that harbour several species of threatened vertebrates: Pico de Basile NP (II) and Caldera de Luba Scientific Reserve (1b). The remaining sites in Río Muni (the mainland) include two natural monuments (IUCN category III) and one which is additionally listed as a Ramsar site. Protected areas comprise 15.4% of the total land area (Murai *et al*. 2013). Rio Campo Natural Reserve in the north-west borders Campo Ma'an National Park in Cameroon. Monte Alén NP, Altos de Nsork NP, and two other sites form part of the Monte Alén-Monte Cristal landscape (26,747 km^2) (Table 3.5). Monte Alén NP is the only site that has received effective protection since the national protected area network was created and also benefits from its remoteness and steep terrain (Murai *et al*. 2013).

Gabon

Gabon gazetted a new set of 13 national parks in 2012, totalling almost 30,000 km^2 in area, following a declaration by then President Omar Bongo after the World Summit for Sustainable Development of Johannesburg (South Africa) that his country was going to set aside 26,000 km^2 of land

for conservation. Their IUCN category is Not Reported, but most likely they correspond to IUCN category II. The parks include some large sites protecting the Congo Basin forests and forest-savanna mosaics and the coastal zone and sheltering populations of many species of threatened vertebrates. Indeed, Gabon remains a stronghold for many species, including African Elephant and Lowland Gorilla. There are 22 national protected areas altogether listed in the WDPA, including four hunting reserves/areas. There are nine Ramsar sites and one Biosphere Reserve and one World Heritage site.

Gambia

There are nine national protected areas, the largest of which, Kiang West NP (IUCN category VI), covers 190 km^2. Four of the nine sites are IUCN category II, but all are small (<10 m^2). There are three Ramsar sites, of which only one is protected.

Ghana

The vast majority of sites reported in the WDPA have no IUCN category reported (and are nearly all forest reserves). Among the remainder are one strict nature reserve (IUCN category Ia), and six national parks (IUCN category II), from Mole in the Guinea savanna zone of the north to Kakum in the rainforest of the south-west. There are two Biosphere Reserves and six Ramsar sites. A national programme, supported by the government agency, has assisted development of several community-managed reserves.

Guinea

Mont Nimba Strict NR (IUCN category 1a) is at the centre of the transboundary Mount Nimba complex (shared with Côte d'Ivoire and Liberia), which is also a Biosphere Reserve and World Heritage Site ('in Danger'), although the area of the SNR was reduced by 15 km^2 to facilitate iron ore extraction (see Box 4.2; Edwards *et al*. 2014). There are two national parks, both IUCN category II: Badiar (contiguous with Niokola-Koba in Senegal) and Haut Niger, which are also Biosphere Reserves. Ziama Classified Forest and Biosphere Reserve in the Upper Guinea Forest zone of the south-east contains Pygmy Hippo, Chimpanzee, Zebra Duiker and Jentink's Duiker. The status of Kankan Faunal Reserve (actually proclaimed in 1925 as a national park) is unclear, and is not included in the WDPA. There are numerous classified forests, some of them containing (at least until recently) some Near Threatened or threatened vertebrates. Déré Classified Forest formerly held Pygmy Hippopotamus and Jentink's Duiker, but has largely been degraded. There are 16 Ramsar sites. A detailed review of the protected area system and key sites in Guinea is provided by Brugière & Kormos (2009).

Guinea-Bissau

There are two IUCN category II National Parks, namely Orango NP and João Vieira & Poilão Marine National Park, along with one community reserve, all in the Bijagós Archipelago that has breeding populations of Common Hippopotamus *Hippopotamus amphibius*, crocodiles, West African Manatee *Trichechus senegalensis* and sea turtles. The whole archipelago is also a Biosphere Reserve and is covered by two separate IBAs. Cantanhez National Park was formally created in 2011 through Decree, although is still marked as "proposed" in the WDPA. There are a number of other sites that have been proposed for protected status, including national parks, faunal reserves and forest reserves.

Liberia

There are only two national protected areas listed in the WDPA (neither has an IUCN category reported). Sapo NP in the south-east protects one of the largest remaining tracts of Upper Guinea Forest and East Nimba Nature Reserve in the north forms part of the Mount Nimba transboundary complex. In addition, there is a series of national forests, several of which are large and harbour populations of highly threatened species (see species accounts in Chapter 2). At least 14 sites, including some existing national forests, have been proposed by the Forestry Development Authority as national parks, including Gola Forest, which forms part of the Gola Transboundary Landscape, and Grebo NP in the south-east which contains Pygmy Hippopotamus and Jentink's Duiker. There are five Ramsar sites along the coast.

Mali

Mali has three national parks and two wildlife reserves in IUCN category II. Boucle du Baoulé NP (which seems legitimately missing from the WDPA) is also a Biosphere Reserve, but the former large mammal populations have been devastated by heavy pressure from hunting and competition with livestock; 78,300–150,000 people live in the reserve depending on the season (www.unesco.org). There are eight designated hunting zones, all category VI, and 12 IUCN category IV sites of a variety of types (e.g. Partial Elephant Reserve, Total Wildlife Reserve, Partial Wildlife Reserve, Chimpanzee Sanctuary). The only Ramsar site covers over 40,000 km^2 of the Inner Niger Delta, which has no other designation or formal protection.

Mauritania

There are three nationally protected areas in the WDPA. The Banc d'Arguin National Park (IUCN category II, and a World Heritage Site) on the north-west Atlantic coast is one of the most important global sites for migratory and wintering Palearctic waterfowl, with >2,750,000 birds visiting annually. It is adjoined by Cap Blanc Reserve, which protects the largest breeding colony of Mediterranean Monk Seal within its global range. Diawling NP is in the south-west, on the northern side of the Senegal River Delta and forms part of the Senegal River Delta Transboundary Biosphere Reserve. The Chott Boul IBA and Ramsar site lies on the coast immediately north of Diawling and is itself adjoined by Aftout es Saheli IBA, forming an extended wetland complex. Banc d'Arguin and Diawling NPs are both Ramsar sites and there is another small Ramsar site in the interior at Lac Gabou. There are 24 IBAs, including the three protected sites above. Many of these are identified on the basis of typical biome-restricted species assemblages in the desert interior (Fishpool & Evans 2001). The vast desert interior, including the Assaba mountains, where African Elephant survived until the 1980s, and other mountains in the south retaining relict populations of Nile Crocodile, contains no formal protected areas.

Niger

Niger's system of designated national protected areas includes the W National Park (IUCN category II), which is the Niger portion of the W transboundary reserve (and WAPOK complex), and two very large sites on the edge of the Sahara and Sahel zones: Termit Tin Toumma National Nature Reserve and Aïr and Ténéré NNR, both category IV. The Addax Sanctuary (IUCN category 1a) is a strict nature reserve that is situated within Aïr and Ténéré NNR and protects the largest, and possibly only, surviving population of Addax *Addax nasomaculatus*. These two sites harbour remnant populations of Dama Gazelle, as well as Dorcas Gazelle, Barbary Sheep and several species of vultures and bustards. W NP and Aïr and Ténéré are also World Heritage Sites and Biosphere Reserves. There are 12 Ramsar sites.

Addax Addax nasomaculatus *(CR) in Termit Tin Toumma National Nature Reserve.* © Thomas Rabeil/SCF

Nigeria

There are more than 950 national protected areas of all types listed in the WDPA, but the majority are forest reserves with no IUCN category reported and can be assumed to exist on paper only. Large national parks (IUCN category II) known to harbour important populations of threatened vertebrates including African Elephant, Lion, Cross River Gorilla *Gorilla gorilla diehlii*, Nigeria-Cameroon Chimpanzee and other primates are Cross River, Gashaka-Gumti, Old Oyo and Kainji Lake. There are 21 game reserves although perhaps only one, Yankari Game Reserve, which contains Elephants, Lions and other large species, is still functional. There are several strict reserves (IUCN category 1a), but all are very small several (e.g. Lekki) are heavily encroached (A. Dunn pers. comm. 2014). There is one Biosphere reserve and 12 Ramsar sites.

Republic of Congo

Three large national parks (IUCN category II) protect many species of Near Threatened and threatened vertebrates: Nouabalé-Ndoki NP is part of the Sangha Trinational transboundary World Heritage Site; Conkouati-Douli NP in the south-west also forms part of a large transboundary complex; and Odzala-Kokoua in the centre of the country is also a Biosphere Reserve and home to key populations of African Elephant and Western Lowland Gorilla. Ntokou-Pikounda NP (IUCN category Not Reported) was established by ministerial decree in 2012 to protect a large population of Western Lowland Gorillas. There are 10 Ramsar sites including the very large Grands Affluents (>40,000 km^2). The proposed Ogooué-Lekiti NP (4,230 km^2) lies adjacent to Batéké NP in Gabon.

Senegal

The vast majority of national protected areas recorded in the WDPA, have no IUCN management category reported and most are classified forests. There are six IUCN category II national parks and one of these, Djoudj NP on the north-west coast, is also part of the Senegal River Delta Transboundary Biosphere Reserve. Delta du Saloum NP and Basse Casamance NP (both IUCN category II) are also situated on the Atlantic coast and important for migrating and wintering waterfowl among other species. Niokolo-Koba NP in the south-east covers over 9,000 km^2 and protects one of the largest remnants of Guinea savanna woodland and the only remaining population of Western Giant Eland *Tragelaphus derbianus derbianus*, as well as other antelopes, Chimpanzee and some of the few remaining Lion *Panthera leo* and African Wild Dog *Lycaon pictus* in West Africa. It is also a World Heritage Site ('in Danger') and a Biosphere Reserve. However, many large species have been

Headquarters of Nouabalé-Ndoki National Park, Republic of Congo. © WCS / Fiona Maisels

The gallery forests and savannas of Niokolo-Koba National Park, Senegal, a World Heritage Site in Danger. © Niels Broekzitter

greatly depleted. Ferlo Nord and Ferlo Sud wildlife reserves (category IV) in the Sahel zone both exceed 6,000 km^2. The Katane enclosure within Ferlo Nord is being used for acclimatization of Scimitar-horned Oryx *Oryx dammah*, Dama Gazelle *Nanger dama* and Dorcas Gazelle *Gazella dorcas* for reintroduction. Two privately managed reserves near Dakar host important semi-captive breeding herds of Western Giant Eland.

Sierra Leone
Most of Sierra Leone's national protected areas reported to the WDPA are forest reserves. The recently designated Gola Rainforest National Park (IUCN category II) on the border with Liberia combines three forest reserves and has populations of Chimpanzee and Pygmy Hippo; Outamba NP (IUCN category II) in the north-east may also have Pygmy Hippo, while Western Area Forest Reserve (IUCN category II) close to Freetown is home to the Endangered Jentink's Duiker. There is one Ramsar site.

Togo
The majority of the national protected areas reported to the WDPA are forest reserves and have no IUCN management category reported. There are three IUCN category II national parks. Oti-Kéran NP and Oti-Mandouri Faunal Reserve comprise the Oti-Kéran/Oti-Mandouri Biosphere Reserve, which is the easternmost component of the WAPOK transboundary complex.

3.9 Conclusions

There has been a substantial amount of conservation attention paid to identifying sites as protected areas and having them designated. The World Database on Protected Areas lists 2,186 national protected areas across West and Central Africa. The size of just under half of these is known, and nearly 90% have not had their management category reported. Furthermore, even where the size is stated, the boundaries are often not clear. There are only 209 protected areas that are classified in IUCN management categories I–IV, occupying more than 730,000 km^2. In addition, there are a number of national parks and others, including some important sites, whose management objectives match one of categories I–IV, although the government agency responsible has not reported a category to WDPA. However, there are far more sites in IUCN category VI, many of which, especially hunting zones and forest reserves, contribute positively to biodiversity conservation. Sites vary widely in size, from <1 km^2 to 97,000 km^2, averaging 2,920 km^2 in West Africa and 4,470 km^2 in Central Africa. In reality, some are only 'paper parks' and lack effective management and protection.

Only about 10% of West and Central Africa is covered by formal, government-protected areas, but this figure increases once MAB, World Heritage and Ramsar sites are included. International initiatives, particularly in the Congo Basin Forest, have further identified landscapes at a wider scale that encompass clusters of protected areas and the areas that connect them. AZE sites, and more especially IBAs, have further identified a large suite of sites of biodiversity value. However, the lack of thorough documentation, including accurate, GIS-based maps, and demarcation of sites on the ground certainly hinder protected area planning. Redressing this lack of documentation is urgently needed, not least so that countries can demonstrate whether or not they are meeting their commitments to the CBD.

One positive trend is the increase in the number of transboundary sites. These better preserve ecosystem function, show the value of managing biodiversity conservation at a sub-regional in spite of institutional difficulties, engage local communities and may lead to harmonization of legislation.

It is doubtful, given the current pressures on land for agriculture, resource extraction and other purposes, along with growing human populations, whether a significant increase in formal protected area coverage for medium- to large-sized vertebrates can easily be achieved. However, there is great scope in the majority of sites to significantly increase the effectiveness of protection (see Chapter 6) and thereby aid the persistence of medium- and large-sized vertebrates.

4. What are the major pressures on wildlife?

4.1 Introduction

In West and Central Africa, wildlife populations are affected by a variety pressures. An analysis of data contained within the IUCN Red List of Threatened Species, which documents major threats impacting species, shows that among threatened and Near Threatened mammals, birds and amphibians the most commonly reported threats across all three groups are agriculture and logging (Figure 4.1). Hunting is also a major threat for mammals and birds, which collectively account for the majority of medium- to large-sized vertebrate species in the region. Urban development activities are also a key threat. Many species, of course, are affected by more than one threat. These patterns are not too dissimilar to freshwater fishes: in both West Africa and Central Africa, agriculture and logging are cited as major threats to threatened species, but in contrast to terrestrial vertebrates, pollution (primarily due to sedimentation from deforestation) is a far greater threat than fishing to threatened fishes (see Lalaye & Entsua-Mensah 2009, Stiassny *et al*. 2011).

Agricultural expansion and logging have resulted in widespread deforestation in the region, but particularly in the countries of West Africa. Indeed, while Central African rainforests are still relatively intact (and account for ~90% of the Continent's rainforests; Mayaux *et al*. 2013), in West Africa forest patches are highly fragmented and overall much smaller, being remnants of a historically much larger forest block. This likely reflects the difference between clear-felling, which has removed a lot of the Guinean forests in the last few decades (replaced by rubber, oil palm, and farmbush), and selective logging (extraction of high-value timber species that thins, but does not destroy, the canopy). Mayaux *et al*. (2013) found that West Africa exhibited a deforestation rate (measured over the years 1990–2000 and 2000–2010) three times higher than Central Africa (Table 4.1; and see Figure S4.1), although it has slowed down post-2000. In Central Africa, Rudel (2013) postulates that deforestation rates have been lower in part because tax receipts from oil and mineral industries in this region caused rural to urban migration, declines in agriculture and increased imports of cereals from abroad. However, human population density is also markedly lower in Central Africa when compared with West Africa; the available evidence suggests that deforestation drastically increases when rural populations exceed ~8 people/km^2 (Ernst *et al*. 2013, Mayaux *et al*. 2013). Nonetheless, indications are that deforestation is increasing, as agricultural activities begin expanding in the Congo Basin (see Section 4.2.1). Ernst *et al*. (2013) recorded a doubling in annual gross deforestation between 1990–2000 and 2000–2005, increasing from 0.13% to 0.26%, which represents a loss of 240,000 and 480,000 ha/yr of forest, respectively. These authors have shown that population density, small-scale agriculture, fuelwood collection and forest accessibility are closely linked to deforestation in the Congo Basin, whereas timber extraction has had a lower impact on the reduction in the canopy cover.

Even in areas where habitat has remained relatively intact, bushmeat hunting has contributed to the "empty forest syndrome" (Redford 1992, Wilkie *et al*. 2011). Hunting has been exacerbated by industrial extractive activities (minerals

Figure 4.1 Main threats to globally threatened and Near Threatened mammals (n=129), birds (n=122) and amphibians (n=123) in the region (source: IUCN Red List of Threatened Species 2014.2).

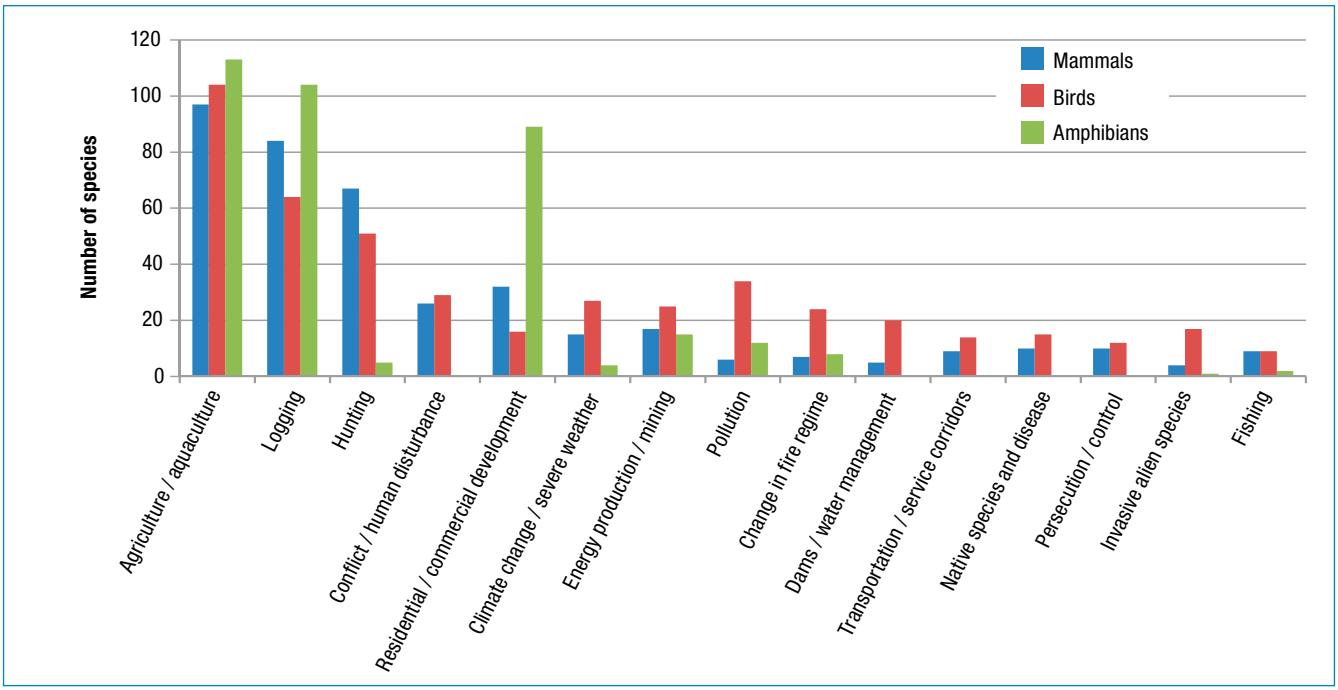


Table 4.1 A comparison of net deforestation and annual deforestation rates for the period 1990–2010 (source: Mayaux *et al.* 2013).

	1990–2000		2000–2010	
	Net deforestation x 1,000 ha (± SD)	Annual deforestation rate (%)	Net deforestation x 1,000 ha (± SD)	Annual deforestation rate (%)
West Africa	233.5 (± 108.3)	0.91	70.4 (± 23.9)	0.30
Central Africa	285.4 (± 36.5)	0.16	181.5 (± 39.8)	0.10

and timber), because in the course of their activities, companies: a) directly destroy habitat, disturb movement patterns and alter animal behaviour, and b) indirectly facilitate hunting by building roads and/or providing hunters with means for transportation. Salaried employees and their extended families that live in company camps (within or bordering concessions) constitute a significant local source of demand for protein (and therefore bushmeat; see below). The establishment of camps with better living standards than the surrounding villages creates an immigration flux and locally increases human population density. The presence of a large cash-rich population simultaneously generates a cascade of changes within local communities that further exacerbates the impact on wildlife and increase the volume of the harvest. Increased incomes allow hunters to take advantage of new hunting technologies (such as cartridges, guns, outboard motors, and headlamps), which in turn allows for a more efficient harvest. As industrial activities stimulate the local economy, the increased level of income generally raises the demand for wild meat.

This chapter discusses the major pressures on wildlife in the region, especially the threat of hunting (as the original primary impetus for this Situation Analysis). It is intended to provide a general overiew of major pressures, both in the recent past and future, and should be read in tandem with the species-specific summaries in Chapter 2.

4.2 Review of major pressures and impacts on wildlife

4.2.1 Agriculture

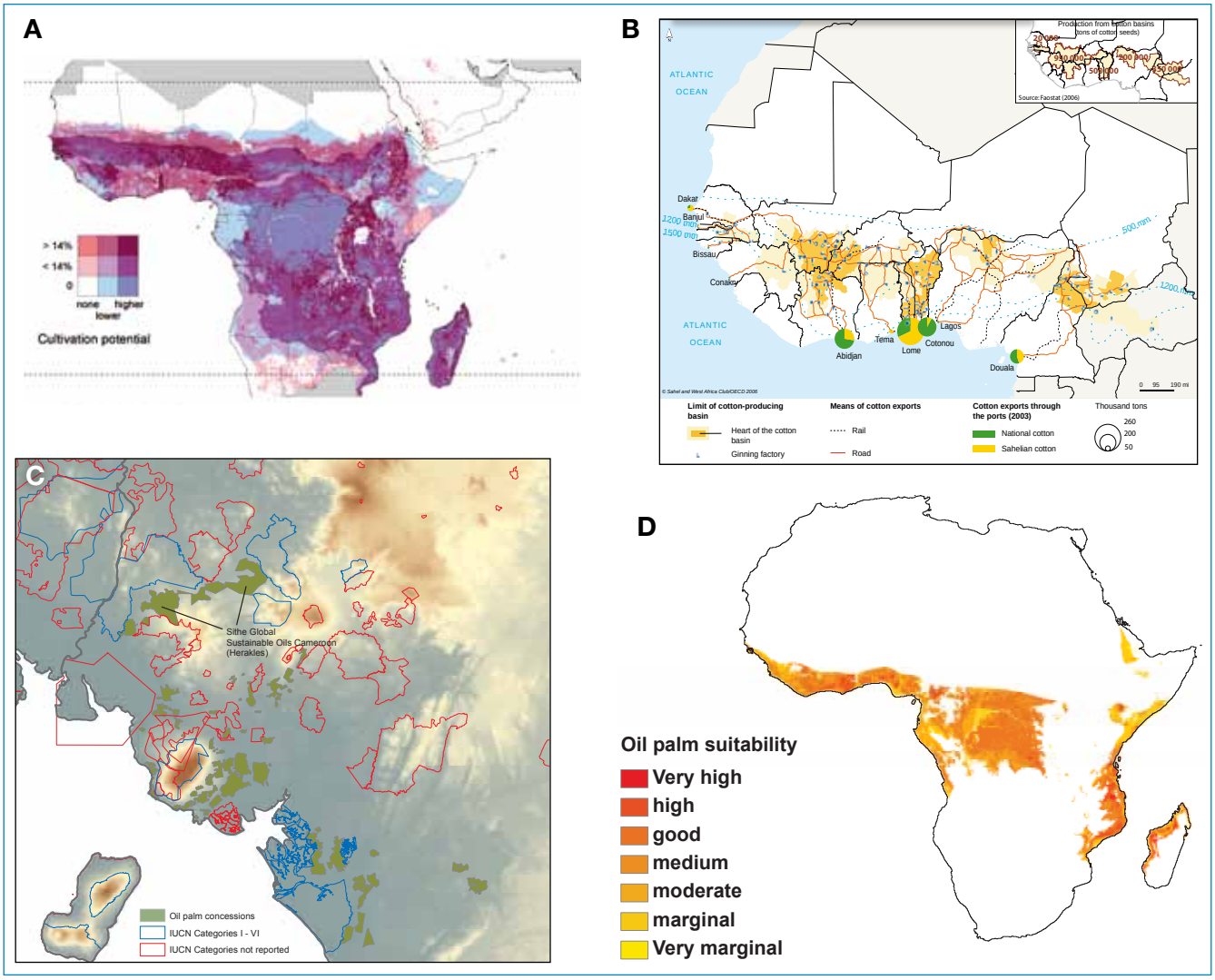
As noted above, current (2000–2010) deforestation rates in West and Central Africa are relatively low compared with those globally (Ernst *et al*. 2013, Mayaux *et al*. 2013), and lower in Central Africa than in West Africa. Perhaps because of this, the Congo Basin ranks amongst the areas with the highest potential agricultural cultivation potential for the major world crops (including maize, oil palm, soybean and sugar cane) in the world (Fischer & Shah 2010, Phalan *et al*. 2013; see Figure 4.2A).

Crop land increase in the last decades, also characterized by the shift from slash-and-burn agriculture to permanent cropping (no fallow periods), is mentioned by several authors as one of the main changes observed in historical land use patterns in West and Central Africa (Norris *et al*. 2010, van Vliet *et al.* 2012a). Indeed, in West Africa, agricultural expansion stands as the primary cause of deforestation, with around 80% of the original forested landscape now forest-agriculture mosaics (Norris *et al*. 2010). Nigeria (the richest country in the region) sits at the top of the list of those countries experiencing the greatest change in the area of land used for annual crops (absolute increase in arable cropland) over the period 1999–2008, while Sierra Leone, Guinea and the Gambia (among the poorest) sit in the top five countries in which annual crops expanded at the greatest rate (relative to the area of cropland) (Phalan *et al*. 2013).

In West Africa, crop land increase typically corresponds to observed human population density increases or immigration (van Vliet *et al.* 2012a). In southern Burkina Faso, immigration started in the 1980s when severe drought affected the northern and central regions of the country, inflicting significant losses in terms of crops and livestock to farmers (Reenberg & Lund 1998, Gray 1999, Pare *et al.* 2008, Ouedraogo *et al.* 2009). From that period onwards, migration to less drought affected areas (in the south, east, and west of the country) became an important livelihood diversification strategy. Consequently, the size of crop land increased at an annual rate of >1% during 1986–2002 (Pare *et al.* 2008, Ouedraogo *et al.* 2009). In Eastern Saloum, Senegal, the rural population grew considerably in many villages between 1958 and 1988, partly due to immigration for groundnut production launched by the Société Terres Neuves (Mbow *et al.* 2008). In Maradi, Niger, rapid immigration and population growth are among the main drivers of land use/ land cover change, linked to a boom in the production of groundnuts for the export market (Mortimore & Adams 2001). In Kouonbaka, Mali, the growth of the area's population has increased the pressure on arable land (human population density rose linearly from 18 to 34 persons/km^2 between 1967 and 2003), mainly related to the increased demand for millet and sorghum production (Ruelland *et al.* 2010). In Côte d'Ivoire, the road infrastructure left by the timber concessionaries facilitated, at least partly, an influx of agricultural migrants from the savanna regions of Côte d'Ivoire and neighbouring Burkina Faso and Mali which led to expansion of cocoa and coffee (Norris *et al*. 2010).

In West Africa, cotton production has increased markedly since the 1960s (Perret 2006). During much of the 1970s and 1980s, cotton growers received considerable support from national governments and aid donors in the form of subsidies for fertilizers, pesticides and seeds (Bassett 2001). Although no single country dominates international exports, the region as a whole is the world's third largest cotton exporter after the US and Central Asia. Cotton production in the region is mostly rainfed and cultivated in regions receiving an annual rainfall of between 500–700 mm and 1,200–1,500 mm. Hence most cotton-producing zones are transboundary areas covering the northern zones of coastal countries and the southern zones of land-locked countries (Figure 4.2B). Cotton production is almost always cultivated in association

Figure 4.2 A) Areas of land with cultivation potential (blue) in relation to current cropland (red) in tropical Africa (source: Phalan *et al.* 2013). Shades of blue indicate cultivation potential for the crop for which each 5-min grid cell is most suitable. Cultivation potential is calculated as the "agro-climatically attainable yield" for 12 major tropical crops as a percentage of the global maximum for that crop (Tóth *et al*. 2011). Shades of red indicate cropland extent in the year 2000, from Ramankutty *et al*. (2008). The darker shades indicate values above the median. Land which is suitable for one or more crops, and which is already cultivated, is mapped in shades of purple; land with no cultivation potential for these crops, and no cropland, is mapped in white, and land outside tropical countries is shaded grey. B) Cotton-producing zones, ginning factories and exports from West Africa (source: Perret 2006). C) Map of oil palm concessions in Cameroon relative to existing protected areas in IUCN categories I–VI (blue) and other protected areas (red) (sources: oil palm, World Resources Institute 2014; protected areas, World Database on Protected Areas, August 2014 release). D) Agriculturally suitable areas for oil palm under irrigation (map courtesy of John Garcia Ulloa; source: IIASA/FAO 2012).



with millet, sorghum and maize, which may explain why cotton and grain production have increased at similar rates since the 1980s (Perret 2006). However, cotton production and exports from West African countries have been undercut by controversial (and significant) government subsidies to cotton sectors in the United States (Heinisch 2006).

In highly populated areas in the Congo Basin, slash-and-burn agriculture remains dominant, but competes locally with crops such as banana and plantain (Mertens *et al.* 2000, Sunderlin *et al.* 2000), cocoa production under agroforestry systems (van Vliet 2010) and, more recently, oil palm plantations. Global palm oil production is increasing by 9% every year, prompted largely by expanding biofuel markets in the European Union and by food demand in

Industrial-scale oil palm plantation near Edéa, Cameroon. © Flore de Preneuf/PROFOR

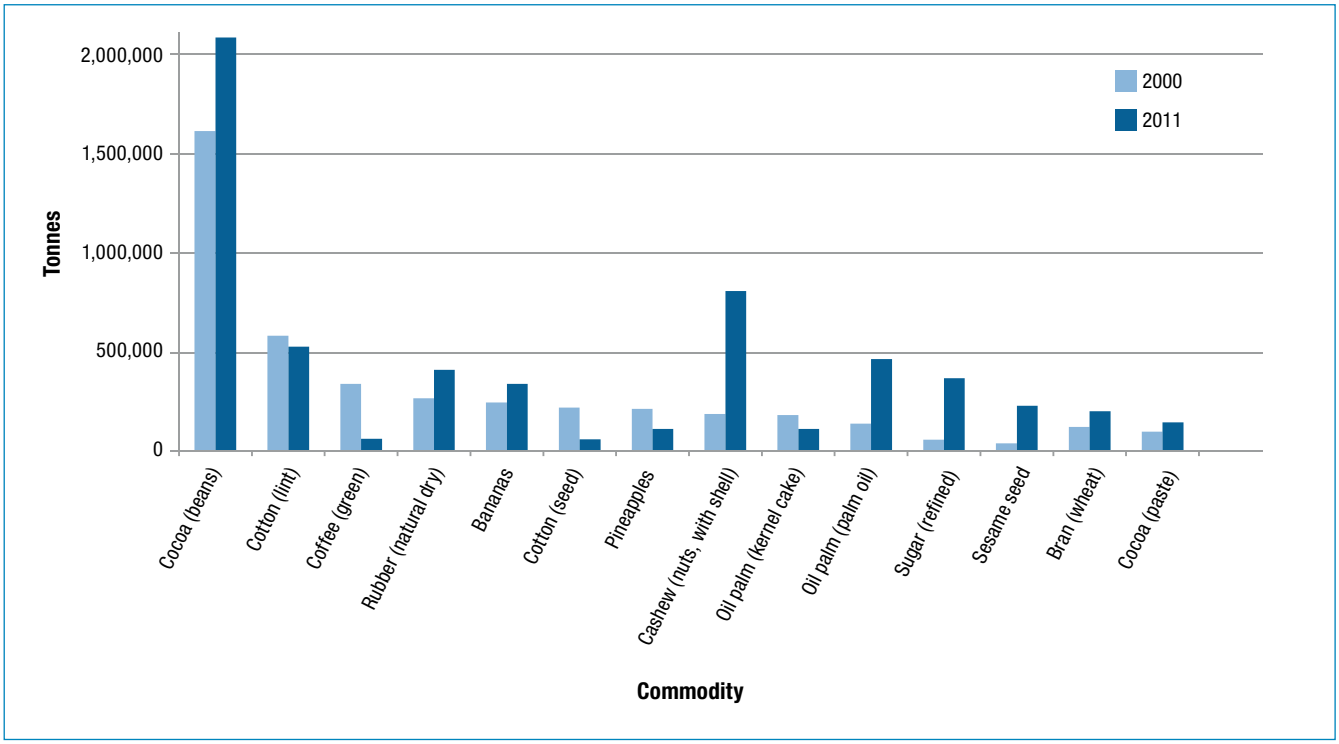
Indonesia, India and China (Fizherbert *et al.* 2008). Corley (2009) has estimated that the demand for edible oil will probably be around 240 Mt in 2050, nearly twice the current total. Most of the additional oil may come from palm oil, which has the lowest production cost of the major oils, with an additional 12 Mha of palm plantations required to achieve this. Although the extent to which oil palm has been a direct cause of past deforestation is difficult to quantify, its potential as a future agent of deforestation in Africa is enormous (though there are questions whether yields comparable with those in Southeast Asia are achieavable given climatic and infrastructural limitations). Nigeria is the world's third largest producer of palm oil after Indonesia and Malaysia, and the last decade has already seen a huge increase in production throughout West Africa to supply export markets (Figure 4.3). Cameroon, for example, has committed to increase its palm oil production from 230,000 crude tons in 2010, to 300,000 tons in 2015 and 450,000 tons in 2020, with a focus on increasing the area under production rather than yields (Hoyle & Levang 2012). A high-profile case concerns the acquisition by a US-based firm, Herakles Farms (via a locally based subsidiary, Sithe Global Sustainable Oils Cameroon, SGSOC), of ~1,000 km^2 of land for palm oil production in south-western Cameroon. The concession's position has proved highly controversial, because it is surrounded by Korup National Park, Rumpi Hills Forest Reserve, Bakossi National Park and Banyang-Mbo Wildlife Sanctuary (Figure 4.2C). In 2013, Sifca Group, which owns Africa's largest refinery near Abidjan, Côte d'Ivoire, said it would spend >US$400 million expanding its oil palm operations in Ghana, Nigeria and Liberia (Monnier 2013). Demand for palm oil is predicted to continue increasing, and globally, most of the remaining areas suitable for planting are forested (Figure 4.2D). Furthermore, the roads and railways being constructed to access minerals in the Congo Basin means that the potential for oil palm expansion (and indeed for other agricultural commodities) is particularly high in parts of the region where lack of infrastructure has, until now, been a limiting factor (Weng *et al*. 2013).

4.2.2 Logging and wood extraction

In Central Africa, selective logging is the most extensive extractive industry. The forestry sector plays a key role in the economy of the region and is often the main sector generating direct and indirect employment (Bayol *et al*. 2012). Estimates of the proportion of forests under logging concessions are around 30% (Laporte *et al*. 2007, Bayol *et al*. 2012; Figure 4.4). Only in Democratic Republic of Congo have areas allocated for concessions decreased, largely because in 2002 the country revoked some 25 million hectares of concessions, while in Equatorial Guinea all forest concessions were cancelled in 2008 (Bayol *et al*. 2012; Table S4.1).

As of 2010, Central Africa's production of tropical timber represented only 3% of the global total (Bayol *et al*. 2012). Gabon has been the largest producer of timber since 1999, followed by Cameroon, Republic of Congo, and Central African Republic. Production in Equatorial Guinea dropped in the late 2000s following back-to-back decisions to ban log exports in 2007 and all concessions in 2008. Timber production is lowest in Democratic Republic of Congo, where the relatively low value of the timber present and constraints on transport infrastructure have inhibited growth in the sector (Bayol *et al*. 2012). Gabon has good reserves of Okoumé *Aucoumea klaineana*, which dominates production

Figure 4.3 Top 10 commodities by export quantity in West Africa in 2011 vs. 2000 (source: FAOStat 2014).



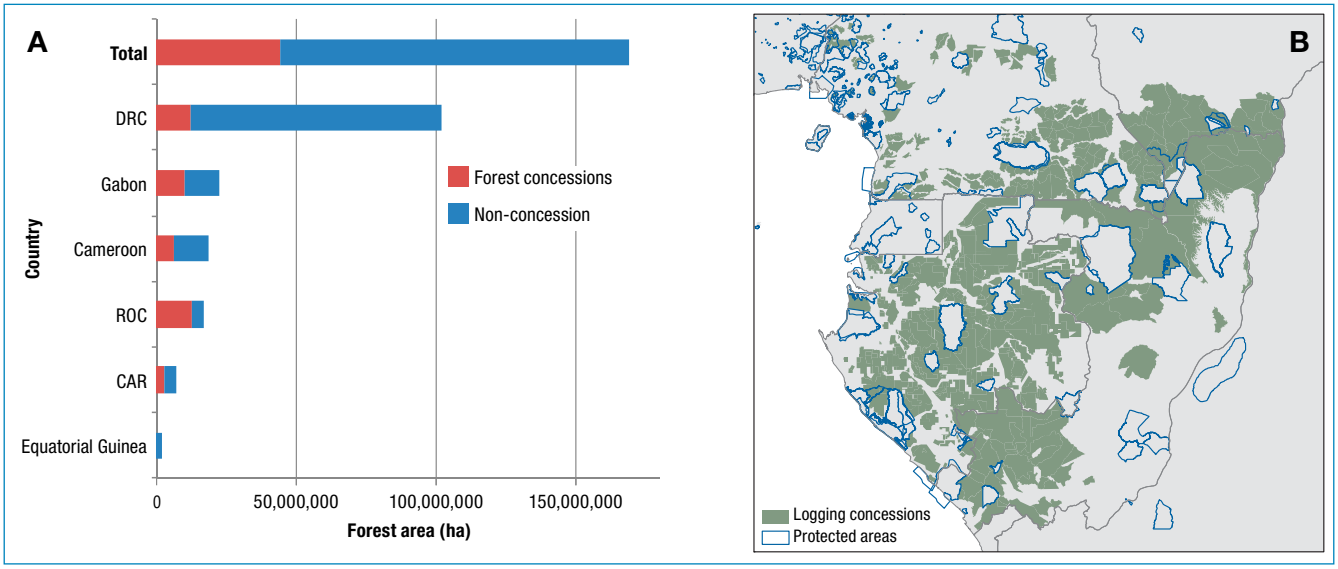


Figure 4.4 A) Forest areas (in ha) allocated to long-term (>15 years) forest concessions (red) by country in Central Africa and total area of non-concessioned, lowland moist forest (blue). In Equatorial Guinea, all the forest concessions were cancelled in 2008 (source: Bayol *et al.* 2012). B) Map of logging concessions in western Central Africa relative to all existing protected areas (sources: logging, World Resources Institute 2014; protected areas, World Database on Protected Areas, August 2014 release).

from the region; other key timber species are Sapele *Entandrophragma cylindricum* followed by *Triplochiton scleroxylon* (which comes mainly from Cameroon) (Bayol *et al*. 2012).

Although commercial logging has yet to result in a large-scale loss of the forest canopy in Central Africa (Ernst *et al*. 2013), the secondary impacts have been marked (Abernethy *et al*. 2013). Four major causes of wildlife disturbance are generally cited in and around timber concessions: roads, hunting, human population increase, and habitat disturbance (Table S4.2). Increased human densities are linked to company infrastructure and camps, which offer better facilities than existing urban centers (Nasi *et al*. 2008) and attract people into areas that were formerly sparsely populated. Agriculture and hunting activities then increase in response to the increased demand for food (Wilkie *et al*. 2000, Laurance *et al*. 2006). Chief among the causes of wildlife disturbance has been the dramatic impact of roads. In 2007, logging roads accounted for 38% of the entire road network in Central Africa, ranging from 13% in Democratic Republic of Congo to over 60% in Gabon and Republic of Congo, significantly influencing forest disturbance and unregulated human access (Laporte *et al*. 2007). The rate of road construction for logging has increased dramatically in the last decade, potentially opening an additional 29% of Central African forests to increased human pressure, with the greatest degree of disturbance evident in Cameroon and Equatorial Guinea (Laporte *et al.* 2007).

Despite the negative impacts of logging concessions, evidence has shown that logged forest can, if appropriately managed, extend the conservation estate for many of West and Central Africa's most threatened species. Indeed, Clark *et al*. (2009) found that the abundance of large mammals in four tropical logging concessions studied in northern Congo even rivaled that of the adjacent Nouabale-Ndoki National Park. In Gabon, Laurance *et al*. (2009) found that a logging concession near Rabi, facilitated seasonal movements of forest elephants and other large wildlife species between inland and coastal areas across the nearby Loango and Moukalaba-Doudou National Parks and was playing a key role in sustaining biodiversity, by maintaining forest connectivity and by limiting human population growth near park borders. In the Congo Basin, the last two decades have seen revisions of most forestry laws (Central African Republic in 1990 and 2008, Cameroon in 1994 currently under revision, Republic of Congo in 2000, Gabon in 2001 and Democratic Republic of Congo in 2002) and the emergence of forest management implemented on several million hectares of logging concessions in the region. In the Congo Basin, among the 293 concessions officially recognized in 2010, 90 were operating under an approved management plan with a further 95 designing their management plan (yet to be finalized), for a total area of about 221,920 km² (59% of the area allocated for logging)

Logging truck in Lastourville, Gabon. © Nathalie van Vliet

(Nasi *et al*. 2012). Certified concessions amounted to about 4,754 km² in 2010 (3,040 km² for FSC) or about 13% of the total area under logging concessions (Nasi *et al*. 2012). Any significant improvement towards more sustainable management of biodiversity in West and Central Africa requires better involvement of all stakeholders in the design and implementation of the management plans involving both production and conservation forests. This implies developing platforms at local level where representatives of the international/national/local levels, private/ public sectors, informal sector/civil society are consulted about management options and decisions. There is also need for a regional forum where biodiversity, both from conservation and production forests, can be addressed. In the Congo Basin, under the COMIFAC umbrella, RAPAC (Réseau des Aires Protégées d'Afrique Centrale) is the regional body dedicated to providing guidance and tools for protected areas and managers. However, there is no regional equivalent for production forests, nor for biodiversity at the global level (Nasi *et al*. 2012).

Industrial-scale logging is not the only extractive use of wood: fuelwood extraction can be a major cause of forest degradation. The majority (83%) of sub-Saharan Africa's population is dependent on fuelwood for cooking energy, including, for example, 96% of Malians and 91% of Ghanaians (Daurella & Foster 2009). Besides domestic household use, many businesses also depend on wood for their energy. Access to alternative fuel has a marked effect on fuelwood consumption: for example, in Gabon, more than 62% of the population has access to liquified petroleum gas, and consequently its reliance on fuelwood is among the lowest (34%). Senegal and Mauritania also perform well in terms of access to gas, and have slightly lowered rates of fuelwood consumption. However, use varies dramatically between urban and rural communities; even in Gabon, rural communities are far more dependent on woodfuel (84%) than urban communities (16%) (Daurella & Foster 2009). While forestry plantations currently occupy a limited space in Central Africa, it is possible that the coming years could see an increase in these given the high demand for woodfuel (Bayol *et al*. 2012).

4.2.3 Hunting

Species impacted and hunting techniques

In West and Central Africa, an estimated 177 species have been documented as being hunted and used in the wild meat industry, of which 17% are listed as threatened on the IUCN Red List (Taylor 2012, Taylor *et al*. 2015). A recent systematic review (Taylor *et al*. 2015), reveals a clear bias in bushmeat research that is also apparent from this Situation Analysis with more research undertaken in Central Africa than in West Africa, and a disproportionate focus towards certain countries (Gabon, Equatorial Guinea, Cameroon and Nigeria). Site-specific species lists compiled throughout the region typically show that the majority of species are used in wild meat consumption and trade, with mammals (comprising 76% of the 177 species noted above) dominating the harvest compared with other taxa. On average, over 60% of village hunting offtake comprises small ungulate and rodent species (Nasi *et al.* 2011; and see Table 4.2). The most frequently hunted species are those between 2 and 22 kg, with Brush-tailed Porcupine *Atherurus africanus*, Blue Duiker *Philantomba montícola*, and red duikers (*Cephalophus* spp.) forming the majority of the catch in most forest areas. Blue Duiker alone accounts for about one-third of the catch (Kümpel 2006, van Vliet 2008).

Snaring using wire cable or tough plastic snares is probably the most widespread hunting method used in Central African forests (Noss 1998, 2000). However, it is wasteful and is almost completely non-selective of species: in Central African Republic, Noss (1998) recorded that 27% animals successfully snared are lost to decomposition or

A) High-calibre hunting rifles, including many home-made arms, recovered from anti-poaching confiscations in Dzanga-Sangha Forest reserve, Central African Republic; and B) home-made 12-gauge shotgun shells recovered from the same location, showing, right, a typical AK-47 bullet (7.62 calibre), and left, a metal manufactured slug for hunting African Elephant (inset shows firing pin bored out from the former). All images © David Greer

Table 4.2 Percentage of carcasses from ungulates, primates, rodents and other (including non-mammal) species in different hunting sites of Central Africa (source: Nasi *et al.* 2011, van Vliet *et al.* 2012b).

Country	Location	Ungulates	Primates	Rodents	Other	Source
DRC	Ituri Forest	60–95	50–40	1	1	Hart 2000
Gabon	Makokou	58	19	14	9	Lahm 1993
	Dibouka, Baniati	51.3	10.6	31		Starkey 2004
	Dibouka, Kouagna	27	8.3	48.7		Coad 2007
	Ntsiete	65	23.5	9		van Vliet 2008
ROC	Diba	70	17	9	4	Delvingt 1997
	Oleme	62	38			Gally & Jeanmart 1996
	Ndoki and Ngatongo	81–87	11–16	2–3		Auzel & Wilkie 2000
CAR	Dzanga – Sangha	77–86	0	11–12	2–12	Noss 1995
Equatorial Guinea	Bioko and Rio Muni	36–43	23–25	31–37	2–4	Fa *et al.* 1995
	Sendje	30	18	32		Fa & Yuste 2001
	Sendje	35	16	43		Kümpel 2006
Cameroon	Dja	88	3	5	4	Dethier 1995
	Ekim	85	4	6	5	Delvingt 1997
	Ekom	87	1	6	6	Ngneugueu & Fotso 1996

scavenging, and one-third broke the cable and escaped having been injured. Nocturnal hunting with shotguns is practised commonly when hunting duikers, since they freeze in torchlight and can be approached closely (Newing 2001) and in some regions (e.g., some Mbuti tribes in the Ituri forest) hunters use nets (Wilkie & Curran 1991). Hunting with guns facilitates more selective and efficient hunting of larger-bodied (and arboreal) animals, such as bushpig, buffalo and primates (Kumpel *et al*. 2008, van Vliet & Nasi 2008) and, of course, elephants. In Central Africa, the two most commonly used weapons to hunt elephants are the AK-47 and the 12-gauge shotgun using manufactured bullets, followed by high-calibre hunting rifles (e.g. .458) (Stiles 2011); more rarely, cable snares and homemade firearms are used (Stiles 2011). Home-made firearms, often manufactured with the provision of parts/tools/machinery from timber companies, are increasingly encountered as a lot of the heavier calibre rifles (such as .458's) from the colonial era have been confiscated (D. Greer *in litt*. 2014). Chapter 2 provides a more detailed discussion of the impact of hunting on individual species.

The ecological implications of hunting

Hunting can trigger numerous, yet not completely understood, effects which can alter the overall function, structure and composition of the ecosystem (Nasi *et al.* 2010). Often these effects are straightforward and easy to predict, especially for those species directly targeted (and removed from the population) by hunting activities. Hunting may also have indirect effects, often referred to in the literature as cascade effects, whereby species declining under extreme hunting pressure change their ecological interactions with others (Redford 1992, Wright 2003, Letorneau *et al.* 2004). Plant regeneration (loss of pollinators, seed dispersers and seed predators), food webs (loss of top predators or of their prey), and plant diversity (change in herbivory patterns, increased pests) are among the various processes dependent upon the presence of animals. Effiom *et al*. (2013), for example, compared paired sites, with high and low hunting pressure, in three areas of south-eastern Nigeria and found that in hunted sites populations of important seed dispersers (small and large primates, including the Cross River Gorilla) were drastically reduced. Consequently, in protected sites, seedling communities were similar in composition to the mature tree communities, but in hunted sites species with other dispersal modes dominated among seedlings, evidencing the transformative effect of bushmeat hunting on plant communities.

Wildlife species are not all affected equally by hunting, although some general ecological rules are evident: large, low-density, slow-reproducing and specialist species, such as elephants, large primates and large carnivores, tend to be more vulnerable to increases in predation pressure than smaller, fast-reproducing and high-density generalist species, such as rodents and small duikers (Abernethy *et al*. 2013). Forest elephants can represent as much as 90% of the animal biomass of intact Central African forests and diurnal primates up to 30%; hence, the dramatic declines recorded for such larger-bodied species can radically alter functional relationships in which they play a key role (Abernethy et *al*. 2013). Forest African Elephants, for example, may consume more seeds from more species than any other taxon of large vertebrate seed disperser, defecating them over long distances into nutrient-rich and protective dung. Loss of elephant populations, therefore, could result in a number of (often highly specialized) plant species being poorly dispersed (or not dispersed at all), and many species being dispersed in lower quantities and over much shorter distances (Campos-Arceiz & Blake 2011). Although the loss of these "large forest architects"

(or "mega-gardeners") can be the most obvious cause of ecosystem changes, other shifts in species composition will also have important impacts. Leopards have already been lost from heavily hunted areas, not due to direct hunting, but rather due to loss of their prey base (Henschel *et al*. 2011). Similarly, smaller-bodied species released from predation pressure and competition (as their natural predators and competitors are hunted to low densities) can find conditions of high hunting pressure favourable and often increase locally in density, with knock-on consequences for the area's ecology (Abernethy *et al*. 2013).

Rates of offtake and sustainability

Harvest rates of bushmeat in West and Central Africa are generally held to be increasing in the face of human population growth, increased access facilitated by new roads, and more efficient hunting methods. All the evidence points to current harvest rates for many species as being unsustainable. Fa *et al*. (2005) have estimated, from published studies at 36 sites across the region that an average of 2,000 carcasses per site (amounting to roughly 16,000 kg per site), with as many as 12,000 carcasses at one site in Ghana, were extracted in a year. These authors noted that at sites where larger species had been severely depleted, hunters would select more of the smaller species such as the Giant Pouched Rats *Cricetomys* spp. or the Cane Rat *Thryonomys swinderianus*, suggesting that the relative proportions of ungulates and rodents in the offtake could be used as indicators of site over-exploitation.

Indeed, while Cowlishaw *et al*. (2004, 2005) noted that a strong urban demand for bushmeat and sustained hunting pressure has led to the local extinction of animals with low reproductive rates (primates and large ungulates) in Takoradi in Ghana, they also showed that there was evidence of a 'post-depletion sustainability' of smaller ungulates and rodents that (as noted above) comprise the majority of animals in the bushmeat trade. Species such as flying squirrels and Brush-tailed Porcupine appear to be 'robust species with high reproductive rates that can therefore sustain heavy exploitation' (Cowlishaw *et al*. 2004). The argument for post-depletion sustainability has two important policy implications. The first, the authors argue, is that scarce conservation funds should be allocated towards new markets where vulnerable species may be experiencing rapid depletion (e.g. markets supplied from new logging concessions). Second, they suggest that a sustainable bushmeat trade, with an emphasis on fast-reproducing, more adaptable, species, can coexist with the conservation of more vulnerable (e.g., forest obligate) species.

Bushmeat as a source of protein

In remote forest areas of West and Central Africa, bushmeat is often the main source of animal protein available and plays an essential role in people's diets especially where livestock husbandry is not a feasible option and wild fish are not available. In the Congo Basin, for example, average bushmeat consumption amounts to 51 ± 14 kg/capita/year and ranges from seven to 110 kg/capita/yr (Nasi *et al.* 2011). Eating bushmeat is, therefore, a matter of survival with few if any alternatives.

Bushmeat trade occurs in open markets alongside other agricultural products and bushmeat is a common meal for most households regardless of the social and cultural background. Although urban bushmeat consumption per capita appears significantly lower than in rural areas according to most available studies, the contribution of urban areas to overall bushmeat consumption is high. Consumption in Libreville (Gabon) is estimated at 7.2 kg/person/year (Wilkie *et al.* 2005), in Bangui (Central African Republic) at 14.6 kg/person/year (Fargeot & Diéval 2000), and in Mbanjock (Cameroon) at 2 kg/person/year (Bahuchet & Ioveva 1999). Given the very significant urban and rural consumption and the either non-existent (e.g. Gabon, Democratic Republic of Congo, Republic of Congo) or limited (Cameroon, Central African Republic) domestic livestock sector, bushmeat remains a crucial component of food security for the Congo Basin.

In contrast to rural communities or forest dwellers, urban consumers usually have a choice of several sources of protein, and may opt for bushmeat for a variety of reasons (e.g. cost, taste or preference) that vary between regions. In such a context, bushmeat consumption can vary according to variations in the price of alternative foods, such as fish (Wilkie *et al.* 2005). In several African cities, bushmeat is still the cheapest source of protein and represents a crucial source of meat for the poorest urban households. In Kisangani, Democratic Republic of Congo and Bangui, Central African Republic, bushmeat is cheaper than many other alternative sources of protein (Fargeot 2010, van Vliet *et al.* 2012) and is essentially perceived as a 'lower cost' protein as it can be captured rather than purchased (Kümpel 2006). By contrast, in large cities of Equatorial Guinea, Gabon and Cameroon, bushmeat is more of a luxury product. Although preferred for its taste, it is less frequently consumed than frozen mackerel, chicken or pork due to lower cost (Kümpel *et al.* 2007, Abernethy & Ndong Obiang 2010). Analysis of taste choices in Gabon indicated that consumers differentiate amongst bushmeat species and that wildlife cannot be treated as a generic food source (Schenck *et al.* 2006, Knights 2008).

When wild fish is available it can outweigh the importance of bushmeat in the diet of forest dwellers (Wilkie *et al.* 2005). The consumption of fish and/or bushmeat seems to be closely linked to both availability and/or the price of substitutes. Brashares *et al.* (2004) used 30 years of data from Ghana to link mammal declines to the bushmeat trade and showed that many years of poor fish supply coincided with increased hunting in nature reserves and sharp declines in the biomass of 41 wildlife species. There are also contexts in which fish may or may not be preferred to bushmeat. The other possible wild source of protein, namely invertebrates, represents an important traditional habit (being widespread in West Africa) and also, considering their nutritional composition, can make a substantial contribution to the human diet (Vantomme *et al.* 2004). However, invertebrate protein is often not recorded during bushmeat market

surveys (Taylor *et al.* 2015). Similarly, many invertebrate species are seasonal (making it hard to develop stable markets), there is some stigmatization of insect eating, and modern farming tends to view insects as pests (rather than as a food source) with the application of pesticides to reduce insect populations making consumption of invertebrates more hazardous (ACET 2014).

Bushmeat as a source of income

In many rural settings hunting provides a very important source of income, often more important than the income generated by the trade of agricultural products. Bushmeat can represent a main cash-earning commodity for the inhabitants of the humid forest regions of the tropics (Table 4.3). Income-generating alternatives to hunting are scarce in rural villages (Elliott 2002, de Merode *et al.* 2004) and, where available, can be short term and unpredictable, which can lead young men to hunt rather than engaging in potentially more profitable activities (e.g. cocoa farming) (Solly 2001). Where jobs are not available locally, and catch per unit effort is profitable, hunting serves as a reliable fall-back in times of financial need and can be differentially important during times of stress for local people, such as when crops fail.

Whilst hunting has the potential to provide a substantial income, households do not tend to accumulate wealth through hunting; rather, hunting income may be spent in part on items (like cigarettes and alcohol) that do not contribute to household food security (Coad *et al.* 2010). In villages in south-east Gabon, Starkey (2004) showed that household income from hunting was 15–72% of total household income, and this percentage was higher in more remote communities. In Lebialem, Cameroon, Wright & Priston (2010) showed that income generation was the reason for harvesting that was stated most frequently during interviews (by 46% of the hunters interviewed) and bushmeat harvesting was mentioned as the major source of income by 33% of respondents. A typical response was: "hunting is the only way of getting immediate cash". In Equatorial Guinea, hunting has been shown to be a major income-generating activity at the village level, only eclipsed by waged employment (Kumpel *et al.* 2010). At the individual level, hunting earned an average of US$597 per year and 60% of the men interviewed earned income from hunting. The vast majority (two-thirds) of hunters chose to hunt 'because there is no other way of making money' as their reason for hunting.

For the majority of hunters, as hunting offtakes for a household increase, the percentage of the offtake sold also increases, reflecting the fact that hunters sell the remaining meat only after the household's requirement for a certain level of protein is satisfied. On occasions, men do hunt for commercial purposes to fulfil a household's short-term cash needs, such as school fees, ceremonies or medical care (Starkey 2004, Solly 2004, van Vliet & Nasi 2008); the quick income possible from selling meat is a common incentive for bushmeat hunting. Individuals with part-time or seasonal employment allocate more time to hunting than those with full-time jobs (Brashares *et al.* 2011).

In Côte d'Ivoire, subsistence and market hunting were part of a repertoire of economic diversification initiatives pursued by individuals to make up for lost revenues in the ailing cotton economy. Between 1985 and 1995, farmers experienced worsening terms of trade for cotton, the main cash crop of northern Côte d'Ivoire. World market prices were low and the farmers responded to this cost-price squeeze by diversifying livelihoods. Hunting for the bushmeat trade and household food consumption presented an additional source of income as hunter associations expanded their ranks and the number and quality of firearms increased in the community (Basset 2005). Farmers who hunt to supplement their agricultural incomes also contribute to unsustainable levels of hunting. In Côte d'Ivoire, the vast majority (90%) of hunters are farmers who hunt for both subsistence and commercial purposes.

A few hunters specialize in commercial hunting and base their livelihoods entirely on the sale of wild animal meat. Commercial hunters target particular species (e.g. bushpig and elephant in Gabon; Okouyi 2006) and often work in agreement with traders or directly with the consumers who provide guns and ammunition. Those hunters who specialize in elephants primarily target ivory, but meat is an important by-product of these hunts. Stiles (2011) notes that the economic potential of elephant meat often exceeds that of ivory for hunters: if all meat could be harvested and sold from an adult male (estimated to equal approximately 1,000 kg smoked) earnings would amount to US$1,000–5,000, or an average of about US$2,600. Only an elephant with very large tusks (>20 kg each) could provide that much from ivory. On average, hunters could earn much more from meat of one elephant than from ivory. However, although elephant meat has tremendous economic potential for hunters, the commodity appears underutilized, and seldom

Table 4.3 Wild meat use (self consumption and sold) in various communities (source: Nasi *et al.* 2011, van Vliet *et al.* 2012b).

Country	Locally consumed (% biomass)	Sold (% biomass)	Source
DRC	10	90	de Merode *et al.* 2004
CAR	27	73	Noss 1995
	65	35	Delvingt 1997
Equatorial Guinea	57	34	Fa & Yuste 2001
	10	90	Kümpel 2006
Gabon	41	59	Starkey 2004
	60	40	van Vliet & Nasi 2008
	56	44	Carpaneto *et al.* 2007
Cameroon	36	64	Wright & Priston 2010
	44	56	Solly 2004
	34	40	Delvingt 1997
	63	15	Takforyan 2001
	59	28	Takforyan 2001
	68	14	Dounias 1999
ROC	28	68	Delvingt 1997
	42	54	Delvingt 1997
	45	35	Delvingt 1997

reaches its true value, because of manpower and transport constraints as well as fear of detection (Stiles 2011). In general, little is known about the income generated by specialized commercial hunters, as their activity is most often illegal and sometimes associated with the illegal trade of other wild products (furs, horns, pets, etc.) where meat sales are only secondary. Specialized commercial hunting is also sometimes practiced by armed militia. In the Ituri region of Democratic Republic of Congo, for example, the forest has been heavily hunted in an open-access system exploited by a large number of lower-ranking soldiers that relied on bushmeat for their subsistence (de Merode & Cowlishaw 2006).

Hunting households are not the only beneficiaries of the bushmeat trade. Throughout tropical forest countries, bushmeat generates income for a variety of stakeholders including those who transport it at all points along different supply chains and those who trade it in roadside locations, in established markets, door to door, or in restaurants and shop halls. Rural hunters are linked with urban-based merchants and restaurant owners in a well-organized, and not always illicit, commerce in wild game meat. Although urban bushmeat consumption per capita appears significantly lower than in rural areas according to most available studies, the contribution of urban areas to the overall bushmeat consumption is high and likely to become higher as the population of Central African countries grows and becomes more urbanized. Starkey (2004) estimated that a total of 161 tonnes of bushmeat was sold per year in five markets in Gabon. Similarly, Fa *et al.* (1995) suggested that the volume of bushmeat traded annually in Equatorial Guinea's two main markets is of the order of 178 tons. An inventory in 1995–96 of the four main markets in the Cameroon capital, Yaoundé, estimated sales of 840–1080 tons of bushmeat per year (Bahuchet & Ioveva 1999). In Yaoundé, Edderai & Dame (2006) identified 15 markets and 145 restaurants and cafeterias selling bushmeat and providing an occupation for 249 people, of whom 84.3% were women. Fargeot & Dieval (2000) estimate annual consumption in Bangui, Central African Republic, to be of the order of 9,500 tons per year, of which at least half passes through formal markets. Bushmeat trade in Ghana shows strong similarities with Côte d'Ivoire in terms of its organization and impact on wildlife populations (Cowlishaw *et al*. 2004, Mendelson *et al*. 2003).

The family of a subsistence hunter in Ovan, Gabon. © Nathalie van Vliet

The cultural importance of bushmeat

The cultural importance of bushmeat, particularly for traditional indigenous peoples confronting major societal and socioeconomic change, is also a major factor driving bushmeat consumption (van Vliet & Mbazza 2011). In Gabon, bushmeat is associated with the village, with rituals and with ceremonies, such as men's circumcision ceremonies (Angoué *et al.* 2000, van Vliet & Nasi 2008). The traditional importance of bushmeat has also been shown in Equatorial Guinea; whereas some species are considered to have magical or medicinal properties that increase their value, others are taboo (Kümpel 2006). Indeed, taboos on certain foods are widespread in parts of Central Africa (Okouyi 2006, van Vliet & Mbazza 2011). In the Batéké Plateau of Gabon, many local people resist urban hunters' using their hunting grounds without permission, so historic hunting domains and customary claims persist and may be a way to engage with communities in protecting wildlife in their customary lands (Walters *et al*. 2014)

The growing illegal international trade of wildlife products

Contemporary illegal wildlife trade is now frequently cited as ranking alongside the trade in drugs, arms, and humans as one of the largest in the world. While the industry sometimes uses village hunters to secure tusks, meat and skins, an increasing number of commercial hunters, using heavier calibre weapons than those available to villagers, and particularly targeting ivory-bearing elephants, are also hunting in the region. Meat and ivory then pass via highly organized trade chains to their destinations in the cities of the region and then overseas (Abernethy *et al*. 2013; Figure 4.5). Although data from the Elephant Trade Information System (ETIS) indicate that Kenya and Tanzania are currently the major exit points for illicit ivory, 10 further countries or territories are recognized as areas of concern as sources of ivory, transit points or domestic ivory markets, including Cameroon, Democratic Republic of Congo, Gabon, Nigeria, and Republic of Congo. The two countries most heavily implicated as destinations for illicit trade in ivory are China and Thailand (UNEP, CITES, IUCN, TRAFFIC 2013). The impact of ivory poaching is currently exceptionally severe in Central Africa, with some sources reporting forest elephants across the region having declined by 62% between 2002 and 2011 (Maisels *et al.* 2013).

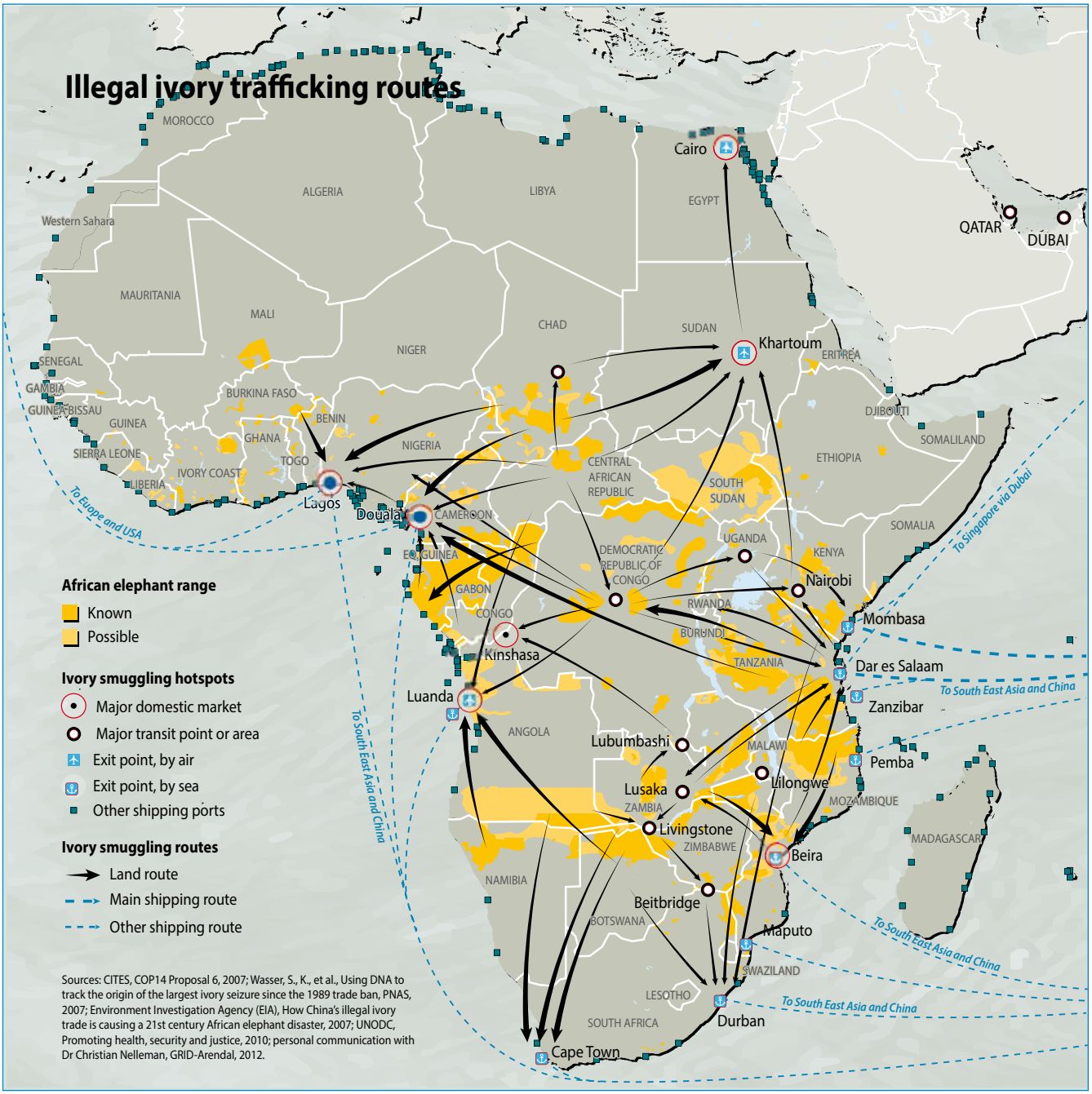
However, while much of the focus is on ivory, other species are also affected. There is evidence of a growing intercontinental trade in African pangolins between Africa and Asia, perhaps using rhinoceros horn and ivory trading routes between the two continents. In recent years, there have been a small number of pangolin-related seizures from Africa which have been destined for Asian markets. For example, in 2009, 100 kg of scales of '*Manis* spp.' were seized in transit between Côte d'Ivoire and Hong Kong (Challender 2011), and in 2011

custom officials seized a consignment comprising 100 African White-bellied Pangolin *Phataginus tricuspis* skins (with scales attached) that had originated in Guinea and that was bound for Thailand (Challender & Hywood 2012). Skins of spotted carnivores (such as Leopards *Panthera pardus* and genets *Genetta* spp) still fetch high prices in international markets; in addition, the expanding trade of wildlife parts such as the recent practice of selling Lion *Panthera leo* as counterfeit Tiger *Panthera tigris* bones in Asian markets is an indication that such trade may increase in future (Lindsey *et al.* 2012).

International trade is not just for high commodity items like ivory or pangolin scales, but also for other purposes, including the pet trade and for meat. While there is anecdotal evidence of international trade in bushmeat, including seizures of African bushmeat at airports, and the occasional prosecution of traders in European cities, there is evidence that the volumes exported are far from negligible (Chaber *et al*. 2010, Bair-Brake *et al*. 2014).

International trade in wildlife has rapidly emerged as a major concern for two primary reasons. First, it might be contributing to unsustainable demand, exacerbating the overexploitation of source populations of wild animals. Second, the international movement of animal products, including bushmeat, is likely to pose a threat to human and animal health through the introduction of pathogens. Concerns have been raised about the illegal import of bushmeat from Africa into Europe or the United States,

Figure 4.5 Illegal ivory trafficking routes (source: UNEP, CITES, IUCN, TRAFFIC 2013).



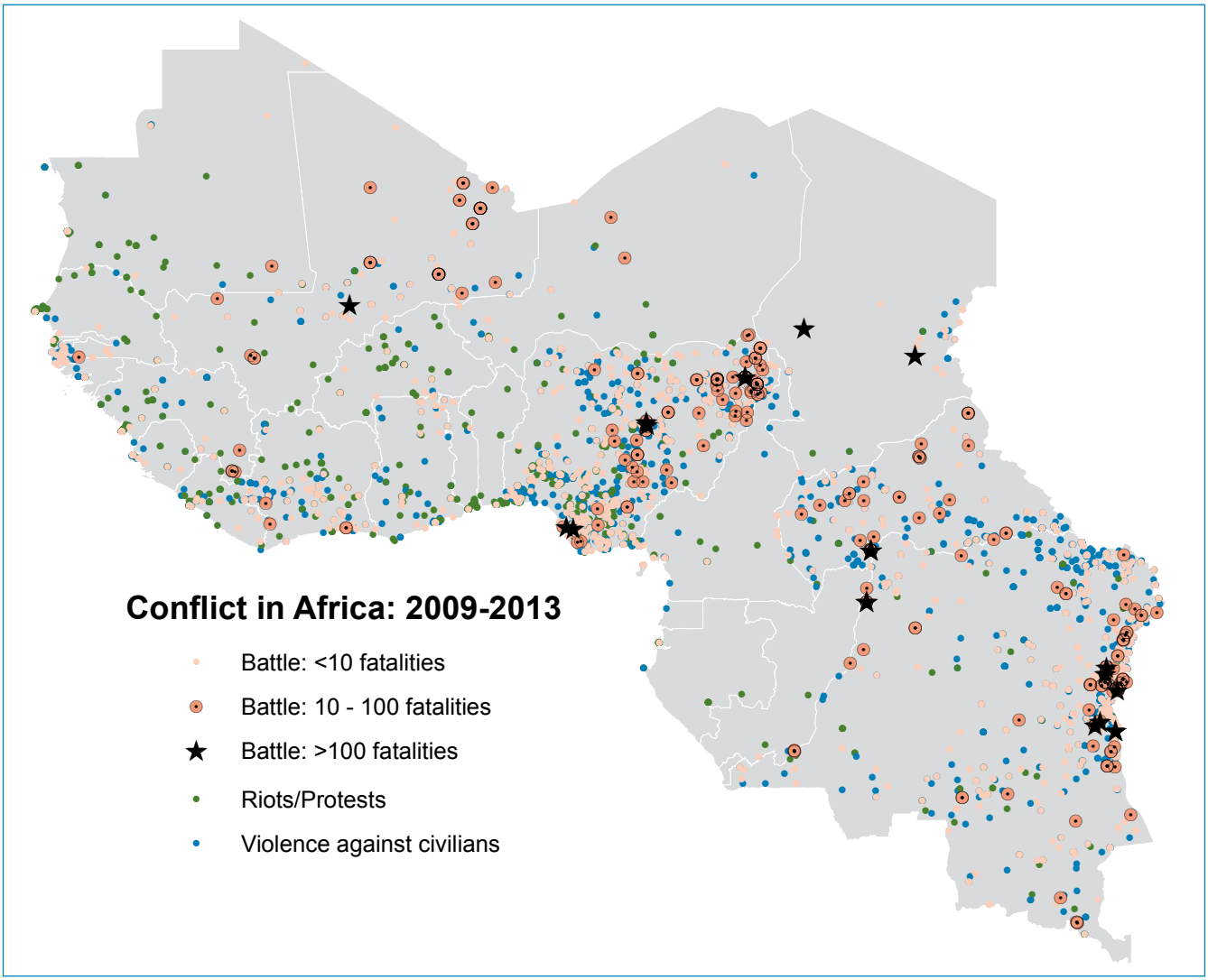
particularly regarding the health risks posed to people and livestock (Chaber *et al.* 2010, Bair-Brake *et al.* 2013). Chaber *et al.* (2010) estimated that around five tonnes of bushmeat per week is smuggled in personal baggage through Paris Roissy-Charles de Gaulle airport. Bushmeat is not only imported for personal consumption, but is part of a lucrative organized trade, with high prices indicating luxury status. Eleven bushmeat species were found, including one piece of elephant trunk *Loxodonta* sp.; CITES Appendix 1), two primates, two ungulates, three rodents, two crocodiles (CITES Appendix I), and two pangolins (CITES Appendix II), with rodents and Blue Duiker *Philantomba monticola* (CITES Appendix II) making up 75% of the total number of carcasses found (Chaber *et al.* 2010). Overall, 39% of the bushmeat carcasses were CITES-listed species. Bair-Brake *et al*. (2013) reviewed US Centers for Disease Control and Prevention (CDC) port of entry surveillance records to describe trends in, and reasons for, bushmeat importation into the United States. The authors found that among a total of 543 confiscated bushmeat items recorded, half of those identified were rodents. Africa was the most frequent continent of origin, and there were evident signs of seasonality with bushmeat confiscations peaking in late spring to early summer.

4.2.4 Conflict and war

Civil war, internal conflicts, insurrection, the presence of illegal armed groups and spill-over from conflicts in neighbouring countries have affected many countries of West and Central Africa over the last 40–50 years. There were prolonged civil wars in Sierra Leone (1991–2002) and Liberia (1989–1996 and 1999–2003) and a series of major conflicts in the Democratic Republic of Congo (see below). More recently (2009–2013), conflicts have been particularly concentrated in Democratic Republic of Congo, Central African Republic, and Nigeria, as well as in Mali, Chad, Guinea and Côte d'Ivoire (ACLED 2014; Figure 4.6). In August 2014 alone, major conflicts (defined here as >10 human fatalities) were reported in Cameroon, Central African Republic, Chad, and northern Nigeria, many involving Boko Haram (ACLED Real Time data, accessed 02 October 2014).

Wars have multiple impacts on biodiversity and protected areas, and the livelihoods of local people dependent on natural resources. Impacts on wildlife can be highly variable, and may be positive in some areas and negative in others (McNeely 2000, 2003, Dudley *et al*. 2002, Hanson *et al*.

Figure 4.6 Armed conflicts, political and social unrest across West and Central Africa for the period 2009 to 2013 (source: ACLED 2014; www.acleddata.com).



2009). For example, vegetation and wildlife may flourish in areas where access by people is limited. In Sierra Leone, the 10-year civil conflict that ended in 2002 resulted in large numbers of internally displaced people moving from rural to urban centres, which temporarily slowed the rate of forest clearance and allowed some regeneration of farmland (Brncic *et al*. 2010). However, modern wars and civil strife are typically associated with detrimental effects on wildlife and wildlfe habitats (e.g. Yamigawa 2003, Nackoney *et al*. 2014). Most cited instances of contemporary war-zone refuges refer to military security areas or demilitarized zones that are functionally and geographically distinct from actual battle fields or areas subject to armed civil conflits. Munitions and chemical agents exert both immediate and residual effects, direct and indirect, on wildlife and habitats. Overharvesting of wildlife and vegetation in conflict zones exacerbates existing constraints on the access to natural resources, threatening both the resource base and the livelihoods of local communities dependent on these resources (Dudley *et al.* 2002). Bushmeat hunting typically increases during periods of political instability due to a breakdown in law enforcement and reduced availability of alternative food. For example, hunting of Bonobos *Pan paniscus* increased dramatically in Democratic Republic of Congo as a result of ongoing civil wars in the region (IUCN & ICCN 2012), and Beyers *et al*. (2011) recorded Forest African Elephant densities in Okapi Faunal Reserve halving during the wars due to hunting. In Côte d'Ivoire, civil unrest since 2002 may have exacerbated poaching pressure and deforestation, especially inside protected areas; Campbell *et al*. (2008a) measured a 93% reduction in forest cover between 2002 and 2008 for Marahoué National Park. Similarly, civil disturbances during and subsequent to the Rwandan genocide greatly increased poaching of Mountain Gorilla *Gorilla gorilla beringei* (Kalpers *et al*. 2003) and African Buffalo *Syncerus caffer* and antelopes (Plumptre *et al.* 1997, de Merode *et al.* 2007).

In northern Côte d'Ivoire, Bassett (2005) showed that pressure on vulnerable and robust wildlife populations increased considerably during the 1990s as the conflict there developed. The number of farmers bearing arms increased noticeably, in response to unmitigated threats to food security associated with crop damage caused by transhumant cattle, and new threats to public security linked to rampant crime. As in many West African countries during this period, hunters and their associates were called upon to bring order where the police and military proved to be incapable or unwilling to do so (Leach 2004). It thus became easier to obtain and carry firearms in those countries (such as Côte d'Ivoire) where the state encouraged hunter associations to take an active role in security work. In Comoé National Park (Côte d'Ivoire), the outbreak of a rebellion that followed a failed coup attempt in September 2002 led to the development of a front line that still runs through the southern parts of the park. If an assumed war-zone refuge effect ever existed, it only persisted for a very limited time period (Fischer 2004). In fact, the situation worsened with the complete collapse of any management structure, retreat of international scientists and a reported increase in poaching (Fischer 2004).

Eastern Democratic Republic of Congo has been ravaged by a series of ethnic conflicts, war, rival paramilitary groups, invasion by neighbouring forces and armed criminal gangs. Several national parks have been occupied by well-armed paramilitary groups who engage in all forms of illegal activities, notably the looting of rich mineral resources, and, increasingly, poaching for ivory. Maiko National Park has been occupied by two groups, Simba and Mai-Mai, and is virtually unmanaged. Garamba National Park and adjoining hunting zones have been a stronghold of the Lord's Resistance Army (LRA) for nearly the past decade since they sought refuge there from the Ugandan army. In 2009 the LRA attacked the Garamba park headquarters, killing 15 park staff and family members and destroying US$1 million worth of infrastructure. The LRA has since become increasingly involved in elephant poaching to fund its operations (CITES press release 2012), and (by August 2014) poachers had killed 68 African elephants in the park in a space of two months, representing around four per cent of the park's elephant population. In a second notorious recent incident, another rebel group attacked the Epulu headquarters of the Okapi Wildlife Reserve in June 2012, killing six people, including two park rangers, and 13 captive Okapi *Okapia johnstoni*. The political landscape is particularly turbulent in Virunga National Park, which has been invaded by several paramilitary groups who engage in poaching, illegal logging and charcoal production (and see Box 4.1).

Previous authors have discussed the challenges of biodiversity conservation in such conflict-torn landscapes as the Albertine Rift, with security concerns often forcing the suspension of conservation-related activities (Hart *et al*. 1997, Plumptre *et al*. 2000, 2001, Hart & Hart 2003). Professional development and training for national staff, supported by international NGOs, has proven key; in Rwanda, for example, international NGO maintained support for local staff of Volcanoes National Park and Nyungwe Forest Reserve throughout the civil war, genocide, and the volatile post-war period (Plumptre *et al*. 2001).

4.2.5 Residential and commercial development

West and Central Africa is undergoing very rapid urbanization, with rates above 3% for nearly all countries in the region (Table 4.4). Gabon, in particular, has nearly 90% of its population now urbanized compared with ~15% in 1950 (United Nations, Department of Economic and Social Affairs, Population Division 2014). Today, two of Africa's three established megacities (>10 million) are in the region, namely Lagos in Nigeria (12.6 million) and Kinshasa in Democratic Republic of Congo (11.1 million). Kayembe wa Kayembe *et al*. (2009) quantifed urban growth in Kinshasa between 1995 and 2005, and found that the city had spread very quickly primarily to the east and south-west along the road to Matadi and Bandundu, allowing access by public transport to the city centre. Since 1960, when the population numbered only ~400,000 individuals, expansion has taken place even on steep slopes thought less suitable for human settlement. This expansion can have dramatic implications; for example, charcoal consumption for Kinshasa alone is estimated at ~4.8 million m^3 of wood,

Box 4.1 Rangers: the unsung heroes of conservation

Rangers in West and Central Africa work in exceptionally challenging conditions. First, they are often inadequately resourced and equipped to do their jobs. In Mali, for example, according to Bourama Niagate, the Managing Director of Parc National de la Boucle du Baoule et des Reserves Adjacentes, the reserve has only 59 rangers who between them have seven vehicles and 15 old bicycles to roam an area covering around 25,000 km^2. Of course, there are exceptions, as in the case of Gashaka-Gumti and Cross River National Parks in Nigeria, where rangers are well trained, reasonably well equipped (in part thanks to the involvement of NGOs and zoos), and very disciplined even though they live in very remote, isolated conditions. However, even then, rangers in Gashaka-Gumti face threats from Fulani cattle herders and increasingly from Boko Haram and fatalities do occur. Cross River is situated in Calabar State, which is more peaceful, but the enclave communities living inside the park can be hostile at times. In regions of political turmoil and severe unrest, the risks increase: in Chad's Zakouma National Park, rangers have come up against well equipped, aggressive poachers; over the last 10 years, 23 rangers have lost their lives in the Park. In Virunga National Park, around 140 government rangers have been killed in the last decade in clashes with poachers and armed groups and in May 2014 the chief warden was badly wounded in an ambush. Finally, in all parks there is an ever-present danger of encountering dangerous game and over the years several rangers have been killed by animals. There is no shortage of passion amongst many rangers, despite the conditions they are working under and the threats they face. They are on the frontline and they deserve great respect and support for the exceptional job that they do.

Authors: *Chris Galliers (Game Rangers Association of Africa) and Andrew Parker (Game Rangers Association of Africa and African Parks)*

Ecoguards at attention in Mbam and Djerem National Park, Cameroon. © WCS Cameroon

affecting forested areas up to 300 km away (Schure *et al*. 2012).

Sea port construction has been one of the key forms of commercial development in the region. Historically, poor infrastructure has hampered port performance and efficiency in West and Central Africa, but recent investments especially by foreign firms are leading to increased development. For example, the French firm Bolloré has invested in port development in Pointe Noire, the main port in the Republic of Congo, which has undergone significant infrastructure works in recent years, and the China Road and Bridge Corporation (CRBC; a subsidiary of China Communications Construction Company) signed an agreement with the Government in 2013 for the construction of a deep-water, bulk export port just north of Pointe Noire (to export iron ore from Zanaga). Several ports in Nigeria have been undergoing reforms, while Côte d'Ivoire has plans to spend US$60 million to upgrade its port infrastructure in Abidjan into a major regional trans-shipment hub (African Development Bank 2010). Recently, Guinea Alumina Corporation (GAC), a joint venture between Mubadala Development, Dubal Aluminium and BHP Billiton, signed a deal with the Government of Guinea to build an extension to the Port of Kamsar, part of a wider project that includes an alumina (aluminium oxide) refinery and a power plant in the north-west of the country. While the economic benefits of such infrastructure development are undeniable, the direct and indirect impacts resulting from the conurbation of Kamsar from a simple fishing village to the fourth largest city in the country are seldom sufficiently documented.

Table 4.4 Average annual rate of change of the urban population for the periods 2005–2010, 2010–2015 and 2015–2020, and percentage of the total population as urban in 1950 and 2014 (source: United Nations, Department of Economic and Social Affairs, Population Division 2014).

	Average annual rate of change of the urban population (%)			Percentage urban (2014)	
	2005–2010	2010–2015	2015–2020	1950	2014
West Africa	4.5	4.3	4.1	8.4	44.4
Benin	3.9	3.7	3.5	5.0	43.5
Burkina Faso	6.4	5.9	5.3	3.8	29.0
Côte d'Ivoire	3.3	3.7	3.4	10.0	53.5
Gambia	4.6	4.3	4.0	10.3	59.0
Ghana	3.9	3.4	3.1	15.4	53.4
Guinea	3.8	3.8	3.7	6.7	36.7
Guinea-Bissau	4.2	4.1	3.7	10.0	48.5
Liberia	4.6	3.4	3.2	13.0	49.3
Mali	5.5	5.1	5.0	8.5	39.1
Mauritania	4.0	3.5	3.2	3.1	59.3
Niger	4.7	5.1	5.5	4.9	18.5
Nigeria	4.8	4.7	4.3	51.4	46.9
Senegal	3.3	3.6	3.5	17.2	43.4
Sierra Leone	3.1	2.7	2.7	12.6	39.6
Togo	3.9	3.8	3.6	4.4	39.5
Central Africa	4.1	3.9	3.8	14.0	43.5
Cameroon	3.8	3.6	3.4	9.3	53.8
CAR	2.3	2.6	2.7	14.4	39.8
Chad	3.3	3.4	3.7	4.5	22.3
DRC	4.1	4.0	3.8	24.9	42.0
Equatorial Guinea	3.0	3.1	3.1	19.1	39.8
Gabon	2.9	2.7	2.4	15.5	86.9
ROC	3.7	3.2	3.0	11.4	65.0

4.2.6 Energy Production and mining

Mineral extraction has influenced human population distribution and development patterns in West and Central Africa since pre-colonial times (Weng *et al.* 2013). The ancient civilizations of Ghana and Mali existed because of trans-Saharan trade in gold and salt. Development in present day Ghana and Congo was driven by mineral exploitation in the early days of European colonization. However, an unprecedented mineral boom is now underway in Africa (Weng *et al.* 2013). Indeed, much of the recent increase in foreign direct investment in Africa is linked to extractive industries. China is rapidly increasing investments in minerals in Africa, especially for high-volume resources such as coal, iron, copper and cobalt and other metals (Zhang & Wilkes 2010). The mineral boom is contributing to the emergence of "growth corridors" where infrastructure upgrades will improve the competitiveness of agriculture and other economic activities (Delgado *et al.* 1998, African

Mining prospecting for the Zanaga iron ore mine outside the proposed Ogooue-Leketi National Park in Republic of Congo. © WCS / Fiona Maisels

Agricultural Development Company Ltd. 2013). Again, China (together with other non-OECD countries such as India) is emerging as a major financier of infrastructure development (in return for access to mineral wealth), increasing its investments from ~US$0.5 billion per year in the early 2000s to at least US$7 billion in 2006 (Foster *et al*. 2009). In 2013, China's Ministry of Commerce and Ministry of Environmental Protection issued joint Environmental Guidelines on Foreign Investment and Cooperation to direct Chinese companies to further regulate their environmental behaviors in foreign investment and cooperation[4].

Gold is undoubtedly the largest mineral resource in West Africa. Since the 1980s, gold has attracted considerable investment, and artisanal gold mining also is still prevalent today, providing livelihoods for several hundred thousand people in countries like Mali, Burkina Faso, Côte d'Ivoire and Guinea. Artisanal gold (and diamond) mining requires little capital or equipment, but can affect large areas, tends to be unregulated, and since it often occurs in riparian zones, contributes to pollution of water courses through the use of chemicals (even in protected areas). The other main substances mined (apart from construction and road-building materials) are diamonds, iron ore, bauxite, phosphate and uranium. Mining for base metals (copper, lead, zinc) is not very developed, apart from a copper mine in Akjoujt in Mauritania and a zinc exploration project in Burkina Faso (UICN/PACO 2012, Jalloh *et al*. 2013; Figure 4.7). The region also contains valuable reserves of, among others, rutile, cobalt, manganese and tin. Although much of the Congo Basin is underlain by sedimentary formations devoid of mineral occurrences (Edwards *et al*. 2014), there are nonetheless important deposits of valuable rare minerals, including tantalum and coltan in eastern Democratic Republic of Congo.

Open-cast (or open-pit) operations for heavy metals can have a substantial footprint and may pose problems for rehabilitation. Well-known examples in the region (a number of which have attracted considerable attention of

[4] http://hzs.mofcom.gov.cn/article/zcfb/b/201302/20130200039909.shtml

Key mining and energy production activities by country

Angola (Cabinda): No major mining developments are under way on the mainland of Cabinda at present. However, there are extensive off-shore oil deposits that provide 500,000–900,000 barrels of oil per day (up to 60% of Angola's total production).

Benin: The mining sector is insignificant in Benin and consists of cement, gravel, marble and clay, along with a little artisanal gold mining (Bermúdez-Lugo (2014a).

Burkina Faso: The 4th biggest gold producer in Africa. The Banfora Gold Project covers 1,200 square kilometres in the south-west, where six exploration licenses covering all Loumana Birimian greenstone belt in the country are being pursued. Gold made up 76% of exports and 19% of total government revenue in 2012, mainly through industrial production. A zinc mine was due to open in 2013 (Bermúdez-Lugo 2014a).

Cameroon: The 5th largest producer of crude oil in sub-Saharan Africa, with two offshore fields. There is a small amount of artisanal mining of gold and diamonds. Large reserves of bauxite, cobalt and nickel have been located but development is hindered by lack of infrastructure (Newman 2014).

CAR: Mining is not significant. There is some small-scale artisanal mining of gold and diamonds and as yet unexploited deposits of copper, iron and manganese. Deposits of uranium have been found in the east but work on these was suspended in 2009 (Bermúdez-Lugo 2013a). However, petroleum resources have been identified recently is rumoured to be a cause for the recent outburst of violence and political instability in the country (S. Regnaut *in litt.* 2014).

Chad: Petroleum production was the leading element of the economy by 2012, with crude oil exported from the Doba Basin via the Chad-Cameroon pipeline. Other minerals are mainly limited to natron (soda ash), extracted from the Lake Chad region, salt, clay and limestone (Mobbs 2014a).

Côte d'Ivoire: Mining currently makes up a small sector of the economy (2.3% of GDP in 2012), consisting of crude oil, gold and manganese (Bermúdez-Lugo 2014b).

DRC: very rich in minerals, producing 55% of the world's cobalt in 2011, 21% of industrial diamonds and 21% of tantalum. There are also large deposits of copper, tin, coltan, tungsten and other minerals, while coal and crude oil production also make an important contribution to the economy. There are an estimated 1.8–2 million artisanal miners, mostly producing diamonds, but also gold and cassiterite (Yager 2014).

Equatorial Guinea: Offshore oil and gas production contributes around 75% of GDP and with a projected export value of US$14.6 million in 2012 (Mobbs 2013).

Gabon: Gabon contains high concentration of minerals and is the world's 4th largest producer of manganese (at the Moanda mine and others) and the 8th largest producer of oil in Africa (Bermúdez-Lugo 2014c). Oil accounted for 77% of exports in 2011. Diamond production has increased since the early 2000s, and there are deposits of platinum group elements and rare earth metals. There an estimated 1 billion tons of iron ore deposits at Belinga in the north; developing these will entail extending and upgrading the railway to the coast.

Gambia: Mining is insignificant, except for industrial minerals (sand, gravel, clay, limestone etc) (Bermúdez-Lugo 2014d) which has contributed to coastal erosion.

Ghana: Gold makes up 38% of export earnings. Crude oil production began in 2010 (Bermúdez-Lugo 2013b).

Guinea: Minerals make up 25% of GDP and 95% of exports. Guinea is the world's 5th largest producer of bauxite and 12th largest producer of industrial diamonds; small quantities of gold, cement and salt are also produced. Guinea also has very large deposits of iron ore at Mount Simandou (the world's largest untapped deposit), necessitating construction of a ~650 km railway track to link the iron-ore mine with the coast, and Mont Nimba in the south-east (part of the Mont Nimba World Heritage Site was degazetted to enable mineral exploitation; see Box 4.2). These have been predicted to increase GDP by 15%, but have been beset by problems hindering their exploitation (Bermúdez-Lugo 2013c) (see Box 4.2).

Guinea-Bissau: The main extractive industry is mining for phosphate and industrial minerals (Bermúdez-Lugo 2014d). An Angolan company is proposing to develop a bauxite mine in the Boe region, overlapping protected areas and the proposed Boe NP (deposits estimated at 113 million tons). If developed, the development of new roads will further increase the negative impact of the Kamsar (Guinea) deep-sea port.

Liberia: Iron ore and gold make up 25.5% and 5.7% of export earnings respectively. High quality iron ore is mined at three deposits (the Western Range Project) in the Mt Nimba Biosphere Reserve. Extensive deposits along a 13-km-long ridge on the biodiversity-rich Putu Mountains are planned for extraction. This operation includes a possible new railway line to the coast that may pass close to Sapo NP. Significant gold deposits have been found as well as diamonds. Oil exploration is ongoing offshore (Bermúdez-Lugo (2014e).

Mali: Some gold and semi-precious stones are mined in the south and extraction of salt in the north is part of an ancient trans-Saharan trade. Production of phosphate rock is increasing. Very large deposits of bauxite, chromium, copper, iron lithium and other minerals have been identified (Bermúdez-Lugo 2013d).

Mauritania: Minerals comprised 30.4% of GDP in 2012. The second largest producer of iron ore in Africa (http://www.worldbank.org/en/country/mauritania/overview; accessed 3 October 2014). Its export of 13 million tons in 2013 is expected to increase to 18 million tons by 2015. There are considerable deposits of copper and gold (Taib 2014).

Niger: Minerals make up 40% of export earnings, mainly uranium, but there are smaller deposits of other minerals. The uranium sector represented 82% and 84% of State mining revenues in 2005 and 2006, respectively. Oil extraction has been rapidly increasing; for example, the recent development of oil wells at Agadem, with production estimated to reach 80,000 barrels/day by 2016.

Nigeria: The largest oil producer in Africa. Oil and gas make up 70% of government revenue and 98% of export earnings. There are 150 oil and gas fields and ca. 1,500 wells in and around the Niger Delta (see Box 4.3). The head of the Nigerian Extractive Industry Transparency Initiative estimated that Nigeria lost US$10.9 billion of revenue in 2009–2011 through oil theft (www.eiti.org). Oil theft itself contributes to further pollution in the Niger Delta, a key area for marine and estuarine wildlife. Revenues and oil were a contributory factor to the Biafra (Nigerian Civil) War in 1967–1970 and remain a source of political unrest in the delta region.

ROC: Oil and gas contributed 62% of GDP in 2012 (almost all production is offshore). Large deposits of gold, iron and potash have been identified (Mobbs 2014b). The proposed Zanaga mine project in the south of the country is forecast to become the largest iron-ore development in the world (with a 30 year lifespan); ore will be transported by means of a 366-km-long slurry pipeline to a newly constructed deep-water port north of Point-Noire. Zanaga lies adjacent to the, yet-to-be-established, Ogooué-Lekiti National Park, which has been proposed as the main offset site for the mine development in the (unpublished) Social and Environmental Impact Assessment.

Senegal: The country is considered to hold significant undeveloped mineral deposits. It has been a leading producer of phosphate rock. The Grande Côte Mineral Sands project north of Dakar is set to become one of the largest producers of zircon and titanium dioxide (Bermúdez-Lugo 2014d). Gold exploration also is expanding.

Sierra Leone: The country's primary minerals are diamonds, rutile, gold, bauxite, and iron ore. The production or mining of these resources contributed about 20% of GDP and up to 15% of fiscal revenues until the closure of some mines before the civil war in the 1990s (Jalloh *et al.* 2013). Diamonds, in particular, have been the source of much instability and blood diamonds played a major role in the civil war and were also used to part-fund the Liberian civil war. At present, iron ore mining is developing rapidly, especially in Tonkolili district with plans to develop one of the world's largest mines (Brncic *et al.* 2010, Jalloh *et al.* 2013). Sierra Leone's GDP in 2012 grew by ~15%, mostly driven by an increase in iron ore production (Bermúdez-Lugo 2014f).

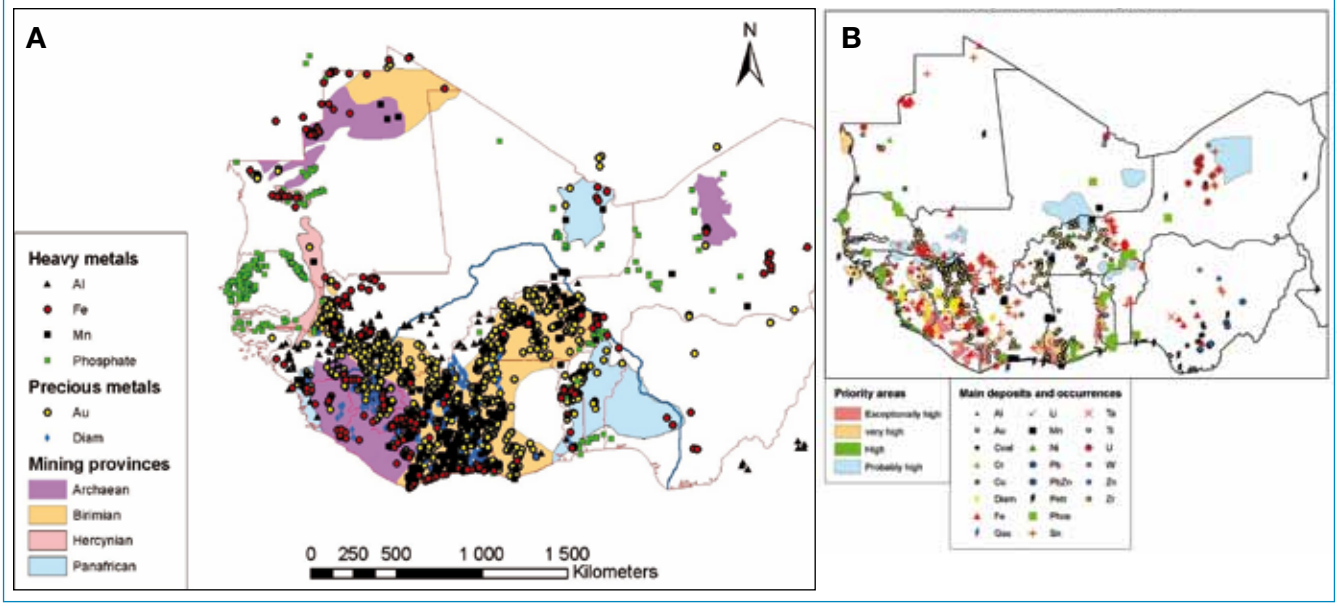
Togo: There are no known significant mineral reserves. The main product mined is phosphate (60 million tons/year), and small quantities of gold are produced (Bermúdez-Lugo 2013a).

Box 4.2 Mount Nimba

Mount Nimba straddles the borders of Guinea, Liberia and Côte d'Ivoire. It has long been recognized for its biodiversity importance, harbouring species not found anywhere else, including the Critically Endangered viviparous Nimba Toad *Nimbaphrynoides occidentalis* and Lamotte's Roundleaf Bat *Hipposideros lamottei*. For this reason, it has been designated as an Important Bird and Biodiversity Area by BirdLife International, and as an Alliance for Zero Extinction site. In theory, Mount Nimba is strictly protected: a transboundary Biosphere Reserve since 1980, the Guinean part was protected as the Monts Nimba Strict Nature Reserve in 1944, and in 1981 and 1982 the Guinean and Ivorian parts were declared a World Heritage Site. However, the site has the unfortunate distinction of also lying on top of a high-quality iron-ore deposit. For more than 20 years, the mining of Mount Nimba iron ore has been an issue of much controversy and contention between conservation groups and mining supporters. Mining has already taken place on the Liberian side, with a railway linking Mount Nimba to the mining port of Buchanan. Initial mining in Liberia was undertaken in the 1960s by a US and Swedish consortium, but was abandoned in 1976 amid civil unrest; the gaping breach on the mountain can still be seen on aerial photographs of the mountain several decades on. On the Guinean side, a section of the Mont Nimba World Heritage Site was degazetted in 1992 to enable mining exploration to take place; the World Heritage Committee had requested the government to abandon plans to mine the iron ore, but Guinea stated that the proposed mining area was never intended to be included in the WHS-boundaries as originally nominated, and the Committee agreed to a boundary change in 1993 to exclude the mining area. On the Ivorian side, Indian mining giant Tata Steel had signed an initial agreement with the Ivorian Government, but the company subsequently committed not to impact on the Outstanding Universal Value of the property after World Heritage Committee intervention. Examples of other World Heritage sites at risk of mining and oil/gas exploration where the World Heritage Committee has voiced concern include, among others, Virunga National Park (DRC), Comoé National Park (Côte d'Ivoire) and Dja Wildlife Reserve (Cameroon).

Part of the Mont Nimba World Heritage Site, on the border of Guinea and Côte d'Ivoire, was degazetted in 1992 to enable mining to take place. © UNESCO/Guy Debonnet

Figure 4.7 A) Mining provinces and principal deposits of heavy metals (Aluminium, Iron, Manganese and Phosphate) and precious metals (Gold and Diamonds) in West Africa. B) Priority biodiversity areas in West Africa and the main mineral deposits (source: UICN/PACO 2012).



conservation organizations) include Mount Nimba (see Box 4.2) and Mount Putu in Liberia, Simandou in Guinea, Tonkololi in Sierra Leone and the proposed Zanaga mine project in southern Republic of Congo (for iron ore), and the 14-million tons per year Sangaredi CBG Mine in Guinea (for bauxite).

It is not always immediately clear what is driving new explorations for some minerals. Guinea, for example, holds the most extensive reserves of bauxite, the main source of aluminium, and currently is one of the leading global producers along with Australia. However, global demand for aluminium has been decreasing, while the cost of refinement to produce aluminium remains expensive due to the very high amount of energy necessary to process alumina. Aluminium is easily recycled, and emerging technology to extract alumina from clay and coal ash might further decrease demand for bauxite, if shown to be economically feasible. The driver for new project developments such as those in Guinea and Guinea Bissau seems therefore not to be driven by global markets, but by a strategic decision to bypass large mining corporations, such as BHP Biliton, Rio Tinto and Vale, to access and secure supplies for refineries located in the Gulf, India or in Europe.

Oil is an important part of the economies of Gabon and Nigeria (especially in and around the Niger Delta; see Box 4.3) and exploration is increasing, including off-shore Liberia. Niger, for example, has undergone a rapid increase in its oil extraction and refinery activity in recent years, posing a real threat to the last remaining population of wild Addax *Addax nasomaculatus* in the country (Rabeil 2011) and also to wildlife elsewhere (Duncan *et al*. 2014). Osti *et al*. (2011) documented oil and gas concessions overlapping with 27% of World Heritage sites in Sub-Saharan Africa – all of which were awarded *after* World Heritage site designation (despite the World Heritage Committee's position that mineral and oil/gas exploration is incompatible with World Heritage status) – and 24% of MAB and Ramsar sites. In June 2014, a proposed project to drill for oil inside the Virunga National Park World Heritage Site was halted due in large part by a campaign led by WWF and other environmental organizations[5]. Although no currently active oil wells were operating directly within World Heritage sites, extensive infrastructure (more than 53 completed wells) has been established within at least one tentative site, the Niger Delta Mangroves. Cosequently, the boundaries of any future nomination will have to be carefully selected to satisfy the requirements of the Convention (Osti *et al*. 2011).

Box 4.3 IUCN–Niger Delta Panel

In 2012, the IUCN–Niger Delta Panel was established at the request of Shell Petroleum Development Company of Nigeria Limited (SPDC), to provide science-based recommendations for the remediation and rehabilitation of biodiversity and habitats of oil spill sites in the Niger Delta. The following five recommendations emerged from the Panel:

i) redefinition of some SPDC internal environmental management procedures to broaden intervention mechanisms;
ii) revision of oil spill response procedures to enhance rapid response to new spills;
iii) evolution of new, but proven, scientific approaches to boost and support *in situ* biological remediation and rehabilitation processes;
iv) supporting the sustainability of remediation at the community level by the evolution of a socio-environmental strategy; and
v) evolution of a Niger Delta biodiversity best practices strategy that seeks to establish institutional support for broader engagement of communities, the oil industry and Government in the conservation of biodiversity of the Niger Delta (see IUCN Niger-Delta Panel 2013).

The panel commenced monitoring of uptake of recommendations by SPDC in the fourth quarter of 2014.

Besides the obvious environmental footprint impacts, other direct and indirect effects of mining and oil exploration on wildlife are probably comparable to those observed for logging concessions, especially road construction, increased human population densities, and hunting. However, little is found in the literature concerning the effects of mining on wildlife for West and Central African wildlife. Thibault & Blainey (2003) use a case in Gamba, Gabon, to demonstrate the role that oil concessions may play in exacerbating bushmeat trade. Nevertheless, data from two active oilfields in the same area demonstrate that forest elephants can use habitat subjected to frequent human activity in oil concessions, including high road densities, provided that browse is available and hunting is controlled (Kolowski *et al.* 2010). These data support the notion that extractive-use areas in Central African forests can be managed to support resident elephants when relatively basic safety and environmental policies are in place. With fear of harassment and hunting reduced, oil concessions may act as shields from real and pervasive threats (Berger 2007), influencing the behaviour of elephants as well as primates and other ungulates (Croes *et al.* 2007), and mimicking the positive effects of protection in national parks (Blake *et al*. 2008). Implementing sound environmental and wildlife management in these areas and harnessing the private sector resources associated with them may create the potential to complement existing formally protected areas in a large-scale regional elephant conservation effort (Kolowski *et al.* 2010). However, while the potential is there for the mining sector to contribute to biodiversity conservation, this potential is currently rarely realized and most mining companies work without meeting any sustainability requirements; consequently, mining remains a considerable threat to many existing protected areas and key sites for biodiversity (Lanjouw 2014). In several instances, extractive industry operations have already led to several instances of protected area downgrading, downsizing and degazettement in Africa, including within World Heritage sites (Table 4.6; and see Table S4.4).

[5] However, concerns have been raised that since UNESCO accepted a boundary change to Tanzania's Selous National Park, also a World Heritage Site, which enabled the mining for uranium, this could be used as a precedent for negotiating a change to the Virunga National Park's boundaries to facilitate access to oil reserves.

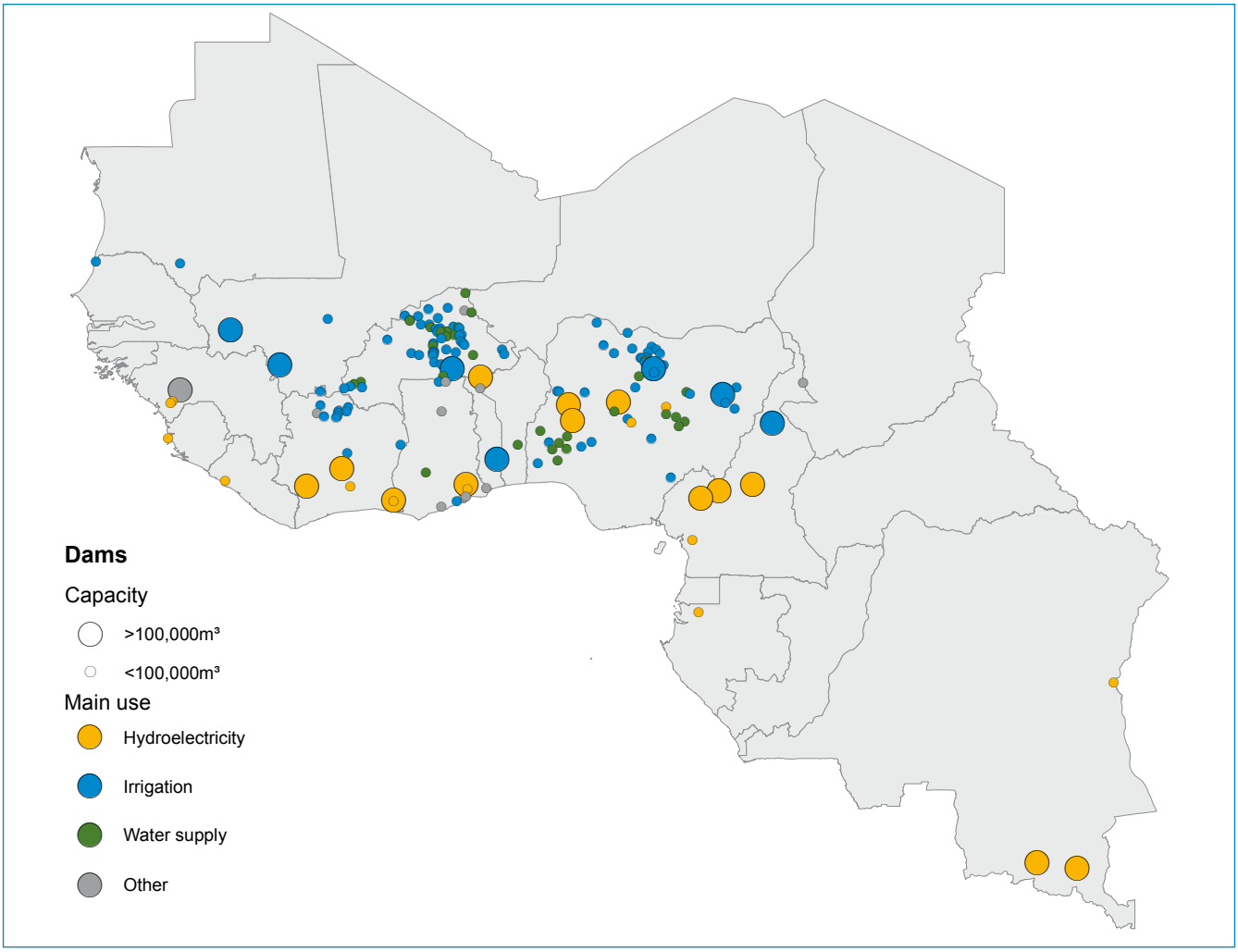


Figure 4.8 Location of dams in West and Central Africa, distinguishing dams by capacity and those constructed mainly for hydroelectricity, irrigation, water supply or other purposes (source: Lehner *et al*. 2011).

Chutes de Kongou in Ivindo National Park, Gabon. © Nathalie van Vliet

Table 4.6 Examples of protected area downgrading, downsizing, and degazettement (PADDD) for mining prospecting or extraction in Africa. Downsizing relates to a reduction in park area, and degazettement to a removal of formal protection (source: Edwards *et al.* 2014; see www.paddtracker.org).

Country	Location	PADDD	Year	PADDD Area (km²)	Mining activity
Guinea	Mount Nimba World Heritage Site	Downsize	1992	15.5	Iron-ore prospect
DRC	Basse Kando Reserve	Degazette	2006	unknown	Mining

4.2.7 Pollution

The primary impacts of pollution are on freshwater-dependent species, and two recent regional assessments for freshwater fauna in both West Africa and Central Africa have reported on the negative effects of pollution (Smith *et al*. 2009, Brooks *et al.* 2011). Oft-quoted sources of pollution in the region include: mining and oil exploration activities (for example, small-scale alluvial mining and commercial extraction of sand adjacent to the Ankobra and Birim rivers in Ghana has severely impacted fish life below the discharge site); pesticides, which are commonly used to control disease vectors like malaria, trypanosomiasis and schistosomiasis, and fertilizers; and domestic and industrial pollutants (for example, the entire population of a small poeciliid *Poropanchax myersi* found only in Malebo Pool near Kinshasa and Brazzaville may be impacted negatively by the impacts of sewage and industrial waste from these large cities) (Laleye & Entsua-Mensah 2009, Stiassny *et al*. 2011). These effects are compounded by the increased sedimentation due to soil erosion resulting from deforestation, in turn causing extensive eutrophication of lakes and rivers. A number of non-freshwater species also are negatively impacted by pollution; for example, several studies have reported extensive range-wide declines in vulture populations, such as the Hooded Vulture, most commonly resulting from secondary (non-target) poisoning with pesticides from livestock baits used intentionally to poison mammalian predators (Ogada 2014; see Section 4.2.13).

4.2.8 Fire

Historically, fire is likely to have had a profound influence on the composition of the present forest canopy in West Africa (Swaine 1992). However, unnatural changes in fire regimes (such as increased frequency of burning) can result in significant changes in vegetation communities with direct impacts on biodiversity. Fire is used to clear fields for agriculture, for controlling pests, improving dry season grazing, hunting and for deterring wild animals, and sometimes for more insidious purposes (in Benin, for example, taking revenge on national parks) (Hough 1993). A number of species are indirectly or directly thus affected. For example, although fire is a naturally occurring phenomenon on Mt Cameroon, the regular burning of grassland by hunters results in both loss of forest habitat as well as the destruction of both eggs and young of the Endangered Mount Cameroon Francolin *Pternistis camerunensis* (BirdLife International 2014). Similarly, in the Bamenda Highlands in western Cameroon, forest fires are responsible for most of the habitat loss affecting Bannerman's Turaco *Tauraco bannermani* (BirdLife International 2014).

4.2.9 Dams and other system modifications

Dudgeon *et al*. (2011) provide a recent synopsis of the impacts of dams and water abstraction on African freshwater fauna. More than 1,200 dams have been constructed on small and large rivers in Africa; many more are either under construction or have been proposed. Dam development has been far more extensive in West than in Central Africa (Figure 4.8). Dams have been built for a range of purposes, including for domestic, industrial and mining water supply, crop irrigation and hydroelectricity. Most of the largest dams were built after the mid-1950s, on large rivers and for electricity supply. However, more recently, many smaller reservoirs have been established to meet other water demands including, irrigation, water supply (domestic use) or fish production. The wider environmental impacts of dams are well established and will not be discussed here.

Currently, one of the largest projects on the African continent is Grand Inga on the Congo River (Showers 2009, 2011). The Congo has the world's second largest flow (after the Amazon), but it is the only major river with significant falls or rapids close to its mouth. Furthermore, as the river drops its final 96m to sea level, the channel narrows and makes a 180-degree bend – the Inga Falls. Inga I and II were constructed in 1972 and 1982, respectively, to incorporate the falls, and constitute Africa's second largest hydroelectric generating capacity. The Grand Inga scheme would divert the lower Congo River through a channel cutting across this bend to flow through a bank of electricity generators before returning the river to its natural course. It is estimated that Grand Inga could produce ~40,000 MegaWatts, twice as much power as China's Three Gorges Dam. Grand Inga is planned for construction in six development phases with Inga III being the first of these phases. Construction has been estimated at ~US$80 billion, including cost of the transmission lines needed to carry power across Africa (and potentially to Europe), with financing from the World Bank (which has helped support Environmental Impact Assessment studies), the African Development Bank and the European Investment Bank.

In addition to dams, water abstraction for urban, industrial and agricultural purposes poses a major threat. Lake Chad, for example, has shrunk to around 5% of its volume since the 1960s, due to both drought and desertification caused by shortage of rainfall and the over-abstraction and diversion of water for agriculture, in particular rice production (Grove 1996, Birkett 2000; Figure 4.9). A highly controversial inter-basin water-transfer scheme has been proposed that would divert the Ubangi River (removing from the Congo River ~6–8% of its overall flow) along a ~2,500-km-long navigable channel, to revitalize the drying Lake Chad. The project is included within the Lake Chad Basin Commission's (see Section 5.4.4) 2013–2017 investment plan, with a prospective implementation date of 2017 or 2018.

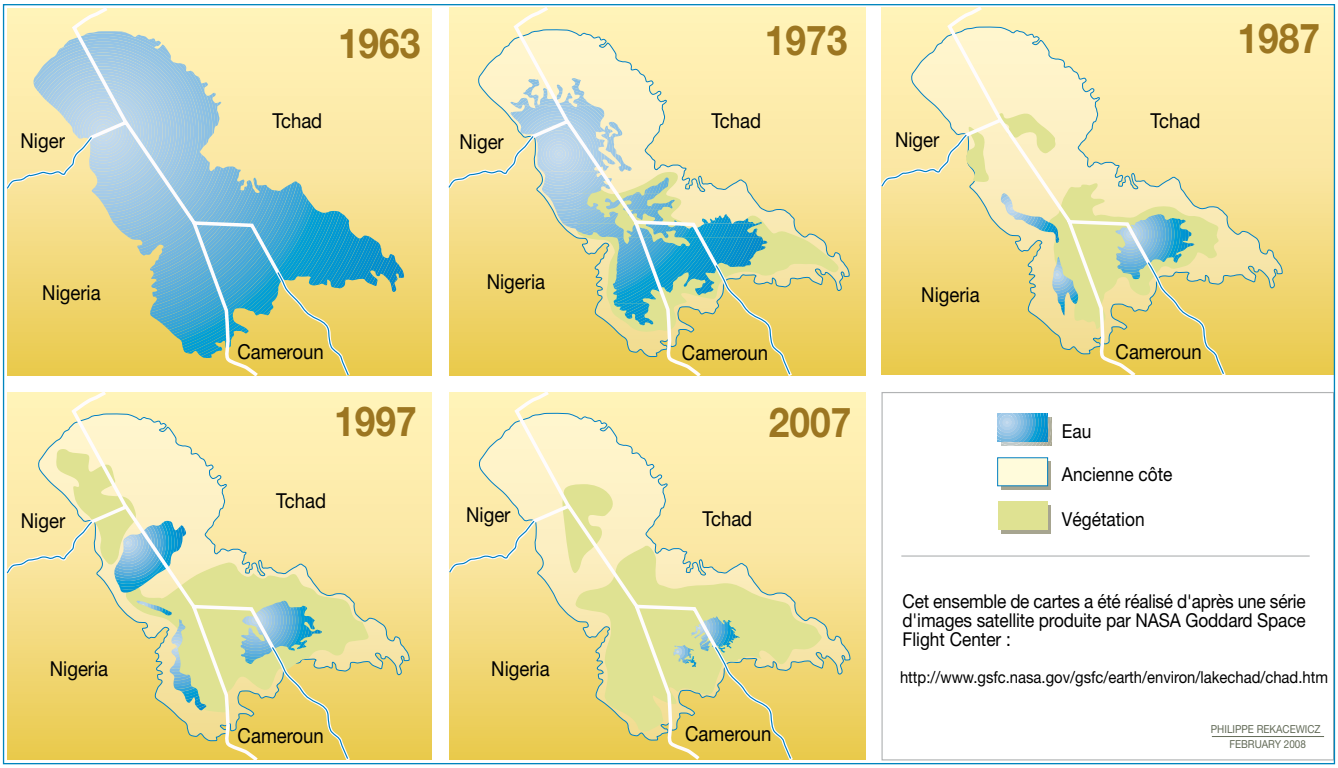
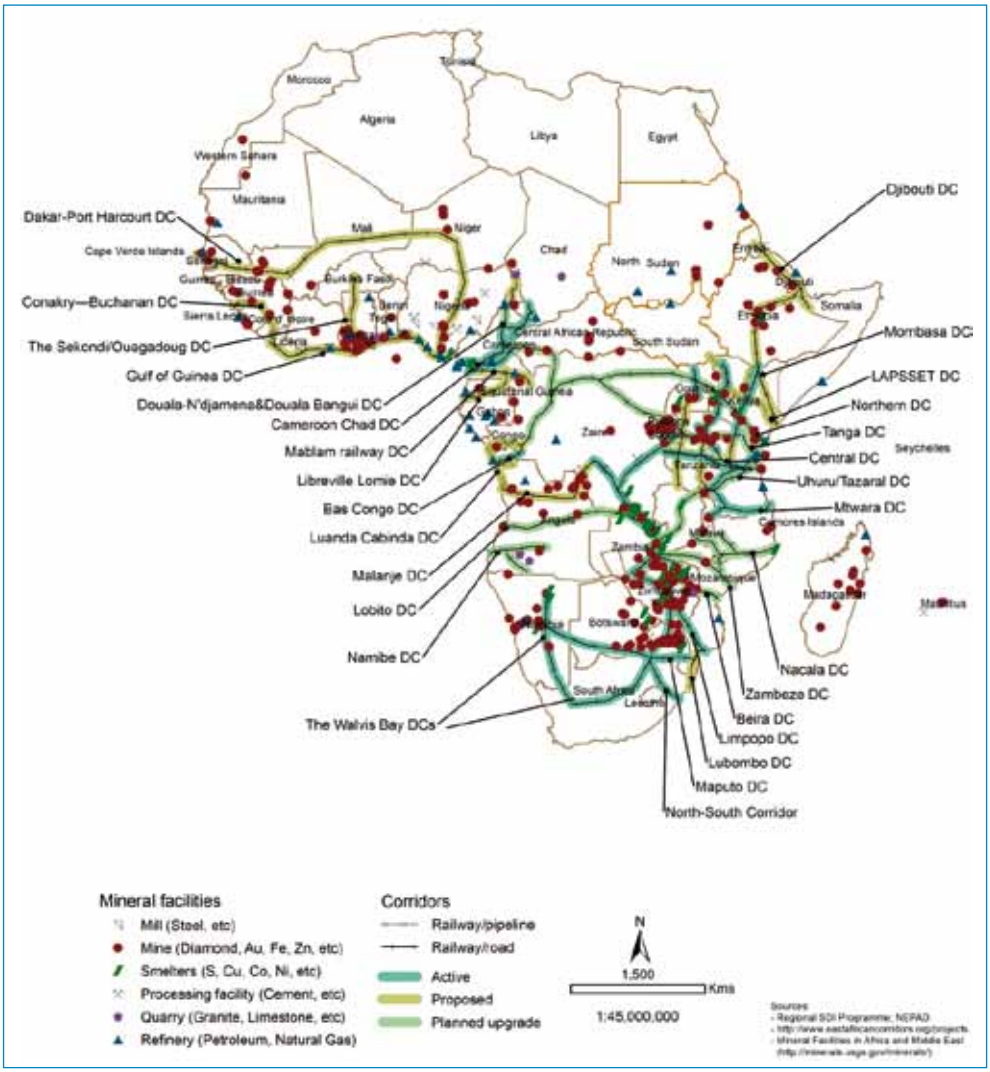


Figure 4.9 Reduction in the size of Lake Chad over the period 1963 to 2007 (source: Rekacewicz 2006).

Figure 4.10 Development corridors (DC) and mineral facilities in sub-Saharan Africa (source: Weng *et al*. 2013).



4.2.10 Transportation and service corridors

Extractive activities, whether logging or mining or oil exploration, require railways or significant road infrastructure to connect inland areas to ports and markets (Figure 4.10A). For example, Guinea plans to construct ~650 km of railway track (the Simandou Railway) to link the Simandou iron-ore mine in south-east Guinea with Simandou Port south of Conakry. Growth corridors are being developed in areas of the Guinea savannas that have major agricultural potential; the Guinea savannas have been described as one of the major untapped agricultural areas in the world (Morris *et al.* 2009), where lack of infrastructure is the only remaining constraint to agricultural expansion.

At least two major infrastructure projects are likely to have significant impacts in the region. The Grand Inga development on the Congo River (see Section 4.2.10) will require the development of several "energy highways" to link Inga with energy markets. These include a "Northern Highway", between Inga and Egypt, which be more than 5,000 km long, a "Southern Highway" between Inga and South Africa (a major partner in the project) likely involving two transmission lines, and a "Western Highway" between Inga and Nigeria, involving a 1,700-km-long transmission line.

The six-lane, predominantly coastal, 1,028-km-long Abidjan-Lagos Highway will connect five West African countries from Côte d'Ivoire to Nigeria. In March 2014, ECOWAS (see Section 1.2.6.4) members signed a treaty at the 44th Summit of Heads of State and Government, with the five nations committing to provide US$50 million in seed funding intended to spur investment (with Nigeria contributing US$27 million). The road forms part of the planned Trans-African highway network, a system of transport corridors linking all African countries via mega-highways and providing all landlocked countries with access to markets and ports, which includes a plan to link Dakar to Lagos. The network aims, among others, to link fully Dakar with Cairo, Algiers with Lagos, Tripoli with Cape Town, Dakar with Ndjamena, and Lagos to Mombasa. A 2003 review of implementation of the Trans-African highway network estimated that about one-quarter of the proposed network consists of missing links with the cost of completing the network estimated (then) at about US$4.2 billion (African Development Bank 2003).

The main impact of railways and, in particular, road infrastructure such as logging roads, is to open routes into previously inaccessible (forested) areas, thus providing access to markets and transforming hunting from a largely subsistence activity into a commercial one (Wilkie *et al*. 2000, Thibault & Blaney 2003). For example, in northern Republic of Congo, Poulsen *et al*. (2009) found that, over the course of six years, the population of five logging towns rose by an average of 69% and the biomass of bushmeat in those towns increased by 64% (further, 72% of the animals recorded in markets were harvested by immigrants from logging towns who also consumed 66% of all bushmeat). Roads may also affect mammal species abundance directly in various ways according to species and probably also according to local conditions such as the location of the road, its width and the vehicle traffic. It is somewhat difficult to measure precisely the direct disturbance by the road and the increased hunting. Clark *et al.* (2009) reported high negative correlations between proximity to roads and the abundance of elephants, chimpanzees and guenons, but other studies find contradictory trends. Van Vliet & Nasi (2008) reported no negative effects of roads on elephant and great ape abundance, but did find that small monkey abundance was higher farther away from roads. Laurance *et al.* (2008) found that elephants were not affected by roads and nocturnal primate abundance increased with proximity to roads, but primate species richness decreased. Although the latter authors reported that that the abundance of Yellow-backed Duiker *Cephalopohus silvicultor*, Bay Duiker *C. dorsalis* and Peter's Duiker *C. callipygus* was not affected by roads, van Vliet & Nasi (2008) found that the abundance of these species increased with distance from roads. Furthermore, some species may benefit from roads; for example, some carnivores are known to use roads for movement and as hunting grounds (e.g. African Civet *Civettictis civetta*; Ray & Sunquist 2001).

4.2.11 Disease

While this report was being prepared, the West Africa region was experiencing not only the first recorded outbreak of Ebola Virus in the region, but indeed the worst-ever outbreak of the disease with nearly 8,500 fatalities as of 13 January 2015. A decade ago, the disease was implicated in the substantial declines of great ape populations in Central Africa (Walsh *et al*. 2003, Bermejo *et al*. 2006). Disease, foremost among them rinderpest, has had an important role in shaping the current status of wildlife populations in the region (Plowright 1982), even if some pathogens that have devastated wildlife populations in other parts of the world (such as chytridiomycosis in amphibians) have yet to impact the region. Today, disease is perhaps a more minor player compared with the pressures of hunting and habitat loss, but outbreaks of Ebola serve to highlight the links between wildlife, emerging zoonotic diseases, and human health.

The global trade in wildlife discussed above provides disease transmission mechanisms (e.g., see Smith *et al*. 2012) that not only cause human disease outbreaks, but also threaten livestock, international trade, rural livelihoods, native wildlife populations, and the health of ecosystems. Outbreaks resulting from wildlife trade have caused hundreds of billions of dollars of economic damage globally (Karesh *et al.* 2005). Hunters, middle marketers, and consumers experience some type of contact as each animal is traded. Other wildlife in the trade is temporarily exposed, and domestic animals and wild scavengers in villages and market areas consume the remnants and wastes from the traded and potentially traded wildlife. This suggests a huge number of direct and indirect contacts among wildlife, humans, and domestic animals result from the wildlife trade annually. The increasingly global scope of this trade, coupled with rapid modern transportation and the fact that markets serve as network hubs rather than as product endpoints, dramatically increases the movement and potential cross-species transmission of the infectious agents that every animal naturally hosts.

Today, the possibility of emerging infectious diseases spreading between persons and animals is rising, fueled by human activities ranging from the handling of bushmeat and the trade in exotic animals to the destruction or disturbance of wild habitat (Walsh *et al.* 1993). For example, SARS-associated coronavirus has been associated with the international trade in small carnivores (Bell *et al*. 2004), and a study comparing antibody evidence of exposure to this coronavirus demonstrated a dramatic rise from low or zero prevalence of civets at farms to an approximately 80% prevalence in civets tested in markets (Tu *et al.* 2004). Of 1,415 human pathogens, 61% are known to be zoonotic, and multiple host pathogens are twice as likely to be associated with an emerging infectious disease of humans (Taylor *et al.* 2001). Seventy-seven per cent of pathogens found in livestock are shared with other host species (Haydon *et al.* 2002). The projected growth of industrial livestock production in non-industrialized countries to meet global protein demand will increase the impact of future disease outbreaks on economic and food supply security. Some of these outbreaks will inevitably be linked to the trade in wildlife.

Rather than attempting to eradicate pathogens or the wild species that may harbour them, a practical approach to decrease the risk of the spread of infectious diseases would include decreasing contact between species. Since wildlife markets serve as a system of networks with major hubs, these trading points serve as opportunities to maximize regulatory efforts. Focusing efforts at markets to regulate the trade in wildlife could provide a cost-effective approach to decrease the risks of disease transmission for humans, domestic animals, wildlife, and ecosystems.

Major diseases with influence on wildlife populations

Ebola Virus Disease

The first two known outbreaks of Ebola Virus Disease in humans occurred in 1976 in Democratic Republic of Congo and Sudan, the former from a village near the eponymous Ebola River. No cases were recognized in Africa between 1979 (Sudan) and late 1994, when it was reported in Gabon. There are five documented types of Ebola Virus, three of which have been associated with disease outbreaks in Africa. The most virulent is *Zaire ebolavirus* (EBOV). Since 1994, outbreaks of EBOV have occurred in Democratic Republic of Congo, Gabon, and Republic of Congo, the most recent in 2008 with a case fatality of 44%. This is the lowest fatality rate of any EBOV outbreak to date, as others range between 60% and 100%. Ebola virus infection causes hemorrhagic fever and death may result within a few days.

In West Africa, the first Ebola Virus Disease outbreak began in Guinea in December 2013, later spreading to Liberia, Sierra Leone and Nigeria. Although preliminary reports (Baize *et al*. 2014) suggested the Guinea Ebola virus may be distinct from that in Central Africa, subsequent reports have confirmed it to be a member of the Zaire lineage (Dudas & Rambaut 2014, Calvignac-Spencer *et al*. 2014). Besides the four main countries affected, there have also been travel-associated outbreaks in Senegal, the United States and a number of Europen countries. As of 13 January 2015, the total case count stood at 21,408, with 8,483 fatalities.

Several Ebola hemorrhagic fever outbreaks in humans have been traced to patient contact with infected great apes that are hunted for food (Walsh *et al.* 2003, Leroy *et al.* 2004a). However, although non-human primates have been a source of infection for humans, they are not likely to be reservoirs (Leroy *et al*. 2004b). Since 1994, Ebola outbreaks from the EBOV and Tai Forest Ebola Virus (TAFV) species have been observed in Chimpanzees and Western Lowland Gorillas (e.g., Formenty *et al*. 1999). During these outbreaks, gorilla mortality can be as high as ~95% (Caillaud *et al*. 2006, Bermejo *et al*. 2006). To date, the wild reservoir of Ebola Virus Disease remains unknown. Leroy *et al*. (2005) documented evidence of asymptomatic infection by Ebola virus in three species of fruit bat (*Hypsignathus monstrosus*, *Myonycteris torquata* and *Epomops franqueti*), leading to suggestions that species like *M. torquata*, whose range stretches as far west as Guinea, may be implicated in transmission (Vogel 2014). More recent evidence suggests the index case of Ebola (a two-year-old boy in Meliandou, Guinea) may have been infected by playing in a hollow tree housing a colony of insectivorous free-tailed bats (*Mops condylurus*) (Saéz *et al*. 2014). Wallace *et al*. (2014) suggest that the Ebola outbreak in West Africa ultimately may be the result of complex economic and agricultural policies, and very specifically an increase in oil palm cultivation (since palm trees offer desirable habitat for bats).

Pigott *et al*. (2014) have assembled location data on all recorded Ebola Virus outbreaks in humans (their Figure 2) and EBV infections in animals (including bats and primates; their Figure 3) to map the zoonotic transmission niche of Ebola Virus in Africa.

Rinderpest virus

No single disease has had as great an effect on Africa's livestock and wildlife as rinderpest (Plowright 1982). Rinderpest first appeared in sub-Saharan Africa in Ethiopia in 1884, and had reached West Africa by 1892. It was declared officially eradicated in May 2011, after many decades of targeted eradication initiatives. The multi-nation (22 countries) Joint Programme 15 (JP15) was implemented in six phases, from 1962 and 1979, after which most participating countries were relatively free from rinderpest, except for a few sporadic outbreaks (e.g., at the Mauritania-Mali border in West Africa). However, by the mid-1980s, countries were again reporting outbreaks of the disease. Declines in African Buffalo *Syncerus caffer* in Arly in Burkina Faso, and Giant Eland *Tragelaphus derbianus* in Cameroon, Central African Republic and Chad, have been attributed to these rinderpest outbreaks in the early to mid-1980s (East 1999). This prompted the establishment of the Pan-African Rinderpest Campain (PARC), which was implemented in three stages between 1986 and 1998 (with major support from the European Union). A third programme, the Pan-African Programme for the Control of Epizootics (PACE), ran from 2000 to 2006, and by the time of its completion the disease held on only in parts of the Horn of Africa. However, despite the disease's eradication, wildlife populations in some countries have never quite recovered,

especially in light of other pressures like hunting and habitat loss (Bouché *et al*. 2011).

Chytridiomycosis
Chytridiomycosis (*Batrachochytrium dendrobatidis*, or Bd), a fungal disease now identified as a major cause of the high extinction risk of amphibian species worldwide, is suggested to have been spread by the international trade in African clawed frogs (Weldon *et al.* 2004). Interestingly, while Bd has been documented across continental Africa (including from Cameroon, Gabon and eastern Democratic Republic of Congo), it appears to be absent from West Africa. Penner *et al.* (2013) tested 793 amphibians from seven West African countries representing one caecilian and 61 anuran species for the presence of Bd. All samples tested negative, including a widespread habitat generalist *Hoplobatrachus occipitalis* which is intensively traded on the West African food market and thus could be a potential dispersal agent for Bd. The authors suggest that the apparent absence of Bd in West Africa indicates that the Dahomey Gap may have acted as a natural barrier. However, they caution that the most likely entry points for Bd from Central Africa to West Africa include Accra, Ghana (via human Bd transport) and either the highlands of Togo or the Atewa range in Ghana (animal vectors), because they are closest to the Bd positive localities in Nigeria (Okomu NP) and are environmentally suitable for Bd.

Parasites
The most important external parasite in wildlife is sarcoptic mange, caused by *Sarcoptes scabiei*. Although the disease can cause devastating short-term mortality in African species of great apes, cats, and antelopes, an epizootic does not generally affect long-term population dynamics (Pence & Ueckermann 2002). The origin of the parasite in wildlife populations is thought to be man and his domestic animals, and interspecies infection may occur.

Trypanosomiasis is a parasitic disease maintained in a variety of wildlife species and has led to the virtual exclusion of cattle from large tracts of African bush. It affects both humans and animals. Protozoan parasites are transmitted to humans by tsetse fly (*Glossina* genus) bites which acquire their infection from other human beings or from livestock or wildlife harbouring the parasites. The form of human African trypanisomiasis (sleeping sickness) prevalent in West and Central Africa is *Trypanosoma brucei gambiense*. In the last decade, over 70% of reported cases occurred in Democratic Republic of Congo; the country accounted for 83% of the cases reported in 2012. Central African Republic and Chad also reported between 100 and 500 new cases in 2012. However, many other countries in the region have not reported any new cases for more than a decade. *Trypanosoma* (specifically *T. congolense*, *T. vivax* and *T. brucei*) can also cause animal trypanosomiasis in domestic animals (commonly referred to as *Nagana*) and is frequently fatal. However, the epidemiological role of wildlife in trypanosomiasis is less clear: in wild animals, the parasites may cause only mild infections, with some species being trypanotolerant or even completely resistant to trypanosomiasis.

4.2.12 Direct persecution

Local resentment over the loss of property and risk to human safety can lead to many negative perceptions of wildlife and frequently to direct conflict (Woodroffe *et al*. 2005). The majority of research on human-wildlife conflict has been undertaken in East and southern Africa, but the problem is no less severe in West and Central Africa. Crop damage at Banyang-Mbo Wildlife Sanctuary in south-west Cameroon has led to negative attitudes towards wildlife among local communities, and farmers are increasingly calling for the culling of problem elephants (Naughton *et al*. 1999). Even though Lion (and other large carnivore) densities are lower in West and Central Africa than elsewhere (and consequently human casualties are rare), predation on livestock is still a problematic occurrence resulting in opportunistic shooting, snaring and poisoning of Lions. For example, around Zakouma National Park, 32% of villages and 63% of nomadic settlements reported regular predation incidents (Bauer *et al*. 2010). Livestock losses can result in considerable economic loss: around the Niger side of W National Park, predation has been estimated at US$138 per household per year and occurred mostly while cattle were grazing (see Table S4.5). Mitigation measures include improved herding, livestock enclosure improvements, and the use of livestock guarding dogs. However, Bauer *et al*. (2010) also report that the only mitigation measure universally practiced throughout West and Central Africa, but which has received little attention from human-wildlife conflict researchers, is the use of magic, with individuals investing large sums of money (average approximately equivalent to one head of livestock per year) in magical protection, e.g., by paying for prayers by a professional 'marabout', purchasing amulets or acquiring derivatives of various wildlife species).

One of the more insidious threats to wildlife is the growing and widespread use of poisoning. Poisons have long been used to control problem animals throughout Africa, and their use has been sanctioned and endorsed by government wildlife authorities, a situation that has continued until recently (Ogada 2014). For example, in Senegal, wildlife was systematically poisoned with strychnine between 1950 and 1965, a situation that began under French colonial rule (Toure 1988). The recent increase in the intensity of wildlife poisonings (facilitated by the availability of inexpensive, highly toxic agricultural pesticides), has led to population declines in a number of species, but especially scavengers such as vultures (Rondeau & Thiollay 2004, Ogada & Buij 2011; and see Chapter 2). Although it is illegal to hunt wildlife using poisons under the national laws of all countries in the region (Mali excepted), pesticide regulations are inadequate (Ogada 2014).

4.2.13 Invasive species

Invasive species have, as yet, had a relatively limited impact on large- to medium-sized vertebrates in the region. As noted above, chytrid has yet to be recorded in West Africa, and its impacts in Central Africa have thus far been negligible, but other invasive species, such as African Common Toad *Amietophrynus regularis*, have been reported present in

degraded forest habitats at sites in Republic of Congo, an incursion likely facilitated by access opened up by logging roads (Jackson *et al*. 2007). Walsh *et al*. (2004) documented the invasion of equatorial Africa by the little red fire ant (*Wasmannia auropunctata*). Commercial logging operations and other extractive industries have helped the species rapidly spread into the interior of Gabon, with evidence that the species is negatively affecting the country's large mammal fauna causing mortality or blindness in primates and leopards.

The main impact of alien invasive species is probably among the region's freshwater fish species; however, documented impacts are few (Lalaye & Entsua-Mensah 2009, Stiassny *et al*. 2011) compared with East Africa where the many range restricted endemic fish species of the large lakes have been impacted by invasives. Sixteen species of fishes have been introduced to the central Africa region, including *Oreochromis niloticus* and *Heterotis niloticus,* which has become a dominant component in many rivers of the Cuvette Centrale. The main scourge is surely Water Hyacinth *Eichchornia crassipes*, a super-invasive species that has caused major degradation of water quality in both West and Central Africa.

4.2.14 Fishing

Fishing poses a threat to just under 10% of all fish species in Central Africa and 1% of threatened species (Stiassny *et al*. 2011). However, there is evidence of the adverse effect of overharvesting on fish stocks. For example, surveys in the Mbandaka-Ngombe region, Democratic Republic of Congo, in 2003, showed that 74% of the catches of four species were composed of juveniles, indicating that stocks were already overexploited (Thieme *et al.* 2005). Fishing pressure is also relatively high in Lake Tumba, Democratic Republic of Congo (Inogwabini *et al.* 2010). Fishing nets of undersized mesh (1 cm or less) are reportedly used, along with other non-selective methods such as the use of chemicals, and fishing in spawning grounds during the reproductive season. Fishermen have noted declining yields and in Lake Tumba large species seem to be declining. Unregulated use of fish poisons has also been reported in the main channel of the Congo and from Salonga National Park (Monsembula 2008, Stiassny *et al*. 2011). In West Africa, fishing is documented as a key threat to ~5% of threatened species (Laleye & Entsua-Mensah 2009). However, in many areas in the region, especially the Volta system, increased harvest levels have changed fish community structure and distribution and lowered recruitment. For example, in the Oueme system of Benin, larger predatory species have been replaced by smaller catfish, cichlids and cyprinids. Twenty years ago, Brainerd (1995) warned that most fishery resources were close to their maximum level of exploitation, fully exploited or overexploited.

Although the international pet trade in tropical freshwater fish is huge, amounting to many millions of US dollars a year, and 82% of African freshwater fish in trade are threatened species, the trade appears based mainly on captive-bred specimens (Raghavan *et al*. 2013) and it has not yet been reported as a specific threat to fish in West and Central Africa.

4.2.15 Climate change

Recent climate models for Central Africa predict an increase in temperature and drying (James *et al*. 2013), yet also suggest no increased risk of extremely high or extremely low precipitation (Otto *et al.* 2013). Asefi-Najafabady & Saatchi (2013) posited that, despite an increasing drying trend across West and Central Africa since the 1970s, these forests may be more resilient and adapted to water deficits compared with other major moist tropical forests (such as those in much-better studied western Amazonia). Yet, Zhou *et al*. (2014) have presented clear observational evidence for a widespread decline in forest greenness in the Congo Basin (particularly in the northern Congolese forest), over the past decade, based on analyses of satellite data (optical, thermal, microwave and gravity) from several independent sensors, a decline generally consistent with decreases in rainfall and land surface temperature, among others. These authors warned that a persistent drying trend could alter the composition and structure of the Congolese forest to favour the spread of more drought tolerant species. In Uganda, for example, a decline in the fruiting and flowering of some tree species (but increasing fecundity of others) has been correlated with increases in annual temperatures over several decades (Chapman *et al*. 2005). Hence, climate change might lead to changes in food availability for animals, thereby affecting animal ranging patterns and densities and triggering trophic cascades as prey distributions, pollination, and seed dispersal functions and nutrient cycling are in turn changed (Abernethy *et al*. 2013).

In West Africa, the last century or so has seen tremendous climate variability, as evidenced by the 1930–1960 wet period, the 1970–1980 droughts and the return of rainfall in the 1990s and 2000s. The PARCC (Protected Areas Resilient to Climate Change in West Africa) project recently assessed the sensitivity and adaptive capacity of the terrestrial and freshwater vertebrates of this region (as defined in this Situation Analysis, plus Chad) to the impacts of climate change (Carr *et al*. 2014; Table S4.3). West African amphibians are highly sensitive to climate change impacts because of their dependence on specific habitats at critical stages in their life-cycles, mainly freshwater for larval development (and see Figure S4.2). Many amphibian species in the region are also considered to have poor dispersal ability, making it difficult to respond to climate change. West African freshwater fishes also show a high sensitivity to climate change and its impacts, especially due to specific habitat and microhabitat associations, which may be affected by climate changes; a low intrinsic capacity for dispersal also emerges as the most common trait within this group. Mammals show a medium to high sensitivity to climate change impacts and appear poorly able to adapt. The presence of physical barriers such as unsuitable habitats which potentially prevent dispersal poses a particular problem. West African reptile species show a high sensitivity to the impacts of climate change, particularly due to dependency on specific habitats and microhabitats. However, there are

significant data gaps in terms of sensitivity, and particularly for temperature dependent gender determination. Reptiles also appear poorly able to adapt to climate change impacts, due to low intrinsic dispersal ability. Birds in the region have lower sensitivity compared with other groups, although microhabitat dependencies, and particularly a dependence upon primary forest, emerged as the most common trait indicating sensitivity within birds. A medium to low number of species will have the ability to adapt to climatic changes, predominantly due to low reproductive output over time and intrinsically low dispersal distances (Carr *et al*. 2014). A similar exercise has not yet been conducted for vertebrate species in Central Africa.

4.3 Conclusions

The current status of wildlife in West Africa, as discussed in Chapter 2, ultimately is a consequence of extensive habitat loss, incurred primarily through wide-scale clear-cutting activities to replace forests with agricultural commodities, including rubber, cotton, oil palm, and crops. These developments, in turn, have been spurred by rapid population increase and immigration, and higher population densities than seen in Central Africa. By contrast, Central Africa's selectively-logged forests remain (relatively, and for now) less disturbed, although agricultural activities in the region are already on the increase, and indeed the Congo Basin's tremendous cultivation potential for key crops such as maize, sugar cane, soy and, increasingly, oil palm has been recognized. Similarly, while mining developments have been most prevalent in mineral-rich West Africa, in particular (including several high-profile, open-cast mining projects in areas of exceptional biodiversity importance, such as Mount Nimba and Simandou), mining operations and oil exploration are now expanding apace in Central Africa, too, with large iron-ore developments underway in Gabon (Belinga) and Republic of Congo (Zanaga), to name a few.

Meanwhile, evidence is clear that current rates of bushmeat hunting, exacerbated by commercial logging operations and mining activities that open up access into previously difficult to reach areas, are unsustainable for many taxa.

A shipment of wild-caught Grey Parrots Psittacus erithacus *from the Democratic Republic of Congo, packed in cramped cages prior to export.* © Lwiro Sanctuary

Hunting and illegal international trade in species like African Elephant have precipitated marked declines in populations across Central Africa (as much as 60% by one modelled estimate). Civil war, conflicts, insurrection, and the presence of illegal armed groups have contributed greatly to wildlife declines (primarly through hunting) across the region, and made conservation efforts under already challenging circumstances even more so. Rinderpest left many wild ungulate populations depleted in the wake of repeated outbreaks across the African continent, and thereby further vulnerable to the effects of hunting and habitat loss.

As Gray & Moseley (2005) emphasize, wildlife trends in West and Central Africa cannot be simply conceptualized as the outcome of many poor people exploiting natural resources to meet basic economic needs (Bassett 2005). Rather, drivers of pressure on wildlife populations occur simultaneously and the effect of a single factor is impossible to disentangle from another, and changes in game populations are explained by a multi-causal and multi-scale effect (Bassett 2005), calling for much better integration of wildlife issues in agricultural, land use, climate change, poverty reduction, food security, and health policies.

5. Is the legal basis for wildlife conservation sufficient?

5.1 Introduction

Legislation underpins formal biodiversity conservation at the national level as it lays down the principles, codes and rules that are to be followed within a state. It also provides the basis by which countries implement international agreements that they have signed up to. It is, however, acknowledged that in many areas the state, and therefore, the rule of sovereign law is virtually absent. The wildlife that is the focus of this Situation Analysis may be affected by a wide range of direct (e.g. hunting) and indirect (e.g. forest loss, declining water quality, developments) impacts (Chapter 4) throughout the region and many of these drivers are typically subject to legislation of one sort or another.

5.2 Methods

Given the breadth of drivers and the diversity of contexts (e.g. habitats, customs and traditions, colonial history) in West and Central Africa, an analysis of the laws that have an impact on biodiversity is a challenge. There are no reviews or syntheses that provide the basis for an overarching assessment of the state of the region's legislation. Simple assertions that a specific legal text provides the basis for a particular action or measure are inadequate because of the nature of legal systems that often require additional legal texts to implement or apply laws. It is a mistake to assume that such implementing legislation is in place. Even national level reviews, such as National Biodiversity Strategies and Action Plans and the most recent (Fourth and Fifth) National Reports submitted to the Convention on Biological Diversity are often incomplete and sometimes contradictory. In some cases there are unequivocal statements about the poor state of the legislative basis of biodiversity and general comments about conflicts, gaps and the absence of implementing legislation.

An assessment of the biodiversity-related legislation in West and Central Africa will only be meaningful, therefore, if it reviews in some detail what legislation exists in each country and draws on any assessments or reviews that have been undertaken. Once this detailed compilation has been undertaken, general conclusions can be drawn and issues and themes identified, if they exist, across this diverse region of 22 sovereign states.

The basic resources for this analysis were: a) ECOLEX, the information service on environmental law that is operated by the Food and Agriculture Organisation of the United Nations, IUCN and the United Nations Environment Programme (FAO/IUCN/UNEP 2014); b) the National Biodiversity Strategies and Action Plans and the Fourth and Fifth National Reports submitted to the Convention on Biological Diversity (www.cbd.int/reports/); and c) peer-reviewed literature and unpublished reports (e.g. by USAID and IUCN). These are fully referenced where they are used. The database provided by Mitchell (2014) was also examined for international agreements. The result was a substantive description of legal texts and their applicability (where available) for each country and this is provided in the Supplementary Information. This section first summarizes that information and then identifies general issues and recurring themes.

The challenge of assessing the legal basis for wildlife conservation in the region is exemplified by a US Law Library of Congress report on *Wildlife Trafficking and Poaching*. The version accessed during the compilation of the report included an account of the relevant legislation for Democratic Republic of Congo that conflated legislation from Democratic Republic of Congo and Republic of Congo (Figueroa 2013a). This country account was removed from the document after this confusion was pointed out to the US Law Library, although the date of the report remains unchanged (i.e., 2013, rather than being updated to 2014).

A key issue in all countries is determining whether the legal texts are actually in force. The legal process in each country requires specific types of text for particular functions. For example, several countries lay down guiding legal principles in Codes. These then require additional texts (such as Orders) to provide the mechanism by which various aspects of the Code are implemented. There is only the patchiest of information available on how these texts relate to each other and what the impact has been of the proposal and adoption of subsequent texts. All of this means that documenting the extensive range of legal texts available in all 22 countries does not translate to a description of legally enforceable provisions. For example, the African Convention on the Conservation of Nature and Natural Resources (see Section 5.3) that was agreed in July 2003 is not yet in force because not enough countries have ratified it. Nigeria has a Biodiversity Bill that was presented to Parliament in 2009 that does not appear to have been passed.

This confusion and lack of clarity is not trivial and it is not just people outside the national legal system of each country who cannot be sure of the status of legislation. Indeed, USAID-Guinea (2008) concluded that in Guinea, "Current natural resource legislation is spread across many sectors (e.g., land, forests, water, minerals), often lacks adequate application texts, and is often little known to the general population and even to some of the technical agents responsible for its implementation. There are often inconsistencies and even contradictions across the policies of the different sectors. Sometimes inconsistencies exist within a set of policies of a single sector." This situation appears widely applicable across West and Central Africa. Two examples demonstrate this:

a) Obtaining a coherent picture of legislation in force is especially challenging in Equatorial Guinea. The country's Fourth National Report (Ministerio de Pesca y Medio Ambiente, 2009) and Ecoloex (FAO/IUCN/UNEP 2014) seem incomplete, out-of-date and at odds with each other. For example, the National Report does not refer to

some legislation that Ecolex indicates was in force when it was published. Furthermore, the Fourth National Report states that Law No. 8/1988 (*Ley Nº 8/1988 Reguladora de la fauna silvestre, caza y áreas protegidas*) contributes to the implemention of the National Biodiversity Strategy and Action Plan. FAO/IUCN/UNEP (2014), however, states that this 1988 Law was repealed by the Regulatory Environment Act (Ley reguladora del Medio Ambiente) of 27 November 2003.

b) There appears to be uncertainty about the status of Sierra Leone's 1988 *Forestry Act.* This replaced the Forestry Act of 1912 and was based on the recommendations of an FAO technical assistance project. Its implementing regulation is the Forestry Regulations, 1989 (P.N. No. 17 of 1990) of 21 November 1990 and whilst the country's Third National Report (Forestry Division, 2008) indicates that the Forestry Act, 1988 protects threatened species, FAO (2004) stated that it had not been enacted by that time and it is not clear that any further legal provision has been put in place since 2004.

In other cases legislation (e.g. from colonial times or early post-independence) has been replaced in full or in part by other legislation. Clear statements of the precise relationships between the original and the newer legislation would help clarify which aspects of which legislation are in force and which are redundant. This becomes more complicated when there is separate implementing legislation that may or may not have been superseded. For example, in Burkina Faso much legislation dates from colonial times and does not accord with the principles laid down in the Constitution that was adopted in 1991. There are a range of conflicts in the legal texts and so the basis of wildlife conservation is extremely complex. The situation is further confused by significant discrepancies between customary practices (see Section 5.6.3) and national legislation.

All of this means that a detailed review of the status of all legal texts (e.g. in force, lacking implementing text in full or in part, repealed in full or in part) would be needed to understand precisely what the legal basis of wildlife conservation is in each country.

5.3 Global agreements

All 22 countries are Parties to four global conventions concerning species, sites and habitats. Details of dates when countries became Party to each are given in Table 5.2, along with dates of independence. Descriptions of each convention are given in the Supplementary Information.

5.3.1 Convention concerning the Protection of the World Cultural and Natural Heritage (World Heritage Convention)

Under this convention, 19 sites in the region have been designated as World Heritage Sites under natural or mixed criteria in 11 countries: Dja Faunal Reserve (Cameroon), Manovo-Gounda St Floris National Park* (Central African Republic), Sangha Trinational (Cameroon, Central African Republic and Congo), Lakes of Ounianga (Chad), Comoé National Park* and Taï National Park (Côte d'Ivoire), Mount Nimba Strict Nature Reserve* (Côte d'Ivoire and Guinea), Garamba National Park*, Kahuzi-Biega National Park*, Okapi Wildlife Reserve*, Salonga National Park* and Virunga National Park* (Democratic Republic of the Congo), Ecosystem and Relict Cultural Landscape of Lopé-Okanda (Gabon), Cliff of Bandiagara (Land of the Dogons) (Mali), Banc d'Arguin National Park (Mauritania), W National Park of Niger and Air and Ténéré Natural Reserves* (Niger), and Djoudj National Bird Sanctuary and Niokolo-Koba National Park* (Senegal). Only Lakes of Ounianga and Cliff of Bandiagara are not triggered under the biodiversity criteria (ix) and (x).

The 10 sites marked with an asterisk (*) have been included on the *List of World Heritage in Danger* (http://whc.unesco.org/en/danger/; accessed 25 September 2014). The complete List of Sites in Danger contains 44 sites from around the world, of which 18 are natural heritage sites and, therefore, more than half of the planet's natural World Heritage Sites that are in danger are in West and Central Africa. Such sites may be eligible to submit proposals to the Rapid Response Facility (RRF), jointly operated by Fauna and Flora International, UNESCO World Heritage Centre and Fondation Franz Weber, which invites small grant applications for UNESCO inscribed natural World Heritage sites facing emergency threats to their biodiversity. See http://whc.unesco.org.

5.3.2 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

This is a legally binding convention and requires that national legislation be enacted so that its provisions can be enforced and the extent to which this has been done in each country is outlined in the Supplementary Information (Section 5.5). Countries that have been considered to have inadequate national legislation are listed in Section 5.6.4, as are countries that are currently the subject of notifications recommending the suspension of trade because of non-compliance. See http://www.cites.org.

In addition to being party to the convention, Cameroon, Central African Republic, Congo, Gabon (and Sudan) signed an *Agreement between the Central African States concerning the Creation of a Special Fund for the Conservation of Wild Fauna* in 1983. See http://www.cites.org/eng/notif/76-89/E374.pdf. Just over a decade later in 1994, Congo (along with Kenya, Liberia, Tanzania, Uganda, Zambia and the Kingdom of Lesotho) became Parties to the *Lusaka Agreement on Co-operative Enforcement Operations directed at Illegal Trade in Wild Fauna and Flora*. The objective of this Agreement is to reduce and ultimately eliminate illegal trade in wild fauna and flora and to establish a permanent Task Force to achieve that. South Africa, Ethiopia and the Kingdom of Swaziland are signatories. See http://lusakaagreement.org/.

5.3.3 Convention on Biological Diversity (CBD)

All countries in the region have produced a National Biodiversity Strategy and Action Plan and have produced

Fourth National Reports. Eighteen of the region's countries have produced Fifth National reports, the exceptions being Central African Republic, Gabon, Ghana and Sierra Leone. However, Republic of Congo's NBSAP was only concerned with agriculture and has not been ratified by the government. Details for each country are given in the country accounts below and these indicate that the status of the necessary legislative and structural basis for implementing the Convention is very variable across the region. Some countries have identified a clear need to overhaul their legislation, and some have started the process, but progress seems to have stalled for no clear reason. For example, Nigeria laid a Biodiversity Bill before its parliament in 2009 and it has not yet been passed; Guinea-Bissau drafted text for a Wildlife Act, but this was not compliant with CBD requirements (Secretariat d'Etat à l'Environnement et Développement Durable 2009) and there does not appear to be a Wildlife Law; Cameroon appears to have a substantial body of legislation relating to the organization of committees, programmes and interministerial activities, but no implementing legislation for the Framework Law of the Environment (see Section 5.5.3); and Benin's National Biodiversity Strategy and Action Plan (Ministere de l'Environnement, de l'Habitat et de l'Urbanisme 2002, and its Fourth National Report (Point Focal Convention Des Nations Unies Sur La Diversite Biologique, 2009) consider its legislation as in need of an overhaul, but there appears to have been no progress in the seven years between the two documents being produced. See www.cbd.int/.

5.3.4 Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention)

Every country in West and Central Africa has at least one wetland of international importance (commonly known as Ramsar Sites). Altogether the region has 137 such sites occupying 575,289 km^2 (see Table 3.3). Guinea (16) and Burkina Faso (15) have the largest number of sites and Sierra Leone (1) and Guinea-Bissau (2) the fewest. Chad (124,051 km^2) and Republic of Congo (113,353 km^2) have the largest total extent of designated wetland with each occupying more than 20% of the region's internationally important wetlands. See http://www.ramsar.org.

The Ramsar Convention is noted as having the highest percentage (fairly consistently above 90%) of National Reports received of all the environment-related conventions: of 158 Contracting Parties at the time of CoP10, 142 had submitted their National Reports, 1 (Yemen) was a new Party and not expected to submit a report in its first year, and 15 Parties failed to submit (including Equatorial Guinea and Guinea-Bissau); for CoP11 in 2012, 143 of 157 Parties submitted reports (including all countries in the West and Central Africa region).

5.3.5 Convention on the Conservation of Migratory Species of Wild Animals (CMS)

Twenty countries in the region are Parties to this convention. Central African Republic has signed but not ratified its participation and Sierra Leone has signed the *Memorandum of Understanding concerning Conservation Measures for the West African Populations of the African Elephant* but is not a Party to the convention. See www.cms.int. Countries in the region are Parties to four Memoranda of Understanding (MoU) and two Agreements that operate under CMS. These are:

Memorandum of Understanding concerning Conservation Measures for the West African Populations of the African Elephant (November 2005)
This MoU states that Parties "will work closely together to improve the conservation status and the habitat of the African Elephant throughout its range." The Parties within the region are Benin, Burkina Faso, Chad, Côte d`Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone and Togo. See http://www.cms.int/en/legalinstrument/west-african-elephants.

Agreement on the Conservation of Gorillas and their Habitats (June 2008)
This agreement provides the gorilla range states, as well as the other governments and organizations, with a legal framework that will reinforce and integrate conservation efforts. Its purpose is to maintain or restore gorillas to favourable conservation status. Central African Republic, Congo, Democratic Republic of Congo, Gabon and Nigeria (plus five other States) are Parties. See http://www.cms.int/species/gorillas/index.htm

Agreement on the Conservation of African-Eurasian Migratory Waterbirds (November 1999)
The objective of this agreement is to maintain African-Eurasian migratory waterbird species in a favourable conservation status or to restore them to such a status.
Benin, Chad, Congo, Equatorial Guinea, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Niger, Nigeria, Senegal, Togo are Parties. See http://www.cms.int/en/legalinstrument/aewa.

*Memorandum of Understanding concerning Conservation Measures for the Aquatic Warbler (*Acrocephalus paludicola*)* (April 2003)
The objective of this MoU is to improve the conservation status of the Aquatic Warbler. The only Party from the region is Mali: Mauritania and Senegal are range States that have not signed. See http://www.cms.int/en/legalinstrument/aquatic-warbler.

Memorandum of Understanding concerning the Conservation of Migratory Birds of Prey in Africa and Eurasia (November 2008)
The overall aim of the Raptors MoU is to promote internationally co-ordinated actions to achieve and maintain the favourable conservation status of migratory birds of prey throughout their range in the African-Eurasian region, and to reverse their decline when and where appropriate. Parties in the region are: Chad, Congo, Democratic Republic of Congo, Equatorial Guinea, Gambia, Ghana, Guinea, Mali, Mongolia, Morocco, Niger Senegal and Togo. See http://www.cms.int/en/legalinstrument/birds-prey-raptors

Memorandum of Understanding concerning the Conservation of the Manatee and Small Cetaceans of Western Africa and Macaronesia (October 2008)
The aim of this MoU is to achieve and maintain a favourable conservation status for manatees and small cetaceans of Western Africa and Macaronesia and their habitats and to safeguard the associated values of these species for the people of the region. The Parties to this convention in the region are: Benin, Chad, Congo, Côte d'Ivoire, Equatorial Guinea, Gabon, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger and Togo. See http://www.cms.int/en/legalinstrument/western-african-aquatic-mammals.

The Parties to the Convention on Migratory Species are required to report to the Convention six months prior to a Conference of the Parties under Article VI paragraph 3, which states that "The Parties which are Range States for migratory species listed in Appendix I or Appendix II should inform the Conference of the Parties through the Secretariat, at least six months prior to each ordinary meeting of the Conference, on measures that they are taking to implement the provisions of this Convention for these species." Reports for the November 2014 Conference of the Parties were due, therefore, by the start of May 2014: seven were available on the Convention's website by September 2014. Previous reports were due prior to Conferences of the Parties that were held late in 2011, 2008 and 2005 and so on. The most recent reports for each country are listed in Table 5.1.

Table 5.1 Most recent National Reports submitted to the Convention on Migratory Species.

Country	Date National Report submitted
Benin	18 May 2014
Burkina Faso	14 May 2014
Cameroon	None available
CAR	Signed but not ratified
Chad	30-Mar-11
Côte d'Ivoire	21-Oct-10
DRC	31-May-08
Equatorial Guinea	None available
Gabon	None available
Gambia	14 May 2014
Ghana	24 April 2014
Guinea	24-May-11
Guinea-Bissau	23-Aug-08
Liberia	21-Jun-08
Mali	24 April 2014
Mauritania	22-May-11
Niger	25 May 2014
Nigeria	16-May-05
ROC	18 August 2014
Senegal	07-Jun-11
Sierra Leone	Not a Party, but has signed African Elephant MoU
Togo	11-Apr-11

5.4 Regional and bilateral agreements

5.4.1 African Convention on the Conservation of Nature and Natural Resources (revised version) (African Union, 2003)

This Convention is not yet in force and the reasons for this have been assessed and ways of enhancing ratification suggested (UNEP 2012). The earlier 1968 Algiers Convention on the Conservation of Nature and Natural Resources was signed by 38 African States and came into force on 16 June 1969. It has now been ratified by 31 state Parties. (http://www.au.int/en/sites/default/files/Nature%20and%20Natural%20Resources_0.pdf).

For a range of reasons it was evident that there was a need to revise the convention (UNEP 2012). The resulting "Maputo Convention" sought to enhance environmental protection, foster the conservation and sustainable use of natural resources and harmonize and coordinate policies in these fields with a view to achieving ecologically rational, economically sound and socially acceptable development policies and programmes. The text (see http://www.au.int/en/content/african-convention-conservation-nature-and-natural-resources-revised-version) was adopted by the 2nd Ordinary Session of the Assembly of the African Union in Maputo, Mozambique on 11 July 2003. Article 35 states that it will come into force on the 30th day following the deposition of the fifteenth instrument of ratification. By 23 September 2014, depositions had been received from 12 States, including Côte d'Ivoire, Ghana, Mali, Niger and Republic of Congo. All other countries in West and Central Africa have signed but not ratified the convention apart from Cameroon, Gabon and Mauritania which are not signatories. (http://www.au.int/en/sites/default/files/Revised%20-%20Nature%20and%20Natural%20Resources_1.pdf).

5.4.2 Treaty on the Conservation and Sustainable Management of Forest Ecosystems in Central Africa and to establish the Central African Forests Commission (COMIFAC)

The treaty was adopted in February 2005 in Brazzaville at the 2nd Summit of Heads of State of Central Africa and established the *Commission of Central African Forests* www.comifac.org. The Commission is a sub-regional international organization responsible for the orientation, harmonization and monitoring of forest and environmental policies in Central Africa and all 10 signatories to the Treaty are Member States. The Parties to this Treaty are Cameroon, Central African Republic, Chad, Congo, Democratic Republic of Congo, Equatorial Guinea and Gabon, along with Burundi, Rwanda and São Tomé & Príncipe.

5.4.3 Other

There are also a range of other agreements and those that do not relate specifically to waterways are shown in Table 5.3 (with further details provided in the Supplementary Information).

Table 5.2 Dates of independence and deposition of legal instruments of global wildlife conventions. *Unilateral Declaration of Independence on 24 September 1973, now considered as Independence Day, however independence was only recognized by Portugal on 10 September 1974 as a result of the Algiers Accord of 26 August 1974. Parts of both Nigeria and Cameroon became independent from Britain on other dates (British Cameroon North to Nigeria on 1 June 1961 and British Cameroon South to Cameroon on 1 October 1961). These global conventions are summarised in the Supplementary Information (Section 5.3). WHC, World Heritage Convention; CITES, Convention on International Trade in Endangered Species of Wild Fauna and Flora; CBD, Convention on Biological Diversity; CMS, Convention on the Conservation of Migratory Species of Wild Animals. Ac = Acceptance; A = Accession; R = Ratification; S = Signed, but not Ratified. A single date of entry into force for the Ramsar Convention and CMS is given.

Country	Independence	WHC	CITES	CBD	Ramsar	CMS
Benin	1 August 1960	14/06/1982 (R)	28/02/1984 (A)	30/06/94 (R)	24/05/00	01/04/86
Burkina Faso	5 August 1960	02/04/1987 (R)	13/10/1989 (A)	02/09/93 (R)	27/10/90	01/01/90
Cameroon	1 January 1960	07/12/1982 (R)	05/06/1981 (A)	19/10/94 (R)	20/07/06	01/11/83
CAR		22/12/1980 (R)	27/08/1980 (A)	15/03/15 (R)	05/04/06	S
Chad	11 August 1960	23/06/1999 (R)	02/02/1989 (A)	07/06/94 (R)	13/10/90	01/09/97
Côte d`Ivoire	7 August 1960	09/01/1981 (R)	21/11/1994 (A)	29/11/94 (R)	27/06/96	01/07/03
DRC	30 June 1960	23/09/1974 (R)	20/07/1976 (A)	03/12/03 (R)	18/05/96	01/09/90
Equatorial Guinea	12 October 1968	10/03/2010 (R)	10/03/1992 (A)	06/12/94 (A)	02/10/03	01/08/10
Gabon	17 August 1960	30/12/1986 (R)	13/02/1989 (A)	14/03/97 (R)	30/04/87	01/08/08
Gambia	18 February 1965	01/07/1987 (R)	26/08/1977 (A)	10/06/94 (R)	16/01/97	01/08/01
Ghana	6 March 1967	04/07/1975 (R)	14/11/1975 (R)	29/08/94 (R)	22/06/88	01/04/88
Guinea	2 October 1958	18/03/1979 (R)	21/09/1981 (A)	07/05/93 (R)	18/03/93	01/08/93
Guinea-Bissau	24 September 1973/10 September 1974*	28/01/2006 (R)	16/05/1990 (A)	27/10/95 (R)	14/05/90	01/09/95
Liberia	26 July 1847	28/03/2002 (Ac)	11/03/1981 (A)	08/11/00 (R)	02/11/03	01/12/04
Mali	22 September 1960	05/04/1977 (Ac)	18/07/1994 (A)	29/03/95 (R)	25/09/87	01/10/87
Mauritania	28 November 1960	02/03/1981 (R)	13/03/1998 (A)	16/08/96 (R)	22/02/83	01/07/98
Niger	3 August 1960	23/12/1974 (Ac)	08/09/1975 (R)	25/07/95 (R)	30/08/87	01/11/83
Nigeria	1 October 1960	23/10/1974 (R)	09/05/1974 (R)	29/08/94 (R)	02/02/01	01/01/87
ROC	15 August 1960	10/12/1987 (R)	31/01/1983 (A)	01/08/96 (R)	18/10/98	01/01/00
Senegal	4 April 1960	13/02/1976 (R)	05/08/1977 (A)	17/10/94 (R)	11/11/77	01/06/88
Sierra Leone	27 April 1961	07/01/2005 (R)	28/10/1994 (A)	12/12/94 (A)	13/04/00	
Togo	27 April 1960	15/04/1998 (Ac)	23/10/1978 (R)	04/10/95 (Ac)	04/11/95	01/02/96

Table 5.3 Legal instruments between several States (see also Supplementary Information).

Instrument	Objectives	Countries	Date and comments
Protocol Agreement on the Conservation of Common Natural Resources	Provides for co-operation between the three signatory countries for the conservation of protected species and their habitat	Democratic Republic of Congo is a signatory along with Sudan and Uganda	Adopted on 24 January 1982 Not clear if entered into force. There is no Secretariat.
Convention on the game hunting formalities applicable to tourists entering countries in the Conseil de l'Entente	Harmonise the game-hunting formalities applicable to tourists	Benin, Burkina Faso, Côte d'Ivoire, Niger and Togo	Entered into force 1 January 1977. The Secretariat is the Conseil de l'Entente. No physical location given.
Agreement on the management of the Cross-border biosphere of W	Management of the W Transboundary Reserve that lies within the W-Arly-Pendjari (WAP)	Benin, Burkina Faso,	January and February 2008
Agreement for Co-operation and Consultation between the Central African States for the Conservation of Wild Fauna	Co-operation and consultation amongst the Parties on the conservation of wild fauna	Cameroon, Congo, Gabon and Sudan	16 April 1983 but none of the signatories have ratified the agreement and it has not entered into force

5.4.4 Legislation on international waterbodies

Senegal River There have been legal arrangements in force between Mali, Mauritania and Senegal on the management of the Senegal River since 1973. Guinea joined the resulting Senegal River Development Organization in 2006. Amongst the various provisions are the maintenance of water quality and protection of the environment (OMVS 2014). This applies to the entire watershed of the Senegal River including tributaries and associated depressions.

Niger River and Basin Institutions were created in 1988 to promote better management of the water resources of the Niger River and Basin. They were charged with promoting the exchange of information relating to all aspects of water management. The Niger Basin Authority has responsibility for environmental protection, including fauna and flora. This Authority was re-launched in 1998 and the *Charter of Water of the Niger Basin* entered into force in 2010 (Fondation Chirac 2011). An agreement between Nigeria and Niger on the use common water resources in four specified water

basins may not have been ratified and, therefore, it may not be in force.

Lake Chad Agreements provide for the adoption of a common policy and joint regulations on issues that include the trade in illegally taken species, the control of polluting material for fishing purposes, and the construction of dykes, dams and other obstacles to fish migrations. The *Lake Chad Water Charter* was formally approved at the 14th Summit of the Lake Chad Basin Commission's Heads of State and Government in 2012 and presented to member countries in December 2013 for ratification by parliaments (ICID 2013). If ratified and managed as intended the Charter should ensure a balance between ecosystem conservation and economic development (http://allafrica.com/stories/201312091581.html).

5.5 National legislation

5.5.1 Benin

Benin's National Biodiversity Strategy and Action Plan considered that the country's biodiversity legislation was inadequate (Ministere de l'Environnement, de l'Habitat et de l'Urbanisme 2002). Although there was no shortage of regulations in place for the protection of the environment, there were problems with applying them, including within the context of customary rights. The National Strategy provided a list of international agreements and national legislation, but concluded that were gaps. More fundamentally, it identified that a key challenge was establishing a new conceptual basis for the reformulation, updating and the application of laws governing the conservation of biological resources. One of its conclusions, therefore, was the need for a project to prepare and/or update laws and regulations regarding conservation of biological diversity.

The Fourth National Report indicated that there had been some progress in drafting legislation relating to benefit sharing and indigenous knowledge, but little other progress (Point Focal Convention Des Nations Unies Sur La Diversite Biologique 2009) Consequently, it considered that the lack of revision and harmonization of certain laws, including the Forest Code and the Code of Hunting and Fishing, which were seen as the main instruments for the management of biological resources, was a significant issue. It further recognized difficulties in understanding, interpreting and disseminating legal codes to local levels. All of this led to the conclusion that it was urgent that, amongst other needs, biodiversity codes and laws be developed and adopted at the national level and disseminated to all agencies. This should be part of a re-evaluation and a truly systematic approach to the conservation of biodiversity in Benin (Point Focal Convention Des Nations Unies Sur La Diversite Biologique 2009). These general comments suggest that there is still a need for a thorough analysis of the legal provision for wildlife related legislation in Benin. There is also a broader need to determine where there are conflicts, overlaps and gaps in the legislation in order to provide the coherence that the National Biodiversity Strategy and the Fourth National Report call for. The Fifth National Report, produced in January 2014, again stated the need to develop an appropriate legislative framework (Ministre de l'Environnement Charge de la Gestion des Changements Climatiques, du Reboisement et de la Protection des Ressources 2014), suggesting that no progress had been made in recent years. Details of national legislation that affects wildlife in Benin are given in Section 5.5.1 of the Supplementary Information.

5.5.2 Burkina Faso

The National Biodiversity Strategy and Action Plan considered that the non-application of legislation was one of the central issues that had led to the loss of biodiversity in Burkina Faso (Secretariat Permanent du Conseil National pour la Gestion de l'Environnement 1999). It further identified that old legal texts were not harmonized with more recent principles of the Constitution and that many laws on forestry, wildlife and fisheries overlapped and sometimes conflicted with colonial texts that had not been repealed, particularly those dating back to 1955 and even 1935. This provided a complexity to the legal basis for biodiversity conservation and significant discrepancies between customary practices and legal texts. There is also inadequate implementing legislation. The National Strategy identified a range of legislative needs that should be addressed to conserve biodiversity and take into account the cultures of Burkina Faso.

The Fifth National Report (Anon 2014a) noted recent efforts to enhance legislation affecting wildlife and its conservation, notably new Forest and Environment Codes. The degree to which these meet the identified needs for increased harmonization of legislation and a reduction in complexity is not clear. Details of national legislation that affects wildlife in Burkina Faso are given in Section 5.5.2 of the Supplementary Information.

5.5.3 Cameroon

Legal inadequacies are a recurring theme in the country's National Biodiversity Strategy and Action Plan (Anon 1999a). These include inconsistencies, gaps and lack of harmonization as well as widespread lack of enforcement and the national plan includes activities addressing some of these issues. One of the resulting strategic goals was to adapt legislation so that it met Convention on Biological Diversity requirements. It did, however, suggest that a number of legislative measures had been taken, including a new forestry, wildlife and fisheries law to ensure the protection and sustainable management of the environment and biological diversity. It also highlighted the Framework Law on the Environment as the first legislation to introduce strict environmental requirements and the provision for compulsory Environment Impact Assessment before any development project can be carried out. A key limitation, however, was the lack of implementing legislation.

The Fourth National Report (Anon 2011) provided little evidence of significant progress in addressing these legislative weaknesses. It did, however, assert that 13

appropriate biodiversity related international conventions had been translated into national law, most of them with implementing texts. There was, however, no specification that the legislation necessary to support Cameroon's obligations under the Convention on Biological Diversity had been enacted. Subsequently, legal provision has been put in place for the appropriate institutional framework, such as for the establishment of the Ministry of Environment, Nature Conservation and Sustainable Development (MINEPDED). The institutional emphasis has been on integrating environmental protection into sectoral legislation and there remains no law specific to biodiversity, and conflicts and overlap remain (République du Cameroun 2014). Djeukam *et al*. (2012) reinforces the conclusion that the laws relating to wildlife specifically are old. Details of national legislation that affects wildlife in Cameroon are given in Section 5.5.3 of the Supplementary Information.

5.5.4 Central African Republic

The country's National Biodiversity Strategy and Action Plan was produced in 2000 (Ministère de l'Environnement, des Eaux, Forêts, Chasses et Pêches 2000). It described relevant legislation and included as the main programme of work the improvement of the legal basis for wildlife conservation. The emphasis was to provide a general framework and few areas were highlighted specifically, apart from a need for implementing texts for the Environment Code. Particular suggestions made for conserving species were to increase understanding, training and enforcement, as well as the creation of new protected areas. New laws were proposed to address threats from invasive species and biotechnology and to promote equitable benefit sharing. The lack of adequate national legislation on fisheries was mentioned specifically as an impediment to better wetlands management and it was noted that at that time the country had not ratified the Ramsar Convention on Wetlands of International Importance.

A decade later, the Fourth National Report described progress on adopting legal texts, including Environment and Forest Codes, and national legislation to implement a range of multilateral agreements (including the Ramsar Convention), but indicated that there has been no additional legislation regarding wildlife (Ministere de l'Environnement et de l'Ecologie 2010). It reiterated that whilst legislation was in place there were a range of factors that continued to cause the decline of biodiversity, including a sharp reduction in flagship species. There was a clear statement of the need to bring hunting under control and a range of measures were proposed, largely in areas that fall under the responsibility of the Department of Wildlife and Protected Areas and including legislation to control domestic trade in hunting products. Elsewhere in the report there is recognition that the existing legislation on wildlife conservation (*Law No. 84/045 of 2 July 1984 on the protection of wildlife and hunting regulations in Central African Republic*) no longer reflected current realities. It further states that there are inadequate, overlapping and contradictory texts and that these inconsistencies present a significant problem. Figueroa (2013b) stated that the legislation concerning wildlife protection consists of varied legal instruments that overlap and duplicate, leading to a conclusion that "it is almost impossible to determine with absolute certainty which legal instrument would apply in a specific situation." Details of national legislation that affects wildlife in Central African Republic are given in Section 5.5.4 of the Supplementary Information.

5.5.5 Chad

Chad is one of only two African countries (the other being Ghana) that refers to the codification of customary law in its constitution (Cuskelly 2011). Customary laws affect wildlife because they define the traditional relationship of the local population to its livelihood resources (land, water, vegetation and animals). The constitution states that until they are codified, customary and traditional rules are applicable only in the communities where they are recognized, although customs contrary to the public order or those which promote inequality between citizens are forbidden. This suggests that they have limited legal force in issues relating to wildlife conservation and the environment.

The National Biodiversity Strategy and Action Plan (Ministere de l'Environnement et de l'Eau 1999) lists relevant national legislation, but offers little synthesis apart from general comments about its limitations, a need to work towards the decentralization of resource management and noting that in some cases enforcement has led to a negative impact on attitudes towards protected areas. The Fourth National Report stated that some legislation had been produced to address general environmental issues, but indicated that there had been little progress in wildlife conservation (Direction des Parcs Nationaux, des Reserves de Faune et de la Chasse 2009). It further stated that enabling legislation was still required to prevent and mitigate the most serious negative impacts on threatened protected areas and to establish standards and best practice in their management. The Fifth National Report, produced in April 2014, reiterated the weakness of the legislative and regulatory framework (Direction des Parcs Nationaux, des Reserves de Faune et de la Chasse 2014), suggesting that progress had still not been made. Details of national legislation that affects wildlife in Chad are given in Section 5.5.5 of the Supplementary Information.

5.5.6 Côte d'Ivoire

The range of laws and decrees that have been passed in Côte d'Ivoire reflect the attention that nature conservation has had in the country during the colonial period and since (Kone 2013). However, these laws are seen as inadequate for current needs (see Kone *et al*. 2012, Kone 2013 and references therein). The country's National Biodiversity Strategy and Action Plan identified the strengthening of its legal and institutional framework as one of eight key themes to be pursued (Ministere de l'Environnement et du Cadre de Vie 2006). As a result, one of the NBSAP's objectives was to improve the legal and institutional framework for conservation and management of biological diversity. In order to achieve this a range of actions were identified, including: 1) harmonizing existing legal texts (Conventions,

laws, decrees, orders etc.); 2) developing the necessary legislation to better conserve biological diversity; 3) integrating customary rules and practices favourable to the protection of the environment in the environmental legal framework; and 4) creating a database of all legal texts. Furthermore, institutions and mechanisms should be established to coordinate and monitor the development of national policy, ensuring synergy with conventions and regional networks and identifying all institutions or structures that may be concerned with biological diversity. Progress however has been limited because of financial and capacity constraints (Republique de Côte d'Ivoire 2009).

The National Biodiversity Strategy and Action Plan further identifies specific areas for enhancing legislation and the Fourth Report emphasizes this need in relation to protected areas and the conservation of aquatic resources. It considers that adequate legislation is in place to control international trade in endangered species and to ensure adequate assessment of environmental impacts on proposed developments (Republique de Côte d'Ivoire 2009). Conversely, the Fifth National Report considered that the legal framework was adequate (Republique de Côte d'Ivoire 2014) without specifying new legislation that had been enacted and it is not evident that there have been relevant recent legal texts (see Supplementary Information). Details of national legislation that affects wildlife in Côte d'Ivoire are given in Section 5.5.6 of the Supplementary Information.

5.5.7 Democratic Republic of Congo

The country's National Biodiversity Strategy and Action Plan was produced in 1999 and revised in 2002 (CBD Secretariat 2014b). The revised Strategy (Division de Diversité Biologique 2002) identified a clear need to revise and adopt new legislation and regulatory processes on biodiversity. Of 18 projects selected for attention during the first five year period, eight involved developing legal and regulatory measures (see Supplementary Information):

The Fourth National Report (Direction de Developpement Durable 2009) states that the continued deterioration of biodiversity and water resources is at least partly attributable to a continued weak legal framework. It indicated that part of the reason for this is the inability of existing texts to cope with the change in the nature of natural resource use and the principles enshrined in the international agreements to which Democratic Republic of Congo is a signatory. In particular, it reported that whilst a Forestry Code was enacted in 2002, there had been little progress towards the Framework Law on the Environment and laws on the conservation of nature, hunting and fishing and the Water Code. Ruppell & Bwiza (2013) state there is progress in some areas, but that significant obstacles remain. The Fifth National report makes it clear that legislation remains weak, noting that the oil and mining sectors are governed by legislation that is 30 years old, pending the passage of a new Hydrocarbons Code (Ministère de l'Environnement, Conservation de la Nature et Tourisme 2014). Furthermore, the report acknowledged that there remain inconsistencies in the legislation governing a range of land-use sectors. Details of national legislation that affects wildlife in Democratic Republic of Congo are given in Section 5.5.7 of the Supplementary Information.

5.5.8 Equatorial Guinea

Obtaining a coherent picture of legislation in force is especially challenging for Equatorial Guinea. The Fourth National Report does not appear comprehensive or up-to-date: it omits some legislation that was in force when it was published. Ecolex (FAO/IUCN/UNEP 2014) contains relatively few legal texts for the country and it is not clear if this is an accurate reflecton of limited legislation, or an inability to obtain the necessary data.

The Fourth National Report (Ministerio de Pesca y Medio Ambiente 2009) stated that the relevant legislation supporting the implemention of the National Biodiversity Strategy and Action Plan (see Ministerio de Pesca y Medio Ambiente 2005) includes Law No. 8/1988 (*Ley N° 8/1988 Reguladora de la fauna silvestre, caza y áreas protegidas*) of 31 December 1988 on wildlife, hunting and protected areas. This established, inter alia, the protection, management, use, transportation and marketing of wildlife animals. FAO/IUCN/UNEP (2014), however, states that this 1988 law was repealed by the Regulatory Environment Act (*Ley reguladora del Medio Ambiente*) of 27 November 2003.

The 1988 law on wildlife, hunting and protected areas (8/1988) regulated the protection, management, use, transportation and marketing of animal wildlife and its products, the protection of endangered species, conservation of wildlife habitats and its flora and the declaration of protected areas. It also contains a list of species which may be hunted and which includes a range of duikers, primates, antelopes and small mammals. The 2003 Act sets the legal framework for environmental management, regulating the basic rules of conservation, protection and restoration of the environment and the sustainable use of natural resources. Mugnier & Martinez-Plaza (2009) stated that the Act was not fully operational in 2008 and, recently, the application of measures remained limited (Nguema & Pavageau 2013). The Fifth National Report to the Convention on Biological Diversity stated that a study had been conducted on legislation that relates to biodiversity (Ministerio de Pesca y Medio Ambiente 2014), without giving details of its findings or conclusions. Details of national legislation that affects wildlife in Equatorial Guinea are given in Section 5.5.8 of the Supplementary Information.

5.5.9 Gabon

The National Biodiversity Strategy and Action Plan considered that there are several fundamental reasons for Gabon's lack of adequate legislation for environmental conservation in general and biodiversity conservation in particular (Direction Generale de l'Environnement 1999). These seem to centre on the perception that whilst formal legislation is required it is not seen as central to the conduct of everyday life. This has resulted in a lack of coherence

amongst laws, weak or absent implementing legislation and a perception that laws are for others. For example, legislation concerning hunting does not necessarily have biodiversity conservation as its guiding principle and forest legislation is centred on controlling the harvest of trees rather than promoting forest conservation more holistically (ie including faunal communities). Whilst it does consider that there are some good legal texts it concludes that the current legal and institutional framework is a handicap for the conservation of biodiversity. The priorities identified included: revision of the legal and institutional framework for the sustainable management of biological resources (Law 16/93 was highlighted for revision to promote the overall coherence of legislation); and completing legal coverage through harmonising laws and promulgating new legislation where gaps existed.

Gabon's most recent National Report is its second (Observatoire National de la Biodiversite 2004). It provides a little more information on legislation in fisheries, but otherwise there is no significant addition to the analysis in the National Report (Direction Generale de l'Environnement 1999). Since then, however, there have been some legislative advances. Details of national legislation that affects wildlife in Gabon are given in Section 5.5.9 of the Supplementary Information.

5.5.10 Gambia

The Republic of Gambia's legislation concerning wildlife and the wider environment is very limited indeed and where it does exist it is poorly enforced (Department of Parks and Wildlife Management 1998). The country's National Biodiversity Strategy and Action Plan was intended to "catalyse and provide guidance for legal, policy and institutional reforms necessary to achieve effective conservation and sustainable use of biological diversity". The need to address the legislative inadequacies was made clear by two of nine key strategic aims being to: a) review and harmonize existing policies and legislation; and b) enact new policies and legislation in areas that are not or are inadequately covered by the existing legislation such as access to genetic resources and biosafety.

The country did not submit a Fourth National Report, but its third suggested that limited progress had been made (Department of Parks and Wildlife Management 2006). The country had recognized that there were serious issues with its judicial processes and legal capacity and after reviews that were supported by international agencies, it put in place a Legal Sector Strategy between 2005 and 2010 (see Republic of the Gambia and European Community 2007: see also Sallah-Njie 2012). Although these issues concern the judicial process rather than the making of laws, it shows that there was recognition of significant challenges in the legal system as a whole and not just its effect on the environment, and wildlife specifically. The Third National report refers to a "Wildlife/Biodiversity Act of 2003" and the Fifth National Report, published in May 2014 refers to a "Biodiversity and Wildlife Policy and Act of 2000" that was being revised. The status of this legislation is, therefore, not clear. Details of national legislation that affects wildlife in Gambia are given in Section 5.5.10 of the Supplementary Information.

5.5.11 Ghana

The country's National Biodiversity Strategy and Action Plan was produced in 2002 and asserted that Ghana's social and economic development had been achieved at the expense of its environment, including biodiversity (Ministry of Environment and Science 2002). Whilst the precise role of policy failures, limited legislation and enforcement and inadequate institutional arrangements is not clear, the Strategy considered that "there are convincing indications that these factors have led to [a] marked decrease in the country's biodiversity. Good implementable policies, enforceable legislative arrangements and better-strengthened institutions may be the key to ensuring a decline in the rate of biodiversity loss and consequently the strengthening of management and conservation potentialities." It further asserted that there was no overarching legal framework for natural resources and that much legislation was sectoral and that it may conflict and be obsolete, deficient or otherwise unenforceable. At that time there was also limited transposition into national law of the international conventions and agreements that Ghana has signed.

The Strategy did not adopt an Action Plan (Anon 2009), but did identify actions that would improve the legislative basis for the conservation of wildlife and its habitats (Ministry of Environment and Science 2002). These were to: i) review and update forestry legislation, and harmonize these with non-forestry legislation; ii) review and update wildlife legislation and seek harmonization with wildlife-related legislation and ensure compliance of such laws; iii) develop appropriate legislation, at both national and district levels, to provide sanctions against individuals, corporate bodies and communities which engage in activities detrimental to the sustainable use and management of the country's biological resources; and iv) ensure The Ministry of Environment and Science is responsible for promoting the development of national legislation based on the various international agreements and conventions which the country ratifies.

Ghana's Fourth Report (Anon 2009) indicated that little progress towards these improvements had been made. A Wildlife Bill had been submitted to the Cabinet in 2008, but the revision and harmonization of forestry legislation was listed as high priority, implying it had not yet started. There was no mention of either legislation providing a framework for sanctions or ensuring that all international agreements had been translated into national law. Details of national legislation that affects wildlife in Ghana are given in Section 5.5.11 of the Supplementary Information.

5.5.12 Guinea

The legislative framework for biodiversity conservation in Guinea is acknowledged to be weak and in need of significant strengthening (Ministere des Mines de la Geologie et de

l'Environnement 2002). The key issues identified when the country's National Biodiversity Strategy and Action Plan was produced in 2002 were gaps and inconsistencies in the framework legislation, which included the Environmental Code, Water Code, Forest Code, a code for the protection of wildlife and hunting regulations, and in general legislation such as the National Criminal Code, the Guinean Penal Code. Consequently, strengthening existing legislation in support of the conservation of biological diversity and its sustainable use was seen as a priority (Ministere des Mines de la Geologie et de l'Environnement 2002). The specific objectives included addressing inconsistencies between the Environmental Code and other texts, filling legislative gaps, and harmonizing laws across sectors so as to provide overall environmental protection.

Guinea's Fourth National Report to CBD (Ministere de l'Environnement et du Developpement Durable 2009) stated that whilst there had been some progress, legislation remained weak and there was little enforcement capacity. It further specified inadequate legislative frameworks and institutions as a significant constraint on achieving objectives relating to protected area management, suggesting that the legislation in place since 1997 represented a legal vacuum. This lack of adequate legislative basis was listed consistently as an impediment to progress on a range of protected area issues. The report's conclusion again contained the call to harmonize legislation (Ministere de l'Environnement et du Developpement Durable 2009).

USAID-Guinea (2008) provided a considered analysis of the 'mass of legislation' that regulates or influences property rights to land and natural resources in alluvial diamond mining areas and it confirms the conclusions drawn above, stating: "Current natural resource legislation is spread across many sectors (e.g., land, forests, water, minerals), often lacks adequate application texts, and is often little known to the general population and even to some of the technical agents responsible for its implementation. There are often inconsistencies and even contradictions across the policies of the different sectors. Sometimes inconsistencies exist within a set of policies of a single sector." It appears as though some of these inconsistencies are being tackled, as the Fifth National Report states that a range of legislation is being reviewed or promulgated. Those noted as under review include the Forest Code, the Wildlife Protection Code and hunting regulations and a framework law on the protection and enhancement of the environment is being developed. Orders relating to environmental impact studies and pesticides are stated as now in force, although details are not given. Details of national legislation that affects wildlife in Guinea are given in Section 5.5.12 of the Supplementary Information.

5.5.13 Guinea-Bissau

The country's Fourth National Report to the CBD Secretariat indicated that legislation remained weak and enforcement seriously deficient (Secretariat d'Etat à l'Environnement et Développement Durable 2009). In particular the protected area legislation was weak and required harmonizing, updating and aligning with Guinea-Bissau's commitments under the convention. Furthermore, there was virtually no enforcement of the legislation that was in place. The report contained many references to strengthening the legal framework and its enforcement and concluded by highlighting this need. The report stated that texts for a new Forest Act and a Wildlife Act had been produced but were not compliant with CBD requirements. The Fifth National Report (Secretary of State for Environment and Tourism 2014) notes progress in tackling some of these issues, such as a new Forestry Law, Basic Law of the Environment and Framework Law on Protected Areas (see Supplementary Information), but there does not appear to be a new Wildlife Law.

Despite this revision of forest legislation, there is a need to implement its provisions, especially to ensure appropriate use of forest resources and the legislation for wild fauna urgently requires both updating and harmonization with CBD objectives (CBD Secretariat 2014c). There is also recent legislation on Fishing, Environmental Impact Assessment and on regulating economic activities that may affect the environment. Details of national legislation that affects wildlife in Guinea-Bissau are given in Section 5.5.13 of the Supplementary Information.

5.5.14 Liberia

Liberia's National Biodiversity Strategy and Action Plan was produced in 2004 (see CBD Country Profile: CBD Secretariat 2014d). It reflected on a range of legislative inadequacies and considered that there was a "Lack of legislation or clear cut policy on environmental sustainability and enhancement of adequate coordination among agencies dealing with the environment" (Anon 2004). Although there is a range of laws in place it was felt that inadequate policy and legislation was a significant impediment to biodiversity conservation in particular. The strategy drew attention to further challenges, stating that regardless of what legislation is place, enforcement relies on both the will of the people and the technical and general capacity of the implementing and enforcing agencies. The strategy included goals for protecting critical ecosystems and conserving the forest estate, both of which identified the need to review, harmonize and revise legal provision and enact new laws. The Action Plan contained a large number of proposals for new legislation, including for wildlife and protected areas.

The Fourth National Report (Anon 2010) stated that a National Wildlife Law was nearing completion and was due to be ratified by the National Legislature. Legislation was being considered for six new protected areas and a corridor between Grebo National Forest and the Taï National Park in Côte d'Ivoire. The Report stated that the key institutions have provisions in their legislations for Environmental Impact Assessment. These include three Environmental Protection Agency legislations; the Forestry Development Agency and the Ministry of Lands, Mines and Energy. Liberia's report to the 10th Session of the UN Forum on Forests in April 2014 stated that the *New Wildlife Management and Conservation*

Law was at the national legislature for enactment (Anon 2014d). The Fifth National Report, whilst reiterating some of the progress made above, indicated that there remains no law specifically relating to biodiversity issues. It also stated that enforcement is a challenge because many relevant laws are far removed from the real world contexts that they seek to influence (Anon 2014b). Details of national legislation that affects wildlife in Liberia are given in Section 5.5.14 of the Supplementary Information.

5.5.15 Mali

Mali considers that it has established a relatively comprehensive environmental legislation and has ratified a range of international environmental agreements (Ministère de l'Environnement et de l'Assainissement du Mali 2014). It does, however, acknowledge that the quantity of laws and decrees adopted in recent years requires greater coherence across all legal instruments concerning the environment. It further indicates that the state has to improve the application of these laws. The protection of the environment is rooted in the Constitution of Mali of 1992. The policy framework is provided by the National Policy for Environmental Protection (NEPP) adopted in 1998.

Its National Biodiversity Strategy and Action Plan was completed in May 2001 and identified five specific programmes of work: strengthening of protected areas; sustainable management of biological resources; capacity building; promotion of traditional practices and knowledge; and preservation of local crop varieties as well as domestic breeds (Ministere de l'Equipement, de l'Amenagement du Territoire de l'Environnement et de l'Urbanisme 2001). The Fourth National Report indicated that the integration of environmental legislation was still needed (in contrast with above) and that a code or policy for the environment should be considered and take into account land and use rights (Ministère de l'Environnement et de l'Assainissement 2009). The Fifth National Report, produced in June 2014, reported no progress and, instead, stated that a framework law on the environment and sustainable law should be studied, and should recognize the rites of local communities (Ministère de l'Environnement, de l'Eau et de l'Assainissement 2014).

There is a range of national legislation and regulations relating to the management of natural resources that have been adopted. Of particular relevance are *Law No. 95-04/AN-RM of 18 January 1995* which lays down the conditions for exploitation of forest resources and *Law No. 95-031/AN-RM of 30 March 1995*, which lays down the conditions for the management of wildlife and their habitat and their implementing regulations. Details of national legislation that affects wildlife in Mali are given in Section 5.5.15 of the Supplementary Information.

5.5.16 Mauritania

Mauritania has a range of environmental legislation and has ratified a range of international environmental agreements. However, it does consider its legal framework to be both incomplete and lacking integration, with protected areas and traditional and spiritual values of environment specified as in need of strengthening (Anon 1999b). Although the country established a National Environment Council Development (CNED through *Décret n° 95/060 portant création d'un Conseil national environnement et développement en Mauritanie*) it had not become active by 2009 (Ministère Délégué auprès du Premier Ministre 2009). The National Biodiversity Strategy and Action Plan stated that laws should be supplemented and updated (Anon 1999b). It also asserted that greater enforcement was required. The country's Fifth National Report to the Convention on Biological Diversity (Ministere de l'Environnement et du Développement Durable 2014b) reported no meaningful progress and reiterated the need for the application of legal and regulatory frameworks.

Law No. 2000-045 (*Loi n° 2000-045 portant loi cadre sur l'Environnement*) enacted on 26 July 2000 established the general principles that should underpin national policy on environmental protection, which aimed to: ensure the conservation of biological diversity and the sustainable use of natural resources; take steps against desertification, and pollution, and harmonize development and protection of the natural environment. The law comprises 100 articles in six parts, including, inter alia, fundamental principles, such as a natural resource that ensures the sustainable use, the right of everyone to a healthy and balanced environment and involvement populations in the development and implementation of environmental policies, management of the National Environmental Policy, protection of resources and the natural environment.

A decade later this initial framing of an environmental policy was seen as in need of revision because of international conventions and requirements of national policies on environmental protection and sustainable development. A draft revision of the Framework Law on the Environment was published on 9 June 2011 (Dev-Stat 2011) as part of the UNDP-UNEP Poverty-Environment Initiative, but it has not yet been enacted. Challenges facing this body are further described in the 2012 National Report on Sustainable Development (Ministère Délégué auprès du Premier Ministre Chargé de l'Environnement et du Développement Durable 2012), which also identified strengthening environmental governance as one of three priorities in the 2011–2015 Strategic Framework for the Fight against Poverty.

Law No. 97-007 (*Loi n° 97-007 abrogeant et remplaçant l'ordonnance n° 82-171 portant Code forestier du 15 décembre 1982*) of 20 January 1997 repealed and replaced the earlier Forest Code. It gave provisions for forests and afforested land belonging to the State, local communities and individuals as well as parks, reserves and other protected areas. It dealt with, inter alia, basic principles and the provisions relating to procedures for classification and declassification, management and exploitation of forests. Traditional use rights were established, impact studies were required to precede work that may have a negative impact on the ecosystem, management plans were required for state forest areas, and a full list of protected tree species was provided in an Annex. Details of national legislation

that affects wildlife in Mauritania are given in Section 5.5.16 of the Supplementary Information.

5.5.17 Niger

The second edition of the country's National Biodiversity Strategy and Action Plan reported that there were more 300 pieces of legislation in force relating to the environment (Conseil National de l'Environnement pour un Developpement Durable 2009a). It nonetheless included action on legal aspects relating to biodiversity conservation as one of 22 areas prioritized for action. This is because some of the existing texts were outdated, some were non-operational or lacked implementing legislation and others did not take biodiversity conservation into account. Consequently, the need for strengthening the legal basis for biodiversity was highlighted and a range of specific actions described, including for the extension of legal provision, harmonising of existing legislation and the elaboration and implementation of certain laws (e.g. Forest Law).

The Convention on Biological Diversity was implemented in Niger by Order No. 46/PM/SE/CNEDD (*Arrêté n° 46/PM/SE/CNEDD du 23 avril 2004, modifiant et complétant l'arrêté n° 53/PM/SE/CNEDD du 21 juillet 1997, portant création, composition et attributions de la commission technique sur la diversité biologique (CTDB)*) of 23 April 2004, which amended and supplemented Decree No. 53/PM/SE/CNEDD of 21 July 1997 on the establishment, composition and functions of the Technical Committee on Biological Diversity (CTDB).

The Fourth National Report, also produced in 2009 (Conseil National de l'Environnement pour un Developpement Durable 2009b) outlined more specific requirements, such as the adoption of legal texts providing the system of protected areas, to improving the status of threatened species, and adoption of a law on environmental management. By 2014 a process had been initiated to adopt implementing regulations for several laws relating to biodiversity, including *Law 98-56 of December 29, 1998* (the Framework Law on Environmental Management); *Law No. 98-042 of December 7, 1998* (Relating to Fisheries); and *Law No. 2004-040 of 8 June 2004* (Establishing a Forest System) (Conseil National de l'Environnement pour un Développement Durable 2014). Some implementing regulations are mentioned in Section 5.5.17 of the Supplementary Information, which also gives details of national legislation that affects wildlife in Niger.

5.5.18 Nigeria

Nigeria's Fourth National Report to the CBD Secretariat stated that the country's legislation relating to wildlife and the environment was weak and there was little implementation (Federal Ministry of Environment 2010). Some laws were being reviewed but the pace was slow. The report further stated that legislation and institutional arrangements were the principle mechanisms by which biodiversity conservation activities were to be mainstreamed into national programmes, but that progress had been limited. It stated that a priority was the "Enactment of a comprehensive modern national law that would ensure efficient conservation of biodiversity in Nigeria". Usman & Adefalu (2010) assert that whilst Nigeria has a long history of conservation-related policy, it has not been effective and there is an urgent need to review legislation affecting forestry and wildlife. Adekola *et al*. (2012) further suggest that since 1980 and especially after the return to democratic rule in 1999, few of the 36 states and 774 local governments in the country have enacted relevant laws on conservation of natural resources and largely follow federal laws.

Nigeria has reviewed its biodiversity related laws through consultation between the Federal Ministry of Justice, Law Review Commission and Nigerian Institute for Advanced Legal Studies, the Federal Ministry of Environment, National Assembly and other relevant stakeholders. A National Biodiversity Bill (see http://www.nassnig.org/nass/legislation.php?id=735) was laid before Parliament in 2009 and appears not yet to have led to a Biodiversity Act. Indeed, there was no mention on this Act in the country's Fifth National Report (Government of Nigeria 2014). Instead the report painted a very strong picture of the weakness of the legislative process, stating "In most States of Nigeria, the biodiversity related legislations such as the wildlife and forestry laws are obsolete, non-implementable and are totally ignored (or not regarded) by the customary, sharia and other courts." Details of national legislation that affects wildlife in Nigeria are given in Section 5.5.18 of the Supplementary Information.

5.5.19 Republic of Congo

Congo's National Biodiversity Strategy and Action Plan was finalized in 2001 (Batamio 2001) and validated in 2006 but has not received government endorsement (see CBD Country Profile: CBD Secretariat 2014a). It was concerned explicitly with agriculture and, therefore, contained no mention of legal provision for biodiversity conservation and emphasized the need to address inadequacies in food production in order to reduce pressures on biodiversity. Consequently, the actions identified were concerned entirely with agriculture in one form or another and did not comment on the adequacy of national legislation in meeting the provisions of the Convention.

The Fourth National Report (Direction de l'Environnement 2009) stated that Congo had 10 laws, four decrees and four orders for the management of biological resources. It further reported that the absence of a national strategy and a national action plan for the conservation and management of protected areas hindered the country in meeting its CBD obligations. There was also limited national legislation to give force to the international conventions that Congo had ratified. Although this CBD process has not seen any assessment of how comprehensive and suitable the legal basis for the conservation of wildlife and its habitats in Congo is, the legislative framework does appear robust. This is reinforced by the Fifth National Report, which considered that there are suitable legal texts (Direction Generale du Developpement Durable 2014). It does, however, suggest that a database should be created of all legal texts on

biodiversity (conventions, laws, decrees, orders, etc.) so that they can be better harmonized. The need to integrate customary rules into the legal framework is also stated. Details of national legislation that affects wildlife in Congo are given in Section 5.5.19 of the Supplementary Information.

5.5.20 Senegal

Senegal's National Biodiversity Strategy and Action Plan (Anon undated) identified legal issues as one of four main factors underlying the loss of its biodiversity. These issues included inadequate regulations concerning activities connected with biodiversity, little or no implementation of regulations concerning access to certain biological resources, inconsistencies and inadequacies in codes and laws governing the exploitation of biological resources, the lack of flexibility in the status of protected areas, and the lack of harmonization in regulations concerning resources shared with adjacent countries. It further stated that the current legal framework was almost exclusively targeted towards the organization of hunting and the management of protected areas. Consequently, it proposed that in future legislation should have an emphasis on biodiversity conservation.

The Fourth National Report stated that there was still a lack of harmonization between legal texts such as the Codes for the Environment, Forestry, Mining, Hunting and Fishing (Direction des Parcs Nationaux 2010). Decentralization of rights over natural resources, such as forests and wildlife, has further complicated the legal framework. The Report did however indicate that there had been some improvement in legal provision and asserted that species considered rare and threatened were either protected by law and forestry regulations or were singled out by international conservation organizations for their protection. The development of legislation on the environment, wildlife, flora and inland and marine fisheries was highlighted as important. There has been no notable change since (Ministère de l'Environnement et du Développement Durable 2014a). Details of national legislation that affects wildlife in Senegal are given in Section 5.5.20 of the Supplementary Information.

5.5.21 Sierra Leone

The need to establish appropriate and comprehensive post-conflict legislation for the conservation of biodiversity was recognized in the National Biodiversity Strategy and Action Plan (The Republic of Sierra Leone 2003). Consequently one of its key strategic objectives was to "review, revise and enact the appropriate legislation on biodiversity, updating and harmonizing sectoral laws and introduce institutional reforms for the sustainable management of biological resources". Amongst the "selected important legislation" that it listed was: Forestry rules (1942; 1946; 1955), Forestry Ordinance (1960) and Forest Industry Corporations Act (1992) as amended (1990); Wildlife Conservation Act (1972); Fisheries Control and Preservations Act (1932), Fisheries Management and Development Act (1988) as amended (1990), Fisheries Management and Development Act (1994); and the National Environment Protection Act (2002). The last Act is presumably *Environment Protection Act (No. 2 of 2000)* (ie not 2002) and which has since been revised (see below).

It is not easy to determine the relationships of the range of Fisheries Decrees (=Acts) and regulations that have been adopted since the late 1980s. It is not clear, for example, whether all provisions are implemented by the associated regulations and whether subsequent legislation repealed all provisions of earlier Decrees.

Brown & Crawford (2012) recommended a range of legislative improvements, including strengthening of national laws governing protected areas, updating the Forestry (1988), Fisheries (1988) and Wildlife (1972) Acts, and strengthening environmental protection laws to ensure that the impacts of large-scale development projects such as mining and commercial plantations are considered fully in important areas. Details of national legislation that affects wildlife in Sierra Leone are given in Section 5.5.21 of the Supplementary Information.

5.5.22 Togo

Early laws were concerned largely with taxes, licenses and the procedures for managing, rather than protecting, species. There appears to be a better balance now and the National Biodiversity Strategy and Action Plan (Ministere de l'Environnement et des Ressources Forestieres, 2003) seems to have had a significant effect on the development of legislation. It stated that inconsistencies between legal texts, laws and regulations, as well as limited or a complete lack of implementing legislation, had contributed to problems facing biodiversity. The Constitution of 14 October 1992 enshrined the right of every person to a healthy environment and required the State to ensure the protection of the environment and natural resources. At that time *Law No. 88-14 of 3 November 1988 concerning the Environment Code* was not in force because of a lack of implementing legislation. Consequently, a programme to strengthen legislation and institutions (*Programme de Renforcement des Capacités Juridiques et Institutionnelles (PRCJI*)) was one of the four key programmes identified in the Strategy.

The Fourth National Report (MERF, 2009) indicated that progress had been made in some areas, including: a framework law on the environment and its implementing texts; adoption of a specific law on the conservation and use of biodiversity and its implementing regulations; development of a legal framework for a national system of protected areas; adoption of the Forest Code; integration of recommendations on biodiversity in sectoral legislation relating to, inter alia, mining, agriculture, livestock, fisheries and water resources; and the preparation of sectoral guidelines on impact studies on the environment. The Fifth National Report (MERF 2014) stated that the development of two new laws on land code and federal processes was started in 2013. These are intended to provide structure to the governance of land. Details of national legislation that affects wildlife in Togo are given in Section 5.5.22 of the Supplementary Information.

5.6 Issues and challenges

5.6.1 Colonial legacy

All countries in the region have laws relating to wildlife and the environment that were passed during colonial times, or which are based upon them. Perhaps more significantly, most countries have legal systems that were established by colonial powers. The single exception is Liberia, which has been an independent State since the middle of the 19th Century. Such a legacy has had a profound effect on the nature of legislation across West and Central Africa, how it varies from place to place, and how it is (or is not) implemented. At the most fundamental level, in some cases independence resulted in national boundaries that differed from legal jurisdictions that had applied during colonial times. For example, *Afrique Occidentale Française* (French West Africa) was a federation of eight colonies that became the independent countries now called Benin, Burkina Faso, Côte d'Ivoire, Guinea, Mali, Mauritania, Niger and Senegal between 1 August and 28 November 1960. Jurisdictions that were in place in Nigeria soon after independence mean that there are Wildlife Acts from the 1960s that are in force in parts of the country, but not all of it (see Section 5.5.18).

The pre-independence legislation was shaped by attitudes and behaviours of colonial powers towards wildlife and the environment and this period typically saw laws and regulations that were concerned with providing the rules and mechanisms for hunting and the establishment of some protected areas. In Côte d'Ivoire, for example, there was a colonial emphasis on creating protected areas and this continued after independence (see Kone 2013), arguably at the expense of alternative approaches that would have provided other effective support for biodiversity. As a result, the country's National Biodiversity Strategy and Action Plan identified the need to harmonize existing legislation, develop new legal texts and incorporate customary laws and practices into the legal framework (Republique de Côte d'Ivoire, 2009). Virtually all countries have legislation that is rooted in colonial laws that were concerned with regulating hunting. The emphasis of much of this legislation is on the practical considerations of hunting, such as where hunting may take place and when and what fees should be paid. There is a significant body of legislation throughout the region governing hunting guides and the use of weapons. There is some consideration of open and closed seasons (e.g. Mali, Mauritania, Nigeria and Senegal), but how these relate to the emerging importance given to customary rights is not clear. Furthermore, obtaining up-to-date lists of protected species (and in some countries, partially protected species) is difficult and thus it is not possible to be certain that there is legal provision for the range of threatened species that require such protection.

5.6.2 War and civil strife

There is a strong relationship between areas of global biodiversity importance and warfare (Hanson *et al.* 2009). Much of the region has been subject to armed conflict (Chapter 4) and the scale, intensity and duration of this conflict seems to have influenced the importance given to environmental legislation. At the most extreme, Sierra Leone's National Biodiversity Strategy and Action Plan recognized that the country needed to establish appropriate and comprehensive post-conflict legislation for the conservation of biodiversity (The Republic of Sierra Leone, 2003). Elsewhere, Liberia has seen an increase in new and the revision of old wildlife-related legislation (e.g. Environment Protection Law of 2002, National Forestry Reform Law of 2006) since the last days of its civil war. Indeed, the reform of the forestry sector was stimulated by the UN Security Council placing an embargo on Liberia's natural resources sectors from 2001 in the absence of compliance with international standards (notably 'conflict timber': see Altman *et al*. 2012). Nonetheless, a national Wildlife Law that was reported as in draft in 2010 (Anon 2010b) is not yet in force.

Milburn (2012) suggested that after the cessation of hostilities, there is much to be gained by incorporating the environment into the peace-building process and suggests that conservation-driven programmes that engage local communities can offer opportunities for restructuring and enhancing governance that are not possible through formal (inter-)governmental processes alone. He cites work in the Virunga landscape and Kahuzi-Biega National Park as examples.

5.6.3 Customary rights and law

Traditional rights and practices, many of which are enshrined in customary laws, are poorly represented in legislation that derives from, or is based on, European legal systems from the colonial period. Customary laws affect wildlife because they define the traditional relationship of the local population to its livelihood resources (land, water, vegetation and animals). Before the colonial period, relations between local forest communities and the natural spaces that make up their natural habitats generally hinged on four systems of access and ownership (Diaw & Oyono 1998): 1) collective ownership of all spaces; 2) individual control of farmlands, water and some tree species; 3) free access to some major rivers, arid zones, roads and special products; 4) limited access to a common pool of resources like wildlife, forest products, non-timber forest products (NTFPs), some streams and natural forests.

These systems of access comprised a series of collective and individual customary rights that were based on: a) genealogical rights based on *le droit de hache* (wood-chopping rights) or being the first occupant; b) productive rights integrating human labour in resources; c) rights of succession and inheritance, guaranteeing the continuity of collective rights over individual rights; and d) allocation rights granted to foreigners adopted by the local community. In other words, African customary law is originally communal or "usufructuary", meaning that land rights are not vested in any individual but in some corporate group such as a clan, community or family (Assembe-Wondo 2013).

The expression of customary rights was changed profoundly by the arrival and imposition of colonial legal systems that

Table 5.4 Countries subject to a recommendation to suspend trade on any animal or plant species 09/09/2013 (most recent data available). Common names from IUCN Red List where available.

Country	Notification	Basis	Scope	Valid from
Benin	No. 2013/013 (02/05/2013)	Significant trade	*Pandinus imperator* Emperor Scorpion	2 May 2013
Cameroon	No. 2013/013 (02/05/2013)	Significant trade	*Hippopotamus amphibius* Common Hippopotamus	7 September 2012
Côte d'Ivoire	No. 2015/012 (19/03/2015) No. 2013/013 (02/05/2013)	National Ivory Action Plan Significant trade	*Pericopsis elata* African Teak	7 September 2012
DRC	No. 2015/012 (19/03/2015) No. 2013/013 (02/05/2013)	National Ivory Action Plan Significant trade	All trade *Poicephalus robustus* Brown-headed Parrot *Stigmochelys* (*Geochelone*) *pardalis* Leopard Tortoise	19 March 2015 9 July 2001
Equatorial Guinea	No. 2013/013 (02/05/2013)	Significant trade	*Psittacus erithacus* Grey parrot *Chamaeleo* (*Trioceros*) *feae* Bioko montane chameleon *Prunus africana* Red stinkwood	22 August 2008 7 September 2012 3 February 2009
Guinea	No. 2013/013 (02/05/2013) No. 2013/017 (16/05/2013)	Significant trade Compliance & enforcement	*Balearica pavonina* Black Crowned-crane All commercial trade	2 May 2013 16 May 2013
Mali	No. 2013/013 (02/05/2013)	Significant trade	*Poicephalus robustus* Brown-headed Parrot *Uromastyx dispar* Sudan Uromastyx	9 July 2001 22 August 2008
Mauritania	No. 2004/055 (30/07/2004)	National legislation	All commercial trade	30 July 2004
Niger	No. 2013/013 (02/05/2013)	Significant trade	*Chamaeleo africanus* Sahel Chameleon	30 July 2004
Nigeria	No. 2015/014 (19/03/2015)	National Ivory Action Plan	All trade	19 March 2015
Togo	No. 2013/013 (02/05/2013) No. 2013/013 (02/05/2013)	Significant trade Significant trade	*Poicephalus robustus* Brown-headed Parrot *Pandinus imperator* Emperor Scorpion	9 July 2001 2 May 2013

were based on individuals and were seen as profit-driven (Kouassigan 1982). The European colonists made land and natural resources the property of the State under a highly centralized system of resource control (Inambdar *et al*. 1999). Colonial administrations tried to adapt written law to the existing, complex customary regimes and to modify traditional ownership rights. In West and Central African countries, laws governing access and use of forests, wildlife and other natural resources were passed in 1960s and these legal frameworks have changed relatively little since then (Assembe-Mvondo 2013). Under such codes, although communities cannot assert ownership rights, they are in principle permitted user rights for subsistence only in all types of forest other than certain classifications of protected area. Commercial exploitation of forest products (including wildlife) harvested under those traditional user rights is not permitted (Egbe 2002).

At present, Chad and Ghana are the only two African countries that codify customary law in their Constitutions (Cuskelly 2011). In Chad, the provision for customary and traditional rules are simply that unless they are codified in legislation, they are applicable only in the communities where they are recognized and that customs contrary to the public order or those which promote inequality between citizens are forbidden. Some countries have identified the need to harmonize these two systems, or at least reduce the conflict between them (e.g. Burkina Faso and Côte d'Ivoire), and others make reference to customary rights but make little accommodation for them in their legislation and simply state when and how they may have legal relevance. For example, fisheries legislation in many countries refers to customary use, but there is little evidence that this encompasses the full extent of such rights. Typically, the codification in national law is to control customary use and state that it prevails where there is no rule of written law (e.g. Niger's Framework Law on the Environment and Cameroon's Law 96-12 (*Loi n° 96-12 portant loi-cadre relative à la gestion de l'environnement*).

However, there is ample reference to customary rights and traditions elsewhere in the region's wildlife legislation. For example, in Gabon, Act No. 003/2007 (*Loi n° 003/2007 relative aux parcs nationaux*) provided for the customary rights of local communities to be taken into account in the creation, management and downgrading of National Parks. There is increasing evidence that such cursory consideration of customary rights is unhelpful for wildlife conservation. Nguiffo & Talla (2010) considered that the effectiveness of Cameroon's wildlife-related legislation is severely compromized because it does not take into account local customs and uses, and Ingram (2014) provided a discussion of the current impact of the legal system on rural community livelihoods in the country. Temudo (2012) has gone even further in suggesting that external identification of a conservation problem (the need to protect forests in the Cubucaré peninsula, Guinea-Bissau) and the steps taken to address it (including legislation to create the Cantanhez National Park) have not adequately taken into account traditional practices of local communities. In essence, Temudo (2012) concluded that land insecurity (through a fear of losing land to the national park and through a new land law) led to a rapid division of forested land and its subsequent use for growing commercial crops.

5.6.4 Compliance with international agreements

Four of the international agreements covered in Section 5.3 are not legally binding. They require reporting and action towards agreed targets, such as the Convention on Biological Diversity's Aichi Targets or in pursuit of agreed goals, such as recognition and protection of World Heritage Sites and

Ramsar Sites. The status of reporting to these conventions is described in Section 5.3. In contrast, the Convention on International Trade in Endangered Species of Wild Fauna and Flora is a legally binding convention requiring each country to take particular actions.

All countries in the region have signed and ratified CITES (Section 5.3). This is a prelude to developing appropriate national legislation that provides for the convention to be implemented. The state of appropriate domestic legislation across all 22 countries is variable. CITES Notification to the Parties No. 12/036 (of 18 April 2012: see www.cites.org/eng/notif/2012/E036.pdf) describes the status of national legislation that is designed to support CITES. It states that:

- Four countries have legislation that is believed generally to meet the requirements for implementation of CITES (Category 1): Cameroon, Democratic Republic of the Congo, Equatorial Guinea and Senegal.
- Eight countries have legislation that is believed generally not to meet all of the requirements for the implementation of CITES (Category 2): Benin, Burkina Faso, Congo, Gabon, Gambia, Guinea, Mali and Togo.
- Six countries have legislation that is believed generally not to meet the requirements for the implementation of CITES (Category 3): Central African Republic, Chad, Côte d'Ivoire, Ghana, Niger and Sierra Leone.
- Four countries in the region are priorities for the development of appropriate legislation: Guinea-Bissau, Liberia, Mauritania, and Nigeria.

Two countries from the region are presently the subject of notifications recommending the suspension of all trade, namely Democratic Republic of Congo and Nigeria, based on the failure of these countries to submit a formal National Ivory Action Plan (NIAP). A further nine countries are the subject of notifications recommending the suspension of trade in one or more species.

5.6.5 Legal responsibility for wildlife

The collation of the information in this section and the Supplementary Information suggests that there is likely to be a lack of clarity in where responsibility for actions relating to wildlife management lies. As noted in Section 5.5.12 above, this has been identified as an issue for government agencies in Guinea (USAID-Guinea 2008). The extent to which this is an issue in other countries is not clear, but the information presented in this chapter and the legal texts described in the Supplementary Information suggest that other countries may also have a lack of clarity. For example, some agencies described in legislation may no longer exist as the result of reorganization either within ministries, or across government more widely, and assessing where responsibility now lies is difficult without extensive analysis. The part of government with responsibility for submitting national reports to CBD has also changed in some countries, even fairly recently. Again, how this relates to management of wildlife and its habitats is not clear. Finally, responsibility may be split where there are different agencies involved with terrestrial and freshwater habitats, and furthermore, with income generating activities, such as fishing, forestry and hunting. A list of agencies in each country that have responsibility for aspects of CITES and CBD that relate to wildlife management is given in the Supplementary Information (Table S5.1).

5.7 Conclusions

The existing legislation that relates to wildlife and wider biodiversity is inadequate, although the degree to which it is considered to be poor varies from country to country. The weakness of many national legal frameworks also hinders their ability to fulfil their obligations to the international agreements that they have signed. They also have little potential to respond to emerging threats to wildlife that may require a broad co-ordinated legal response. For example, Ogada (2014) reports that although it is illegal to hunt wildlife using poisons in 83% of African countries, the regulations governing pesticides are inadequate, let alone their enforcement (and see Section 4.2.13). The States in West and Central Africa have been independent for little more than 50 years at most and were born with legal structures that have evolved over centuries in Europe and which were designed for a very different relationship with wildlife and the environment. In the 50 or so years since independence many of these countries have witnessed significant upheaval.

Armed ranger patrols in the Yankari Game Reserve, Nigeria.
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6. Do protected areas have a role in mitigating declines of wildlife?

6.1 Introduction

Protected areas are seen as crucial to the conservation of species and habitats in West and Central Africa and much is expected of them (Chapter 3). It is, however, difficult to determine their effectiveness in delivering biodiversity benefits because of limited data availability that would allow appropriate and meaningful comparisons (see below). Despite this difficulty, it is critical to assess whether protected areas can have a useful role in conserving species and their habitats because the resources for conservation in the region are very limited and it is vital to know whether protected areas can contribute to conservation and, if so, under what circumstances. Consequently, it is important to understand whether or not these legally designated areas have made a difference to the conservation of biodiversity in West and Central Africa and what role they could play in the future. This is examined here by reviewing: a) how well protected areas in the region cover biodiversity; b) ecological indicators of protected area performance, such as information on wildlife population change or change in habitat in individual protected areas; and c) assessments of management effectiveness. This information will help to inform consideration of whether protected areas are a wise investment for conservation and, if so, under what conditions: for example, which places and/or what issues need to be addressed? Furthermore, it should provide lessons on protected area management, species and habitats and suggest whether the high hopes that policy makers and scientists have for protected areas are realistic and if they are, in what context.

6.2 The role of protected areas

There are more and more demands placed on protected areas, such that now they are exected to deliver benefits to local comunites and national economies, as well as their more traditional role in conserving wildlife and habitats (Watson *et al*. 2014). As noted in Chapter 3, legally designated protected areas are widely considered to be a vital intervention that will lead to biodiversity conservation (e.g. Bruner *et al*. 2001). Globally, the status of poorly protected mammals, birds and amphibians (i.e. those species with less than half of their important sites protected) is declining at twice the rate of well-protected species (those with more than half of their important sites protected) (Butchart *et al*. 2012). There has been a significant increase in both the number and extent of protected areas in recent decades (Jenkins & Joppa 2009, Bertzky *et al*. 2012). Many are predicated on the removal of human activities that are seen as damaging (see, for example, Kalamandeen & Gillson 2007) and, therefore, the legal basis of many protected areas describes restrictions on such human activities and the processes for obtaining permissions (see Chapter 5 – detailed legal notes in Supplementary Information). The IUCN Protected Area Management Categories most closely associated with nature conservation are those that have the lowest levels of modification by humans (Dudley 2008, Carranza *et al*. 2014). This basis is set within the context of people living in many of these areas, or having legitimate historical claims to the land or use rights, for a long time (McNeely 1993). For example, as many as 85% of the world's protected areas are inhabited by indigenous peoples and most remaining forested areas are either claimed or owned by such groups through statutory or customary rights (Hayes 2006). There is an increasing realization that existing legal instruments and institutional approaches to land-based conservation (including protected areas) do not take into account customary rights and traditional mechanisms for determining land tenure (see Chapter 5). Within the area covered by the Situation Analysis, USAID's Land Tenure and Property Rights Division has produced profiles on these issues for 14 countries in West and Central Africa: Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Democratic Republic of Congo, Ghana, Guinea, Liberia, Niger, Nigeria, Mali, Senegal, Sierra Leone (see usaidlandtenure.net/country-profiles/west-africa and usaidlandtenure.net/country-profiles/east-africa).

6.2.1 Protected areas and international commitments

The importance given to protected areas as an approach to biodiversity conservation is encapsulated in the Convention on Biological Diversity, which all countries covered by this analysis are Party to (see Chapter 5). Article 8 of the Convention (source: http://www.cbd.int/protected/pacbd/default.shtml) encourages Parties to:

- establish a system of protected areas or areas where special measures need to be taken to conserve biological diversity;
- develop, where necessary, guidelines for the selection, establishment and management of protected areas or areas where special measures need to be taken to conserve biological diversity;
- regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use;
- promote environmentally sound and sustainable development in areas adjacent to protected areas with a view to furthering protection of these areas; and
- co-operate in providing financial and other support for in-situ conservation, particularly to developing countries.

In support of this Article, the CBD adopted a Programme of Work on Protected Areas (PoWPA: www.cbd.int/protected/overview/default.shtml) in 2004 (see COP 7 Decision VII/28: Protected areas (Articles 8 (a) to (e)) www.cbd.int/convention/results/?id=7765&l0=PA) that was intended to

promote the establishment and maintenance of protected areas that contribute to biodiversity conservation in a range of ways (see the Decision above for the full text of the objective). In 2010, Parties to the CBD adopted, as part of the CBD Strategic Plan 2011–2020, a target to, among others, set aside at least 17% of terrestrial and inlands waters for conservation (see Box 6.1). Parties to the CBD elaborate their national protected area commitments in Action Plans under PoWPA and National Biodiversity Strategies and Action Plans. It is worth emphasizing that the achievement of several other Aichi targets, especially Target 12, is particularly linked with Target 11.

6.2.2 General issues in determining the value of protected areas

CBD's diverse work programme and Aichi Target 11 indicate the complexity of measuring the contribution that protected areas make towards the biodiversity conservation roles expected of them. Indeed, Woodley *et al*. (2012) discuss each significant clause in Target 11. Determining the effectiveness of protected areas (rather than how many there are and of what size, and what biodiversity they contain when designated) is a significant challenge. There are few adequately representative analyses that include both before/after designation and inside/outside protected area boundary comparisons upon which clear conclusions can be drawn about the role of protected area designation in safeguarding wildlife populations and habitat integrity. What would be required to inform assessment of the effectiveness of protected area status are analyses of change over time, such as that carried out by Clark *et al*. (2013) for South Asia's protected areas or Western *et al*. (2009) in Kenya. The former analysis concluded that designation had not reduced habitat conversion inside protected areas when compared with land outside; the latter reported that wildlife populations in national parks and reserves had declined at a rate similar to non-protected areas and country-wide trends. Furthermore, Gaston *et al*. (2008) point out that the situation is constantly changing and that gathering reliable and comparable data for meaningful assessments is a serious issue.

Current efforts to measure the effectiveness of protected areas are, therefore, largely centred on assessments of the management structure and processes in place (e.g. Leverington *et al*. 2010) and there are a range of approaches for assessing management effectiveness (see Leveington *et al*. 2008 for a description). There is, however, a debate about the approaches and methods for such qualitative measures (e.g. Hockings *et al*. 2009, Stoll-Kleemann 2010) and what can be reliably and independently inferred or deduced from them in terms of biodiversity outcomes (see Joppa *et al*. 2008, Craigie *et al*. 2010).

Despite all of these issues, it is clear that protected areas have not been immune from the substantial declines of wildlife across West and Central Africa. Indeed, they have contributed to the rationale for this Situation Analysis (see Chapter 1). The difficulties in documenting and then setting in context why the status of habitats and/or species has changed inside protected areas is hugely problematic. Geldman *et al*. (2013) conclude that whilst there is evidence that protected areas do lead to benefits for biodiversity conservation, there is "a limited evidence base, and weak understanding of the conditions under which PAs succeed or fail to deliver conservation outcomes". For example, whilst Carey *et al*. (2000) suggest that significant threats to protected areas can be divided into four categories (Box 6.2), it is not necessary here to analyse the effectiveness of each protected area in West Africa to withstand each of these pressures. Rather, it is the survival prospects of biodiversity, especially that which is most under pressure that is of concern.

Here, information on the performance of protected areas is established from two sources: a) published ecological indicators of performance, and b) assessments of management effectiveness. This is examined following an

Box 6.1 The Convention on Biological Diversity (CBD) Aichi Targets 11 and 12

Target 11: By 2020, at least 17 per cent of terrestrial and inland water areas and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascape.

Target 12: By 2020, the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

Source: CBD Strategic Plan 2011–2020 www.cbd.int/sp/targets/rationale/target-11/

Box 6.2 Category of significant threats to protected areas (from Carey *et al*. 2000)

- Individual elements of the protected area removed without alteration to the overall structure (e.g. animal species used as bushmeat, exotic plants or over-fishing of specific species);
- Overall impoverishment of the ecology of the protected area (e.g. through encroachment, long-term air or water pollution damage or persistent poaching pressure);
- Major conversion and degradation (e.g. through removal of vegetation cover or coral, driving roads through the protected area, major settlements or mining); and
- Isolation of protected areas by major changes of use in surrounding land or water.

initial review of how well the existing protected areas network covers biodiversity.

6.3 How well does the existing protected areas network cover biodiversity?

National protected areas currently cover around 9% and 10% of terrestrial area in West Africa and Central Africa, respectively (Table 3.1), which is considerably short of the internationally agreed 17% target (although this does increase when internationally designated areas are included to 12.0% and 12.6%, respectively). At the national level, differences are even starker. Analyses comparing existing terrestrial protected area coverage with national-level targets (using the 17% global target where individual country targets were not available; Figure 6.1) shows that while half of the 22 countries in the region have exceeded their national-level commitments (generally equating to the 17% threshold), many still have a long way to go (Butchart *et al.* in press). Coincidentally, generally speaking, countries that have performed the worst in conserving their megafauna (especially Mauritania, Gambia and Mali; Table 2.12) also fare worst in terms of meeting their protected area targets. Although these results need to be interpreted with caution, given both analytical constraints when combining GIS layers and well-established caveats concerning percentage-based targets, they do help inform the performance of countries in achieving their stated coverage targets.

While attention on Target 11 tends to be focused on the percentage-based element as the primary metric of success, the target explicitly also calls for these protected areas to be "especially areas of particular importance for biodiversity…". Results presented earlier in the study (Chapter 3) suggest that many sites important for biodiversity remain unprotected: 37% of Alliance for Zero Extinction sites have no protection, and 38% of Important Bird and Biodiversity Areas are not formally protected (Table 6.1). Protected area coverage of Ramsar sites is particularly poor, with only two-fifths having any formal protection.

6.4 Ecological performance

One role of protected areas is to conserve biodiversity. How effectively they do this depends on a wide range of factors, some ecological and some managerial. Indeed, whether or not protected areas have any prospect of conserving key elements of biodiversity may be determined by their size and configuration upon designation. For example, as Joppa *et al.* (2008) report, protected areas of West Africa are typically small. Detailed scrutiny of the World Database on Protected Areas (August 2014 release) confirms this difference between the two parts of the region. There are, however, 77 protected areas (of all habitat types *cf* Joppa *et al.* 2008) of IUCN management category I–IV that are larger than 200 km^2 in West Africa and 71 in Central Africa (Table 6.2).

Table 6.1 Protected area coverage of sites identified for their biodiversity importance, either inter-governmental (World Heritage, Ramsar, Biosphere reserves) or NGO (IBA and AZE). Protected taken to include full or partial protection (see Chapter 3 for details).

Site category	Number of sites (% protected)
Inter-governmental sites	
World Heritage	17 (100%)
Biosphere Reserves	32 (75%)
Ramsar	137 (42%)
Other international (NGO)	
Alliance for Zero Extinction	16 (63%)
Important Bird and Biodiversity Areas	321 (62%)

Figure 6.1 Protected area coverage per country compared with national targets for terrestrial coverage (source: Butchart *et al.* in press; note that this study also includes sites identified as part of international processes, except Biosphere Reserves).

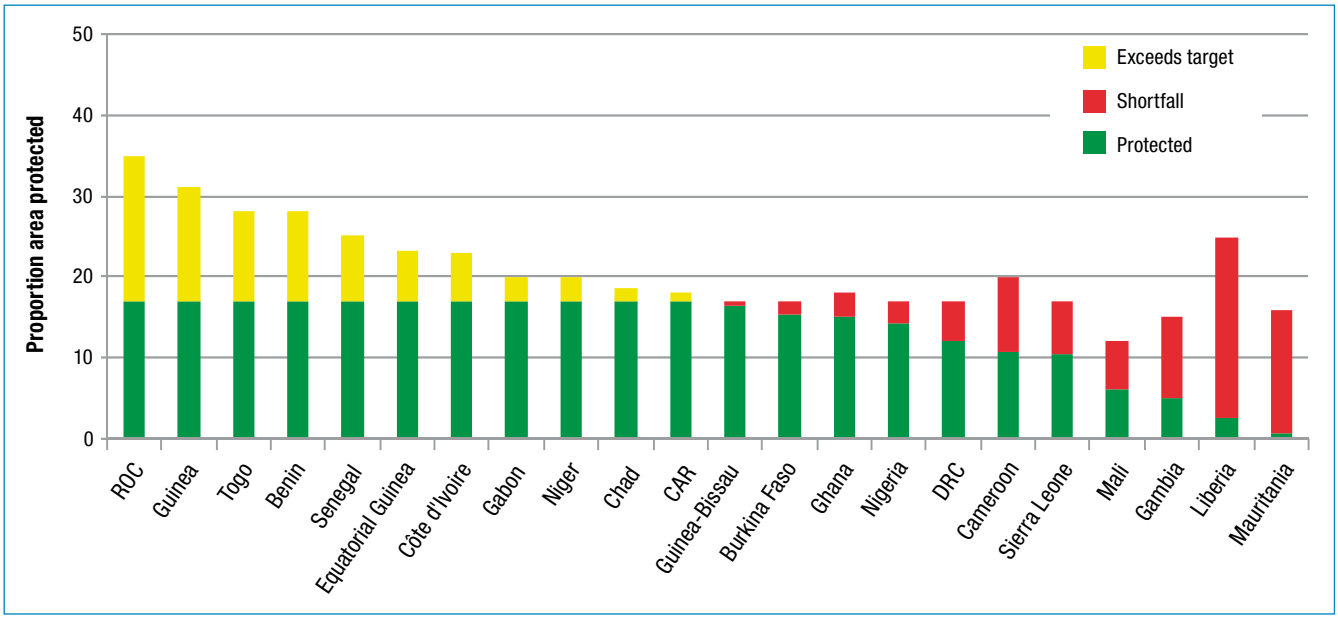


Table 6.2 Number of protected areas of various size classes and management categories in West and Central Africa. (Source: World Database on Protected Areas, August 2014 release).

		West Africa			Central Africa			Whole region	
	Size (km²)	**No.**	**Total Extent (km²)**	**Mean Area (km²)**	**No.**	**Total Extent (km²)**	**Mean Area (km²)**	**Total number**	**Total area (km²)**
All designated PAs	<50	401	6,232	16 ± 14	11	199	18 ± 15	412	6,431
	50–200	251	28,249	113 ± 43	14	1,489	106 ± 52	265	29,738
	>200	250	510,975	2,044 ± 7,664	135	537,319	3,980 ± 8,076	385	1,048,294
	Size not reported	1,111			13			1,124	
PAs of category I-IV	<50	26	192	8 ± 8	4	118	30 ± 15	30	311
	50–200	23	2,826	123 ± 50	7	685	98 ± 53	30	3,512
	>200	77	361,969	4701 ± 13,329	71	365,707	5,151 ± 10,159	148	727,676
	Size not reported				1			1	

The key issue for this Situation Analysis is whether or not protected areas of West and Central Africa, as they are currently constituted and governed, are capable of safeguarding populations of medium- to large-sized vertebrates. There are relatively few quantitative assessments of change in biodiversity in West and Central Africa's protected areas. Those that do exist report either change in vegetation cover (natural habitat) or the status of vertebrate species, typically mammals.

Protected areas lie within wider landscapes to which they are, or have been, ecologically connected. They are also established by, and managed within, governance and socio-economic systems that operate at greater spatial scales than any single site. These broader contextual factors often place significant constraints on the ability of any protected area management structure to deliver the conservation benefits it is legally obliged to. An assessment of African protected areas (see below) carried out in the early 2000s suggested that 43% of them were large enough to accommodate viable populations of all species and seasonal movements for one-third of them. However, the local context is crucial. Joppa *et al*. (2008) reported important differences in the extent and landscape of forest cover between West and Central African protected areas, although their regions were defined biogeographically rather than politically. They do caution against simplistic interpretation of measures of natural forest cover as indicators of protected area effectiveness, suggesting at least two confounding factors. First is the 'protection' afforded by simply being remote and subject to relatively little human pressure (*de facto* protection). Second is that the sharp transition in vegetation at the protected area boundary is not, on its own, evidence of the effectiveness of legal processes (*de jure* protection). Importantly, they state that protected areas do appear to afford protection when compared with unprotected areas inasmuch as they contain more forested land.

Naughton-Treves *et al*. (2005) reported at the time of their review that there were few studies looking at deforestation rates in African protected areas and none from West or Central Africa. This does not appear to have changed. Although not looking explicitly at protected areas, Ernst *et al*. (2012) report a doubling of gross annual deforestation rates in the Congo Basin from 0.13% during 1990–2000 to 0.26% in 2000–2005. This latter figure represents the loss of 4,800 km² per year. In encouraging contrast, Rogers (2011) concluded that the annual net deforestation rate for 87 protected areas in Central Africa was 0.05%. Five of the 87 protected areas considered in the study suffered no deforestation. Cameroon's protected areas had significantly higher levels of deforestation than the other countries in Central Africa. Deforestation rates up to 10 km beyond the protected area boundary were not significantly different from those inside protected areas. Furthermore, protected areas that were contiguous with other protected

Park boundary sign for Nouabalé-Ndoki National Park, Republic of Congo. © WCS / Fiona Maisels

areas had significantly lower levels of deforestation than isolated protected areas. Mayaux *et al*. (2013) drew three notable conclusions from their analysis of change in African rainforest between 1990 and 2010. First, that the Congo Basin had a lower deforestation rate than other tropical forest regions of the world. Second, that for much of West Africa, there (currently) appears to be little substantial conversion of forest into agricultural plantations. Third, the pace of deforestation had slowed since 2000, although is higher in West Africa than in Central Africa, perhaps reflecting the contagion effect of habitat loss (see Boakes *et al*. 2010) (and see Chapter 4).

As noted above there are no broad-scale studies designed to compare species populations before and after designation, or inside and outside protected areas in West and Central Africa. One of the most cited recent papers is that of Craigie *et al*. (2010), who used "time-series data" to infer trends for 69 species of large mammals from 78 protected areas in western, eastern and southern Africa. The data were gathered from a range of sources that contained population information at (at least) two points in time. The authors concluded that there has been an 85% decline in large mammal populations in western African protected areas between 1970 and 2002. However, interpreting the results of this paper for protected areas in West Africa requires caution for three reasons. First, sample size is small: the study includes only 11 protected areas from five countries in the current study region; only four of the protected areas are named, the rest remaining bounded by confidentiality clauses and it is therefore not possible to know the characteristics of the protected areas analysed and how indicative they may be of other areas in the region. Second, the confidentiality means that it is not clear for the majority of West African protected areas what time period the analysed data relate to. The supplementary data to Craigie *et al*. (2010) shows that the shortest time span of data from the non-confidential sites was at least three years and the longest 45 years, with the most recent data set concluding in 2007 and the oldest 1973. Finally, there are inconsistencies in the basic description of the sites and countries. The text says that the study is of 78 protected areas, but Figure 2 states that there were 11 in western, 35 in southern and 43 in eastern, making 89 in total. Furthermore, although Cameroon is absent from the countries in Figure 2, Waza National Park is listed in the supplementary data.

Scholte (2011) suggests that whilst the Craigie *et al*. (2010) study is a step forward in quantifying declines across Africa, it "falls short in its sampling and analysis", to the extent that conclusions cannot be drawn for western Africa. The reasons for this include: selection of protected areas (e.g. count data available that have not been included); appropriateness of minimum length of time series; and the appropriateness of 'reference dates'. However, there is a small, but increasing, number of studies that attempt to quantify changes in species populations over time within individual protected areas (see Table 6.4), as well as assessments of range-wide population declines (discussed further briefly below). Nonetheless, care is necessary when drawing conclusions about overall patterns and processes, because of limited data and a complex mosaic of drivers and contexts. The ongoing AfroBioDrivers project, which aims to study the patterns and processes of change in the status of the populations of large mammals, and focused on West and Central Africa, should contribute to a better understanding of change over time.

Elephant populations in the West African savannas were considered to be largely restricted to protected areas by the late 1990s (Barnes 1999) and even in these areas they have undergone massive declines (Bouché *et al*. 2011; Table 6.3; and see Chapter 2). Differences in survey area and design make precise estimates of change in each protected area difficult to document conclusively, but the overall trends are clear. In West Africa, W-Arly-Pendjari stands out both in terms of population size and trend, with numbers holding up well between 1980–3 and 2003–7 (Bouché *et al*. 2011). It is possible that this may have been due, in part, to immigration from surrounding areas.

In Central Africa, Maisels *et al*. (2013) reported that in early 2012 several hundred elephants were killed in Bouba Ndjida National Park in Cameroon, an incident that contributed to the World Conservation Congress motion that led to this Situation Analysis. These authors demonstrated a widespread decline amongst forest elephants such that the population is now 10% of its potential size and occupies 25% of its potential geographical range. The factors most

Table 6.3 Population estimates for African Elephant *Loxodonta africana* in West and Central African protected areas. Central Africa estimates are for the periods 1985–91 and 2005–10 and West Africa for the periods 1980–83 and 2003–07 (source: Bouché *et al*. 2011). 95% CI = 95% Confidence Interval (where possible).

Protected area	Time period			
Central Africa	1985–91		2005–10	
	Estimate	95% CI	Estimate	95% CI
Waza	1,071		246	
Zakouma	1,040		542	
Bamingui Bangoran	1,607	914	708	406
Manovo Gounda	2,701	887	74	71
Total	**6,419**	**1,274**	**1,570**	**412**
West Africa	1980–83		2003–07	
	Estimate	95% CI	Estimate	95% CI
Mole	589	486	395	
Gourma	550		344	
Niokolo	50		1	9
Yankari	280		348	
Nazinga	230	280	548	
Po	112	93	64	
Arly Singou	2,335	1074	2,541	
Pendjari	826	480	869	
W	1,331	728	1,094	
Comoé	1,250	250	10	10
Kainji	1,500		0	
Mouhoun	150	180	22	56
Bontioli	100		20	
Total	**9,303**	**1,527**	**6,256**	**58**

Table 6.4 Examples of changes in wildlife abundance over time within selected protected areas (temporal) or comparisons between inside and outside protected areas. Information from site-specific studies only, i.e. does not include assessments of species status throughout a large part of the geographic range, such as for Lion (Henschel *et al.* 2014) and African Elephant (Bouché *et al.* 2011 and Maisels *et al.* 2013), which are treated in the text. *= Included on the "World Heritage in Danger List".

Country	Protected area	Species	Population information	Reference	Comments
Temporal					
DRC	Okapi Wildlife Reserve*	Okapi *Okapia johnstoni*	43% decline 1993/95–2005/07	Hart *et al.* (2008)	
Chad	Zakouma National Park	African Buffalo *Syncerus caffer*	202% increase 2005–2014	Antonínová *et al.* (2014)	Total count aerial survey
		Giraffe *Giraffa camelopardalis antiquorum*	320% increase 2005–2014	Antonínová *et al.* (2014)	
		Roan Antelope *Hippotragus equinus*	284% increase 2005–2014	Antonínová *et al.* (2014)	
		Hartebeest *Alcelaphus buselaphus lelwel*	231% increase 2005–2014	Antonínová *et al.* (2014)	
		Tiang *Damaliscus lunatus tiang*	18% decrease 2005–2014	Antonínová *et al.* (2014)	
		Waterbuck *Kobus ellipsiprymnus defassa*	553% increase 2005–2014	Antonínová *et al.* (2014)	
Côte d'Ivoire	Taï National Park	Pygmy Hippopotamus *Choeropsis liberiensis*	33% decline 1977–2004	Hoppe-Dominik *et al.* (2011)	Transect-based dung encounter rates
		Bongo *Tragelaphus eurycerus*	64% decline 1977–2004	Hoppe-Dominik *et al.* (2011)	
	Comoé National Park*	Roan Antelope *Hippotragus equinus*	70% decline 1978–1998	Fischer & Lindsenmaier (2001)	
		Western Kob *Kobus kob kob*	91% decline 1978–1998	Fischer & Lindsenmaier (2001)	
		Western Hartebeest *Alcelaphus buselaphus major*	60% decline 1978–1998	Fischer & Lindsenmaier (2001)	
Cameroon	Waza National Park	Western Kob *Kobus kob kob*	2/3 decline 2004–2012	Scholte (in press)	
		Korrigum *Damaliscus lunatus korrigum*	Halved 2004–2012	Scholte (in press)	
		Roan *Hippotragus equinus*	Long-term decline	Scholte (in press)	
		Red-fronted Gazelle *Eudorcas rufifrons*	Now scarce	Scholte (in press)	
		Bohor Reedbuck *Redunca redunca redunca*	No longer counted	Scholte (in press)	
CAR	Northern CAR including: a) Bamingui-Bangoran and b) Manovo Gounda Saint Floris* National Parks; c) Vassako Bolo Wildlife Reserve; and d) hunting sectors and community hunting areas	African Buffalo *Syncerus caffer*	94% decline 1978–2010	Bouché *et al.* (2012)	Three aerial surveys reported (1978, 2005 and 2010). Sampling changed in 2010 and, therefore, robustness of decline rates uncertain.
		Roan Antelope *Hippotragus equinus*	93% decline 1978–2010	Bouché *et al.* (2012)	
		Lelwel Hartebeest *Alcelaphus buselaphus lelwel*	91% decline 1978–2010	Bouché *et al.* (2012)	
		Tiang *Damaliscus lunatus tiang*	extirpated before 2005[1]	Bouché *et al.* (2012)	
		Western Kob *Kobus kob kob*	87% decline 1978–2010	Bouché *et al.* (2012)	
Guinea	Haut Niger National Park	Western Hartebeest *Alcelaphus buselaphus major*	135% increase 1997–2002	Brugière *et al.* (2005)	Comparison of encounter rates because methods and areas surveyed in 1997 and 2002 were different
		Yellow-backed Duiker *Cephalophus silvicultor*	336% increase 1997–2002	Brugière *et al.* (2005)	
		Western Kob *Kobus kob kob*	extirpated before 2002	Brugière *et al.* (2005)	
		African Buffalo *Syncerus caffer*	100% increase 1997–2002	Brugière *et al.* (2005)	
Spatial					
ROC	Ndoki-Likouala Landscape (Nouabalé-Ndoke National Park and Lac Télé Community Reserve)	Western Gorilla *Gorilla gorilla*	Density increased outside boundary up to 100 km	Stokes *et al.* (2010)	
		Chimpanzee *Pan troglodytes*	Density decreased rapidly outside boundary up to 40 km	Stokes *et al.* (2010)	

[1] Present during the surveys reported on by Chardonnet (2004)

associated with declines are all related to protection and enforcement, and protected areas (and surrounding Forest Stewardship Council-certified logging concessions) hold the most important populations in Gabon (which now is home to about half of all forest elephants), Congo, Central African Republic, Cameroon and Democratic Republic of Congo (Maisels *et al*. 2013).

Henschel *et al*. (2014) found Lions in only four protected areas out of 21 surveyed: Niokolo-Koba National Park in Senegal, the tri-national W-Arly-Pendjari Complex in Benin, Burkina Faso and Niger, Kainji Lake National Park in Nigeria, and a few animals in Yankari Game Reserve in Nigeria. Protected areas retaining Lions were larger than protected areas without Lions and had significantly higher management budgets. Indeed, WAP, which holds the largest surviving population, consistently received among the highest scores for management effectiveness of all protected areas harbouring Lions. Examples of changes in wildlife abundance over time within selected protected areas for other species are presented in Table 5.5.

Where protected areas are actively managed, great apes have fared better than where enforcement is weak (Tranquilli *et al*. 2012). Law enforcement was the best predictor of ape survival in 109 'resource management areas' in 16 countries across tropical Africa, an area that is largely contained within West and Central Africa as defined in the Situation Analysis. Resource management areas include not only wildlife conservation areas but also areas set aside for extraction of timber and the use of water.

6.5 Management effectiveness

Struhsaker *et al*. (2005) analysed the effectiveness of 13 protected areas in West and Central Africa (as defined in this Situation Analysis, together with three from East Africa). The assessment was based largely on questionnaires and their use of such subjective information is discussed and considered appropriate in this context. For the exploratory purposes stated by Struhsaker *et al*. (2005), such mechanisms for gathering and analysing expert opinions seem appropriate (and are widely used in assessing protected area effectiveness). Joppa *et al*. (2008), however, urge caution when using data that have limited independent verifiability.

Struhsaker *et al*. (2005) concluded that the protected areas studied in West Africa (Taï and Marahoue National Parks in Côte d'Ivoire; and Ankasa Resource Reserve and Bia and Kakum National Parks in Ghana) had lower conservation success (characterized by high levels of threat and violation; status of fauna and flora; disturbance of vegetation and presence of exotics) than those in Central and East Africa, which included: Cross River in Nigeria; Korup and Dja in Cameroon; Dzanga-Sangha in Central African Republic; Odzala in Republic of Congo; Lopé in Gabon; and Mt. Alén in Equatorial Guinea; and Ituri (Okapi Wildlife Reserve) in Democratic Republic of Congo. Poaching was a major problem in all sites.

There has been a great deal of progress in recent years to understand the effectiveness of protected area management in West and Central Africa when compared with other parts of Africa (Figure S6.1). The most recent and targeted assessments of the status of management of protected areas in West and Central Africa are the reviews undertaken as part of IUCN's Programme on African Protected Areas & Conservation (IUCN-PAPACO: papaco.org/gb/) and the action plans compiled under CBD's PoWPA: www.cbd.int/protected/implementation/actionplans/). Although the latter is a plan for the future, the template provided by the CBD Secretariat does ask for a summary of any assessment of management effectiveness that has been carried out. Table S6.1 lists dates and sources of all assessments under both programmes for all 22 countries. The IUCN PAPACO assessments were undertaken using the Rapid Assessment and Prioritization of Protected Area Management (RAPPAM) protocol (Ervin 2003) and their findings are summarized below.

As noted above, there is a range of methods and approaches available for assessing management effectiveness. One method that is increasingly widely used at a site scale is the Management Effectiveness Tracking Tool (METT) (Dudley & Stolton 2009). This approach was designed to monitor and report progress on management effectiveness, rather than to provide a thorough assessment against which management would be adapted. METT has been applied to many sites in West and Central Africa; 56 are protected areas assigned an IUCN category I–IV (Table S6.2), while a further 14 have been designated as National Parks (and whilst there is no IUCN category for these sites, this designation usually accords with IUCN category II). The number of sites for which there is at least one assessment in each country is listed in Table S6.2 (where a site has been assessed more than once, the most recent assessment has been used). For the region as a whole, these sites scored 49.2% of the total possible score. West Africa's protected areas were, on average, less well managed (46.6%; n=40) than Central Africa's (52.8%; n=30); unfortunately, small sample sizes hinder (even when considering all sites evaluated with IUCN categories not reported) detailed national-level comparisons. For broader scale assessments of protected area effectiveness across the region, RAPPAM is reported here because it has been applied more comprehensively across the region's protected areas than other approaches.

6.5.1 Benin

There are no evaluations of the management effectiveness of Benin's protected areas under either PAPACO or CBD's Programme of Work on Protected Areas.

6.5.2 Burkina Faso

The protected areas of Burkina Faso were under significant pressures from, in descending order of severity, poaching, pastoralism, cultivation, bushfires and forest exploitation (UICN/PACO 2009). They are very vulnerable because of weak enforcement as a consequence of weak application of the law. The limited technical, human and financial capacity is

insufficient to undertake effective management of protected areas. Although some sites do benefit from financial support (e.g. Parc du W, Mare aux Hippopotames, or the Réserve de faune de Bontioli) because of ongoing projects related to the implementation of projects that enhance management (ECOPAS, PAGEN, PROGEREF), many protected areas do not reap such benefits.

The country's PoWPA Action Plan does not contain an assessment of its management effectiveness, but does state that there are the following barriers to implementing the Action Plan:

1. Lack of political support for protected areas;
2. Insufficient quantity and quality of human and financial resources;
3. Rapid population growth with its associated increased cropland requirements; and
4. Lack of planning schemes at different levels (provincial, regional, municipal).

6.5.3 Cameroon

The management of some protected areas in Cameroon has been evaluated as part of the Congo Basin assessment (Anon, undated [2010]). These are Dja Faunal Reserve and the Lobéké and Mbam et Djerem National Parks. The findings are summarized under Congo Basin below.

The Cameroon PoWPA Action Plan does not contain an assessment of its management effectiveness, but does state that poaching and the uncontrolled exploitation of resources are the main pressures on protected areas and that the lack of infrastructure and co-ordination between sectors are the most significant barriers to their effective management.

6.5.4 Central African Republic

The management of some protected areas in Central African Republic has been evaluated as part of the Congo Basin assessment (Anon, undated [2010]). These are Dzanga-Ndoki and Mbaere-Bodingué National Parks. The findings are summarized under Congo Basin below. Central African Republic has not developed an Action Plan under the CBD's Programme of Work for Protected Areas.

6.5.5 Chad

Pressures facing Chad's protected areas are considered to be (in descending order of importance): the wider societal context and in particular chronic civil insecurity, grazing, poaching (widespread and well organized), fishing, human population growth, unsustainable use of forest products, uncontrolled fires and agricultural encroachments (UICN/PACO 2008a). All protected areas are easily accessible for illegal activities and the commercial value of the resources is a significant attraction.

Political turmoil and instability have resulted in weak application of laws and widespread bribery and corruption. Very few protected areas have management plans. The administrative structure of the department of national parks, wildlife reserves and hunting is outdated as it is based on 20 wildlife zones and does not fit current needs, whereby staff need to be based close to where protection needs are. Legislation which excludes people from the parks is considered unhelpful as it does not gain their support for conservation policy.

Overall, management in Chad's protected areas is weak except for Zakouma which has benefited from substantial support from the European Union as well as military training for anti-poaching personnel from the United States; Binder Léré Faunal Reserve (and Sena Oura National Park) which are included in a larger programme supported by GTZ; and hunting areas that have been awarded as concessions.

Chad has not produced an Action Plan under the CBD's Programme of Work for Protected Areas.

6.5.6 Côte d'Ivoire

The unstable political situation since 1999 has seen substantial difficulties in the management and monitoring of Côte d'Ivoire's protected areas (UICN/BRAO 2008a). The evaluation covered 10 of the 13 protected areas and overall it was considered that the protected areas were under so much pressure that their survival was jeopardized.

The main pressures are poaching, logging, fishing, collection of forest products and uncontrolled fires. Most parks are not supported by local communities (exceptions being Ehotilé Islands and Banco Park) and together with the demand for high-value park resources this presents significant difficulties for park managers. The political crisis has also led to problems, including corruption and weak enforcement of the law. Indeed, in some parks, managers felt under pressure to exploit natural resources.

Taï National Park was considered the exception, with strong management, but otherwise management was considered weak. Only five parks have management plans so far and they are seen as unsympathetic to local communities. Protected area infrastructure is weak: most parks have no vehicles, field equipment or means of communication in many parks. Funding has been very low in recent years.

The country's PoWPA Action Plan does not contain an evaluation of management effectiveness, but does indicate that protected areas face a range of threats and constraints. It acknowledges that these areas have been partially degraded by agriculture, logging and poaching, which has resulted in loss of habitats and species. The Framework Programme for Protected Areas Management (PCGAP) that was adopted in 2002 has seen limited progress because of the national socio-political crisis, which also led to the withdrawal of donors.

6.5.7 Democratic Republic of Congo

The biological richness of Democratic Republic of Congo's protected areas mean that they are "essential" for human populations because they draw many of their subsistence needs from these areas and they contain many sites that have

significant cultural and spiritual importance (UICN/PACO 2010a). Increasingly, these protected areas are also sought after for other reasons, such as farming, illegal pasture, traditional mining, settlement of populations and illegal exploitation of timber resources. They are also at risk from pollution from adjacent mining operations. Poaching takes place in all protected areas assessed and has increased during recent years in most of them. This is considered a consequence of the climate of insecurity that results in corruption and seriously limits surveillance and control of protected areas. Poaching is carried out both by those living adjacent to parks and gangs that are settled in some parks.

Most protected areas do not have any management documents and, apart from those that are supported by non-government partners, funding is very low and human resources insufficient. The evaluation categorized protected areas into three groups based on their management:

1. the most advanced ones, effectively supported by partners: Garamba, Kahuzi-Biega, Okapi, Lomako and Virunga;
2. those which are still far from ensuring their primary function of conservation: Kundelungu, Maïko, Salonga and Upemba national parks, Itombwe natural reserve, the Mangrove park, Nsele integral reserve and Bombo Lumene and Bushimaïe hunting domains; and
3. those which are effectively on paper only: Basse Kando, Bili Uere, and Mangaï hunting domains, and Mont Hoyo integral reserve.

Democratic Republic of Congo has not produced an Action Plan under the CBD's Programme of Work for Protected Areas.

6.5.8 Equatorial Guinea

Only one protected area was assessed for management effectiveness in Equatorial Guinea under PAPACO. Parc National de Monte Alen was included in the Congo Basin assessment, which is reported below. The country does not have an Action Plan under the CBD's Programme of Work on Protected Areas.

6.5.9 Gabon

The management of some protected areas in Gabon has been evaluated as part of the Congo Basin assessment (Anon, undated [2010]). These are Loango, Lopé and Minkébé National Parks. The findings are summarized under Congo Basin below.

Gabon's PoWPA Action Plan does not contain any evaluation of management effectiveness, but reports the same threats facing all and which include logging, illegal fishing, mining, oil exploration and infrastructure construction and agriculture. It considers the main barriers to effective protected areas as being: no involvement of the people in the processes of conservation at all levels of decision-making; overlapping jurisdictions between different sectors of the administrations and a lack of synergy between them; a weak legal and institutional framework; a lack of management and physical zoning plans, and no strategy for enforcement and monitoring. However, the national parks agency has benefited from a substantial recent investment and upgrade of its organizational structure (S. Regnaut *in litt*. 2014). For example, the number of staff increased from less than 100 to more than 600 during 2014, with plans to increase further still to 1,400.

6.5.10 Gambia

Gambia's PoWPA Action Plan refers to an evaluation of management effectiveness that was published in 2011 (entitled *Management Effectiveness Assessment of Protected Areas in the Gambia using WWF's RAPPAM Methodology*), but this does not seem to be publicly available. The three most persistent pressures on protected area resources are logging, infrastructure developments and land conversion, with forest fires, high demand for natural resources as a result of "unprecedented" population growth and the deterioration of surrounding land also presenting challenges. The Action Plan states that the only barrier at present is a lack of sufficient funding.

6.5.11 Ghana

The main pressures facing protected areas in Ghana are poaching, bush fires and land conversion due to farming or grazing (UICN/PACO 2010b). Poaching is less severe in some protected areas because of better law enforcement or community initiatives that regulate harvesting of non-timber forest products, which contributes to a reduction in poaching. These pressures increase vulnerability, which is an issue for most protected areas and the cultural and

Batéké Plateau National Park, Gabon. © WCS/Fiona Maisels

economic importance of natural resources also presents significant challenges. For example, in Mole and other parks group hunting is a cultural practice, and bush fires are sometimes caused by fire festivals.

Inadequate resources are a major issue and whilst there is variation in staffing and infrastructure from site to site, the overall investment in human, financial and technical resources is insufficient. In particular, additional funds are required for law enforcement activities. Most protected areas have management plans, but they are out of date and require revision.

Ghana's PoWPA Action Plan contains no evaluation of management effectiveness, but identifies the following key threats to the country's protected areas: agriculture and pastoral farming, invasive species, wild fires, extractive industry (logging, mining, oil and gas), human settlements, and the illegal off-take of natural resources. It identifies the barriers to effective implementation as: weak institutional, legal and regulatory framework; attitudes to, and perceptions of, natural resource management; limited financial and practical resources; inadequate capacity of staff, poor buffering and connectivity of protected areas, issues of outstanding compensation for land owners.

6.5.12 Guinea

Most of the parks in Guinea's protected area network are under pressure from poaching, agricultural encroachment, bush fires, illegal fishing, collection of forest products and mining (UICN/PACO 2008b) and these pressures are considered "out of control in several of them". These pressures are compounded by high levels of corruption and the country's instability. The lack of political stability is seen as a significant barrier to any significant progress on these issues.

The PoWPA Action Plan reports the main pressures on protected areas as illegal hunting and trade, shifting cultivation clearing forest and savanna areas, pesticide use, industrial and artisanal mining and logging. It lists the barriers to effective implementation as weak financing and limited resources. Referring to UICN/PACO (2008b: see above) and a METT evaluation, it reports that its evaluation of management effectiveness of management identified the following issues: the weakness of current conservation objectives for each area and for the network as a whole; inconsistencies between the resources made available by the government and expected results; the lack of competence in terms of assessing the current state of natural resources, development of appropriate management tools, monitoring, management, etc; poor consideration of priority areas, which limits the ability to concentrate management efforts to best effect; and the lack of sustainable funding mechanism for protected areas.

6.5.13 Guinea-Bissau

The RAPPAM evaluation of Guinea-Bissau's parks (especially Orango, João Vieira and Poilão, Cufada, Cacheu parks and Cantanhez) suggested that management was effective (UICN/BRAO, 2007). This is partly due to the way that parks were set up, including their relative isolation, but also due to efforts to maintain management at an effective level. Although some pressures (deforestation, fishing, poaching, population growth) were considered under control at the time of the evaluation, others were identified as significant challenges for the future (such as increased demand for natural resources, mining and loss of traditional knowledge) and many of these are a consequence of the greater international interest in the country, whether for tourism, infrastructure development or the exploitation of natural resources.

Guinea-Bissau has not produced an Action Plan under the CBD's Programme of Work for Protected Areas.

6.5.14 Liberia

There has been no evaluation of the management effectiveness of Liberia's protected areas under either PAPACO or the CBD process. The PoWPA Action Plan does, however, report the following key threats: alluvial mining, bush meat hunting, poaching, pit sawing, and a lack of governance structures. It considers the major barriers for effective implementation to be funding for management and related activates along with very limited awareness at all levels (individual and institutional as well as embedded in national processes) of the value of such areas.

6.5.15 Mali

The inventories of biodiversity in Mali's protected areas are out of date and even where data have been collected, they are not easily available (UICN-BRAO 2008b). A comprehensive assessment of the state of protected areas is a priority. All protected areas are under pressure and the main threats are poaching, exploitation of natural resources and the increase of human pressure. Limited staff and other resources mean that it is almost impossible to monitor large protected areas, and law enforcement is considered almost non-existent in the country and this is compounded by bribery and corruption.

Overall, management capacity is very low and only four reserves have management plans. The financial and human resources are insufficient to carry out routine management activities in most parks: very few protected areas have dedicated staff and where there are people in posts they typically do not have the necessary skills to perform their duties. Infrastructure and transportation are also inadequate.

The country's PoWPA Action Plan does not include a formal evaluation of management effectiveness, but acknowledges that it is not effective for a range of reasons. These include the lack of an independent national institution dedicated to the management of protected areas and insufficient political support, as well as limited capacity of managers. There is also limited understanding of how protected areas work and what resources are needed. The issues listed also include a range of significant management constraints, including

no baselines against which to measure progress, weak consideration of protected areas in land use plans, very limited technical capacity and resources for management and monitoring, underinvestment and lack of resources, weak governance and no independent autonomous management structure for protected areas in Mali. Fundamentally, it identifies that there is no understanding of the "substantial contribution of goods and services that biodiversity provides to the national economy and the well being of communities".

6.5.16 Mauritania

The main pressures facing Mauritania's protected areas have been identified as modification of ecosystems (mostly as a result of desertification), mining, over-exploitation of terrestrial and marine resources, pollution and infrastructure development (UICN/BRAO 2008c). Natural resources in parks have a high value and access to them is not controlled and, therefore, they are sought after and under pressure.

Both the Banc d'Arguin National Park (PNBA), together with its satellite reserve of Cap Blanc, and the Diawling National Park (PND) have been the focus of detailed assessments of management effectiveness and are considered to be effectively managed. Both have management plans and some staff capacity. Both parks are and have been supported financially by the government of Mauritania and financial partners, over the past twenty years and PNBA has benefited to a greater degree than PND and as a consequence has greater capacity. The two parks have developed good relationships with local communities, although limited access to some resources is a source of conflict. New rules on the usage of natural resources will be required because of increasing pressures

Mauritania has not produced an Action Plan under the CBD's Programme of Work for Protected Areas.

6.5.17 Niger

The management effectiveness of Niger's protected areas was evaluated during a three day workshop organized in Niamey from 30 March to 1st April 2010 (UICN/PACO, 2010c). Six PAs were evaluated: Niger W National Park, Aïr Ténéré National Reserve, Tamou Wildlife Reserve, Dosso Wildlife Reserve, Gadabéji Wildlife Reserve, and Termit Tin Toumma National Reserve. There are effectively two categories of protected areas in Niger: those with external partners such as the W National Park, Aïr and Ténéré National Reserve and the new Termit Tin Toumma National Nature Reserve, and those that do not benefit from any external support and which have limited capacity (lack of management plan, little or no infrastructure or equipment for routine activities). The inadequacy of human capacity (lack of staff, inadequacy of training, non-residential managers) may combine with insecurity in some areas to make protected areas vulnerable to pressures. The main pressures are poaching and illegal use of lands (for pasture, farming and house-building), but wood and non timber forest product collection, uncontrolled wild fires and other factors (such as silting-up of rivers and invasive species) are also problematic. Furthermore, mining

Diawling National Park, Mauritania. © Jean-Baptiste Dodane

activities around (or sometimes inside) some protected areas (Termit, Aïr Ténéré, W Park) are a serious threat because of the pollution and pressure on water resources that result, along with the increase in human population and the resulting pressures on natural resources.

The country's PoWPA Action Plan contains no contextual information and is simply a list of actions and funds needed.

6.5.18 Nigeria

There is no evaluation of Nigeria's protected area under either PAPACO or CBD's Programme of Work on Protected Areas.

6.5.19 Republic of Congo

In Republic of Congo, protected area managers considered poaching to be by far the most serious pressure, occurring in all PAs (UICN/PACO 2012). Other significant pressures are the conversion of land, bushfires and the exploitation of forest resources. Park managers considered that the most threatened protected areas were Conkouati-Douli, Dimonika and Lefini, because of poaching, followed by Nouabale-Ndoki and Odzala-Kokoua. Protected areas are also widely used for agricultural purposes and as sources of timber and charcoal for Pointe Noire and Brazzaville. The evaluation identified three categories of management effectiveness:

1. Nouabale-Ndoki, Odzala-Kokoua, Conkouati-Douli and Lesio Louna, which show effective management as, on the ground, some management outcomes appears to be measurable and tangible;
2. Lossi, Tchimpounga and Lake Télé. Planning and inputs are globally poorer and this has a direct impact on the process and the outcomes achieved; and
3. Lefini, Dimonika and Patte d'Oie. Characterized by the absence of substantial management other than the establishment of their legal status.

The first two categories have benefited from the support of external partners and have made some progress in management planning and implementation.

Republic of Congo has not produced an Action Plan under the CBD's Programme of Work for Protected Areas.

6.5.20 Senegal

Senegal's PoWPA Action Plan considers that despite progress, the management of protected areas is subject to a range of constraints. Legal and institutional constraints include legislative and regulatory texts not keeping pace with rapid changes in contexts, concepts, principles and approaches that have characterized the management of the environment and natural resources in recent decades. As a consequence, management tends to treat protected areas as separate from wider ecological and social contexts. Levies on wildlife resources in hunting areas are correlated with population dynamics in conservation areas and this poses a problem in ensuring that there is a balance between conservation priorities, good governance and sustainable income for local communities.

Although budget allocations have improved significantly since 2000, they cover only essential operations and there is no allowance for key management activities, such as monitoring and engaging local communities. Furthermore, the Department of National Parks is one of the few government services that provide payments to the Treasury (from tourist fees) and have no option of a rebate. There are management plans for most protected areas, but their implementation is weak because of limited resources.

Practical constraints all flow from these fundamental issues and they include weak infrastructure, limited communication facilities, inadequate protection against poachers (considered a particular problem at Niokola where there are often violent clashes with better armed gangs) and poor living conditions of staff (most notably limited water supplies). Finally, the poverty of local communities means that law breaking is almost inevitable in the search for subsistence livelihoods.

There is no evaluation of the management effectiveness of Senegal's protected areas under PAPACO.

6.5.21 Sierra Leone

There are no evaluations of the management effectiveness of Sierra Leone's protected areas under either PAPACO or CBD's Programme of Work on Protected Areas.

6.5.22 Togo

The overall status of Togo's protected areas is considered poor (UICN/PACO 2008c) and this is largely a consequence of lack of effective management since the civil unrest at the beginning of the 1990s, which saw human populations move onto designated land. The protected area network is no longer composed of intact ecosystems of native biodiversity and only Abdoulaye, Fazao and the centre of Keran still contain ecosystems that are relatively un-modified. The protected areas of Togo continue to face considerable pressure because of an increasing human population. The main pressures that result from this are poaching, fishing, logging and other human activities that are a consequence of more people. The protected areas that are under the most pressure are Oti Kéran, Fazao and Oti Mandouri. The expansion of cultivation led to the disappearance of the Fosse aux Lions National Park and its elephant corridor. Illegal activities are difficult to control in all of the protected areas because law enforcement is weak as a result of political pressure that park managers face, to allow the local population to exploit natural resources.

The country has undertaken a programme to re-gazette its protected areas and this led to a dialogue between local populations and the forest administration. Ten priority protected areas have been identified in consultation, including six existing sites and the process for re-gazetting Oti, Mandouri and Oti Kéran is ongoing. The existence of associations for the participative management of parks (AVGAP in French) and resumed support from international partners were also considered to be encouraging.

Significant constraints do, however, remain and include the lack of human resources and the inconsistency of the legal framework (for example, regional directors are under the authority of the General Secretariat, while PA managers are managed by the hunting and fauna directorate). The lack of implementation of legal texts on the environment, the inadequacy of some laws, the absence of inventories and zoning in the parks, the weakness of operating budgets, the excessive collection of animals and wood by officials (especially the military), the lack of training for staff, and the lack of real benefit sharing for the population. There are no up-to-date management plans and infrastructure and transport is run down.

6.5.22 Congo Basin

The evaluation of the forest protected areas of the Congo Basin (Anon, undated [2010]) reported that although these areas have social and cultural values for those communities who inhabit them, they face many pressures. These include poaching, which was the most significant pressure in each protected area assessed. Removal of trees and non-timber forest products is also a problem, as is mining inside protected areas. The protected areas that were evaluated (which were drawn from Cameroon, Congo, Gabon, Equatorial Guinea, Central African Republic and Democratic Republic of Congo) were considered to be representative of those throughout the various ecosystems of the Congo Basin and, overall, were considered to have weak management effectiveness.

6.6 Conclusions

Protected area coverage across the region falls short of the 17% of land laid down in Aichi Target 11 of the CBD's Strategic Plan for 2011–2020 (to which all countries are signatories). However, half of the countries meet or exceed the target nationally. Nonetheless, many sites that are known to be important for biodiversity remain unprotected.

Understanding the effectiveness of these protected areas in conserving species and habitat is more complex than

a single measure of spatial coverage. The general picture that emerges from patchy data is that, overall, deforestation has proceeded further in West Africa than in Central Africa, leaving protected areas more isolated and with boundaries that have abrupt changes in habitat. Although forest cover is not a direct measure of protected area effectiveness, this arguably suggests that protected areas are extremely important, if not vital, for wildlife in West Africa, and that their importance in Central Africa is not far behind. This is demonstrated in that although protected areas across the region have seen substantial declines of large wildlife species, they often still harbour the best blocks of habitat and the strongest (and in many cases only) populations of some vertebrate species.

The pressures on these areas are huge and reflect the pressures on natural resources throughout the region, often exacerbated by weak governance and ineffective management. The perception of many of those involved in protected area management is one of insufficient resources, including lack of capacity, and limited political will to run protected areas to best effect. The ultimate steps of downgrading, downsizing and/or degazetting protected areas have taken place in 10 countries across the region (Mascia *et al*. 2014). Arguably, the greatest concern at present is the plight of the World Heritage Sites that are on the list of 'World Heritage in Danger' (see Chapter 5). These cover more than 100,000 km^2 in total area and their further erosion would seriously undermine the region's biodiversity. As noted in Section 3.4.1, no World Heritage Sites in West and Central Africa were considered to be free of difficulties in a recent evaluation by IUCN (Osipova *et al*. 2014) and the majority were listed as Outlook Critical or having Significant Concerns.

The responses to these challenges need to be at several levels. There needs to be a clearer demonstration of government commitment, through ensuring appropriate legislation is in place and that protected areas are adequately resourced (see Watson *et al*. 2014 for a discussion of issues). Means of increasing the effectiveness of protected areas can be found where there is a will to do so. For example, Plumptre *et al*. (2014) suggest that it is possible to substantially increase both the cost effectiveness and the conservation impact of enforcement through spatial prioritization designed to maximize the reduction of hunting and minimize the cost of patrolling. They analysed law enforcement effort across the protected areas that lie within the Greater Virunga Landscape and found that effort was limited to areas close to guard posts and although it did deter illegal activities, it had no effect further afield, through much of the landscape and in areas of high conservation value. Through analysis of the distribution of conservation features (such as threatened species) and a range of enforcement variables, it was possible to devise a patrol protocol that increased effectiveness and reduced overall costs.

As mentioned above and in Section 5.6.3, the prevailing legal arrangements for many protected areas take no account of practices that have been enshrined in those human communities that have lived in and around protected areas for generations. A better understanding of these rights may lead to reduction in tensions that are caused by protected areas in some parts of the region.

It may also be appropriate to consider whether the pursuit of the 17% Aichi target is the best way to utilize resources, and indeed the utility of percentage-based targets has been questioned (Rodrigues *et al*. 2004). The basis for this target is unclear and its relevance to biodiversity outcomes is even less clear. It may prove more helpful to develop conservation targets that are based on appropriate outcomes for species and habitats and then to adopt measures (including the siting and extent of protected areas) that will best contribute to their achievement. There is likely to be considerable overlap with existing protected areas, but there would also be the opportunity to re-orientate attention from existing protected areas that now have limited potential to conserve biodiversity to other sites that offer greater conservation value. Fuller *et al*. (2010) have suggested just this approach in Australia. This may offer the chance to concentrate resources in the most outstanding sites so that they have the best possible chance of harbouring significant populations of vertebrates (Chapter 3).

7. What do trophy hunting, ecotourism and community-based management contribute to wildlife conservation?

7.1 Introduction

Sustainable use of biological diversity is one of the three objectives of the Convention on Biological Diversity (CBD). Sustainable use is a valuable tool to promote conservation of biological diversity and is also an effective tool for achieving the Millennium Development Goals (www.un.org/millenniumgoals). The *Addis Ababa Principles and Guidelines* (AAPG) developed under the CBD set out the basis for the sustainable use of natural resources. The AAPG consist of 14 interdependent principles and operational guidelines to govern the use and sustainability of biodiversity. IUCN's recognition that the wise and sustainable use of wildlife can be consistent with and contribute to conservation (because the social and economic benefits derived from use of species can provide incentives for people to conserve them and their habitats), dates back to the World Conservation Strategy in 1980, and was affirmed in Recommendation 18.24 at the 1990 IUCN General Assembly in Perth. IUCN's *Policy Statement on Sustainable Use of Wild Living Resources*, adopted as Resolution 2.29 at the IUCN World Conservation Congress in Amman in October 2000, states that sustainable use of wildlife can contribute to biodiversity conservation and recognizes that where an economic value can be attached to a wild living resource, perverse incentives are removed, and costs and benefits internalized, favourable conditions can be created for investment in conservation and sustainable use, thus reducing the risk of resource degradation, depletion, and habitat conversion. IUCN Resolution 3.074 "Implementing the Addis Ababa Principles and Guidelines for Sustainable Use of Biodiversity" was adopted by the 3rd IUCN World Conservation Congress in Bangkok, 2004, and urged IUCN members to honour the commitments they made through the Addis Ababa Principles and Guidelines.

Because rural populations are likely to continue using wild living resources in human-dominated landscapes, sustainable use and incentive-driven conservation should both be at the centre of the conservation agenda (Hutton & Leader-Williams 2003). Incentives can be generated from both extractive (consumptive) and non-extractive (non-consumptive) uses. In the case of non-extractive uses, such as tourism, the financial benefits have the potential to be as large as, if not greater than, extractive ones, although this appears to apply more in developed than developing countries (Hutton & Leader-Williams 2003). This chapter briefly examines the potential for one non-extractive use (nature-based tourism) and one extractive use (trophy hunting), both of which have generated considerable resources in East and Southern Africa, as well as the role of community-based conservation initiatives, to incentivize conservation efforts in the region.

7.2 Trophy hunting

Trophy hunting is often a contentious activity, supported or opposed on a variety of biological, economic, ideological or cultural bases. The argument in favour of trophy hunting states that, where well managed, trophy hunting can be a crucial conservation tool because it can: i) be sustainable, given low off-take rates (Leader-Williams *et al*. 2005); ii) create incentives for conservation, especially by promoting land use for wildlife (Lindsey *et al*. 2006, 2007); iii) generate higher paying fees (per visitor) than tourism, with the benefit that revenues can be generated from lower volumes of people (Lewis & Alport 1997) and in areas where alternatives such as ecotourism may not be viable because it requires more limited development infrastructure (Wilkie & Carpenter 1999, Leader-Williams & Hutton 2005); iv) provide an umbrella effect for species and other habitats in designated hunting areas (whether commercial concessions or community conservancies) (Lindsey *et al*. 2009); and v) deter illegal hunters in areas where it operates, among others. The argument against trophy hunting includes the negative impact of trophy hunting on wildlife population demographics, structure and fitness (e.g., Loveridge *et al*. 2007, Croes *et al*. 2011), including non-target species; ethical and animal welfare issues; and concerns around corruption, community involvement, poor management of quotas, and revenue distribution (e.g. Caro *et al*. 1998, Mayaka *et al*. 2004).

Conscious of the potential for trophy hunting to serve as a tool for conservation, the International Council for Game and Wildlife Conservation (CIC), together with the Food and Agriculture Organization of the United Nations (FAO), has developed *Best Practice Guidelines* for trophy hunting (Baldus *et al.* 2008). In addition, the *IUCN SSC Guiding Principles on Trophy Hunting as a Tool for Creating Conservation Incentives* (IUCN SSC 2012) set out a framework for trophy hunting and conservation and include the possibility of hunting highly threatened species, if the operation can be shown to have a net positive conservation impact.

Notwithstanding the polarized debate, there is considerable evidence that trophy hunting can be a highly profitable form of consumptive wildlife use, and further represents a large and growing industry. Lindsey *et al*. (2007) estimated that trophy hunting generates gross revenues of at least US$201 million per year in sub-Saharan Africa, from a minimum of 18,500 clients (Table 7.1). Further, over 1,394,000 km^2 on land is used for hunting in sub-Saharan Africa, exceeding the area encompassed by national parks by 22% in the countries where hunting is permitted. Trophy hunting is most significant in Botswana (contributing 0.13% of GDP), Tanzania (0.11%), and Namibia (0.08%).

Accommodation for trophy-hunting tourists in the Porga Hunting Zone, on the border of Pendjari National Park in northern Benin. © Jean-Pierre Bernon/Club Faune.

Assuming well managed trophy hunting programmes, and putting to one side animal welfare concerns, what is the potential for trophy hunting to incentivize conservation of wildlife populations in West and Central Africa? Lindsey *et al*. (2006) assessed the hunting preferences of hunting clients (n=150) who have hunted, or plan to hunt, in Africa. They found that clients were most interested in hunting in well-known East and southern African hunting destinations. South Africa was the country that most clients had hunted in, followed by Zimbabwe, Tanzania and Namibia; Tanzania was the most popular first choice country that hunters expressed a desire to hunt in, followed by Kenya and Zimbabwe. However, experienced clients indicated that they would want to hunt in other countries, including Central African Republic, Ethiopia, Mozambique, Sudan or Zambia, especially for rare antelopes. In general, clients were willing to hunt in areas with depleted wildlife populations or lacking in attractive scenery, and where people and livestock occur, reinforcing the view that trophy hunting can contribute to conservation in areas which may not be viable for ecotourism, including remote countries and those experiencing political instability.

Table 7.1 Trophy hunting statistics for major hunting destinations in Africa (source: Lindsey *et al.* 2007).

Country	No. of operators	No. of hunting guides	No. of clients/ year	Turnover (US$ million)	No. of animals shot/year	No. of jobs
South Africa	1,000	2,000	8,530	100	53,885	5,500
Namibia		505	5,363	29	22,462	2,125
Tanzania	42	221	1,654	27.6	7,034	4,328
Botswana	13		350	20	2,500	1,000
Zimbabwe	149	545	1,874	16	11,318	
Zambia	22		250	5	5,436	
Cameroon	23	47	175	2	960	1,200
CAR	19	41	150	1.4	738	900
Ethiopia	4	15	50	1.3	300	
Burkina Faso	14		300	1.0	994	280
Benin	5		90	0.4	200	100
Chad	1	1	10			
Total	**1,292**	**3,375**	**18,796**	**203**	**105,827**	**15,433**

Regardless of stated hunter intentions, the trophy hunting industry is generally on the wane in West and Central Africa (Lindsey *et al*. 2007). Eighty-eight per cent of clients hunting in Africa do so in southern Africa, where large areas of private land are used for trophy hunting in addition to state-owned wildlife areas. In general, West and Central Africa attract vastly fewer hunters than East and southern Africa (~4% of clients combined), and generate modest client numbers and revenues from hunting that, from the available data, appear to be declining or at best stable (Lindsey *et al*. 2007). For example, based on figures in Roulet (2004) and summarized in Lindsey *et al*. (2007): in Central African Republic, hunting revenues declined from US$4.4 million in 1989 to US$1.4 million in 1995 and the number of visiting hunters declined from 268 in 1990 to 100–200 in 2003; in Burkina Faso, revenues fell from US$2.7 million in 1989 to US$0.57 million in 1999, though the numbers of visiting hunters remained fairly stable, from 276 in 1990 to 250–350 in 2003; and in Cameroon, hunting revenues increased slightly over more than a decade, from US$0.75 million in 1989, to US$1.5 million in 2001 and US$2 million in 2003, and the number of visiting hunters has stayed constant at around 200/year during 1990 and 2003.

A detailed review of big game hunting in West Africa (and Africa more broadly) is provided in UICN/PACO (2009a) and what follows is a summary. In West Africa, the big game hunting sector covers around 13,000 km^2 (a little over 2% of surface area), compared with protected areas which cover around 10% of this territory (and see Section 3.3.2). Most big-game hunting takes place in Benin and Burkina Faso. However, some big-game hunting also takes place in Senegal (only in the south-east in the Zone d'Intérêt Cynégétique de Faleme) and Mali. Small game hunting (e.g., warthogs, birds) occurs in Mauritania, Gambia, and Guinea-Bissau. The potential for the future extension of hunting areas is very limited, although several countries do have the potential to develop big-game hunting areas, including

Guinea, Ghana, and possibly Togo (the Abdoulaye Forest). Hunting has been banned in Côte d'Ivoire since 1974, and several attempts to reopen it have been curtailed by political unrest. Hunting safari prices are low, and overall generates little income (0.008% of GDP in Benin, and 0.017% of GDP in Burkina) and contributes little to job creation (est. 400 permanent jobs).

In Central Africa, most hunting takes place in Cameroon and Central African Republic covering a theoretical area of ~240,000 km^2 (Lindsey *et al*. 2007; Table 7.2). In reality, though, about two-thirds of the land in Central African Republic remains unused (UICN/PACO 2009a). In Chad, which until the 1970s was known as the best big game hunting country in French-speaking Africa, hunting is now mainly confined to the Lake Chad area, where two small game hunting concessions (mainly bird shooting) receive a few hundred tourists per year and to the Melfi hunting area, to the north of the Siniaka Minia reserve, for hunting of Greater Kudu *Tragelaphus strepsiceros*. There is no big game hunting in Republic of Congo (closed in 1999), Equatorial Guinea or Gabon. There are a number of classified hunting areas in Democratic Republic of Congo, presenting opportunities in the future (Lindsey *et al*. 2007, UICN/PACO 2009a).

Lindsey *et al*. (2007) attributed the relatively limited scale and poor performance of the trophy hunting industry in Central and West Africa to multiple factors, including high population pressures, depletion of existing wildlife populations from bush-meat hunting, land ownership issues, difficult habitat for hunting and associated dependency on logging roads for access to forest areas, political instability, and poor infrastructure. They also note that the region has not capitalized on the largest market of international hunters, the US. Indeed, the majority of hunters visiting Central and West Africa are French (Table S7.1), and as noted above the region is likely to be visited only by experienced US hunters (Lindsey *et al*. 2006).

In addition, while hunting operators in Central Africa at least rely on large antelopes such as Lord Derby's Eland and Bongo, the relative lack of dangerous or spectacular game to hunt in West Africa does little to attract visitors. However, Lion hunting is offered in Benin, Burkina Faso, Cameroon and Central African Republic (Lindsey *et al*. 2013) (see Table S7.2). Benin and Central African Republic imposed multi-year bans on Lion hunting during the early 2000s in response to concerns about declining populations and current quotas are lower than previously. In the hunting zones of the Benoué ecosystem, Cameroon, concerns around rates of offtake have spurred recent calls for a moratorium on Lion hunting and a debate in the literature (Croes *et al*. 2011, Joppa & Hutton 2012).

Table 7.2 Land types and land areas utilized for hunting in Central Africa (source: Lindsey *et al.* 2007).

Country	Type of land used for hunting	Size (km^2)	% of country	Parks	% of country
Cameroon	State concessions, communal land	43,860	9.2	30,500	6.4
CAR	State concessions, communal land	196,035	31.5	68,918	11.1
DRC	State concessions	90,362	3.9	124,700	5.3
Total/mean ± S.E.		330,257	15±8.5	224,118	3.1 ± 1.77

7.3 Nature-based tourism

Compared with the wildlife-rich destinations in East and Southern Africa, the countries of West and Central Africa attract far fewer tourists. In 2010, 18.7 million tourists visited North Africa, followed by Southern Africa (12.6 million), East (12.1 million) and finally West and Central Africa (6.8 million). Morocco (9.4 million) and South Africa (8.3 million) receive by far the largest number of tourists (based on 2010 figures; Figure 7.1); by comparison, in Central and West Africa, no country regularly exceeds one million visitors. However, these data include all international arrivals, i.e., tourism for leisure, business and other purposes, and so need to be interpreted with some caution. Unfortunately, there is no global database or consistent set of national statistics summarising trends in nature-based tourism specifically (Balmford *et al*. 2009), and so interest is typically inferred from, for example, park visitation rates. The availability of such data is poor in West and Central Africa; for example, in their study of trends in nature-based tourism, Balmford *et al*. (2009) included only a single protected area from Ghana in their analyses.

A few studies have attempted to investigate the possible contribution that ecotourism could make towards funding protected areas in the region. In Senegal, Ly *et al*. (2006) assessed the willingness to pay of visitors to Djoudj NP, a strict nature reserve in the north of the country, as part of a broader economic analysis of the costs and benefits of the park. Even allowing for a decline in visitor numbers, these authors argued that if the entry price was increased in line with visitors' willingness to pay, total annual revenues in 2002 (from nearly 12,000 visitors) would have been in the range of 78–150 million FCFA, compared with actual revenue in the same year of about 20 million FCFA. However, visitors did express a desire for improvements in the quality of services provided at the park, especially to equipment and infrastructure, including the type of accommodation.

Blom (2000) assessed the potential for gorilla-based tourism in Dzanga-Sangha, Central African Republic, and concluded at the time that it was unlikely that tourism, including ape-viewing, would generate sufficient revenue to cover the management cost of the Dzanga-Sangha protected area now or in the foreseeable future. Similarly, while some user fees have the potential to generate substantial revenue for protected areas in the Congo Basin, the fees would be far from sufficient to manage the protected area system. This fact notwithstanding, revenue from tourism did contribute to the acceptance of the Dzanga-Sangha Project by the local population and probably contributed to an increase in effectiveness of law enforcement (Blom 2000). Of course, this contrasts notably with the experience of gorilla tourism in the Albertine Rift, which despite considerable leakage of tourism revenue can still be highly significant in

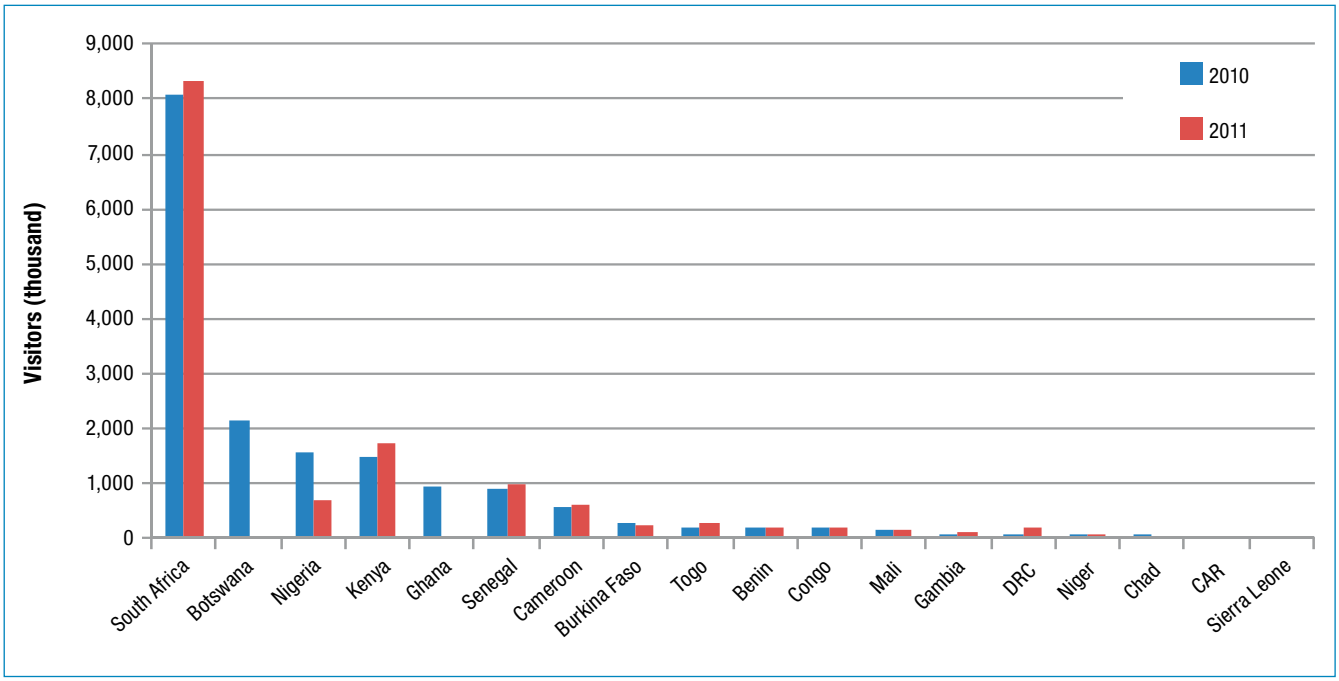


Figure 7.1 International tourist arrivals (thousands) in countries in West and Central Africa for 2010 (source: World Tourism Organization 2013). South Africa, Botswana and Kenya included for comparison. No data available for Côte d'Ivoire, Equatorial Guinea, Gabon, Guinea, Liberia and Mauritania.

a local context (Sandbrook 2010). Indeed, in Uganda and Rwanda, tourism contributes 7.9% and 9.3% to GDP in 2013, respectively (WTTC 2014), with much of this driven by gorilla viewing. In 1989, tourism was the third highest foreign currency earner for Rwanda after tea and coffee exports (Weber 1993). In Uganda, Mountain Gorilla tourism funds all the other parks; however, tourism is highly vulnerable to insecurity, and Kahuzi and Virunga have been closed for long periods during the last decade due to insecurity and so have received few visitors (L. Williamson pers. comm. 2014).

Reviewing nature tourism's potential to finance protected areas across the entire Congo Basin at the time, Wilkie & Carpenter (1999) investigated several other well established and accessible sites, including Lopé NP in Gabon, Korup NP in Cameroon, and Odzala NP in Republic of Congo, and in all sites the gains from tourism were marginal. However, a revised analysis is well overdue, as ecotourism is being developed in Cameroon (in Korup NP, Mount Cameroon NP and sites in the savanna zone), and a luxury camp for wildlife-viewing has been established in Odzala-Kokua NP in Republic of Congo and community based gorilla tourism is being developed at Lossi Gorilla Reserve (also in Republic of Congo). In West Africa, Gambia has an established wildlife tourism sector based on bird watching; indeed, with Senegal, it is one of the few countries in the region with its own bird guide (Barlow & Wacher 1997). Ghana, too, has a developing wildlife tourism sector, whose attractions include Guinea forest birds and primates in forest parks in the south such as Kakum NP, and savanna species in the north in sites such as Mole NP (Table 7.3). However, in all these cases, wildlife tourism operates at much lower volumes than in established, wildlife-rich, destinations such as Botswana, Kenya and South Africa.

Dzanga Bai in Dzanga-Sangha National Park, Central African Republic, offers tourists the opportunity to observe herds of Forest Elephants from an elevated platform located at its edge. © David Schenfeld

The basic tenets of Wilkie & Carpenter's (1999) study remain relevant. While many protected areas in the Congo Basin are able to offer tourists the opportunity to see charismatic species such as Lowland and Mountain Gorillas, Bongo, Mandrills, Giant Forest Hogs, Forest Elephant, and other species, as well as spectacular scenery, few meet some of the essential criteria for ensuring that nature-based tourism can become a major source of revenue, such as easy and safe access, internationally accepted standards of catering and accommodation, and some guarantee on investment (i.e., successful wildlife viewing). Indeed, travel in the region is not only difficult, but potentially unsafe. For example, as of 2 June 2014, the US Department of State website had travel warnings (which asks travellers to consider very carefully whether they should visit a country at all) in place for Cameroon, Central African Republic, Chad, Democratic Republic of Congo, Mali, Mauritania, Niger and Nigeria.

Table 7.3 Tourist arrivals in selected protected areas in West Africa (source: UICN/PACO 2010).

Country	Protected Area	No. of visiting tourists[1]
Benin	W NP	1,542
	Pendjari NP	6,484
Burkina Faso	W NP	622
	Mare aux Hippos (Bala)	28
	Nazinga Ranch	6,000
	Oursi	1,000
Ghana	Kakum NP	77,550 (2007)
	Mole NP	14,809
	Mognori	1,245 (2008)
	Wechiau Community Reserve	2,043
	Boabeng Fiema Community Reserve	18,155
	Tafi-Atome Sanctuary	4,211
	Wli Waterfalls	14,345
	Bui	221
Mali	Bafing	10
Mauritania	Banc d'Arguin NP	3,317 (2006/2007)
	Diawling NP	1,092
Niger	Kouré Reserve	2,300
	W (entry at Tapoa)	5,090
Senegal	Djoudj NP	2,736 (2007/2008)
	Delta du Saloum NP	3,000
	Nioko Koba NP	5,000
	Langue de Barbarie NP	471 (2009), 3,392 (2007)
	îles de la Madeleine NP	4,900
	AMP de Bamboung	700–800
	AMP Popenguine	300
	Guembeul Faunal Reserve	1,674 (2009), 2,492 (2008)
	Bandia Private Reserve	30,000
Chad	Zakouma NP	426 (2008)

[1] Figures for 2009 unless otherwise indicated in brackets.

Similarly, the Government of Canada issued an advisory to avoid all travel in Central African Republic, Chad and Niger, and to avoid all non-essential travel in Republic of Congo, Guinea, Democratic Republic of Congo, Guinea-Bissau, Mauritania and Nigeria. Such notices may sometimes err on the side of over-caution, but they do little to incentivize tourists to visit the region and unfortunately may impact negatively even on neighbouring politically and socially stable countries. Many countries in West and Central Africa also lack simple entry requirements (such as visas obtainable on arrival) and instead have lengthy or expensive visa requirements that serve to further deter visitors.

A decade ago, Gabon – a country now known to hold about half of all surviving forest elephants (Maisels *et al*. 2013), and which has remained politically stable in the midst of turmoil around it – embarked on an amibitious ecotourism endeavour. In 2002, the country established an unprecedented 13 national parks (including five former faunal reserves that previously enjoyed only limited protection) encompassing ~11% of the country's land area. The prospect of a flourishing ecotourism industry was a major incentive for the establishment of the parks, and the development has received both considerable financial investment and technical support (Laurance *et al*. 2006). However, Laurance *et al*. (2006) noted that several key misperceptions must be overcome to develop a large-scale tourism industry in Gabon, including tourists views on insecurity (albeit despite, as noted above, Gabon being politically stable) and easy viewing of large wildlife (compared with the open savannas of East and southern Africa). At least in terms of gorilla viewing, sighting frequencies in Gabon are substantially below that in Rwanda / Uganda; among visitors to the Mikongo Conservation Centre in Lopé NP, only 15% saw gorillas c.f. 98% of visitors to Rwanda/Uganda (French 2009). Further, the profitability of other more exploitative land uses like logging, illegal encroachment of loggers and hunters into nature reserves, and the still developing infrastructure for tourism pose key challenges. Developing the tourism industry will require many years to establish, and even then is likely to be modest in scale (Laurance *et al*. 2006).

Indeed, 10 years on, despite harbouring significant numbers of Central Africa's wildlife, the largest nesting population of leatherback sea turtles in the world, and even sea-loving hippos and beach-loving forest buffalo, Gabon's nature tourism industry is still in development, but improving (WTTC 2014), though it would benefit from simplified visitor entry procedures. Tourism is still in the national strategy, with the aim of increasing its total contribution to GDP to 10% (in 2013, it sits at 2.8%) which would put it on a par with top Africa tourist destinations like South Africa. Notwithstanding, within West and Central Africa, in terms of tourism's contribution to GDP, currently only Senegal performs better (although nature-based tourism is minimal). Encouragingly, long-term forecasts predict a 6.9% growth per annum in total contribution to GDP for the period 2014–2024 (second only to Namibia) and a 6.5% growth in total contribution to employment (ahead of Namibia) (WTTC 2014).

7.4 Community-based programmes

Community involvement in conservation has assumed increasing prominence across Africa in recent decades in part in reaction to established, centralized approaches to protected area and resource management that frequently marginalize or exclude local people (Hackel 1999). Community-based conservation and rural development encompass a broad spectrum of approaches ranging from the more or less passive (e.g. receipt of material benefits) to full Community-based Natural Resource Management (CBNRM) programmes that recognize the rights of local people to manage natural resources themselves. The success of CBNRM initiatives depends on governments and national agencies devolving legal rights to own and/or manage natural resources, including wildlife and forestry, to communities and also on the communities' ability and capacity to manage them effectively (Songorwa *et al*. 1999). However, the transfer of authority over potentially valuable resources such as wildlife and timber to communities entails fundamental legal and institutional reforms that may conflict with government and commercial interests (Assembe-Mvombo *et al*. 2013).

To promote mechanisms for involving local stakeholders in forest management, the Commission des Forêts d'Afrique Centrale (COMIFAC), with financial support from FAO, prepared Subregional Guidelines on the Participation of Local Communities and Indigenous Peoples and NGOs in Sustainable Forest Management in Central Africa, and these guidelines were adopted by the Council of Ministers in 2010 (COMIFAC 2010). However, the effectiveness of the guidelines ultimately depends on the willingness of each member state to grant rights to stakeholders at the national level and so far implementation of the framework by member states has been inconsistent (Assembe-Mvondo *et al*. 2013).

Roe *et al*. (2009) reviewed existing CBNRM initiatives across sub-Saharan Africa, and found that in West and Central Africa, overall, there were relatively few cases of communities obtaining formal authority over land and natural resources, and that central control remained a significant constraint to the development of such initiatives in the region. The term CBNRM may be applied in a more general sense by governments, funding agencies and NGOs to describe benefit-sharing and outreach programmes between national parks and adjacent communities. However, in these cases, communities are not empowered to manage local resources themselves, but are allocated funds from, for example, protected area fees, wildlife revenues or external sources to be used for local development (Roe *et al*. 2009). In fact, the term CBNRM itself is not often used in the francophone countries of West and Central Africa, usually being replaced by *gestion du terroir* (land management), *gestion durable* (sustainable management) and *sensibilization* (community outreach, awareness-raising) (Roe 2011).

Ghana has a well-developed system of Community Resource Management Areas (CREMA) that is underpinned by a formal policy and further supported by a Collaborative Resource Management Unit within the government's Wildlife Division (Ghana Wildlife Division 2000). The Boabeng Fiema Monkey Sanctuary in Ghana has been community-managed since 1975. It harbours White-thighed Black-and-white Colobus *Colobus vellerosus* and Lowe's Monkey *Cercopithecus campbelli,* which are protected by taboos, and offers a tourist guesthouse and guides (Oates 2011). In northern Ghana, Wechiau Community Hippo Sanctuary covers a 40-km-long stretch of the Black Volta River that contains one of the last populations of Common Hippos *Hippopotamus amphibius* in the country and which are also protected by taboos. Income from national and international tourists has raised funds to build schools and water points in the area (UICN/PACO 2009b). Other community reserves established to safeguard wildlife include Tafi Atowe primate reserve and Avu Lagoon, which was being established to protect a small population of Sitatunga *Tragelaphus spekei* for ecotourism (UICN/PACO 2009b). Around 200,000 hectares of community forest have also been designated under Ghana's CREMA policy. In Cameroon, a revised forestry law has enabled the creation of over 100 community forests, with communities having full rights to manage and use the forest resources (Roe *et al*. 2009).

A review of community conservation initiatives at 23 sites in eight countries of West Africa (Benin, Burkina Faso, Chad, Côte d'Ivoire, Gambia, Ghana, Mali, Niger and Senegal) plus Chad, reported a wide range of approaches and management arrangements as well as diversity in relation to state and government agencies (UICN/PACO 2009b). Some sites met the criteria for IUCN categories IV and VI protected areas. In Senegal, community managed sites cover ca. 2% of national territory, compared with 8% by formal protected areas, while in Burkina Faso, the comparable figures are 0.8% and 11%, respectively (UICN/PACO 2009b).

Several community-based hunting zones have been established on CBNRM principles. In the Central African Republic, Zones Cynégétiques Villageoises (ZCV; village hunting zones) have been established as buffers to Manovo-Gounda-Saint-Floris and Bamingui-Bangoran National Parks (Roe *et al*. 2009). Burkina Faso has introduced a law allowing the formation of Comités Villageois de Gestion de la Faune (Village Wildlife Management Committees) and Zones Villageoises d'Intérêt Cynégétique (ZOVIC), but for some time these were difficult to establish in practice, due to resistance from government and commercial interests (Vermeulen 2004). However, this situation has now improved and the ZOVICs established around Nazinga Ranch and W National Park are functioning well and bringing in resources, as well as serving as buffers to these sites.

There have been several NGO-led initiatives on community-managed or co-managed protected areas, such as the Tayna Reserve in Democratic Republic of Congo (Mehlman *et al*. 2006). Tayna Reserve places restrictions on bushmeat hunting, and monitors resource use. The reserve was officially recognized by the government in 2002. Subsequently, eight community-based NGOs from the region formed the Union of Associations for Gorilla Conservation and Community Development in eastern Democratic Republic of Congo (UGADEC), to organize conservation activities modelled on

the Tayna Reserve (Mehlman *et al*. 2006). The Dja Periphery Community Engagement Project (DPCEP) works with the approximately 6,000 people who live in the buffer and transition zone of the Dja Biosphere Reserve in Cameroon and Community-Based Natural Resource Use Zones have been established around Mayumba National Park in Gabon (Roe *et al*. 2009). Lac Télé Community Reserve in Republic of Congo is co-managed with local communities and Lossi Gorilla Sanctuary is also the centre of community-based tourism activities (Roe *et al*. 2009). One site of this kind in West and Central Africa is Mare des Hippopotames in Burkina Faso, which also has the status of Biosphere Reserve and Ramsar site (UICN/PACO 2009b). There is significant community involvement in two, high-profile species conservation projects that operate largely or wholly outside protected areas: the Elephants of Gourma in Mali, and the West African Giraffe in Niger. The integration of communities and poverty alleviation in great ape conservation initiatives was reviewed by Sandbrook & Roe (2010).

The review by UICN/PACO (2009b) concluded that, overall, community sites lacked management capacity; most sites barely received any tangible benefits (those that did derived them from tourism); and there were no indicators to evaluate success in conserving either wildlife or cultural values, a point also made by Roe *et al*. (2009). However, community-managed sites possessed the advantage of being managed by communities who were culturally attached to the land, and while they could not replace 'conventional' protected areas, they supplemented them through presenting a more diverse management approach. Although community-based management of natural resources has been established across West and Central Africa, these initiatives still operate on a relatively small spatial scale. The main issues to overcome before the considerable potential can be realized are the reluctance of governments to devolve full legal authority and rights to local communities and the lack of capacity to manage larger and more complex sites.

7.5 Conclusions

In general, the available evidence suggests that trophy hunting's potential to contribute to wildlife conservation in the region is limited to a handful of countries, and at least for the present there seems limited opportunity for large-scale expansion in West and Central Africa. Nonetheless, the financial contribution that it does make in some countries, such as Cameroon and Central African Republic, is not trivial. Further, hunting zones are often clustered around national parks or other protected areas where they may provide de facto buffer zones. Unfortunately, massive wildlife declines through uncontrolled poaching in, for example, Central African Republic (Bouché *et al*. 2012), are likely to contribute further to a decline in the industry.

The contribution of nature-based tourism in the region also appears minimal. In Central Africa, only Gabon appears on a path towards establishing tourism as a major industry, but unlike other countries in Central Africa it has the wildlife populations and a relatively stable political environment to support it (and even then growth and implementation has been, and continues to be, slow). At least for the foreseeable future, ecotourism is not likely to deliver significant short-term benefits to conservation in the region, at least not without a considerable turn around in infrastructure, security and wildlife viewing opportunities. The situation is not very different in West Africa (and see UICN/PACO 2010), except perhaps for Gambia and Ghana to some extent. Ghana, the first country to achieve independence in Africa, created an incipient tourism industry in 1966, and while the industry struggled to get off the ground due to political instability (Teye 1988), there is now a fairly well-developed circuit for wildlife tourists.

A lot of effort is being invested in West and Central Africa by international NGOs and governments in community involvement, outreach, and awareness programmes and in some cases tourism initiatives and co-management of protected areas. However, apart from some community forests and community hunting zones, fully devolved CBNRM initiatives to manage wildlife resources are relatively scarce and the potential remains, for the moment, largely unrealized.

Political unrest, weak governance and insecurity in general do not make these countries attractive to visitors. For example, Côte d'Ivoire used to receive quite substantial revenue from both hunting and tourism, but political instability and civil conflicts have caused these to dwindle to almost nothing. Additionally, poverty levels and corruption hinder national investment in infrastructure and a combination of all these factors only serves to deter foreign investment by the private sector.

8. What institutional responses to wildlife declines are in place?

8.1 Introduction

This chapter sets out to briefly review what civil society organizations are supportive of, and have a jurisdictional responsibility and /or mandate for, species conservation interests in the region. It is impossible to be exhaustive, and that is not the aim. The primary purpose is to give a flavour of the diversity of initiatives underway and organizations working in the region, the technical capacity that exists to deliver conservation, and whether any possible biases may exist in terms of where technical or financial investment in conservation efforts is being directed.

8.2 Inter-governmental

Food and Agriculture Organization of the United Nations (FAO) www.fao.org
FAO has 194 member countries and is based in Rome, Italy. The regional office for Africa is located in Accra, Ghana; there is a sub-regional office for Central Africa in Libreville, Gabon, and offices in all countries in West and Central Africa. FAO's work focuses on providing technical assistance, reducing rural poverty and making agriculture, forestry and fisheries more productive and sustainable. Core areas of support are animal production and health, plant production and protection, fisheries, forestry, investments, and land and water.

United Nations Development Programme (UNDP)
www.undp.org
The UNDP Headquarters is in New York and its regional service centre is in Addis Ababa, Ethiopia. It has a broad development assistance agenda, with a particular focus on the environment and energy sector and it is a major implementing agency of biodiversity conservation programmes. UNDP has helped to establish and strengthen protected areas and integrate biodiversity and land management into economic sectors such as mining, forestry, and agriculture, restore degraded land and forest, protect water resources, and prepare communities to respond to climate-related risks, such as floods and mudslides. UNDP works with a wide variety of partners and local communities to mobilize funding and knowledge. Democratic Republic of Congo, Nigeria, Sierra Leone, and Burkina Faso were in the top 10 largest country programmes in 2012. UNDP publishes the African Economic Outlook.

United Nations Environment Programme (UNEP)
www.unep.org
UNEP Headquarters is located in Nairobi, Kenya. UNEP promotes the conservation and sustainable use of biological diversity. UNEP engages a wide range of research, non-governmental organizations, business and UN partners. The Green Economy Initiative (GEI), launched in 2008, is aimed at providing the analysis and policy support for investments in green sectors and in greening environmentally unfriendly sectors. The UNEP Poverty-Environment Initiative (PEI) is a joint programme between UNDP and UNEP that supports country-level efforts to mainstream poverty-environment linkages into national development plans and processes. With both financial and technical support, UNDP and UNEP assist decision-makers and a wide range of other stakeholders to manage the environment in a way that improves livelihoods and leads to sustainable growth. Among the most immediately relevant of all UNEP initiatives is GRASP, the Great Apes Survival Partnership (Box 8.1).

International Tropical Timber Organization (ITTO)
www.itto.int
ITTO is an intergovernmental organization established under the auspices of the United Nations in 1986 to promote the conservation and sustainable management, use and trade of tropical forest resources. Its members (which in the study region includes Benin, Cameroon, Côte d'Ivoire, Democratic Republic of Congo, Gabon, Ghana, Liberia, Mali, Republic of Congo, and Togo) represent about 80% of the world's tropical forests and 90% of the global tropical timber trade.

International Union for Conservation of Nature (IUCN)
www.iucn.org
IUCN is a global environmental organization founded in 1948. IUCN represents the largest professional global conservation network, is a leading authority on the environment and sustainable development and has Official Observer Status at the United Nations General Assembly.

Box 8.1 Great Apes Survival Partnership (GRASP)
www.un-grasp.org

GRASP was founded in 2001 by UNEP, which co-hosts the Secretariat with the UN Educational, Scientific and Cultural Organisation (UNESCO). GRASP is a partnership between great ape range states and other interested countries, the biodiversity-related multilateral environmental agreements, United Nations institutions, intergovernmental bodies, international and national conservation non-governmental organizations, and private sector institutions. GRASP works to conserve chimpanzees, gorillas, orangutans and bonobos at the highest political level by focusing on issues like illegal trade in great apes, habitat loss, disease monitoring, sustainable development and transboundary collaboration. In 2005, Partners adopted a Global Strategy for the Survival of Great Apes and their Habitat at the first GRASP council and inter-governmentmal meeting in Kinshasa, Democratic Republic of Congo, and revised this strategy at the 2nd GRASP council meeting in Paris in 2012.

The IUCN Headquarters is based in Gland, Switzerland. The IUCN West and Central Africa Regional Office (PACO) is based out of Ouagadougou, Burkina Faso, with country programmes in Cameroon, Democratic Republic of Congo, Guinea Bissau, Mauritania, Mali, Niger, and Senegal. The office is involved in developing and implementing protected area management tools, World Heritage and Ramsar site evaluations, and capacity building. IUCN's PAPACO (Programme Aires Protegées d'Afrique et Conservation) has developed a Road Map for management and governance of protected areas in West and Central Africa, and undertakes evaluations of protected area management effectiveness.

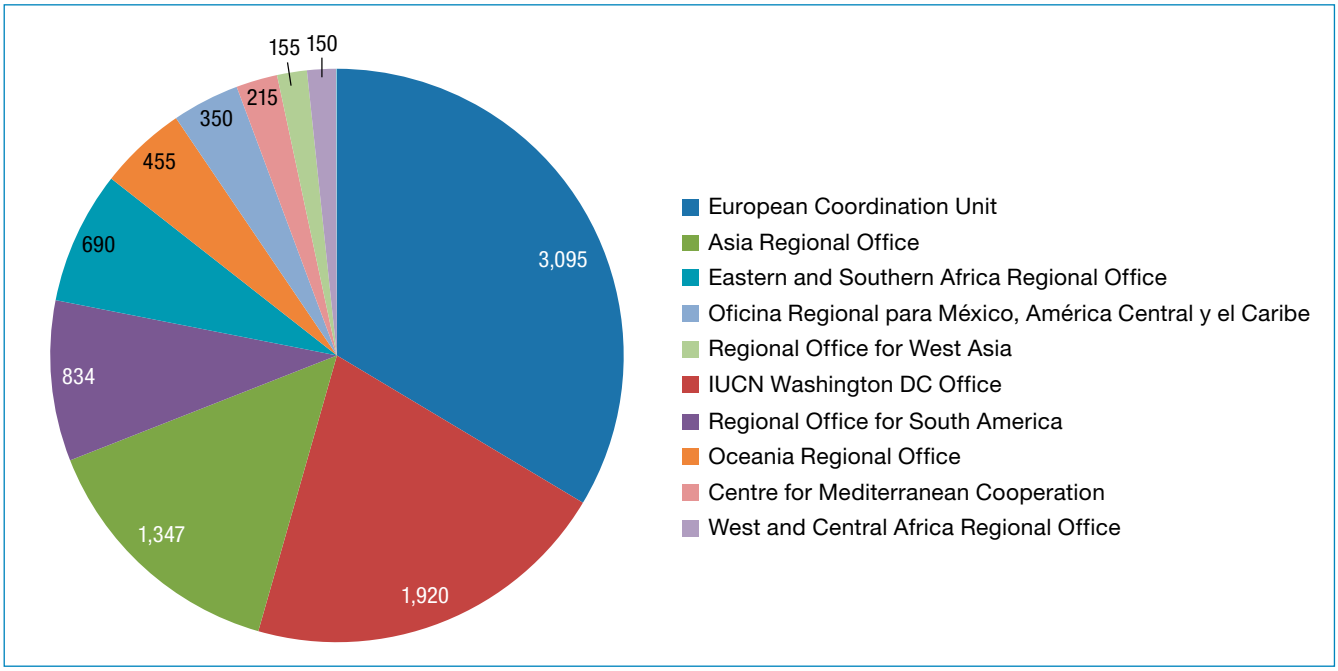
Among IUCN's 1,250 Members (including 200+ governments and 900+ NGOs), a total of 97 Members fall under the operational remit of the West and Central Africa office (noting that this office includes also Burundi, with five Members; Table S8.1). Membership has gradually increased from a little over 60 in 2008 (IUCN-PACO 2014). As of late-2014, the 92 IUCN Members occurred in 18 countries in the region (only Chad, Gambia, and Liberia have no IUCN Members), including 12 State Members, nine Government Agencies and 71 NGOs (Table S8.2)[6]. There are also six national committees (Burkina Faso, Cameroon, Guinea Bissau, Mali, Republic of Congo, and Senegal), and one regional committee. Overall, IUCN Membership in West and Central Africa is comparable with that falling under the operational remit of the East and Southern Africa programme (ESARO).

However, looking at Commission-level membership within the Species Survival Commission (SSC), the West and Central Africa region fares among the worst in terms of representation (Figure 8.1). SSC members in the PACO region total one-fourth of the members falling under the remit of the East and Southern African Regional Office (ESARO). Several countries have only a single SSC member: Equatorial Guinea, Chad, Mauritania and Togo; Guinea-Bissau and Mali have none. This pattern probably reflects both a genuine paucity of in-country species expertise (obviously, many SSC members in other countries do spend considerable time working in the region), as well as issues upstream in the membership constitution of the SSC Specialist Groups. Indeed, there is more balance within the World Commission on Protected Areas (WCPA) where the PACO region has 107 members compared with 128 in ESARO, likely due to the strong engagement of IUCN's PAPACO.

Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) www.ipbes.net

IPBES was established in April 2012, as an independent inter-governmental body open to all member countries of the United Nations. Its purpose is to assess the state of the planet's biodiversity, its ecosystems and the essential services they provide to society. It is intended to provide a mechanism that will be recognized by both the scientific and policy communities for the synthesis, revision, assessment and critical evaluation of relevant information and knowledge. Its first work programme was agreed at the second plenary meeting of the member countries in December 2013. IPBES further aims to strengthen capacity for the effective use of science in decision-making at all levels and to support the Multilateral Environmental Agreements that are related to biodiversity and ecosystem services (see Section 5.3). There are 119 member countries, including all those in the region apart from Equatorial Guinea, Gambia, Guinea and Sierra Leone.

Figure 8.1 Number of SSC members by IUCN operational region.



[6] Two new IUCN Members were admitted by IUCN's Council in January 2015: one Government Agency (Office Ivoirien des Parcs et Réserves, or the Ivorian Office of Parks and Reserves) and one NGO (Association pour le Développement de Nguendar et villages environnants, or the Association for the Development of Nguendar and Surrounding Villages).

8.3 Regional

Central African Forests Commission (COMIFAC) www.comifac.org
COMIFAC is the regional body responsible for co-ordinating and harmonising forest and environmental policy, with the aim of promoting the conservation and sustainable management of Congo Basin forest ecosystems. It has 10 member countries, including all those in Central Africa covered by the current Situation Analysis. COMIFAC's 1999 Yaoundé Declaration recognizes the protection of the Congo Basin ecosystems as an integral component of the development process and reaffirms the signatories' commitments to cooperate on promoting the sustainable use of the Congo ecosystem in accordance with their social, economic, and environmental agendas.

Congo Basin Forest Partnership (CBFP) www.cbfp.org
CBFP unites 70 partners from governments (within and outside Central Africa), donor agencies, international organizations, NGOs, scientific institutions and the private sector. Its aim is to enhance natural resource management and improve the standard of living in the Congo Basin. CBFP works closely with COMIFAC and supports the implementation of COMIFAC's regional Convergence Plan.

Central Africa Regional Program for the Environment (CARPE) http://carpe.umd.edu/
CARPE was launched by the US government in 1997 with the strategic objective to reduce the rate of forest degradation and loss of biodiversity in the Congo Basin by increasing local, national, and regional natural resource management capacity. The programme, funded by USAID (see below), is currently in its third phase which has as its objective to maintain: "the ecological integrity of the humid forest ecosystem of the Congo Basin…". The objective and rationale for Phase III are more fully described in the Regional Development Cooperation Strategy 2012–2020. CARPE works in nine partner countries that include Central African Republic, Cameroon, Democratic Republic of Congo, Gabon, Equatorial Guinea, and Republic of Congo. CARPE works within 12 key landscapes that form the basis of its regional conservation strategy and cover an area of 680,300 km^2 (Figure S3.1).

Observatoire des Forêts d'Afrique Central (OFAC) http://www.observatoire-comifac.net/
An initiative of multiple members of the CBFP, OFAC aims to pool the knowledge and available data necessary to monitor the ecological, environmental, and social services provided by Central Africa's forests. The establishment of OFAC corresponds to one of the actions of the COMIFAC Plan de Convergence. As of October 2014, OFAC (in close association with RAPAC) will host a new regional observatory for biodiversity and protected areas, established under the BioPAMA initiative. Among its most important outputs are the *Forests of the Congo Basin – State of the Forest* reports, produced for the years 2005, 2006, 2008, 2010, and (unfortunately, not in time to be included in this Situation Analysis) 2013.

Observatoire Satellital des Forêts d'Afrique Centrale (OSFAC) www.osfac.net
OSFAC is a regional forum dedicated to using satellite data to detect and manage environmental change in the Congo Basin. It aims to contribute to COMIFAC's Convergence Plan by producing reliable and useful land cover maps and other products.

Programme d'Appui à la Conservation des Ecosystèmes du Bassin Congo (PACEBCo; Programme of Support to the Conservation of Congo Basin Ecosystems) www.pacebco-ceeac.org
PACEBCo is an initiative of the African Development Bank covering the period 2009–2014 to support implementation of the COMIFAC Convergence Plan.

Programme de Conservation et Utilisation des Ecosystèmes Forestières en Afrique Centrale (ECOFAC)
ECOFAC is an EU programme, launched in 1992, whose mission is to strengthen the conservation and sustainable management of the forest ecosystems and savannas of six countries in Central Africa and contribute to the sustainability of ecosystem services. It has had several phases and is currently in its 5th (with funding of ~€30 million). ECOFAC IV was €38 million; the first three stages saw investment in excess of €70 million. RAPAC (Réseau des aires protégées d'Afrique Centrale/Network of Central African Protected Zones) was established under its auspices.

Réseau des Aires Protégées d`Afrique Centrale (RAPAC) www.rapac.org
Membership-based organization based in Libreville, Gabon, and operating in central Africa. It supports the conservation and sustainable use of biodiversity in central Africa through harmonization of policies and management tools and by providing a platform for exchange and support between protected area managers and those wanting to develop or use natural resources and areas.

Central Africa World Heritage Forest Initiative (CAWHFI) **www.unesco.org/en/cawhfi**
CAWFI was established to improve the management of forest sites in Cameroon, Central African Republic, Republic of Congo and Gabon that are likely to be recognized for their Outstanding Universal Value and to improve their integration within the ecological landscapes they belong to. CAWHFI currently works in three transboundary target landscapes: Sangha Trinational, Conkouati-Mayumba-Gamba, and Dja-Odzala-Minkébé Trinational (TRIDOM).

Biodiversity Conservation in Regions of Armed Conflict http://whc.unesco.org/en/congobiodiversity/
The objective of this project under UNESCO is to avoid the loss of the Outstanding Universal Value of the five World Heritage sites in the Democratic Republic of Congo and to achieve the conditions for their withdrawal from the List of World Heritage in Danger. The programme is implemented with the Congolese Institute for Nature Conservation (ICCN).

Great Green Wall for the Sahara and the Sahel (Grande Muraille Verte pour le Sahara et le Sahel)
This initiative by the African Union is a planned project to plant a belt of trees 165 km wide and extending over 7,100 km across the southern edge of the Sahara to hold back desertification and contribute to rural development (AU-FAO-GM-UNCCD-EU 2012). It is composed of a partnership between 20 countries and many international and regional institutions.

Large Carnivore Initiative for West and Central Africa
www.largecarnivoresafrica.com
A collaboration between the Leo Foundation (the Netherlands), SPOTS (the Netherlands), the Regional Lion Network in West and Central Africa (ROCAL), the African Lion Working Group (South Africa), Panthera (see below), Painted Dog Conservation (Zimbabwe), the Ecole de Faune in Garoua (Cameroon), the Centre of Environment and Development Studies (CEDC) of the University of Dschang (Cameroon), the Laboratoire Ecologique of the University of Abomey (Benin), Department of Nature Conservation Tshwane University (South Africa) and the Institute of Environmental Sciences of Leiden University (Netherlands) focused on the conservation of the six species of large carnivores occurring in the region.

8.4 Non-Governmental

Several international Non-Government Organizations (NGOs) have a significant presence in West and Central Africa. NGO activities include: government policy support, landscape planning, protected area management, anti-poaching, training and capacity building, awareness and education, field survey and monitoring, community engagement and enhancing local livelihoods. Investments from the conservation NGO sector amount to several million US$ per year. Nonetheless, despite the biodiversity importance of West and Central Africa (Chapter 1), available evidence suggests that NGO investment (particularly in West Africa) lags behind the rest of the African continent. Brockington & Scholfield (2010), for example, examined expenditure by conservation NGOs in all sub-Saharan Africa using financial data for 87 organizations for some, or all, of the years 2004–2006. These authors demonstrated an uneven distribution of funds and organizations across the continent; proportionally, the *smallest* amount of money by some margin was spent in West Africa (US$5,541,000), followed by Central (US$31,608,000), East (US$34,289,000) and then Southern Africa (US$46,382,000). Brockington & Scholfield (2010) were silent on causality in their study on NGO investment, but noted the need to consider, among others, levels of wealth, governance, corruption, infrastructure, and language.

The list of organizations and related activities that follows below is not exhaustive (but includes the top NGOs in terms of investment identified in the now somewhat out-dated study by Brockington & Scholfield 2010). In addition to these, many national and local NGOs, many of them Member organizations of IUCN (see Section 8.2), are active in the fields of biodiversity conservation and environmental protection.

African Parks
www.africa-parks.org
African Parks is a non-profit organisation concerned with the rehabilitation and long-term management of national parks in partnership with governments and local communities. Emphasis is placed on achieving financial sustainability of protected areas by combining long-term funding from donors with tourism revenues, related business enterprise and payment for ecosystem services. Within West and Central Africa, African Parks has cooperative management agreements with the relevant government agencies to manage Garamba NP, Democratic Republic of Congo (since 2003); Odzala-Kokua NP, Republic of Congo (since 2010) and Zakouma NP, Chad (since 2010).

African Wildlife Foundation (AWF) www.awf.org
Founded in 1961 and works on wildlife conservation, land and habitat restoration, community empowerment and economic development. Principal projects in West Africa are on elephants in Cameroon (Faro National Park), the West African Giraffe in Niger, the African Apes Initiative, and the Congo Shipping Project (an initiative to improve river transport for small farmers thereby increasing income and reducing dependency on bushmeat).

BirdLife International
www.birdlife.org
Operates a global nature conservation Partnership with 120 BirdLife Partners, each of which is an independent NGO. BirdLife International partnership representation is poorest in Africa. In West and Central Africa, Partners have so far been established only in seven countries: Burkina Faso (NATURAMA), Cameroon (Cameroon Biodiversity Conservation Society), Côte d'Ivoire (SOS FORETS), Ghana (Ghana Wildlife Society), Liberia (The Society for Conservation of Nature in Liberia), Nigeria (Nigerian Conservation Foundation) and Sierra Leone (Conservation Society of Sierra Leone). BirdLife also identifies Important Bird and Biodiversity Areas (section 3.5.2) and operates Preventing Extinction and Species Guardian programmes, among others.

Bonobo Conservation Initiative
www.bonobo.org
Washington DC-based organization that works in several protected areas of the Bonobo range in Democratic Republic of Congo, including Sankuru Nature Reserve, and implements education and sustainable development initiatives.

Bonobo and Congo Biodiversity Initiative
www.bonoboconservation.org
NGO founded in 1997 by the Zoological Society of Milwaukee, dedicated to conservation of the Bonobo. Its work is concentrated in Salonga National Park.

Born Free Foundation
www.bornfree.org.uk

UK-based NGO that supports several primate sanctuaries in Democratic Republic of Congo and Cameroon (mainly animals confiscated in the pet trade), and, since 2000, the Kahuzi-Biega NP in Democratic Republic of Congo.

Conservation International (CI)
www.conservation.org
US-based organization with activities in West and Central Africa concentrated on the two global hotspots, the Guinean Forests of West Africa and Eastern Afromontane, and the Congo Basin High-Biodiversity Wilderness Area. It currently has offices in Liberia and Democratic Republic of Congo; it pulled out of Côte d'Ivoire after the civil war began in 2002. In Liberia, CI has been working with steel company ArcelorMittal Liberia to establish a development plan for the East Nimba Nature Reserve (in the north of the country and covering much of Liberia's share of the Mount Nimba range). In DRC, CI's efforts are concentrated in the Maiko-Tayna-Kahuzi Biega landscape in the east and the Maringa-Wamba Lopori landscape (specifically Kokolopori Bonobo Reserve and forest concessions located in Tshuapa District) in the west.

Derbianus Czech Society for African Wildlife
www.derbianus.com
Founded in 2010 by a group of experts from the Institute of Tropics and Subtropics, Czech University of Live Sciences, Prague, to continue a series of Czech-Senegalese cooperation projects running from 2000. The main activities of Derbianus CSAW are focused on the conservation of the Western Derby Eland *Tragelaphus derbianus derbianus* in Senegal.

Dian Fossey Gorilla Fund International
www.gorillafund.org
Founded by Diane Fossey in 1978, and dedicated to the conservation and protection of Gorillas and their habitats in Africa through promoting research and education and providing assistance to local communities through education, training and economic development initiatives, in collaboration with government agencies and other international partners. In Democratic Republic of Congo, activities include training park rangers in Maiko National Park, working with Kahuzi-Biega NP staff to develop a joint research project to study various aspects of Grauer's Gorilla groups, and working with the Institut Congolais pour la Conservation de la Nature (ICCN) to protect Mountain Gorillas in Virunga National Park.

Fauna & Flora International (FFI)
www.fauna-flora.org
Founded in 1903 and based in Cambridge, UK. FFI's West and Central Africa programme operates projects in: Cameroon, supporting development of a newly gazetted protected area in the Bechati-Lebialem forest that contains Cross River Gorillas; Liberia, supporting the FDA in gazettement and management of proposed and newly protected areas in Wonogizi and Nimba respectively, and re-establishment of Sapo NP, through training of park staff and national students to conduct ecological research and biological monitoring at the recently constructed Sapo research and training centre; and Guinea, in the Ziama Biosphere Reserve and the Ziama-Wonegezi corridor to protect the only viable population of forest elephants in Guinea and in the Nimba Biosphere Reserve supporting reserve management and sustainable use of resources by local communities. In DRC, FFI is supporting the government agency in implementing community conservation in Garamba, Kahuzi-Biega and Maiko NPs and supporting local communities to develop sustainable livelihoods.

Frankfurt Zoological Society (FZS)
www.zgf.de
FZS is an independent, non-profit organisation established in 1858 and based in Frankfurt, Germany. It provides logistical support for protected areas, assisting government agencies, financing and assisting animal census surveys and protection programmes for threatened species. The Society's main focus lies in East Africa; it has no presence in West Africa, but in Central Africa supports activities in Upemba, Maiko and Virunga national parks and programmes on Mountain Gorillas and Chimpanzees.

International Foundation for Wildlife Management (IGF)
www.wildlife-conservation.org
France-based NGO working to protect wildlife across Africa, promoting rational management and sustainable use of natural resources.

International Gorilla Conservation Program
www.igcp.org
A consortium composed of AWF, FFI and WWF in partnership with the protected area authorities of Democratic Republic of Congo, Rwanda and Uganda for the protection of the Mountain Gorilla and sustainable livelihoods.

Jane Goodall Institute (JGI)
www.janegoodall.org
Founded by renowned primatologist Jane Goodall, JGI is a global non-profit organisation that seeks to improve understanding and treatment of great apes, contribute to the preservation of great apes and their habitats by combining conservation with education and promotion of sustainable livelihoods in local communities. It has programmes in eastern Democratic Republic of Congo, Republic of Congo (running the Tchimpounga Chimpanzee Rehabilitation Center and contributing to the expansion of the Tchimpounga Nature Reserve) and Guinea (supporting economic development activities in the Boké region).

Les Amis du Bonobo du Congo
www.lolayabonobo.org
Manages a sanctuary for confiscated Bonobos in Kinshasa and releases them back to the wild. Also carries out a public awareness and education programme.

Lukuru Foundation
www.lukuru.org
A US-based organization operating exclusively in Democratic Republic of Congo focusing on research and conservation of great apes in three regions: Lukuru in the center of the country (since 1992); the Tshuapa-Lomani-Lualaba (TL2)

landscape (since 2007), where work focuse on supporting the proposed Lomami National Park (8,050 km²), which will be surrounded by a buffer zone of approximately 16,380 km² with the status of a Faunal Reserve; and conducting research in the Bili-Uéré forest-savanna mosaic zone in the north of the country.

Okapi Conservation Project (OCP)
www.okapiconservation.org
Hosted out of the White Oak Conservation Center in Florida, the OCP was initiated in 1987 to increase support for Okapi conservation. The OCP has contributed to the establishment and security of the Okapi Wildlife Reserve in Democratic Republic of Congo through surveys, agro-forestry, conservation education, alternate livelihoods, and community assistance, coupled with direct support for the Institute in Congo for the Conservation of Nature (ICCN). 'Okapi ambassadors' in zoos help instil awareness of the rapid destruction of rainforests and generate financial support for the preservation of Okapi habitat in the Ituri Forest.

Panthera
www.panthera.org
New York-based organization founded in 2006 with the aim of conserving the world's largest and most endangered cats and their habitats. Project Leonardo, focused on saving Africa's lions, has activities underway focused on: establishing the species' current status across West Africa (see Henschel *et al*. 2014); and W-Arly-Pendjari Complex, carrying out lion population monitoring and assisting the assessment and mitigation of factors currently limiting lion populations in the Complex. Its Leopard Program focuses on leopard conservation across the species' range, and has activities in Gabon, assessing leopard movement patterns outside protected areas to inform wildlife corridor designation, and across West and Central Africa, pooling records from field studies across this region to establish current distribution and status.

Royal Society for the Protection of Birds (RSPB)
www.rspb.org.uk
UK-based organization, founded in 1889 with over 1.1 million members today, working for the conservation of wild birds and their habitat. Its project work in the region is focused on the Greater Gola Landscape (~300,000 ha) which includes the Gola Rainforest National Park (GRNP) in Sierra Leone, with which it has been involved for the past 25 years. Early work here was supported by the Global Conservation Fund, the Darwin Initiative, the European Union and FFEM. Since August 2012, the RSPB is leading the development of the Gola REDD project which is now close to completion and will result in the sale of carbon credits on the voluntary market to two leading standards (VCS and CCB) as of 2015. The GRNP is soon to be managed by a non-profit company formed by the Government of Sierra Leone, the Conservation Society of Sierra Leone and the RSPB. In Liberia, the RSPB's work currently focuses on community forests surrounding the Gola Forest National Park (yet to be gazetted) thanks to a grant from the European Union.

Sahara Conservation Fund (SCF)
www.saharaconservation.org
Founded in 2004, the mission of the Sahara Conservation Fund (SCF) is to conserve the wildlife, habitats and other natural resources of the Sahara and bordering grasslands of the Sahel. SCF was instrumental in securing gazettement of the recently declared Termit & Tin Toumma National Nature Reserve, home of the last viable population of Addax, and continues to assist Niger in the development and implementation of the reserve's management plan. Other projects in Niger include restoration of the North African Ostrich and technical support for the development of wildlife corridors. In Chad, SCF is currently working in partnership with the government and the Environment Agency of Abu Dhabi to restore the Extinct in the Wild Scimitar-horned Oryx to the Ouadi Rimé-Ouadi Achim Faunal Reserve. Both Chad and Niger are also the focus of SCF's efforts to save the last remaining wild populations of the Critically Endangered Dama Gazelle. SCF's Pan Sahara Wildlife Survey, implemented in partnership with the Zoological Society of London (ZSL) conducts wildlife survey and training work in high priority biodiverse areas, including sites in Niger and Chad.

SAVE Wildlife Conservation Fund
www.save-wildlife.com
A recently founded (2010) international NGO based in Germany, and with offices in the United States, supporting wildlife protection projects in Germany, India and Africa. Although much of its work is focused in Botswana, it also supports some projects in the Congo Basin (including work on Spotted Hyaenas *Crocuta crocuta* in Odzala-Kokoua National Park, and engaging on the Herakles Farm oil palm issue in Cameroon).

Wetlands International
www.wetlands.org
NGO dedicated to wetland conservation and restoration. Wetlands International Africa has a head office in Dakar, Senegal, and subsidiary offices in Mali, Guinea-Bissau and Nigeria (latter focusing on the Niger Delta). Efforts are invested in the conservation of wetlands on Africa's west coast (with a focus on mangroves), and further inland, the West African Manatee and migratory waterbirds. Among others, Wetlands International: convened the governments of six West African countries (Mauritania, Cabo Verde, Senegal, The Gambia, Guinea Bissau and Guinea) to sign the Mangrove Charter and National Action Plans; has worked in Mali to save the Inner Niger Delta through implementation of the Development Plan for the Inner Niger Delta and working with the Niger River Basin Authority to reduce the impact of existing and planned infrastructure projects; helped develop the Conservation Strategy of the West African Manatee, supported by the Abidjan Convention; and co-ordinates the African Eurasian Waterbird Census (AEWC) that embraces the entire West and Central Africa region, as part of the International Waterbird Census.

Wildlife Conservation Society (WCS)
www.wcs.org
Founded in 1895, with Headquarters located in New York,

WCS has long had considerable presence in the West and Central Africa region. Since 1996, WCS has supported Cross River Gorilla research and conservation efforts across its range. In 2008, together with the government of Cameroon and other partners, WCS helped create Takamanda National Park (holding a third of the Cross River gorilla population); it also supports long-term research studies at Afi Mountain Wildlife Sanctuary in Nigeria and the Kagwene Gorilla Sanctuary in Cameroon. Surveys by WCS supported designation of the national parks of Deng Deng and Mbam et Djerem in Cameroon. The Nouabale-Ndoki and the Ntokou Pikounda National Parks in the Republic of Congo were created in 1993 and 2012, respectively, thanks to surveys and subsequent support to the Government, and set up the successful model of working closely with logging companies to minimise environmental impacts in northern Congo. WCS, together with WWF, helped to establish the thirteen National parks in Gabon in 2002 and is working with the governments of Gabon and the Republic of Congo to create a new transboundary protected area in the country with the Batéké Plateaux National Park in Gabon. In DRC, WCS also helped to establish the Okapi Wildlife Reserve in 1992, and is working with government to gazette Itombwe and Kabobo. It co-manages multiple protected areas in Central Africa, including several aforementioned reserves.

Wild Chimpanzee Foundation
www.wildchimps.org
European-based NGO, with a head office in Abidjan, Côte d'Ivoire, working to enhance the survival of the remaining wild chimpanzee populations and their habitat throughout tropical Africa, but concentrated in Liberia, Guinea, Sierra Leone and Côte d'Ivoire (especially in Marahoué National Park, Taï National Park and Cavally and Goin-Débé classified forests).

World Wide Fund for Nature (WWF)
www.wwf.org
Established in 1961 and aims to conserve the world's biological diversity and promote sustainable use of natural resources. WWF's Central Africa Programme is based in Cameroon and provides support to WWF projects in Cameroon, Central African Republic, Democratic Republic of Congo and Gabon. The Kudu-Zombo Programme, formerly known as the Campo-Ma'an Project, works to conserve turtles and Mandrill in the Campo-Ma'an landscape of southern Cameroon. WWF's Coastal Forests Programme – also known as the SAWA programme, operates over an area of 44,810 km^2 between the Sanaga and Cross rivers. Through the Jengi Project, WWF is involved in the establishment of three large protected areas in the forests of south-east Cameroon. WWF has been involved in the management of the Gamba Complex since 1992, together with the Ministry of Waters and Forests (MEF). In West Africa, The West Africa Marine Ecoregion (WAMER) project conserves turtles and the marine environment in Senegal.

Zoological Society of London (ZSL)
www.zsl.org
Founded in 1826, ZSL is an international scientific, conservation and educational charity. It has worked across West and Central Africa since the 1990s. ZSL's Cameroon Programme focuses on two priority landscapes: the TRIDOM area of eastern Cameroon, including the Dja Biosphere Reserve and neighbouring forestry concessions; and the Doula-Edea landscape to achieve the sustainable management of the Lake Ossa Wildlife Reserve, an important refuge for freshwater biodiversity. ZSL and the Sahara Conservation Fund collaborate on several initiatives (see above). ZSL has worked to conserve Pygmy Hippos in Sapo National Park in Liberia and Loma Mountains Forest Reserve in Sierra Leone, leading the production of a Regional Pygmy Hippo Conservation Strategy in 2010. ZSL worked in Virunga National Park in DRC between 2001 and 2013 to build the capacity of ICCN to restore the long term integrity of the park and in 2010 started a collaborative range-wide Okapi conservation project, which led to a joint ZSL-ICCN conservation strategy for the Okapi in 2013. ZSL's Bushmeat Research Programme aims to enhance understanding and improve sustainability of the bushmeat trade, with current projects in Equatorial Guinea (Monte Alén and Altos de Nsork National Parks and Río Campo Reserve) and Cameroon (Takamanda National Park and Dja Biosphere Reserve).

8.5 *Ex situ* institutions

Many species of vertebrates from West and Central Africa are maintained in zoos, private collections and ranches worldwide, sometimes in considerable numbers. While many zoos and institutions remain focused on display and recreation, there has been an increasing trend away from these traditional roles towards a conservation-oriented approach, encouraged by global and regional associations, such as the World Association of Zoos and Aquaria (WAZA), the US-based Association of Zoos and Aquariums (AZA), European Association of Zoos and Aquaria (EAZA) and Pan-African Association of Zoos and Aquaria (PAAZA). In the European Union, a 1999 Directive (Council Directive 1999/22/EC) requires Member States to ensure that zoos are licensed and inspected, and to implement a framework for their participation in education and conservation. The vision of the WAZA conservation strategy (WAZA 2005) begins 'The major goal of zoos and aquariums will be to integrate all aspects of their work with conservation activities'. The *One Plan* approach, developed under the auspices of the IUCN SSC Conservation Breeding Specialist Group, is expressly designed to integrate *ex situ* and *in situ* conservation.

The conservation role of zoos encompasses breeding programmes (as insurance populations or to provide stock for reintroduction), education and awareness-raising, fundraising and direct support for field programmes. Co-ordinated breeding programmes are designed to maximize the genetic diversity for as long as possible, especially where captive populations have a small number of founders. However, even in well-managed programmes, animals may not necessarily be suitable for reintroduction into the wild due to demographic factors, habituation to captivity, or other reasons. See, for example, Hunter *et al*. (2012) who cast doubt on the suitability of any captive lions for release into the wild.

Thirty-seven species and subspecies (one reptile, nine birds, 27 mammals) of threatened and Near Threatened vertebrates from West and Central Africa are subject to co-ordinated captive breeding programmes in AZA and/or EAZA registered institutions (Table S8.3) and some Least Concern and Data Deficient species are also maintained under an EEP or SSP. There are many more animals held in private collections or zoos outside regional associations. Several rehabilitation centres have been established to care for confiscated animals and abandoned pets, especially Chimpanzees and Gorillas and in some cases these have returned animals to the wild. Such centres are not strictly captive breeding in the sense used here and are not considered in detail.

Amphibian Ark (www.amphibians.org) is a joint effort of the Amphibian Survival Alliance (ASA), the IUCN SSC Conservation Breeding Specialist Group (CBSG), and the World Association of Zoos and Aquariums (WAZA). It is an integral part of the response by the global conservation community, together with the Amphibian Conservation Action Plan, to the global declines in amphibian populations. Amphibian Ark (AArk) maintains in captivity species that would otherwise go extinct until they can be secured in the wild. Currently, no West and Central African amphibian species are maintained in this programme (perhaps partly a reflection of the fact that chytrid fungus has not yet penetrated the region to a significant extent).

Small numbers of captive-bred Scimitar-horned Oryx *Oryx dammah*, Dama Gazelle *Nanger dama* and Dorcas Gazelle *Gazella dorcas* have been transferred to Senegal and are currently held in an enclosure in Ferlo National Park in preparation for eventual release into the wild. A larger scale operation to reintroduce Scimitar-horned Oryx to Ouadi Rimé-Ouadi Achim Faunal Reserve in Chad is at an advanced stage, with plans to release up to 500 animals over five years beginning in 2015, using animals from the very large government and private collections in the United Arab Emirates. A co-ordinated plan among zoos and private ranches to increase the numbers of the Critically Endangered Dama Gazelle to ensure long-term viability and sufficient animals for reintroduction is being led by the C2S2 initiative as part of a long-term conservation strategy (Senn *et al*. 2014). The Western Giant Eland also benefits from a captive-breeding plan. With only 100 individuals left in the wild, a captive sub-population was established from one male and six females and today totals ca. 100 individuals in two locations in Senegal (Brandlová *et al*. 2013).

Many zoos provide direct financial support for field projects and training or have grant programmes, while others partner directly with individual protected areas. For example, zoos have made a big contribution to the Okapi Conservation Project (see section 8.4) both through funding field activities and ranger support and the 'Okapi Ambassador' programme to raise awareness of the species worldwide. Chester Zoo (North of England Zoological Society) has provided core support to Gashaka Gumti National Park in Nigeria since 1999. The Sahara Conservation Fund has benefitted from over 1 million US$ of funding from the zoo community for its research and conservation programme.

Tribe & Booth (2003) reviewed the role of zoos in wildlife conservation and the effectiveness of their present policies and actions, concluding that the main contribution derived from their *ex situ* actions. Gusset & Dick (2010) assessed the contribution of support by zoos to *in situ* programmes and concluded that the financial investment represented an appreciable contribution to global biodiversity conservation. However, these authors added that zoos and aquariums could enhance their contribution by allocating more resources to *in situ* projects and that increased pooling of resources among zoological institutions would be advisable.

8.6 Species strategies and action plans

Species strategies and action plans are multi-stakeholder initiatives, ideally including government, local communities, researchers and NGOs, developed to provide an overall framework for action. They are also intended to reduce duplication, assess the main threats and identify priority areas for action. Strategies and action plans also play a role in fundraising through demonstrating to donors that project proposals form part of a coherent overall programme to conserve the target species.

A large number of strategies and actions plans (APs) have been developed that cover species and groups of species in West and Central Africa, at range-wide, regional and national levels. These range in scope from global strategies encompassing an entire class (such as the Amphibian Action Plan) to those with a single-species focus, and action plans detailing field-level activities. The thematic and taxonomic Specialist Groups of the IUCN SSC have been prominent in developing species strategies and action plans, while CMS, NGOs and government agencies have generated many others. Plans developed to date are disproportionately concentrated on 'charismatic' species, of mammals and birds (e.g. great apes, elephants, rhinoceroses, cats, canids, antelopes, cranes etc; full list in Table S8.4). For a few species, range-wide strategies have been are complemented by national-level action plans (e.g. African Elephant; see list in Chapter 2).

A criticism of species action plans, including many of those developed under the old IUCN "black jacket" format, is that they lack focus, fail to set out detailed actions, seldom involve all necessary stakeholders, and do not stipulate time frames for delivery or associated costs; they do, however, retain great value as status summaries that collate a wide range of information form published sources and grey literature (Fuller *et al*. 2003). A Task Force established under the auspices of IUCN SSC produced a new set of strategic planning guidelines (IUCN 2008a, 2008b) and their use is now being promoted among IUCN specialist groups. Within the region, these guidelines have already been used to develop regional and national plans for Okapi, Pygmy Hippo, Western Giant Eland and Dama Gazelle. Broadly similar planning guidelines are in use by BirdLife International, and WCS's Rangewide priority setting process has also been

deployed in West and Central Africa, notably for Cheetah and African Wild Dog.

A more substantial criticism of action plans produced from any process is that too often the plan is implemented only partially or not at all. This may derive from a lack of available resources (funding, trained staff, capacity), failure to designate responsibility for monitoring implementation, or a general lack of motivation (e.g. a view that an action plan is an end in itself, not a tool for achieving an end). Nonetheless, the failure to bridge the gap between 'action plan' and 'action' has frequently recurred. Unless a designated focal point has been nominated and a regular reporting scheme been agreed, it becomes difficult to monitor implementation of the strategy or action plan. Unfortunately, this seems often not to apply, rendering tracking the overall effectiveness of species strategies and action plans in West and Central Africa problematic.

8.7 Multi-lateral and bilateral aid

There remains a tremendous challenge to finance existing conservation objectives (James *et al*. 1999). In 2005, approximately US$300 million per year was spent managing ~ 1,250 protected areas covering approximately 9% of the continent, less than 40% of what was considered necessary for an expanded *and* comprehensively managed protected areas system (BirdLife International 2008). More recently, McCarthy *et al*. (2012) estimated the cost of reducing the extinction risk of all globally threatened bird species at US$0.875–US$1.23 billion annually over the next decade, of which only 12% is currently funded. US$0.379 to US$0.614 billion is needed in lower-income countries.

There is a long history of donor investment in West and Central Africa from multi-lateral and bilateral sources. The European Commission has been one of the largest investors in biodiversity conservation in the region, particularly in Central Africa. Its contribution for the period 2002 to 2009 totalled ~€175 million (70% of which was allocated to protection of natural areas), including ECOFAC. This compares with its contributions in West Africa at €34.8 million (46% to protection of natural areas) for the period 2003 to 2009, which includes support to converting the Gola Forest Reserves in Sierra Leone into a National Park (€3 million) and the conservation of the Western Peninsula forest reserves (€2.4 million). By contrast, the EC invested €61.5 million into Southern Africa and €66.3 million into Eastern Africa and the Indian Ocean over the period 2002–2009. USAID has, via the Central African Regional Programme for the Environment (CARPE) initiated in 1995, made a major and sustained investment into the Congo Basin Forest Partnership. 2012 marked the beginning of Phase III of CARPE with a US$13.6 million investment. The Fonds Français pour l'Environnement Mondial (FFEM; or the French Global Environment Facility, FGEF) likewise has made considerable investment into the region, including more than €45 million to a range of multi-year projects in the region since 1996 and €7.7 million through its small-scale initiatives scheme since 2005 (J. Calas pers. comm. 2014). Many of the evaluations of effectiveness of protected areas in West and Central Africa undertaken by IUCN PAPACO (see Chapter 6) also were supported by FGEF.

In recent years, there have been growing efforts to better quantify levels of global and regional investment in biodiversity conservation, especially relative to understood needs. For example, Waldron *et al*. (2013), examining the data contained within AidData (www.aiddata.org), noted that the 40 most severely underfunded countries for biodiversity (including Senegal, Republic of Congo, Côte d'Ivoire, and Mauritania) contained one-third of all threatened mammalian diversity. These authors noted further that many of the countries identified as highly underfunded have suffered recent (and in some cases ongoing) armed conflicts, suggesting that there remains a "net donor reticence to investing in countries in conflict".

Miller *et al*. (2012) considered the geographic distribution of biodiversity aid (specifically, official development assistance likely to have a positive effect on biodiversity) allocation to recipient countries during the period 1980–2008, and their results showed that, within Africa, Kenya, Tanzania, and Uganda in East Africa, Mozambique in Southern Africa, and Cameroon, Nigeria and Ghana in West Africa were placed in the top 20% of biodiversity-related aid receiving countries. However, of the 171 countries and territories that received biodiversity aid during the study period, the top 10 recipients accounted for nearly 40% of the total, and only two African countries featured in the top 10 (Kenya and Tanzania). Miller (2014) suggests three central factors that influence the kind of biodiversity aid a recipient country receives. First, the biodiversity importance of recipient countries generally is positively associated with biodiversity aid. Second, quality of a recipient country's governance is correlated with the receipt of aid. Third, distribution of aid is tilted towards countries with relatively long histories of political independence. The following section attempts to examine current levels of investment in the region (relative in particular to elsewhere on the African continent) by examining spending patterns from the Global Environment Facility.

The Global Environment Facility (GEF)

The Global Environment Facility (GEF; www.thegef.org) – the largest funder of projects focused on delivering global environmental benefits – provides grants to eligible countries for projects related to a number of focal areas, namely: biodiversity, climate change (mitigation and adaptation), international waters, land degradation, and chemicals and waste. The GEF serves as financial mechanism for several conventions, including the Convention on Biological Diversity (CBD); United Nations Framework Convention on Climate Change (UNFCCC); and UN Convention to Combat Desertification (UNCCD). A Small Grants Programme is managed by UNDP and provides an opportunity for the direct participation of NGOs, local communities, and other grassroots organizations. GEF funding cycles are four-years long: GEF-2 project concepts were approved from July 1998 to June 2002, GEF-3 project concepts from July 2002 to June 2006, GEF-4 project concepts from 2006 to 2010,

and GEF-5 from 2010 until 2014. The GEF-6 replenishment will operate from July 1, 2014 until June 30, 2018.

Since inception (and up until GEF-4), the GEF has invested more than US$290 million, and leveraged another US$933 million in co-financing, in West and Central Africa to support biodiversity (covering 75 projects in 23 countries); in addition, the Small Grants Programme has invested US$37.6 million in more than 1,000 projects (GEF 2010). Under GEF-5, the total allocation to the biodiversity focal area was US$1,210 million for biodiversity (20% of which is set aside leaving 968 million for national-level allocations). Under GEF-6, the total allocation to the biodiversity focal area is US$1,296 million, with US$1,051 million available after set-asides.

In terms of regional investment within Africa, under GEF-5 most funding went to Southern Africa (nine countries), then East Africa (nine countries), followed by Central Africa (seven countries) and then West (15 countries) (Figure 8.2). Total indicative allocations to the 22 countries in West and Central Africa was US$68.5 million, which equates to just ~5.6% of the entire biodiversity focal area envelope. Under GEF-6, while all regions have increased total allocations, proportionally more investment has gone to West (26% increase), East (23%) and Central (19%), than to Southern (8%) and North (0.6%). East Africa's increase is at least partly due to the inclusion of South Sudan as an eligible country since GEF-5. In total, the West and Central Africa regional allocation of US$83,880,000 under GEF-6 is a 22% increase from GEF-5.

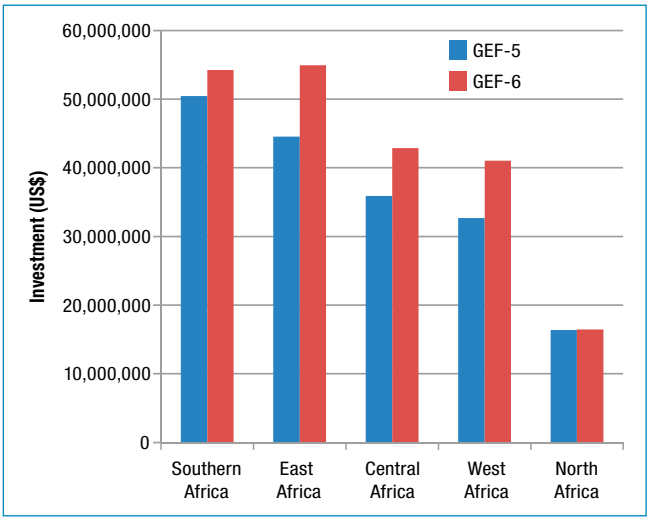
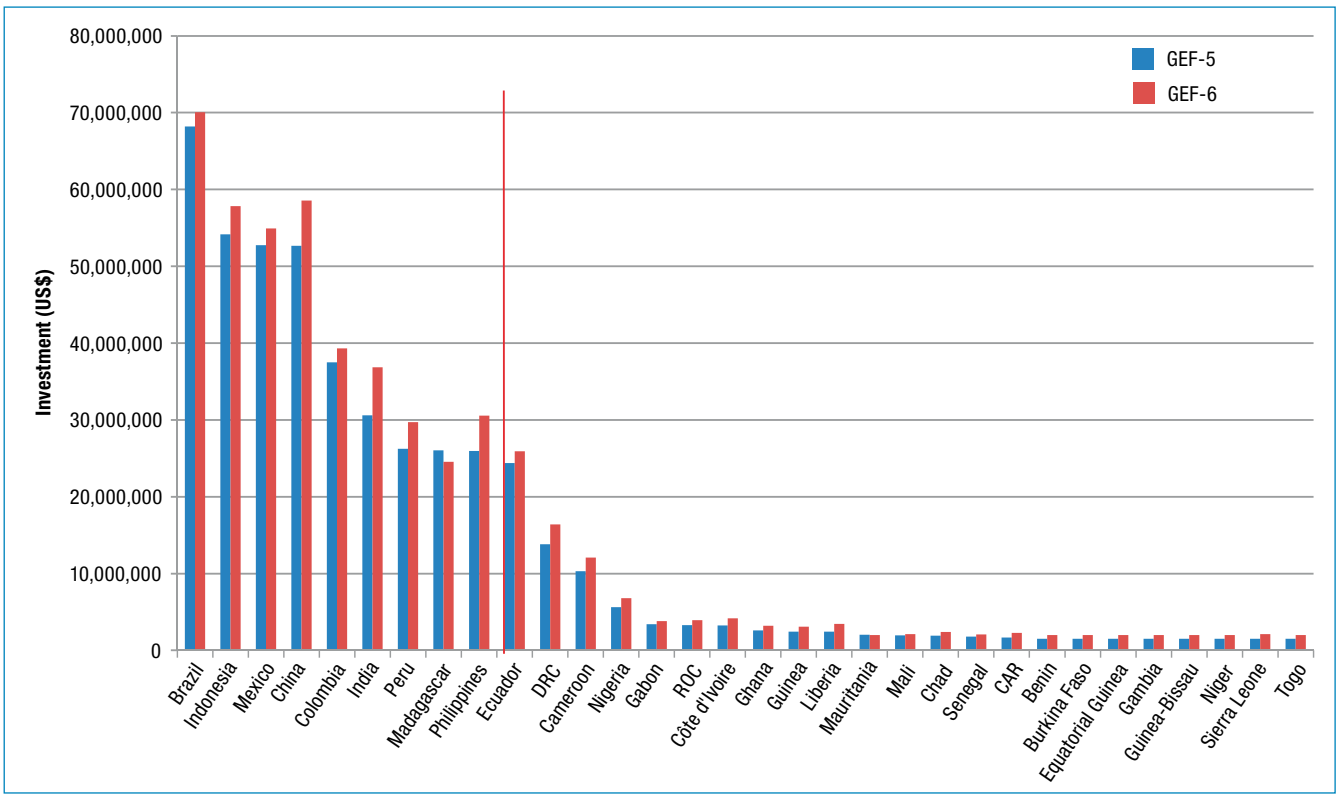


Figure 8.2 GEF investment by region in Africa under GEF-5 and GEF-6 funding cycles in the biodiversity focal area. East Africa includes South Sudan under GEF-6.

Examining individual country-based allocations under GEF-5 and GEF-6 globally, megadiversity countries (sensu Mittermeier *et al*. 1997) receive the majority of funding (Figure 8.3). Within Africa, South Africa (itself a megadiversity country) received by far the largest allocation under GEF-5 (US$21,680,000), followed by Tanzania, Democratic Republic of Congo, Cameroon and Kenya. Under GEF-6, South Africa again tops the list (US$22,790,000) followed by Democratic Republic of Congo, Tanzania, Cameroon and

Figure 8.3 Global country indicative allocations under GEF-5 and GEF-6 funding cycles in the biodiversity focal area. Red vertical line separates top 10 recipient countries (under GEF-5); countries ordered by GEF-5 allocation. Allocation floor is set at US$1.5 million under GEF-5 and US$2 million under GEF-6. Total number of eligible countries equals 144 (GEF-5) and 143 (GEF-6).



Ethiopia. Within West and Central Africa, only Democratic Republic of Congo (the largest, and only, megadiversity country in the region) and Cameroon, received allocations in excess of US$10 million under both GEF-5 and GEF-6. Indeed, of all countries eligible for GEF funding (GEF-5 = 144 countries; GEF-6 = 143 countries), 16 of the 22 countries in West and Central Africa ranked in the bottom half of the list of countries when ranked according to their GEF-5 allocations and six in the lower quartile. Under GEF-5 and GEF-6, eight countries in West and Central Africa received a total amounting to the allocation floor of US$1.5 million and US$2 million, respectively (the allocation floor is the minimum indicative allocation for the biodiversity focal area for an eligible country in the GEF's System for Transparent Allocation of Resources, or STAR).

GEF indicative allocations are determined according to the System for Transparent Allocation of Resources (STAR) – formerly the Resource Allocation Framework for the 3rd and 4th cycles of the GEF. Originally (under GEF-4), indicative allocations were calculated based on a combination of the GEF Benefits Index (GBI) and the GEF Performance Index (GPI). The GBI represents the global environmental benefits that can be generated for each focal area in a specific country, while the GPI provides a relative ranking of eligible countries' performance and capacity to deliver those benefits. A GDP-based Index (GDPI) is a new feature introduced with the STAR under GEF-5, and represents a social and economic index based on Gross Domestic Product per capita, the rationale being that poorer countries need additional funding to build the capacity that is required to ensure the success of GEF projects. In testing undertaken by the GEF to examine how the GDPI affects country allocations under a US$6.5 billion replenishment scenario (Table S8.5), all four countries in the West and Central region were positively influenced by inclusion of the GDPI, while at least two megadiversity countries (Brazil and Colombia) were influenced negatively. The GDPI weighting increased from -0.04 to -0.08 between GEF-5 and GEF-6[7], which may partly explain why West Africa, as a whole, benefitted more than other regions in overall allocation.

Theoretically, a low indicative allocation in the biodiversity focal area for countries is due to a poor score on at least one of the three indices. A key question, then, is whether there is a particular factor that might be dragging down allocations. The GPI, for example, is based on a country's past and current performance in project development and implementation, and on the quality of each country's policies and institutions. As noted in the introduction, only four of the 22 countries rank in the top 50% of countries ranked according to the Corruption Perception Index, and 11 actually rank in the bottom quartile (further, several donors, such as CEPF, have remarked on the lack of capacity and institutional maturity hindering project implementation). One might expect, therefore, that GPI scores for countries in the region are overall low. Indeed, looking at average GPI scores across regions in Africa, Central Africa and West Africa score lowest (Figure 8.4). However, most interesting is that

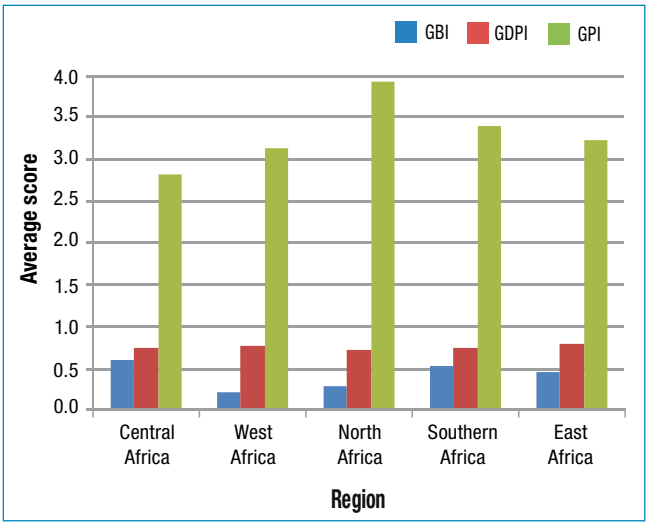


Figure 8.4 Average scores by region for the GEF Benefits Index (GBI), GEF Performance Index (GPI) and GDP-based Index (GDPI) under GEF-5.

West Africa actually emerges with the lowest average GBI, while Central Africa has the highest.

In assessing its approach to funding in the region, the GEF noted that while most projects initiated under GEF-4 were still in the beginning stages of implementation, clear benefits included: securing $90 million in grants to work on forest and biodiversity issues in a region that has had recurring difficulties in accessing GEF resources; and during the first two years of GEF-4, the region increased programming from zero to 13 projects on sustainable forest management in the Congo Basin and 18 projects on biodiversity conservation in West Africa due to financing by the GEF. Under GEF-2 and GEF-3, GEF resourcing was critical to supporting existing protected areas. For example, during a particularly difficult period of civil unrest in Republic of Congo, and despite difficulties, the GEF maintained support for four critical conservation areas: Nouabalé-Ndoki National Park, Conkouati-Douli National Park, Lac Télé/Likouala-aux-Herbes Community Reserve and Lefini/Lesio-Louna Forest Reserve. In Liberia, the creation of Sapo National Park was facilitated under a GEF-3 project, while in Benin, a US$1 million GEF project (with US$5 million in co-financing), implemented by UNDP, aims to incorporate the most significant sacred forests into the national system of protected areas.

8.8 Foundation, civil society and philanthropy

A significant amount of investment flows to supporting conservation of biodiversity in the region from foundations and civil society sources. With few exceptions, these sources invariably support initiatives within focused strategic priorities, usually established over multi-year periods, and investment or support is therefore usually at least geographically (or otherwise) constrained. Some

[7] Specifically, the country score = $GPI^{1.0} * GBI^{0.8} * GDP^{-0.04}$ in GEF-5 and $GPI^{1.0} * GBI^{0.8} * GDP^{-0.08}$ in GEF-6.

of the larger foundations with priorities in-region include Arcus Foundation and MAVA Foundation. Founded in 2000, with offices in New York City and Cambridge, UK, Arcus has a strong focus on great ape conservation, especially within priority landscapes. In 2013, it awarded more than US$10 million to projects focused on ape conservation efforts globally (and also has provided support to develop the IUCN SSC APES map portal as well as to support the Section on Great Apes within the IUCN SSC Primate Specialist Group). Swiss-based MAVA was founded in 1994 and has disbursed more than CFF470 million since establishment making it one of the largest environmental funders in Europe. Of the CHF60 million invested globally in 2013, nearly one-quarter was spent on their Coastal West Africa programme, including support for a socio-ecological assessment by the Wild Chimpanzee Foundation of eastern Foutah Djallon in Guinea.

The Critical Ecosystem Partnership Fund (CEPF), a joint initiative of the Global Environment Facility, The John D. and Catherine T. MacArthur Foundation, Agence Française de Développement, the Government of Japan, the European Union, Conservation International and The World Bank, is planning to kick-start a replenished, multi-million dollar funding cycle in 2015 focused on the Upper Guinea Forests of West Africa hotspot. Between 2000 and 2005, CEPF invested a total of US$6.2 million into six countries in the hotspot (initial approved investment allocation was US$4.3 million funding, which was subsequently increased). Assessing its five years of investment, CEPF concluded that its investment in the Upper Guinean Forest had "*significant impact in improving capacity in the region, improving biological knowledge, promoting a better conservation vision and improving community participation in conservation*". Among its achievements: 18 national NGOs and private sector partners and at least seven international NGOs significantly expanded their staff, diversity of abilities and activities; networks, such as the Environmental Forum for Action in Sierra Leone, and partnerships, such as that of BirdLife International's West African partners, were established and/or strengthened; and more than 186,000 ha of land important for biodiversity was either newly protected or given increased protection, including the creation of the Nimba Nature Reserve (estimated at about 13,568 hectares) in Liberia, contiguous with the Nimba Nature reserves of Guinea and Côte d'Ivoire. Creation of the Nimba Nature Reserve occurred in 2003, alongside other legal developments in Liberia including the expansion of Sapo National Park (by 72,700 hectares, from 107,300 hectares to approximately 180,000 hectares), and establishment of Liberia's first coherent legal framework for conservation of forest resources. In total, CEPF investments leveraged more than US$11.9 million in project co-financing and additional funds.

In addition to the larger foundations, many small grants mechanisms provide critical funding to support conservation projects in the region, although many have restrictions on the types of projects or species that they support. One such granting mechanism, the Mohamed bin Zayed Species Conservation Fund, presents an interesting opportunity to analyse investments and spending in West and Central Africa compared with the rest of Africa.

The Mohamed bin Zayed Species Conservation Fund

The Mohamed bin Zayed Species Conservation Fund (hereafter MBZSCF) is an endowment-based funding mechanism, managed by an independent board, which allocates annual grants to small projects (US$<25,000) off the interest of the original €25 million endowment. Since inception until May 2014, the fund had awarded nearly US$11 million to >1,080 conservation projects around the world, most of it to projects in Africa (US$3.4 million) and Asia (US$3.7 million).

Within Africa, an evaluation of funding to-date shows that only one-quarter of funding has been directed to 72 projects (predominantly species listed as Critically Endangered and Endangered) in West and Central Africa. Indeed, despite the high allocation to Africa, approximately one-third of funding is actually spent in just two countries: Kenya (US$634k on 56 projects) and Madagascar (US$602k on 58 projects) (Figure 8.5). In Kenya, some of this funding represents either multi-year funding or funding targeting the same species (for example, ~US$95,000 on Grevy's Zebra and ~US$80,000 on Hirola Antelope). With South Africa and Tanzania making up an additional share of ~US$500,000, a disproportionate amount of spending is directed to just four countries.

MBZSCF has a predetermined pot of funding to allocate on an annual basis, with grants awarded based on merit and adherence to basic criteria (judged independently by a review panel). Many more applications are received than can be awarded, and so rejection rate is high; currently, only around 13% of applications are accepted, although the dollar amount awarded has been ~6% of the total requested since most applicants only receive partial funding (N. Heard pers. comm. 2014).

Analysis of acceptance rates (comparing proposals accepted versus proposals rejected; see Supplementary Information), suggests that countries in West and Central Africa do not have rejection rates disproportionately greater than elsewhere in Africa. Indeed, looking at the top 10 countries with more than 10 proposals submitted, Cote d'Ivoire and Liberia both have acceptance rates at 50%, with Sierra Leone sitting at 35%. By comparison, acceptance rates for Kenya, Madagascar, Tanzania and South Africa (which, in order, have the most proposals received) are 26%, 40%, 18% and 17%, respectively. Of countries below the 13% global average acceptance rate, and with more than 10 projects submitted, there are three very clear losers: Cameroon, which comes in at number five in terms of numbers of projects received (77) has an acceptance rate of 9%; Benin (8% of 13 proposals); and Republic of Congo, with zero of 13 proposals accepted.

These results suggest that, with a few exceptions, there is no obvious bias in acceptance rates and that an over-riding factor in why Kenya, Madagascar, Tanzania and South Africa receive the majority of financing is because collectively they receive the most proposals (accounting

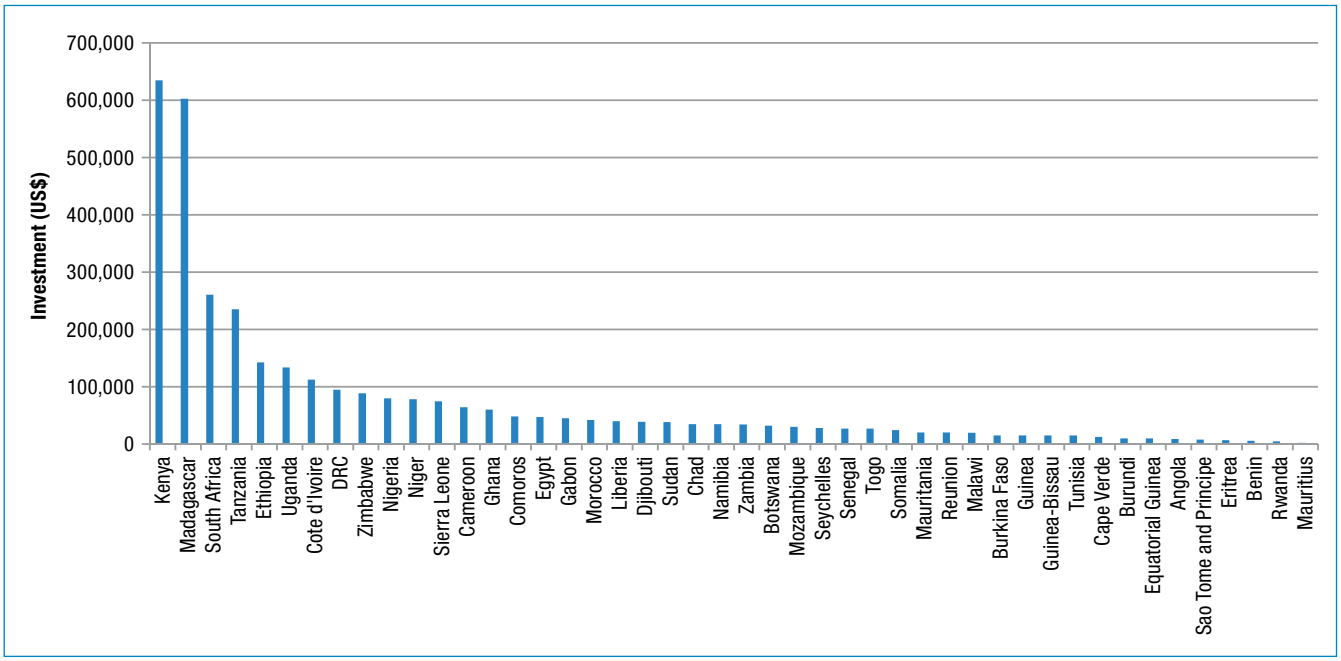


Figure 8.5 Summed MBZSCF allocations to species projects in all African countries for the period 2009 to May 2014 (source: N. Heard, pers. comm. 2014).

for nearly half of proposals received, 562 out of 1,270, the same proportion as funded). One possibility as to why fewer proposals may be forthcoming for West and Central Africa is that the majority of countries are Francophone, while the Fund only operates in English (N. Heard pers. comm. 2014). As to what contributes to high rejection rates, the leading (unquantified) factors remain poor compliance with donor requirements, especially i) poorly constructed proposals with unclear goals, aims and methods; and ii) outright failure to comply with one or more of the basic criteria, such as lack of focus on a threatened species.

8.9 Environmental safeguards

Various kinds of social and environmental standards are now in use world-wide. These standards seek to minimize risks that could arise from environmental or social problems surrounding a development project. The International Finance Corporation (IFC) is one of the five constituent bodies of the World Bank Group and the largest global development institution focused on the private sector. Its Sustainability Framework (revised in 2012), which defines the IFC's commitments to environmental and social sustainability, is widely regarded as the industry standard in safeguard policies. The Framework elaborates the eight Performance Standards that clients are required to comply with throughout the duration of IFC investment, and explains the IFC's commitment to transparency. Performance Standard 6 "Biodiversity Conservation and Sustainable Management of Living Natural Resources" (and its accompanying Guidance Note) is applied during the environmental risk and impact identification process. Financial institutions that have adopted the Equator Principles (see below) have agreed to follow PS6 in their loan agreements.

Other development banks and lending institutions have developed or adopted their own safeguard systems or policies, but these frequently draw or borrow heavily from the IFC Framework. For example, the African Development Bank adopted its Integrated Safeguards System in December 2013, following a process of extensive consultations and five regional workshops in Nairobi, Lusaka, Libreville, Abuja and Rabat. Much of its Operational Safeguard 3 on "Biodiversity, renewable resources and ecosystem services" draws from IFC Performance Standard 6 (PS6), including a focus on critical habitat. The World Bank initiated a review of its own Safeguard operational Policies in 2012. On 01 March 2015, the review concluded the second of three phases following an open consultation of the first draft of the World Bank's Environmental and Social Framework.

IFC Environmental Performance Standard 6 www.ifc.org
The objectives of PS6 are: i) protection and conservation of biodiversity; ii) maintenance of benefits from ecosystem services; iii) promotion of sustainable management of living natural resources; and iv) integration of conservation needs and development priorities. PS6 defines clients' responsibilities for demonstrating no net loss, and a net gain, of biodiversity for impacts on *natural* and *critical* habitat, respectively. When avoidance of impacts is not possible, measures to minimize impacts and restore biodiversity and ecosystem services should be implemented (following the mitigation hierarchy). For the protection and conservation of biodiversity, the mitigation hierarchy includes biodiversity offsets, which may be considered only after appropriate avoidance, minimization, and restoration measures have been applied. A biodiversity offset should be designed and implemented to achieve measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity; however,

as noted above, a net gain is required in critical habitat. Only two countries in the study region, Gabon and Ghana, currently have national policies that suggest or enable the use of biodiversity offsets (TBC 2014; *Government policies on biodiversity offsets*; 6 pp).

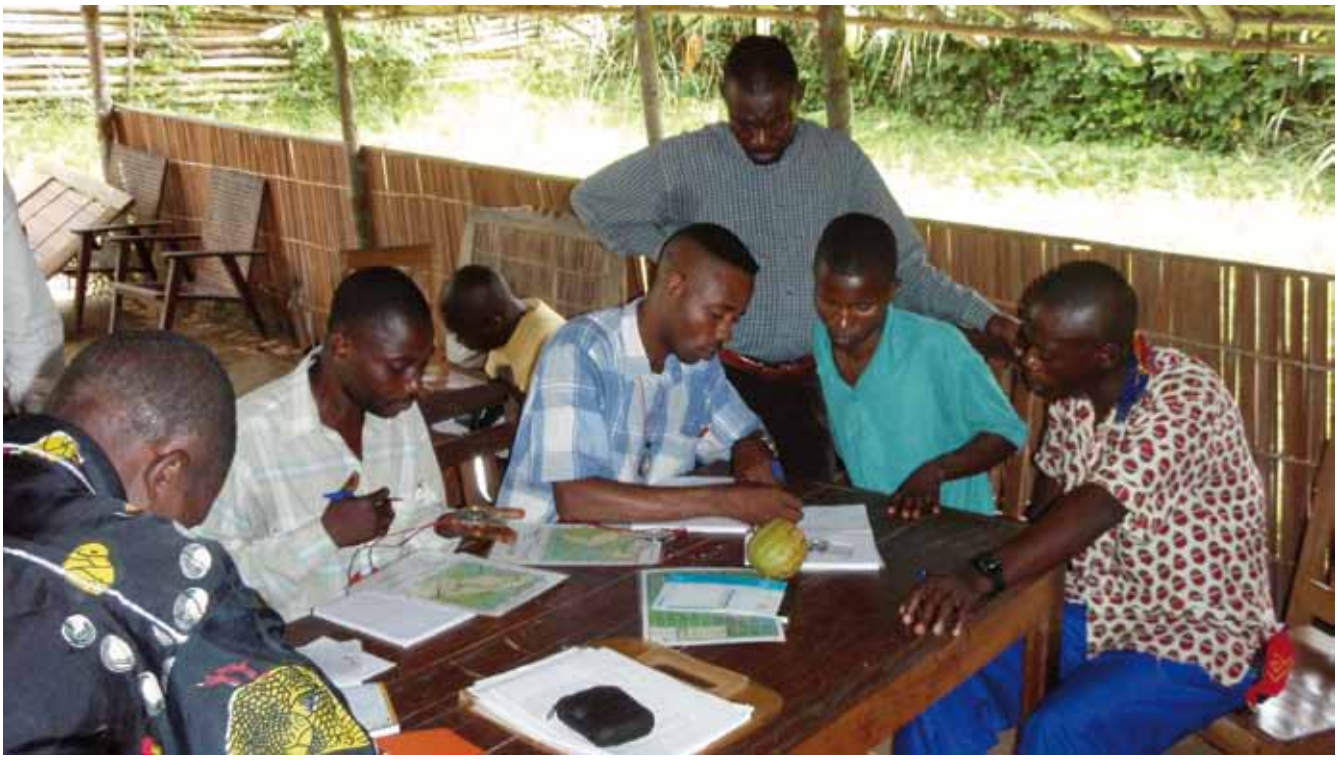
Foundational to PS6 is the concept of critical habitat, defined as areas with high biodiversity value, including: i) habitat of significant importance to Critically Endangered and/or Endangered species (as listed on the IUCN Red List); ii) habitat of significant importance to endemic and/or restricted-range species; iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; iv) highly threatened and/or unique ecosystems; and/or v) areas associated with key evolutionary processes.

Clients can only implement project activities in Critical Habitat where all of the following conditions are met: i) no other viable alternatives within the region exist for development of the project on modified or natural habitats that are not critical; ii) the project does not lead to measurable adverse impacts on those biodiversity values for which the critical habitat was designated, and on the ecological processes supporting those biodiversity values; iii) the project does not lead to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over a reasonable period of time; and iv) a robust, appropriately designed, and long-term biodiversity monitoring and evaluation programme is integrated into the client's management programme.

As noted above, PS6 requires that where a client is able to meet these requirements, the project's mitigation strategy must achieve net gains for the biodiversity values for which the critical habitat was designated. Net gains could be achieved through a biodiversity offset; however, where biodiversity offsets are proposed as part of the mitigation strategy, clients must demonstrate that the project's significant residual impacts on biodiversity will be adequately mitigated. The accompanying Guidance Note 6 provides further context to understanding PS6 and, importantly, introduces numerical thresholds to aid the identification of critical habitat according to the first three criteria (i.e., CR/EN species; endemic/restricted-range species; migratory/congregatory species). These thresholds, drawn largely from work undertaken by IUCN (Langhammer *et al*. 2007), in turn form the basis of a tiered approach to critical habitat (Table S8.5). The Guidance Note (GN61) states that "… *the likelihood of project investment in a Tier 1 habitat is generally considered to be substantially lower than in a Tier 2 habitat. Given the sensitivity of Tier 1 habitats, however, if a development is located in such a habitat… it is considered unlikely that the client will be able to comply with paragraphs 17–19 of Performance Standard 6*". At the same time, GN60 cautions that both the thresholds and associated tiers are indicative and serve as a guideline for decision-making only.

While many critical habitat screenings and assessments have been undertaken for projects in the West and Central Africa region, very few have been published. A rare example is the Rio Tinto Critical Habitat assessment undertaken as part of a larger Social and Environmental Impact Assessment (SEIA) in Simandou, a 95-million-tonnes per year-capacity iron ore mine in the Simandou Range in south-eastern Guinea comprising a trans-Guinean railway of approximately 670 km to transport the ore from the mining concession to the Guinean coast and a new port located south of Conakry,

Navigation training for survey teams in Salonga National Park, Democratic Republic of Congo. © WCS / Fiona Maisels



in the Forécariah prefecture. Simandou mining port will involve total land clearance of approximately 880 ha. At least one Endangered bird species, Hooded Vulture *Necrosyrtes monachus*, is likely to use the port area. However, as the loss of habitats and potential foraging resource resulting from the port construction comprize only a very small part of the species' range and, given the small area of habitat that is being lost within a localized area, the SEIA determined that the impact of habitat loss on the species is likely to be small (Rio Tinto 2012).

In 2013, the Cross Sector Biodiversity Initiative (CSBI) was launched to develop and share good practice and practical tools to apply PS6. CSBI is a partnership between the International Petroleum Industry Environmental Conservation Association (IPIECA), the International Council on Mining and Metals (ICMM), and the Equator Principles Association (EPA) and aims to share experiences and promote learning and continuous improvement. Although the CSBI is an industry forum, the group seeks to engage with non-industry groups who have interest and experience in offsets and the biodiversity mitigation hierarchy included in PS6.

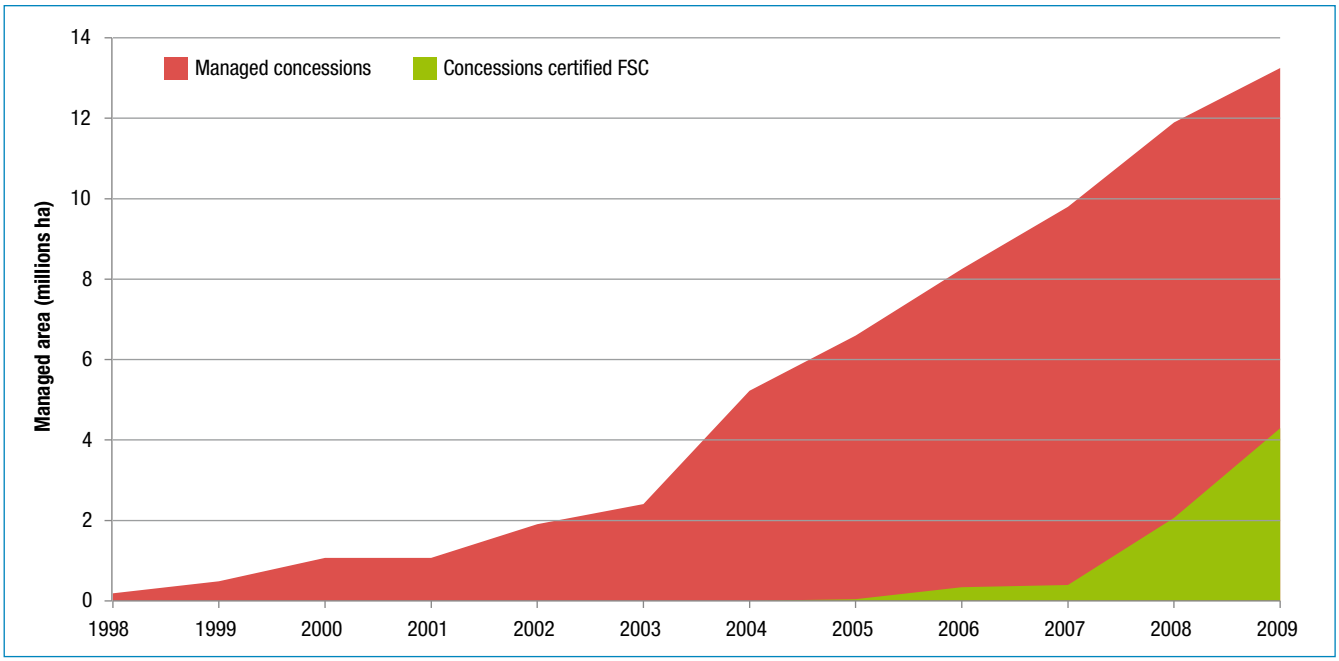
Equator Principles (EP) www.equator-principles.com
The Equator Principles are a risk management framework adopted by financial institutions (80 as of 01 January 2015; abbreviated as EPFIs) to determine, assess and manage environmental and social risk in projects and are primarily intended to provide minimum standards for due diligence in support of responsible decision-making. The Equator Principles apply to all new Project Finance transactions globally with total project capital costs that exceed US$10 million, and across all industrial sectors. The EP were jointly developed by international banks, and are based on the IFC Performance Standards on Social and Environmental Sustainability and on the World Bank Group's Environmental, Health, and Safety Guidelines. They were launched in 2003 (EP I) and were updated in 2006 (EP II) and 2013 (EP III). The Principles recognize the importance of climate change, biodiversity, and human rights, and that negative impacts of projects on ecosystems, communities, and climate should be avoided where possible, and if impacts are unavoidable they should be minimized, mitigated and/or offset. Financial institutions which adopt the EP commit to implementing them in their internal environmental and social policies, procedures and standards for financing projects and will not provide Project Finance or Project-Related Corporate Loans to projects where the client will not, or is unable to, comply with the EP. In the West and Central Africa region, three financial institutions have adopted the Equator Principles: Access Bank Plc and Fidelity Bank in Nigeria, and Ecobank Transnational Limited in Togo.

8.10 Sustainability standards

A number of sustainability standards (and certifications) have emerged in recent decades aimed at encouraging companies to demonstrate to consumers their compliance with international environmental sustainability metrics. Such standards are invariably voluntary, and often originate through NGO initiatives. Certification is usually undertaken by independent third parties.

Business and Biodiversity Offsets Programme (BBOP) http://bbop.forest-trends.org/
BBOP is an international collaboration between companies, financial institutions, government agencies and civil society. BBOP aims to present an internationally accepted standard on biodiversity offsets, and in 2012 proposed a formal Standard on Biodiversity Offsets (Business and Biodiversity Offsets Programme 2012). The standard is presented as a hierarchy of Principles, Criteria and Indicators (PCI), similar to the approach used in a number of sustainability

Figure 8.6 Evolution of managed areas with FSC certification in Central Africa (source: Bayol *et al*. 2012)



standards, such as the Forest Stewardship Council and the Roundtable for Sustainable Palm Oil (see Section 8.10). The BBOP Standard is intended to offer companies a means to demonstrate that they comply with the IFC's PS6.

Extractive Industries Transparency Initiative (EITI)
www.eiti.org
EITI is a worldwide coalition of governments, companies and civil society organizations aiming to promote transparency and accountability in the extractive industries sector. The EITI Standard, approved in 2013, requires full disclosure of all payments and taxes made by oil, gas and mining companies to governments. Details are contained in an annual EITI Report that is open to all (www.data.eiti.org). The EITI Standard further requires that Reports are comprehensible and actively promoted. The EITI Standard sets out the requirements that countries must meet in order to be recognised first as an EITI Candidate, and then an EITI Compliant country. The Standard is overseen by an international Board, whose members come from governments, companies and civil society. In West and Central Africa, 14 countries are EITI compliant (Burkina Faso, Cameroon, Côte d'Ivoire, Democratic Republic of Congo, Ghana, Guinea, Liberia, Mali, Mauritania, Niger, Nigeria, Republic of Congo, Sierra Leone, Togo); two are Candidate members (Chad, Senegal) and one, Central African Republic, is currently suspended due to political instability following the coup d'état in 2013.

Forest Stewardship Council (FSC) www.fsc.org
FSC is an international association of members established in 1993 (by WWF and other NGOs) to promote responsible management of the world's forests through setting standards, and certification and labelling of forest products. FSC has 10 Principles and associated Criteria (FSC P&C) that form the basis for all FSC forest management standards and certification. Use of the FSC logo is intended to signify that the product comes from responsible sources, defined as environmentally appropriate, socially beneficial and economically viable. FSC-Watch is a website critical of FSC concerned about what is perceived as the erosion of the FSC's reliability and credibility. Its website offers a wide range of extensive and detailed criticisms of FSC. In Gabon, the most country-specific important sites for African Elephants were the national parks and their surroundings, which were often FSC-certified logging concessions. Similarly, in Republic of Congo, about half of the north of the country, including not only the National Parks of Odzala and Nouabale-Ndoki (and Ntokou-Pikounda National Park) but several huge areas of FSC-certified timber concessions that connect and surround these Parks, were key for surviving elephants (Maisels *et al*. 2013).

Roundtable on Sustainable Palm Oil (RSPO)
www.rspo.org
Membership-based, Swiss-registered association established in 2004 to advance the production, finance and use of sustainable palm oil products, and to develop, credible global standards and monitor and evaluate environmental and social impacts of sustainable palm oil. The *RSPO Principles and Criteria for Sustainable Palm Oil Production (Including Indicators and Guidance* (revised Nov 2013) are global guidelines for sustainable production of palm oil. At present, three countries in the region have approved members: Ghana (five members); Côte d'Ivoire (one) and Liberia (one). Ghana was the first country in Africa to have its National Interpretation (NI) of the Roundtable on Sustainable Palm Oil (RSPO) Principles and Criteria for sustainable palm oil approved.

8.11 Conclusions

A multitude of institutional responses are in place or operating to mitigate wildlife declines in the region, including considerable NGO engagement and multilateral and bilateral investment. However, despite this, the meagre evidence available indicates that such investments are noticeably lower in West and Central Africa compared with elsewhere on the African continent. For multi-lateral aid, which accounts for the largest proportion of biodiversity aid, a key determining factor may be a poor historical track record of delivering on implementation – as evidenced by poor scores in the GEF Performance Index that may be compromising allocations. Efforts to improve implementation and project delivery in-region would have the direct likely benefit of contributing to an improvement in individual GPIs and thereby possibly increasing indicative allocations. For philanthropic investment, at least for a single species-focused mechanism considered here, low rates of investment in the region have much to do with low rates of proposals received and (with few exceptions) less to do with prejudice or bias in proposal acceptance rates. This suggests an opportunity to attract additional funding to projects in-region *provided* compliance with donor requirements.

9. Conclusions

This Situation Analysis was undertaken because a range of Resolutions highlighting the serious plight of large mammals was passed at the 5th World Conservation Congress in Jeju, Republic of Korea, during September 2012. The Situation Analysis provides a holistic review of the status of these species (and other medium and large terrestrial and freshwater vertebrates) across West and Central Africa. It also reviews information on sites, pressures, legislation, the effectiveness of protected areas, and both community-based incentives for conservation and institutional responses. It draws on published literature, unpublished reports and global databases (e.g. those on protected areas and legislation) and information provided in response to both a request from the IUCN Director General for input and an open consultation on a draft.

The analysis shows clearly that the issues highlighted in the Resolutions are reflective of the serious situation facing wildlife throughout the region. The specifics, in terms of the detail of wildlife declines, their drivers and the nature of responses to the declines, vary from country to country and between West Africa and Central Africa. The overriding conclusion, however, is of substantial wildlife declines and weak responses to either long-standing pressures that have been significant for decades or rapidly escalating pressures that have emerged in recent years. Species extinctions have been recorded nationally and, in extreme cases, from the region as a whole (Black and White Rhinoceros) and even globally (Scimitar-horned Oryx). More are predicted to follow at all levels.

All countries have signed up to global conventions concerning nature and there have been significant bilateral institutional responses to the region's declines, such as those led by the European Union and the United States of America. Nonetheless, the deterioration in the status of wildlife and its habitat shows no sign of halting. CITES has suggested that few of the countries have appropriate legislation in place and reports to the Convention on Biological Diversity, including its Programme of Work on Protected Areas, demonstrate a range of challenges in meeting international obligations. Indeed, protected areas offer clear examples of the difficulties that exist both in meeting these global targets and also in ensuring that they deliver the conservation benefits intended. The region as a whole is falling short of the international protected area coverage target (not to mention nationally set targets where these exist) and, even where coverage targets have been met, many key sites for wildlife are not protected.

Improving the effectiveness of the region's protected areas could have a substantial impact on the survival prospects of its wildlife and its habitat. Whilst there have been assessments of the effectiveness of the management of protected areas and other sites, these have limited value unless steps are taken to improve effectiveness where it has been shown to be lacking. Repeat assessments are then needed so that the impact on effectiveness of changes can be determined, including where effectiveness is deteriorating.

Wildlife and their habitats may seem low on a political agenda that lists war, civil unrest, poverty and corruption amongst more apparently immediate concerns. In some cases, however, competition for these habitats, and other natural resources, is a source of tension that involves unrest and corruption and exacerbates poverty. These may result in the extremely degraded status of these resources or from competing demands to exploit them (e.g. externally driven commercial drivers versus customary and other use by local communities). The increasing globalization of resource use in West and Central Africa means that current and future pressures on wildlife and their habitats are likely to be notably different, and far greater than, has been the case in the past. Given the plight of wildlife, especially in West Africa, where forest loss has been extensive with attendant declines in animal populations, the scale of these pressures suggest that extinctions will happen unless there is action of some sort.

Mining, and extraction of other natural resources, is a significant and seemingly escalating pressure across the region. There is guidance that, if followed, should reduce substantially the impact of extractive activities. Of special note is the International Finance Corporation's Performance Standard 6 on Biodiversity Conservation and Sustainable Management of Living Natural Resources (widely known as IFC PS6). This guidance has been designed to ensure that the potential damage to biodiversity is assessed and then mitigated in proportion to the scale of the impact. It has been incorporated into the Equator Principles, a credit risk management framework for determining, assessing and managing environmental and social risk in projects in all industrial sectors, including extractive industries. More than 80 financial institutions in 34 countries have adopted these principles and a Biodiversity Working Group is in place. If these, and potentially other innovative approaches, can be implemented, then well designed and properly managed extractive concessions could make a positive contribution to wildlife.

This all suggests that the forces acting in West and Central Africa are significant and are likely to require large scale and concerted responses. There are processes in place, but these require consolidating and gaps filling. For example, would ratification of the African Convention on the Conservation of Nature and Natural Resources that was agreed in 2003 add impetus to regional conservation efforts, or not? Then there is a need to put mechanisms in place so that these processes, whether they are legal or bilateral or community-based programmes, are effective.

A major challenge in the collation of information for this Situation Analysis, especially on sites, has been the lack of

alignment, consistency and attribution of sources within and between databases that are seen as global standards. All of this leads, in turn, to a lack of confidence that the data present accurate and up-to-date descriptions of these globally important sites. The site-based databases consulted during this analysis include the World Database on Protected Areas (WDPA) and those for Ramsar Sites, World Heritage Sites, Important Bird and Biodiversity Areas and the Alliance for Zero Extinction. Determining which sites have formal legal protection that is defensible if contested legally requires authoritative documentation of legal status, date of gazettement, extent, boundaries and IUCN management category. Furthermore, some sites list other species (e.g. 'important mammals' are listed for Ramsar Sites) and the sources of this information and an indication of how systematically all sites have been covered would benefit from greater clarity. The relationship between the sites on the above lists should also be made clear (e.g. where a nationally protected area partially overlaps with an Important Bird Area or is part of a larger Ramsar Site). It is hoped that the new emerging standard to identify Key Biodiversity Areas will help address some of these data gaps and inconsistencies and further allow much easier assessment of the requirements and benefits of site-based action.

There is a similar challenge with legislation and assessing which legal texts are actually in force, especially where there is a need for separate implementing legislation that states how the law will be applied or where there have been full or partial revisions to the legislation. This is likely to prove increasingly important given the range of global commitments that countries have made and the dynamic nature of global drivers on wildlife in the region.

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Chapter 2

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