



# Regional Action Plan for the Conservation of Western Lowland Gorillas and Central Chimpanzees 2015–2025



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International Union for Conservation of Nature





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## EXECUTIVE SUMMARY

Most of the world's gorillas and about one-third of all chimpanzees live in Western Equatorial Africa. The Endangered central chimpanzee *Pan troglodytes troglodytes* and the Critically Endangered western lowland gorilla *Gorilla gorilla gorilla* inhabit the rainforest of six countries: Angola (Cabinda enclave), Cameroon, Central African Republic, Equatorial Guinea, Gabon and the Republic of Congo. These great apes are undergoing a dramatic decline due to poaching, disease and habitat loss, driven by demands for bushmeat, a lack of law enforcement, by corruption, and by increased access to their once-remote habitat. More recently the forest itself has come under threat from the expansion of industrial agriculture, which will result in massive losses of great ape habitat unless rapid, targeted action is taken. Conservation strategies and actions must be designed to respond to these pressures to maintain great ape populations at their present numbers.

This document is the product of the second regional workshop on conservation planning for the two subspecies of great ape, which brought together senior representatives of the wildlife authorities in the six range states, protected area managers, NGOs, scientists, wildlife health experts, industry representatives and donors. These stakeholders assessed great ape conservation needs for the next 10 years, building on an action plan published in 2005, to develop a new plan of action that will serve as a guide for range-state governments, donors and conservation organisations to target conservation investment in the region.



Participants of the 2013 great ape conservation workshop in Brazzaville, Republic of Congo

New survey data, collected between 2003 and 2013, were used to verify, refine and re-assess priority areas for great ape conservation. Statistical modelling of the survey data was used to create predicted density maps for the entire geographic range of central chimpanzees and western lowland gorillas. Priority landscapes were then delineated using a decision support tool and a suite of criteria that included the presence of an existing or planned protected area and a great ape population of at least 2,000 individuals (gorillas and chimpanzees together). The results produced 18 priority conservation landscapes (see Table 1), six of which were classified as being of exceptional priority as they each harbour more than 5% of the total number of great apes in the region (i.e., 5% of the global population of western lowland gorillas and central chimpanzees). One landscape was classified as an 'Ebola recovery priority' and another was classified as a 'survey priority'. The total area of the 18 landscapes is 51% of the range of these two taxa, but holds over 77% of the individual great apes. Protected areas alone hold only 21% of these great apes, further underlining the need for effective management and protection of large areas outside formally protected areas in order to maintain their populations.

The action plan lays out a conservation strategy for gorillas and chimpanzees in Western Equatorial Africa. This geographic range covers 655,800 km<sup>2</sup> and the suitable habitat grades from gallery forests at the savannah edge through swamp, lowland *terra firma* and submontane forests. Low birth rates, long periods of infant and juvenile dependence, and late age of maturity mean that great apes are slow to recover from population reduction events when compared to the faster-breeding ungulates and smaller primates with which they co-exist. Since they are threatened with

Table 1. Priority landscapes for western lowland gorilla and central chimpanzee conservation (presented alphabetically within each landscape category). Great ape population size classes: 1 = 2,000–5,000, 2 = 5,000–10,000, 3 = 10,000–20,000, 4 = 20,000–50,000, 5 = 50,000–100,000, 6 = >100,000. See page 9 for definitions of each category of priority landscape.

#	EXCEPTIONAL	Country	Area (km <sup>2</sup> )	Great ape population size class	Protected areas within landscape
1	Birougou-Batéké-Zanaga	Gabon & Congo	42,760	4	Birougou NP, Batéké NP, proposed Ogooué-Leketi NP
2	Lac Télé-Likouala	Congo	16,165	4	Lac Télé Community Reserve
3	Lopé-Waka	Gabon	26,515	4	Lopé NP, Waka NP
4	Monte Alén-Monts de Cristal-Abanga	Eq. Guinea & Gabon	30,510	4	Monte Alén NP, Estuario del Muni Natural Reserve, Monts de Cristal NP
5	Odzala-Lossi-Ngombe-Ntokou-Pikounda	Congo	52,200	6	Odzala-Kokoua NP, Ntokou-Pikounda NP, Lossi Gorilla Sanctuary
6	Sangha Trinational	Cameroon, CAR & Congo	37,310	5	Lobéké NP, Nouabalé-Ndoki NP, Dzanga-Ndoki NP, Dzanga-Sangha Special Reserve
	<b>IMPORTANT</b>				
7	Belinga-Djoua-Mwagna	Gabon	8,900	2	Mwagna NP
8	Boumba-Bek-Nki	Cameroon	10,150	3	Boumba-Bek NP, Nki NP
9	Conkouati-Mayumba	Congo & Gabon	10,030	3	Mayumba NP, Conkouati NP
10	Deng Deng	Cameroon	2,750	2	Deng Deng NP
11	Dja	Cameroon	13,205	3	Dja BR
12	Ivindo	Gabon	16,350	3	Ivindo NP
13	Loango-Moukalaba-Doudou	Gabon	19,020	2	Loango NP, Moukalaba-Doudou NP
14	Ngoyla-Mintom-Kom-Mengamé	Cameroon	14,100	2	Kom NP, Mengamé Gorilla Sanctuary
15	Río-Campo-Ma'an	Eq. Guinea & Cameroon	5,030	1	Río Campo Natural Reserve, Campo Ma'an NP
16	Souanké-Sembe	Congo	14,535	3	Messok Dja proposed PA
	<b>EBOLA RECOVERY</b>				
17	Minkébé	Gabon	13,000	2	Minkébé NP
	<b>SURVEY PRIORITY</b>				
18	Maiombe-Dimonika	Angola & Congo	7,080	3	Maiombe NP, Dimonika BR

# Priority landscape numbers, which correspond with numbers in section 4: Priority landscapes and site-specific actions for western lowland gorilla and central chimpanzee conservation

extinction, great apes are completely protected by national and international laws in all countries of their range, and it is, therefore, illegal to kill, capture or trade in live apes or their body parts. Nonetheless, chimpanzees and gorillas are killed by opportunistic poachers, typically to supply an illegal and elitist commercial trade in bushmeat ‘delicacies’. Poaching and disease have been responsible for considerable declines in great ape numbers in the region over the last few decades. Of particular note in Africa was the loss of over 90% of the great apes inhabiting a vast swathe of land stretching from northeastern Gabon to western Congo as a result of successive Ebola virus disease outbreaks between the 1990s and 2005. Population losses from poaching are due to large numbers of people having access to previously remote ape habitat, facilitated by the construction of open access roads or railroads associated with logging and mining. Infrastructure development generally takes place without regulation and enforcement of reduced impact procedures, and has severe impacts on the environment in terms of habitat loss and degradation and on the wildlife, the populations of which are severely impacted by poaching or displacement. At the same time, however, the region offers useful best practices from pioneering examples of successful collaboration with the private sector in minimizing negative impacts of extractive industry on great apes—including the creation of protected areas through biodiversity offsets and private-public partnerships for wildlife management in logging concessions. Now the region is also attracting agroindustries, especially palm oil and rubber producers, and the destruction of natural forest to make way for crops will have a profound effect on great apes and other forest-dwelling species. In addition, the



arrival of a large labour force to work in the plantations creates additional pressures on the environment. Careful, integrated land-use planning will be vital to minimise the impacts of new industries on wildlife and the functionality of the region's forests.

Over the next decade, the main actions needed to ensure the survival of great apes in Western Equatorial Africa will be (i) law enforcement in conjunction with improved regulations and sanctions; (ii) careful, holistic national and regional land-use planning; and (iii) outreach to and sensitisation of all sectors that deal with land and the protection of natural resources: law enforcement and judiciary, protected area staff, mining, logging, and agricultural industries, tour operators, and local communities. Avoidance of disease transmission from humans to apes can be achieved with outreach and regulations. Avoidance of Ebola in great ape populations is still out of reach, but steps to enhance our understanding of the virus will greatly improve our ability to either mitigate or adapt conservation interventions accordingly. At the same time the monitoring of law enforcement efforts, great ape population abundance and distribution, and disease prevalence in vulnerable locations will allow adaptive and more effective management by national wildlife agencies and protected area authorities. Maintaining large, intact and well-protected areas of forest will be key to maintaining great ape populations in the long term, and this can only be done by a combination of the actions detailed in this plan.

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## 1. INTRODUCTION

Most of the world's gorillas, and around a third of all chimpanzees, live in the Central African tropical humid forests bounded to the south and east by the Congo River and to the north by the Sanaga River in Cameroon. This action plan focuses on the western lowland gorilla, *Gorilla gorilla gorilla*, and the central chimpanzee, *Pan troglodytes troglodytes*. These two great ape subspecies are sympatric over 99% of their geographic range, which comprises all of the forests in Equatorial Guinea, Gabon and the Republic of Congo (hereafter referred to as Congo), plus the Cabinda enclave of Angola, southeast Cameroon (south of the Sanaga River) and southwestern Central African Republic (CAR); a total of over 655,800 km<sup>2</sup> (Fig. 1). We refer to this region as Western Equatorial Africa<sup>1</sup> (cf. Oates 1986).

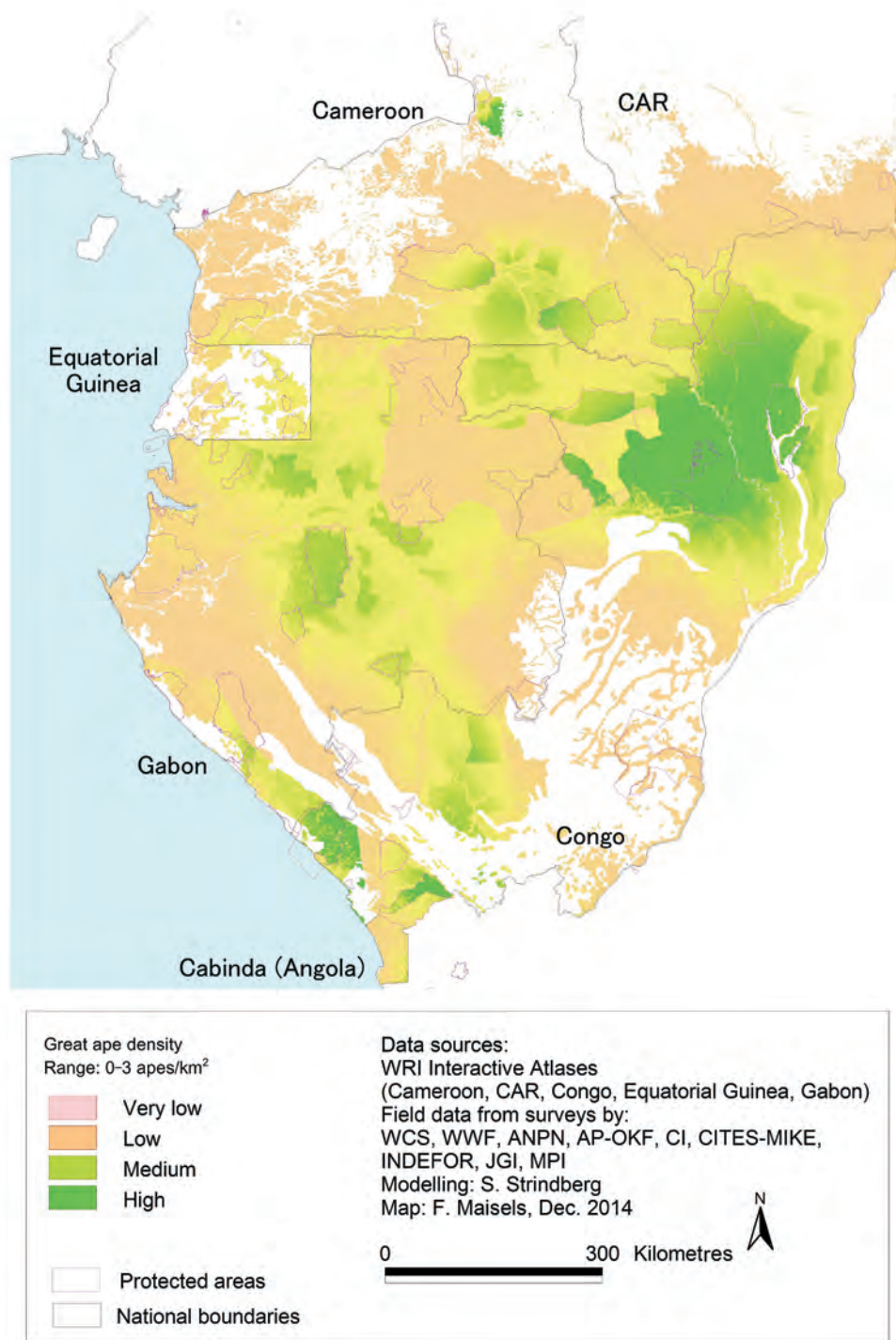
Central Africa has one of the lowest human population densities of any tropical forested area in the Old World. Even so, the great ape populations in this region have been undergoing dramatic declines since the 1970s. This is largely due to three direct threats (those which remove individuals directly from the population): poaching, disease and habitat loss. Indirect threats (which contribute to the direct threats) include increasing demands for bushmeat, lack of law enforcement, corruption, poor governance, and vastly increased access to once-remote forests along networks of logging roads. More recently the forest itself has come under threat from the expansion of industrial agriculture, which will result in massive losses of great ape habitat unless rapid and targeted action is taken. Conservation strategies and actions must be designed to respond to these pressures if great ape populations are to be maintained.

The first action plan for these two subspecies (Tutin *et al.* 2005) was developed using the same participatory approach as this revised plan. Based on knowledge at the time, 12 priority areas were identified, covering in total about 178,000 km<sup>2</sup>. These areas were considered to harbour the largest populations of great apes in the protected area complexes of highest importance for biodiversity conservation. Two other areas were earmarked for surveys to determine whether they should be listed as priorities. Specific conservation management activities were outlined for each area, together with potential partners to implement the activities, and corresponding budgets for implementation. Many were open-ended activities, such as maintaining protection through anti-poaching patrols, monitoring the status of populations and health monitoring. Other activities,

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<sup>1</sup> A small population of central chimpanzees persists in the Mayombe of southwestern Democratic Republic of Congo (DRC), but DRC was not included in the analysis

Figure 1. Model of great ape population density across Western Equatorial Africa



such as creating new protected areas and finalising their legal status, had a specified timeframe. Most of the actions proposed were implemented between 2005 and 2013 (Maisels *et al.* 2013a).

Since 2005, four protected areas have been gazetted specifically to protect their great ape populations (i.e., Deng Deng and Kom National Parks in Cameroon, Ntokou-Pikounda National Park in Congo and Maiombe National Park in Angola), and another has been increased in size (Nouabalé-Ndoki National Park in Congo). In addition, two priority areas for great apes have been inscribed as World Heritage Sites: Lopé-Okanda National Park in Gabon and the Sangha Trinational, shared by Cameroon, CAR and Congo.

During the past decade, wildlife surveys in a large number of sites have provided new data on the status of gorillas and chimpanzees across the region. This dataset was analysed in 2013–2014 to predict density and distribution across the range of these two taxa, and has been used to select priority landscapes for conservation. Key drivers of great ape distribution and density, identified in the analysis, contributed to formulating the actions and strategies needed to conserve western lowland gorillas and central chimpanzees.



Chimpanzees of the Goulougo Triangle in Nouabalé-Ndoki National Park, Republic of Congo © Ian Nichols

## Western Equatorial Africa (WEA) in Context

The last decade has seen increasing political support for wildlife and environmental issues in Central Africa. A number of regional agreements and initiatives provide an important context for forests and conservation. These include the [Central Africa Regional Programme for the Environment \(CARPE\)](#), a regional programme funded by the [United States Agency for International Development \(USAID\)](#) to improve natural resource governance in the Congo Basin by building national and regional capacity to promote biodiversity preservation and reduce deforestation. The Central Africa World Heritage Forest Initiative (CAWHFI)<sup>2</sup> is tasked with supporting transboundary wildlife protection efforts in key landscapes by providing vital equipment and critical funding to support anti-poaching efforts. The Central African Protected Areas Network (RAPAC)<sup>3</sup> aims to enhance effective collaboration and improved governance and management in and around protected areas by promoting effective biodiversity protection and sustainable resource management. The *Programme d'Appui à la Conservation des Ecosystemes du Bassin du Congo* (PACEBCo)<sup>4</sup>, an initiative of the [Central African Forests Commission \(COMIFAC\)](#) and the African Development Bank (AfDB), aims on one hand to strengthen the capacity of institutions in charge of biodiversity preservation, and on the other to improve livelihoods by integrating ecological, social and economic factors into ecosystem management.

As international attention has become increasingly focused on the illegal trade in wildlife, more powerful wildlife protection bodies and international cooperation initiatives for addressing wildlife crime have been created. These include the [International Consortium on Combating Wildlife Crime \(ICWC\)](#) coordinated by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), INTERPOL, the United Nations Office on Drugs and Crime (UNODC), the World Bank and the World Customs Organization (WCO). The Wildlife Justice Commission, a Hague-based international wildlife criminal court due to launch in December 2014, aims to reduce trafficking of threatened species by holding governments accountable for failing to take action against, and often contributing to, wildlife crime.

At the regional scale, the [Plan d'action sous-régional des pays de l'espace COMIFAC pour le renforcement de l'application des législations nationales sur la faune sauvage \(PAPECALF\)](#), is an action plan for wildlife law enforcement created in 2012 and adopted by COMIFAC. The plan proposes National Coordination Units to bring together inter-ministerial participation, including not only the forestry and environment ministries, but also justice, police, military and customs authorities. The aim is to help these ministries coordinate and oversee important field-level operations, judiciary reinforcement and niche activities. The [Economic Community of Central African States \(CEEAC\)](#) has recently supported the establishment of the *Projet de plan d'urgence de lutte anti-braconnage* (PEXULAB). This is an emergency project that will mobilise trained paramilitary troops to fight the highly organized poaching networks.

<sup>2</sup> Managed by UNESCO and initially funded by the United Nations Foundation (UNF), French Facility for Global Environment (FFEN), and the European Commission <http://whc.unesco.org/en/cawhfi/>

<sup>3</sup> Funded primarily by the European Commission <http://www.rapac.org/>

<sup>4</sup> Funded by AfDB, the African Development Fund and the CEEAC



Ecoguard checking a timber lorry on a logging road in northern Congo © David Wilkie



Additional capacity to combat wildlife crime came with the creation of national protected area agencies in both Gabon and Congo—the *Agence Nationale des Parcs Nationaux* (ANPN) and the *Agence Congolaise de la Faune et des Aires Protégées* (ACFAP)—the introduction of new software tools such as [SMART](#) (see Box 3), increases in protection personnel, guard posts and vehicles throughout the region,

and the expansion of the [EAGLE Network](#).

In 2008, gorilla conservation was in the spotlight when the Convention for Migratory Species (CMS) negotiated a ‘Gorilla Agreement’—a high-level, legally-binding framework for maintaining gorilla populations and habitats, which requires that range states report to the United Nations (UN) on the conservation status of gorillas and actions taken to preserve them. Subsequently, the UN declared 2009 the [Year of the Gorilla](#) and was instrumental in drawing up the ‘Frankfurt Declaration on Gorilla Conservation’—a statement of common purpose for gorilla conservation (CMS 2009).

Major obstacles to, and opportunities for, great ape conservation in WEA are summarised in Table 2, while Figure 2 presents the current context of gorilla and chimpanzee conservation in the region.

Table 2. Obstacles and opportunities for effective conservation of western lowland gorillas and central chimpanzees

Obstacles	Opportunities
No effective solution has yet been found to prevent further Ebola epidemics.	Vast tracts of good quality ape habitat, relatively low rates of deforestation and low human population density. Thus, this region has the potential to maintain its great apes and other wildlife species in the long term.
Previously remote forests outside protected areas are being logged or mined. This has created higher human densities than the forest can support due to a combination of in-migration to the industries and new road networks that provide access and transport. The result has been increased poaching of great apes. Investment in law enforcement has been lacking, while evidence of corruption and complicity is mounting.	The protected areas of the region are generally uninhabited, most have some active protection (e.g., ecoguards) and are large enough to maintain viable great ape populations. If managed well, they are vital for great apes. There are excellent opportunities for public-private partnerships in lands surrounding protected areas.
Plans are underway for the conversion of large areas of forest to industrial agricultural plantations, especially oil palm. This will lead to habitat loss for great apes and other wildlife on an entirely new scale. The need for agricultural workers will also often lead to in-migration adding agricultural and hunting pressure.	Some national land-use planning and high conservation value (HCV) approaches have been adopted in recent years in some of the great ape range states. Strict land-use planning that incorporates a strong conservation component and great ape-friendly practices have the potential to reduce habitat loss and curtail poaching, avoiding isolation of great ape populations in forest ‘islands’.
National management, law enforcement, research and monitoring capacity remain generally weak. An entrenched problem is that of corruption in the legal system.	Opportunities exist to provide ongoing training (both in formal taught courses and ‘on the job’) to improve capacity to effectively manage natural resources. Examples include the training courses run in the Garoua Wildlife College, and partnerships between African universities and the <i>Complexe Educatif Docteur Alphonse Mackanga Missandjou</i> ( <a href="#">CEDAMM</a> ). The <a href="#">EAGLE Network</a> approach to addressing poor governance by increasing arrests of traffickers and prosecutions has proven helpful in four WEA countries.



## Regional Conceptual Model for Western Lowland Gorillas and Central Chimpanzees

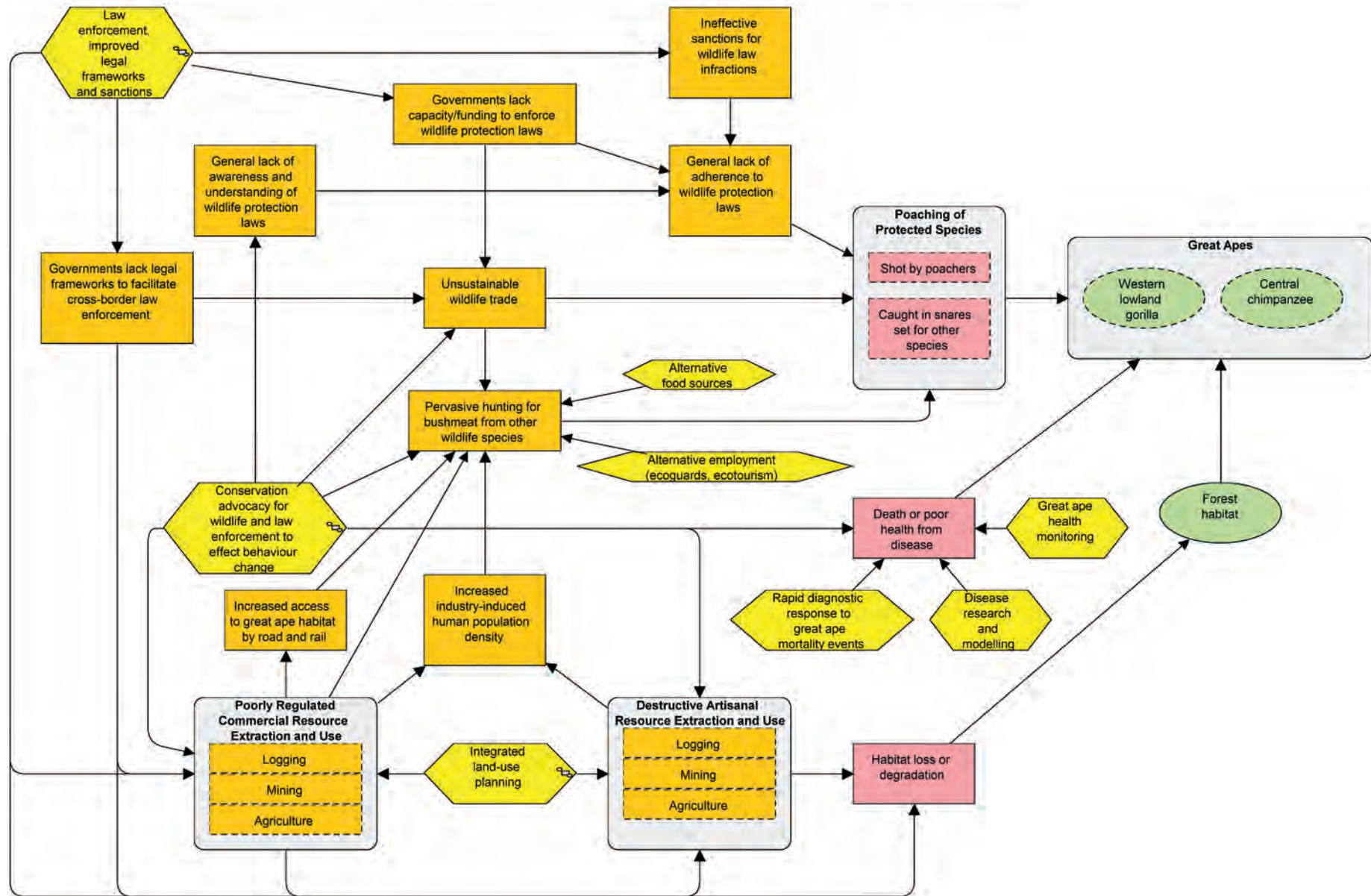


Figure 2. The current conservation situation for western lowland gorillas and central chimpanzees, showing the relationships between conservation targets (in green), direct threats (pink), contributing factors (also known as indirect threats, in orange) and conservation strategies (yellow)

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## 2. IDENTIFICATION OF PRIORITY LANDSCAPES

A decade ago, few western lowland gorilla and central chimpanzee populations had been surveyed, and their numbers were poorly known. Participants at the 2005 workshop therefore relied on their specialist knowledge of many sites to devise a ranking system that combined three types of information: First the survey-based or suspected size of any particular great ape population, second the size of the area where that population was found, and third a measure of general conservation importance based on biological integrity, diversity and threats in each site (WWF 2003).

The approach adopted at the 2013 workshop benefited from a vastly increased knowledge base. Most protected areas and many of the larger logging concessions in the region of interest were surveyed between 2003 and 2013 (58 sites). Many of these sites were surveyed two or more times, thus data from 82 separate surveys were available for analysis. Most of these surveys (72) used line-transect methods; the remainder were based on 'recce' survey methods (see Kühl *et al.* 2008; Maisels *et al.* 2008). The nests of gorillas and chimpanzees can be distinguished *post hoc* if adequate data on nest features have been collected (Sanz *et al.* 2007). Over 7,000 chimpanzee nests and more than 12,100 gorilla nests were differentiated in the dataset spanning the 2003–2013 period and these were used as a proxy for estimating gorilla and chimpanzee abundance. The nest data modelling analysis investigated the known and suspected drivers of gorilla and chimpanzee density and distribution. These drivers included (i) proximity to roads, human population density, location of known Ebola outbreaks, and whether or not gorillas and chimpanzees are hunted as food; (ii) biological information such as forest canopy height, altitude and slope; and (iii) management features such as the presence or absence of ecoguards. The models were used to predict the density and distribution of western lowland gorillas and central chimpanzees across their range (full details of the analysis will be published in Strindberg *et al.* in prep.).



In pursuit of honey, a chimpanzee cracks open a beehive in the crevice of a tree using a half dozen sticks of varying sizes. Such 'honey pounding' is a learned behaviour that has only been observed in the Goualougo Triangle © Ian Nichols



Using these predicted gorilla and chimpanzee density maps (Fig. 1), the Marxan decision support tool (Ball *et al.* 2009)<sup>5</sup> was run to help delineate priority landscapes. Marxan is a spatially explicit optimization tool that has been used widely to identify priority areas for conservation (Airame *et al.* 2003; Watson *et al.* 2011). The objective was to identify the smallest surface area containing a given target level of each of the great ape species. ‘Solutions’ were sought within 42 predefined blocks, using an existing or planned protected area (PA) in these blocks as anchors for the potential priority landscape: in other words the PA was always included and the priority landscape was built around an existing or proposed PA<sup>6</sup>. Blocks were defined to provide contiguous areas for management purposes<sup>7</sup>, and thus did not contain impassable rivers or national roads with heavy traffic<sup>8</sup>. Only blocks with an estimated minimum number of 2,000 great apes were considered by Marxan when searching for areas that could be included in the set of priority landscapes (the exceptions are the PAs that fall within such blocks, which are automatically included in the landscape). The priority landscapes were delineated using the block-based ‘solutions’ provided by Marxan. Occasionally, priority landscapes lie in more than one block and cross national boundaries, where this is more efficient for management (e.g., the Sangha Trinational, which straddles three countries but is managed as a unit).

One of the outputs Marxan provides is a measure of an area’s ‘irreplaceability’ in an efficient conservation network. Irreplaceability is a measure of an area’s conservation value or the likelihood that it will be included in an efficient ‘solution’ (Segan *et al.* 2010). Areas that are highly irreplaceable are more likely to be required to efficiently achieve the conservation objectives. Areas with lower irreplaceability can more easily be substituted for other areas to solve the problem. Looking at the map showing the irreplaceability values produced by Marxan, one can see how the areas with high irreplaceability values form the core of the priority landscapes (Fig. 3).

Eighteen priority landscapes were identified (see Table 1 and Fig. 4). Six of them are considered to be ‘**exceptional**’ because each holds more than 5% of the total number of great apes in the region (i.e., 5% of the global population of western lowland gorillas and central chimpanzees).

Two additional categories of landscape were recognised:

An ‘Ebola recovery’ priority landscape has four defining features: (i) an Ebola outbreak occurred in an area previously known to support medium to high densities of great apes, reducing the size of the great ape population by over 90%; (ii) it includes a protected area, so the great ape population should already be protected from poaching and has a good chance of recovery; (iii) it is large, sufficient for several thousand great apes; and (iv) is connected to habitat with unaffected great ape populations that can enhance the recovery process through in-migration. Minkébé is categorized as an Ebola recovery landscape: one that had a very large great ape population in the past (Tutin & Fernandez 1984) before an Ebola epidemic swept through (Huijbregts *et al.* 2003). The landscape includes Minkébé National Park which, although needing ongoing protection from poaching, will favour recovery of the great ape population. Mwagna National Park qualifies as an Ebola recovery site, but is embedded in the Belinga-Djoua-Mwagna priority landscape, most of which has escaped the disease.

A ‘**survey priority**’ landscape is an area suspected to have a large great ape population but has never been surveyed. In 2005, the Mayombe forest of the Cabinda enclave was classified as a survey priority, and the Mayombe Transboundary Initiative (MTI) landscape, which includes

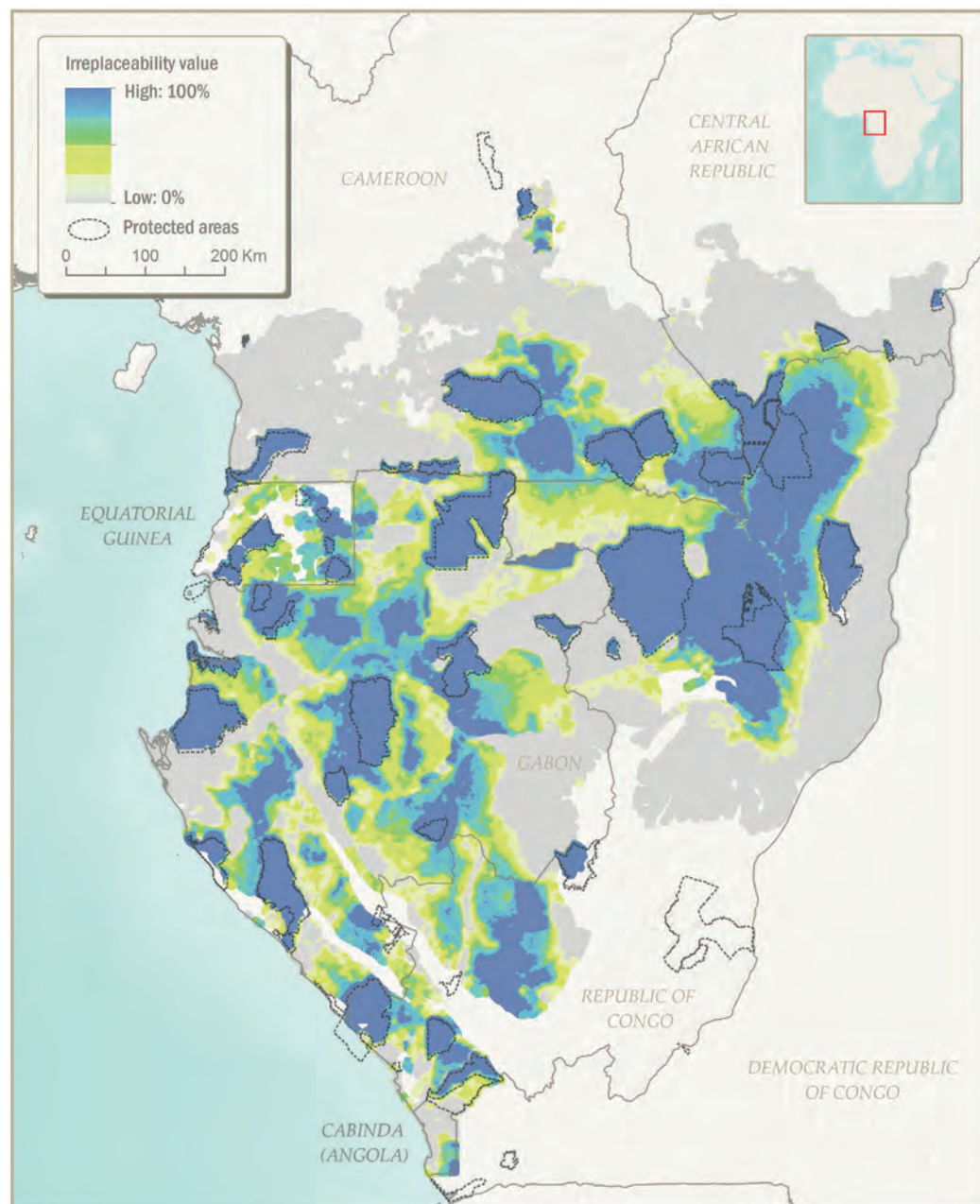
5 Developed at and maintained by the University of Queensland, and freely available on <http://www.uq.edu.au/marxan>

6 Of the priority landscapes with *existing* PAs, all but three contain one or more national parks (IUCN Category II); two encompass biosphere reserves and one includes a community reserve (Messok Dja has no existing PA but a reserve is planned).

7 The exception is the block containing the Río-Campo-Ma’an landscape, which was not split along the river that forms the national border between Equatorial Guinea and Cameroon because there is a formal agreement on transboundary collaboration between the governments of Equatorial Guinea and Gabon.

8 It has been shown that ape populations separated by rivers have been genetically distinct for hundreds of thousands of years (Anthony *et al.* 2007; Fünfstück *et al.* 2014), while forests are usually hunted out for several kilometres on either side of national roads and are subsequently avoided by wildlife.

Figure 3. Irreplaceability values generated by Marxan that were used as a basis for defining priority landscapes for great ape conservation in Western Equatorial Africa



the Maiombe National Park in Angola, the Dimonika Biosphere Reserve in Congo and the Loki Biosphere Reserve in the Democratic Republic of Congo (DRC), is now in this category.

Of these 18 priority landscapes, 14 are larger than 10,000 km<sup>2</sup> and only one is smaller than 5,000 km<sup>2</sup> in size; 17 each harbour more than 5,000 great apes; 11 had great ape densities of >1 indiv./km<sup>2</sup>; 16 >0.5 indiv./km<sup>2</sup>, and five are transboundary landscapes straddling international boundaries.

Six of the 18 are new additions to the list in that they were not identified as priorities in 2005, although one, Souanké Sembe in Congo, was identified as an area likely to be important for conservation over a decade ago. Two of the new priority landscapes are in Cameroon. One is Deng Deng, an isolated forest block at the northern limit of western lowland gorilla range, which was gazetted specifically for its important gorilla population and as a biodiversity offset. The lack of connectivity between Deng Deng and other forests in this region will provide a refuge from Ebola if the disease ever reaches southern Cameroon. The other is Ngoyla-Mintom (part of which will be gazetted as a biodiversity offset related to a nearby mining project), plus the protected areas of Kom and Mengamé. A further two are transboundary landscapes, and they form part of a mountain chain that runs from Monte Alén in Equatorial Guinea, through the Monts de Cristal and Lopé-Waka in Gabon, to the Monts de Chaillu in Congo. The last is Minkébé in Gabon, the 'Ebola recovery' landscape.



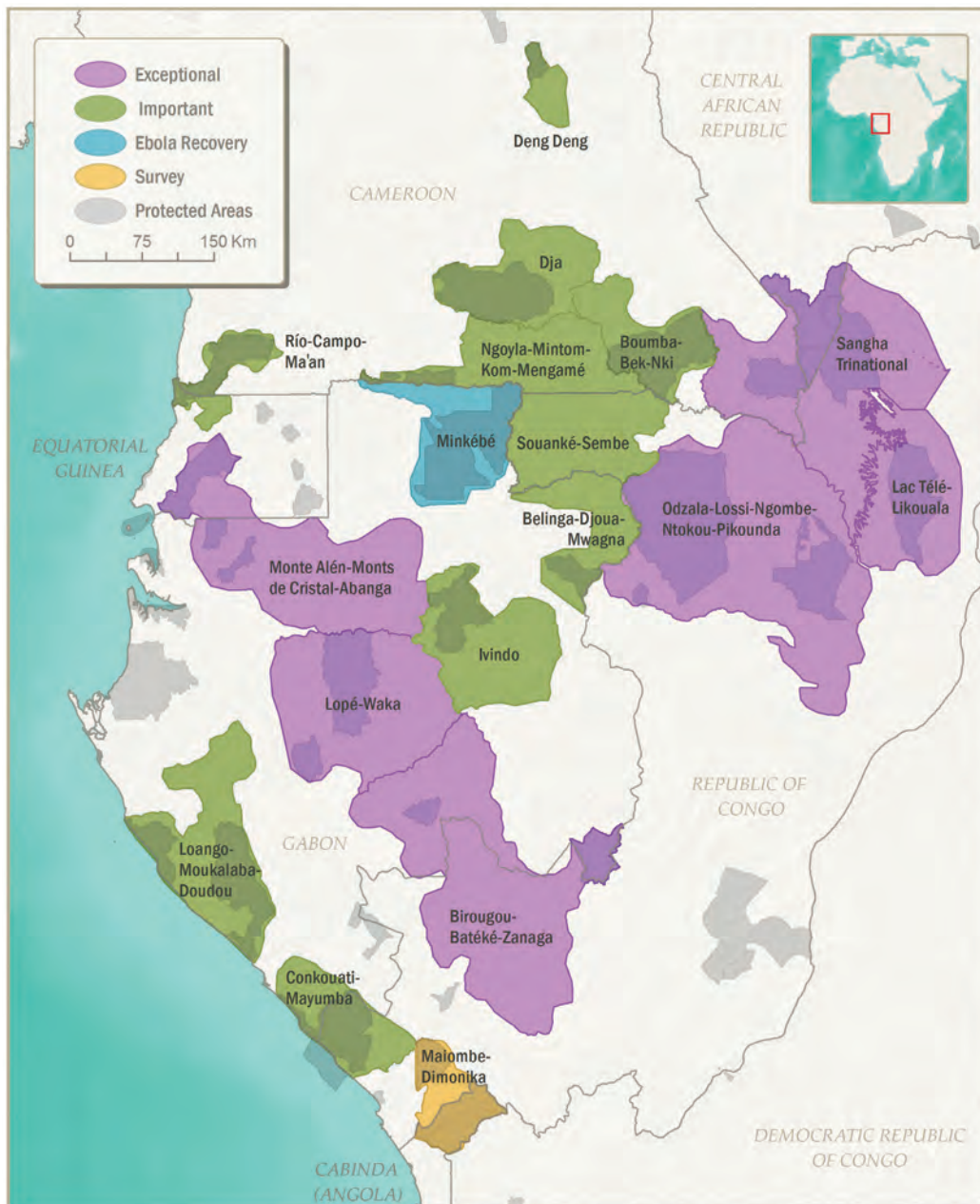


Figure 4. Priority landscapes for western lowland gorilla and central chimpanzee conservation

### 3. THREATS TO WESTERN LOWLAND GORILLAS AND CENTRAL CHIMPANZEES AND RECOMMENDATIONS FOR MITIGATION

The three direct threats to western lowland gorillas and central chimpanzees are poaching, disease and habitat loss (Tutin *et al.* 2005); the latter includes modification or clearing of forests for logging or to make way for industrial agriculture and mining. The following describes these threats and options for mitigation. Figures 5a–c are ‘results chains’ that present future desired results of the conservation strategies. The contributing factors and direct threats summarised in the conceptual model (Fig. 2) are rephrased in the results chain as intermediate results and the reductions in threats that one aims to achieve, respectively.

#### Poaching of Great Apes and the Commercial Bushmeat Trade

Throughout Africa, hunting of great apes is entirely forbidden by national laws. This legislation has been informed by the Red List of Threatened Species, on which all great apes are currently classified as Endangered or Critically Endangered (IUCN 2014a). Great apes are also listed on

CITES Appendix I and the Class A (completely protected) appendix of the African Convention on the Conservation of Nature and Natural Resources. Nonetheless, great apes continue to be killed illegally. While not specifically targeted, opportunistic poachers kill gorillas and chimpanzees to supply a commercial trade in bushmeat ‘delicacies’<sup>9</sup>. The overwhelming majority of gorillas and chimpanzees poached are killed for their meat: primates, including great apes, are eaten by most ethnic groups living in the range of western lowland gorillas and central chimpanzees, although a few ethnic groups have traditional taboos against eating chimpanzees, especially peoples living in coastal Congo, Equatorial Guinea and Gabon. There is also some medicinal use of great ape body parts (Meder 1999; Alves *et al.* 2010) and infants are occasionally captured and sold into the pet trade (Stiles *et al.* 2013); however, most live trade is likely to be a consequence of poaching for meat. The negative impact of this offtake is exacerbated by the fact that over 50% of the human populations in three of the western lowland gorilla and central chimpanzee range countries (Cameroon, Congo and Gabon) lives in towns and cities (UNDP 2014). Large mammals—including

great apes—are usually destined for urban bushmeat markets (Kuehl *et al.* 2009; Abernethy *et al.* 2013), where wealthier consumers pay much more per kilo than the people in rural communities can afford (Starkey 2004).

An analysis of data from over 100 field sites in Africa collected over a 20-year period showed conclusively that law enforcement is the factor most closely linked with persistence of great ape populations (Tranquilli *et al.* 2012). This relationship is mirrored in the wider world by the fact that protected areas with active law enforcement generally fare better than those without (Laurance *et al.* 2012).

Effective law enforcement involves site-based ecoguard patrols and local intelligence networks, together with intelligence obtained along the commercial trafficking chains, roadblocks and mobile patrols along national highways, rivers and railways, and inspection of the markets at destination. In addition, strict judicial follow-up is necessary to ensure that arrests lead to prosecution, as there is often collusion between the traffickers and law enforcers, and bribes are used to influence the legal process (see page 20). It is important to review the sanctions prescribed by wildlife laws to ensure effective dissuasion (fines, destruction of illegal firearms and confiscation of vehicles). All of these activities require recruiting, training and equipping personnel for anti-poaching, intelligence gathering, and working with the judiciary to not merely resist corruption, but also to proactively combat it. In terms of recruitment, a successful strategy has been to employ hunters as park guards, as their forest skills and courage make them ideal protection agents. A law-enforcement monitoring system, such as SMART (Box 3), is required to ensure that activities are targeted, performance is evaluated regularly, and the results of enforcement activities are used as part of an adaptive management and policy approach.

Transboundary collaboration between range countries has already improved law enforcement and should be encouraged by supporting the legal frameworks that facilitate cross-border activities. The porous borders of the region are hard to control and enable trafficking of wildlife products to the most profitable point-of-sale (often a town), irrespective of whether or not it is



Protected species body parts, including chimpanzee and gorilla heads, confiscated from illegal traffickers of West African origin who were arrested in Gabon © Conservation Justice



Gorilla and chimpanzee hands seized from a trafficker in Cameroon. Such prized items are served at traditional gatherings or used for medicinal purposes, such as enhancing virility, fertility and athletic performance © LAGA

9 In addition, some individuals die a slow and painful death when trapped or injured by snares intended for other species.



in another country. For example, hunters from Equatorial Guinea enter Gabon along the common border and carry bushmeat back to sell in urban markets. Hunters from Cameroon enter CAR, Congo and Gabon, and take bushmeat to the logging towns of southeast Cameroon, from where it can be moved to Yaoundé and Douala. Strengthening coordination of cross-border intelligence and operations will increase the number of arrests and prosecutions of wildlife criminals.

Attitudes towards the consumption of great ape meat are likely to change in the long term. There is already a gradual shift among city dwellers in Central Africa, especially the highly-urbanised nation of Gabon, where some young people are starting to view eating bushmeat as rather old-fashioned (Starkey 2004). Environmental education campaigns by NGOs have resulted in some incorporation of wildlife awareness into national curricula, but permanent change in attitudes will require sustained efforts over many years. Diverse forms of information dissemination will influence and improve attitudes towards great ape protection by the extractive industries, local authorities and communities.

### Disease

While disease is a natural component of wildlife ecology, evidence suggests that endemic diseases, including Ebola Virus Disease (EVD), can have catastrophic effects on great apes. Though much is unknown about disease impacts on ape populations, the potential long-term impacts are becoming clearer. Given the low birth rates of great apes, recovery of a population from disease-related mortality can be slow. Ryan and Walsh (2011) predicted that recovery from a single outbreak would range from five years for a low mortality event (e.g., 4% loss in a respiratory outbreak), to 131 years for a high mortality event (e.g., 96% loss in an Ebola outbreak).

EVD is arguably the greatest imminent disease threat to Central African apes. Between the mid-1990s and the mid-2000s, a series of EVD outbreaks swept through great ape populations in northeastern Gabon and western Congo. Between 2002 and 2004, a 90–95% mortality rate was estimated at two sites in the Congo–Lossi Gorilla Sanctuary and the Lokoué area of Odzala-Kokoua National Park (OKNP) (Bermejo *et al.* 2006; Caillaud *et al.* 2006); the same mortality rates in northeastern Gabon similarly greatly reduced gorilla and chimpanzee numbers between 1994 and 2004. The populations affected are only now showing signs of recovery (e.g., Maisels & Ella Akou 2013). More recently, 2005–2012, great ape abundance throughout OKNP has declined by almost half and EVD seems the likely cause (Maisels *et al.* 2013b). Although EVD affects both gorilla and chimpanzee mortality, it appears to have a greater impact on gorilla populations, possibly due to differences in their social systems.

Epidemiological modelling of the combined effects of EVD and poaching on persistence of gorillas has predicted that, under current harvest practices and using the estimated EVD epizootic rate, western lowland gorillas would undergo a 97% decline within 100 years, concluding that the control of bushmeat hunting will not be enough to prevent extinction if frequent EVD outbreaks occur (Rizkalla *et al.* 2007).

Ebola remains a threat to great apes in the whole region and to millions of people, as the 2014 epidemic in West Africa has demonstrated (WHO Ebola Response Team 2014). The vector or reservoir of the virus is strongly suspected to be bats (Pigott *et al.* 2014), but once the disease infects a great ape population, it spreads rapidly, affecting a large proportion of individuals. There is some evidence that physical and 'fear-generated' barriers (*sensu* Blake *et al.* 2008) to movement, especially large rivers and unguarded roads, slow the spread of the disease by limiting great ape movements.

A recently-discovered strain of anthrax (*Bacillus anthracis*) has caused significant mortality in chimpanzee communities (Leendertz *et al.* 2006). Yaws, a treponematoses caused by *Treponema pallidum pertenue* (which is closely related to the bacterium that causes syphilis in humans), has affected both humans and non-human primates in Africa (Lovell *et al.* 2000; Knauf *et al.* 2013). Erosive skin lesions, often severe, usually develop on the face, but progress to other regions of



Ecoguards returning from a patrol, Dzanga-Sangha Protected Areas, Central African Republic © David Greer

the body, eventually invading deeper tissues, including bone. This can result in significant physical impairment. Levréro *et al.* (2007) reported visible lesions consistent with yaws in 17% of individuals in one gorilla population in Congo. As cross-species infection may occur between humans and great apes, current disease eradication efforts in humans depend on understanding the disease in non-human primates (Knauf *et al.* 2013). Further investigations to better characterize the origin of these emerging diseases, their long-term effects on great apes and the potential for intervention are warranted (Warfield *et al.* 2014).

Other disease risks come from contact with humans in the forests. The increasing occurrence of humans in the forest (hunters, forestry and mine workers, and now an agroindustrial labour force) means that great apes are coming into ever-increasing contact with potentially infectious material, especially human excreta and food remains. Anthropogenic diseases can also be introduced through conservation-related activities such as habituation, tourism and wildlife reintroductions. Human respiratory pathogens have been isolated from gorillas and chimpanzees habituated for research and tourism (Chi *et al.* 2007; Kaur *et al.* 2008; Palacios *et al.* 2011).

Figures 2 and 5b show how various actions can reduce the probability of great ape mortality from human-borne diseases, and also how our understanding of what diseases are prevalent in an

### Box 1. Ebola Research

Identifying an Ebola Virus Disease (EVD) epizootic§ can be challenging. A review of field data associated with Ebola outbreaks has shown that the following steps are required to identify the pathogen in non-humans, identify potential sources of transmission from animals to humans, and isolate a suspected virus in an animal in outbreak situations: (i) surveillance of free-ranging non-human primate mortality and morbidity, (ii) investigation of any wildlife morbidity or mortality events as possibly holding the most promise for locating the virus or viral genome sequences, (iii) surveillance of some bat species to isolate and detect evidence of exposure, and (iv) monitoring of morbidity and mortality, along with serological studies of domestic animals (giving priority to dogs and pigs), and including testing for the virus and previous exposure (Olson *et al.* 2012). A recently developed assay to detect anti-Ebolavirus antibodies in great ape faeces as an indicator of prior exposure may well prove a useful non-invasive tool for determining relative naivety and susceptibility of great ape populations, and will be important for potential intervention strategies (Reed *et al.* 2014).

To date, the sole broadly feasible, direct intervention strategy seems to be the use of vaccination to protect wild great apes from EVD. Candidate vaccines in development for human use may be applicable for the protection of great apes (Fausther-Bovendo *et al.* 2012). As yet, no vaccine has been licensed for human use due to the lack of a commercial market to stimulate development and licensure. However, the dramatic acceleration of the 2014 EVD pandemic in humans and the rush to produce a marketable vaccine‡ may mean that a vaccine for wildlife applications may well become available in the near future (see also Warfield *et al.* 2014). There seems little doubt that vaccination of habituated apes against Ebola virus will be achievable; however, vaccination of free-ranging, non-habituated apes still faces significant technical, logistical and ethical challenges; any vaccine used on wildlife will need to undergo stringent efficacy and safety trials. Consequently, the search for viable, non-invasive means of vaccination delivery, such as oral vaccines or baits†, should continue to be explored.

Currently we do not have enough information about EVD to determine the best management and potential intervention strategies to ensure the long-term survival of Central African great apes. Much more information is needed. Worthwhile steps to be taken include:

**Predictive modelling:** continue to tweak predictive models to assist the development of vaccinations and to inform management strategies;

**Vaccine investigations:** closely follow current vaccine development; begin open discussion of vaccination feasibility, including detailed evaluation of ethical, technical and logistical factors;

**Ecological studies:** accelerate ecological studies on reservoirs and other hosts; mechanisms of spillover to great apes; maintenance of infection in great ape populations; extent of impact on great ape populations; and using results to inform predictive models.

§ equivalent to an epidemic in humans

‡ <http://www.who.int/mediacentre/news/releases/2014/ebola-vaccines-production/en/>

† <http://bit.ly/vaccinape>





Veterinarians wearing personal protective equipment to sample potentially-infectious carcasses © Wolfram Rietschel

area can be improved. Conservation activities that will reduce the transmission of diseases from humans to great apes (and vice versa) include the following:

- Train local professionals in great ape health-monitoring techniques;
- Develop rapid diagnostic response capacity for great ape mortality in key regions;
- Implement preventative health programmes for protected-area staff;
- Identify and mitigate risky human behaviour in proximity to great ape habitat;
- Education outreach in local communities on disease risks and best practices.

### Habitat Loss

The extent of forest destruction and habitat modification increases daily in the logging, mining and industrial agriculture concessions of the region. Thus far, rates of deforestation in Central Africa have been low compared to Indonesia and Malaysia (Hansen *et al.* 2013), but are likely to change rapidly with the expansion of the palm-oil industry (Wich *et al.* 2014). The conversion of large tracts of forest to monoculture will eliminate great apes and most other wildlife, whereas logging in this region is usually selective (few trees are extracted per km<sup>2</sup>, although there is collateral damage to neighbouring trees and lianas). Reductions in species diversity, especially mammals, correlate with the volume of timber extracted per unit area (Burivalova *et al.* 2014). Mining has a relatively small immediate footprint in the vast forests of Central Africa, but it is now estimated that it will eventually affect 42% of ecologically important locations (Edwards *et al.* 2014).

Of greater concern are the indirect impacts of extractive industries, which include in-migration, increased access along new roads and railways, disease risk, bushmeat hunting, agricultural expansion and hydropower production (White & Fa 2014). In-migration of workers to logging and mining camps results in forest clearing to build houses but, more significantly, typically results in an anarchic expansion of deforestation for small-scale agriculture to feed worker families, and an explosion of unsustainable poaching of wildlife for food and to supplement incomes. Loggers and miners tend to view eating bushmeat as their right, thus addressing this widely-occurring form of resource extraction is much more complicated. Building roads and railways is clearly integral to the export of wood and minerals, but such infrastructure brings the commercial bushmeat trade into forests once too isolated for hunting to be practical and profitable (Wilkie *et al.* 2000; Laurance *et al.* 2009; Abernethy *et al.* 2013).

## Box 2. Industry Regulations

### Logging: FSC

Forest Stewardship Council (FSC) certification is a voluntary, market-based initiative that aims to promote sustainable forest management. Companies can apply for certification against the FSC standard and, if successful, are entitled to market their timber as originating from sustainably-managed forests. Companies are audited annually by an independent auditing body accredited by the FSC and verified annually to ensure that they respect the established procedures and standards.

Audits are based on an international standard of 10 principles concerning respect for national laws, respect for local and indigenous people's rights, safe working conditions, and protection of environmental attributes. The principles of particular significance for great ape conservation are: Principle 6 concerning environmental values and impacts; Principle 7 on management planning; Principle 8 on monitoring; and Principle 9 concerning the protection of HCVs. The FSC was created in 1993 and has grown steadily for 20 years. Worldwide, nearly 2 million km<sup>2</sup> of forest is certified, accounting for more than 10% of the total industrial timber trade. Currently in Cameroon, Congo and Gabon, 44,000 km<sup>2</sup> are certified.

### HCV and integrated land-use planning

The concept of high conservation value (HCV) was developed more than 15 years ago by the Forest Stewardship Council (FSC), and was intended to safeguard areas of high value (for biodiversity, ecosystem services, and local livelihoods) where they occur inside forest concessions. It has been used as a tool for individual landowners/concessionaires to identify and protect attributes of outstanding conservation value. The concept as it is applied in the FSC standard requires companies to identify areas of particular conservation value and define the appropriate management of those areas to ensure the continued provision of those values.

Use of the HCV framework gained momentum in the logging industry, and 19 countries have produced guidance documents on the process for identifying HCV areas. This has typically been a bottom-up process. In the absence of agreed national conservation priorities or planning frameworks, companies have used local data to define conservation priorities. However, with increasing data availability and the means to enable the systematic identification of conservation priorities, there are now possibilities for identifying HCV areas at larger scales.

The use of the HCV criteria to inform land-use planning decisions has, therefore, the potential to improve the consistency of the use of the framework by the logging industry, and ensure that conservation priorities at large landscape scales can be taken into account in concession-level planning. The Wildlife Conservation Society (WCS) has tested this approach in Gabon: priority targets for great ape conservation were established at the national scale and then used as the basis for concession-scale planning. The approach will likely improve the protection of areas important for great apes in extractive-use zones. Such informed land-use planning may also help in establishing interventions and activities as aggregated offsets to compensate for the impacts of multiple extractive projects (see Kormos *et al.* 2014).

### Logging

Of Central Africa's 5.3 million km<sup>2</sup> of land (including DRC), approximately 3 million km<sup>2</sup> are covered in forest; forests that contain 25% of the total carbon stored in tropical forests worldwide. Fifteen percent of the forest estate is in logging concessions (440,000 km<sup>2</sup> including 74% of Congo and 45% of Gabon) that produce about 8 million m<sup>3</sup> of timber annually. In CAR and Gabon, the timber industry is the largest employer after the public sector (Megevand 2013).

Removal of timber by the informal logging sector is not selective and artisanal loggers typically harvest at rates higher than natural regeneration. In Cameroon, artisanal logging already surpasses industrial logging production, and it accounts for 30% of all timber produced in Congo (Schure *et al.* 2012). Demand for fuelwood, currently at between 0.5–1 m<sup>3</sup> per person per year depending on the country, suggests that about 98 million m<sup>3</sup> of wood is harvested annually for fuel in the forests of Central Africa, of which the WEA region (i.e., excluding DRC) comprises 24 million m<sup>3</sup> (Schure *et al.* 2012).

## Box 2. Industry Regulations (cont.)

### Mining: IFC requirements

While there is no voluntary market certification system for the mining sector that is comparable to the FSC or RSPO (see below), there are environmental requirements for access to international finance from the International Finance Corporation (IFC). The IFC performance standards, notably Performance Standard 6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources), contain requirements to *avoid*, *mitigate* or *offset* the environmental impacts of mining†. A mining company wishing to access funding from the IFC and/or Equator Principles banks must demonstrate compliance with these standards. One approach to complying with IFC Performance Standard 6 is to apply the BBOP mitigation hierarchy.

A key component of the standard relevant to great ape conservation is the definition of *natural habitat* and *critical habitat*. Natural habitats are areas composed of viable assemblages of plant and animal species of largely native origin, where human activity has not essentially modified their primary ecological functions and species composition. Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of 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.

In areas defined as natural habitat, mitigation measures must be designed to achieve *no net loss, where feasible*, and include protection of areas within the concession ('set-asides'), measures to minimise habitat fragmentation (corridors), habitat restoration, and biodiversity offsets. In areas defined as critical habitat, projects must not lead to measurable adverse impacts on identified biodiversity values or on ecological processes, or to a net reduction in the global and/or national/regional population of any Critically Endangered or Endangered species over time. Actions must be designed to offset any residual impacts so as to achieve *net gains of those biodiversity values for which critical habitat was designated*.

† <http://bit.ly/IFC-PS6>

### Oil palm: RSPO

The Roundtable on Sustainable Palm Oil (RSPO)‡ was created in 2006 to provide an opportunity for palm oil producers, traders, and environmental and social stakeholders to agree upon good practice. The RSPO validated its first standard in 2007, and developed a certification system similar to the model operated by the FSC. The standard requires reduced use of pesticides, protection of high conservation values (HCVs) in the plantation, and management of social conflicts. Importantly, it also requires that no area of HCV be converted during plantation establishment. This means important wildlife habitat must be protected or avoided when siting plantations.

Each year, companies are audited against the principles and criteria by accredited certification bodies. On the basis of a successful audit, the producing or trading companies are able to sell their palm oil product as RSPO certified, giving them preferential access to certain markets. Although the number of RSPO-certified producers has grown rapidly, so far only about 5% of the world's palm oil plantations are certified.

The accreditation system is being strengthened to ensure more robust auditing, and working groups have been created to address questions of HCV identification and the possibility of including compensation and offsets. Nevertheless, the RSPO system suffers from the dominance of industry representatives and producers in the decision-making structure of the organisation. RSPO lacks the chamber-balanced voting system of FSC, allowing certain interests to dominate. This limits the number of environmental protection requirements that the membership can accept. Another limitation is the voluntary nature of the system. The standard only applies to companies that choose to submit themselves to audits. Companies wishing to develop concessions in areas that are of high value for biodiversity are likely to choose not to pursue RSPO certification, so the opportunity to influence practices is lost. As with other voluntary initiatives such as FSC, the key to ensuring the conservation of wildlife habitat is linking voluntary industry initiatives to government-level land-use planning decisions and adequate national policies with which *all* companies need to comply.

‡ <http://www.rspo.org>

### Mining

Most of Central Africa has vast and still relatively untapped mineral wealth. To date, lack of infrastructure and poor governance have slowed expansion of the mining, oil and gas sectors. However, global economic development, particularly in China, is driving a huge increase in demand for minerals. Declining oil reserves are pushing Cameroon and Gabon to look at their mineral resources for future state revenues. New mining deals that include infrastructure development will remove a major historical impediment to mineral extraction and export—the requirement that governments





Camera-trap image of a chimpanzee in Messok Bai, Messok Dja, Republic of Congo © Victor Mbolo/WWF

first build roads, railways and deep-water ports to attract investment. As a result, ore deposits in isolated, once inaccessible regions are now increasingly open to exploitation (Hund & Megevand 2013).

Artisanal and small-scale miners fill the void in areas where there has been no investment by international mining companies. As many as 10,000 artisanal miners are digging for gold and diamonds throughout Gabon (World Bank 2013); before they were evicted in 2011, over 3,000 artisanal miners were excavating a vast gold-mining pit adjacent to the Minkébé National Park. Chinese trading houses buy and export most of the minerals produced (Hund & Megevand 2013).

Lack of land-use planning is becoming a more prevalent concern in this sector. For example, mineral exploration permits, including those which overlap with protected areas, have been handed out by mining officials on numerous occasions with little or no consultation with forestry and/or wildlife authorities.

### Industrial-scale agriculture

Oil palms (*Elaeis guineensis*) generate more calories of oil per unit area than any other oil-producing crop (Fitzherbert *et al.* 2008). In 2000, palm oil became the most important globally-produced and traded vegetable oil, accounting for 40% of all vegetable oil bought and sold on international markets (<http://faostat.fao.org>). Although oil palms are native to West and Central Africa, until recently they were typically cultivated by smallholders in forest fallow plots, with some colonial-period commercial cultivation in coastal Cameroon and northern Congo. As available land becomes scarce in Southeast Asia, where the bulk of internationally-traded palm oil is produced, companies are increasingly looking to Central Africa as one of the next oil palm frontiers.

Oil palm plantations already cover about 1,000 km<sup>2</sup> of Central Africa; however, over 1 million km<sup>2</sup> of forest in this region are agriculturally suitable for oil palm production (Stickler *et al.* 2007; Earthsight 2013). This amounts to 92% of forested land in Congo and 64% in CAR (Earthsight 2013). Most importantly, almost 40% of the great apes' geographic range that is not in protected areas overlaps with areas suitable for oil palm (Wich *et al.* 2014), and will be lost unless oil palm expansion is preceded by a transparent and accountable process involving rigorous and strategic Environmental and Social Impact Assessments (ESIAs). Plantations established in areas thinly populated by humans will often bring in-migration of agricultural labourers and their families. In Gabon, 1 km<sup>2</sup> of oil palm requires 12 workers, and if each worker has a family of five, this equates to over 7,000 people for every 100 km<sup>2</sup> planted.

### Mitigation of the key drivers of habitat loss

Integrated land-use planning and national and international regulations (see Box 2) have proven effective in reducing the impacts of industrial expansion. In Gabon, all of the ministries concerned with land use are working together to draw up a national land-use plan. This planning will include conservation as one of the vital elements of national value; as important as agriculture, minerals, forests, urban expansion and infrastructure. The approach has been used to identify species and habitats of high conservation value (HCV) in order to avoid the overlaying of, for example, agricultural plantations on areas of important biodiversity. A National Climate Council and the national parks agency, ANPN, are overseeing the technical aspects of the plan for the Gabonese government.

A number of actions intended to reduce the negative effects of logging, mining and agroindustry can be used to address these key drivers of habitat loss (see Figs. 2, 5b and 5c). They centre around integrated land-use planning (including road and railroad networks), compliance with industry standards, civil society and government engagement with the companies involved, and company engagement with positive conservation actions, including:

### Box 3. SMART

SMART (Spatial Monitoring and Reporting Tool) is a freely available open-source software tool designed for use by those directly responsible for wildlife conservation, from field staff to senior government staff. SMART is deployed at the site level and synthesises standardised ranger-collected information on illegal activities, wildlife and patrol routes to understand where patrol efforts need to be deployed, and to evaluate patrol effectiveness in addressing poaching and other threats. Data on wildlife observations, signs and locations of illegal activities, arrests and other patrol results are logged in the field by ecoguards on hand-held computers or standard forms and GPS units. This is then fed back into a central computer in near real-time. Data are loaded and converted into easily produced, visually informative maps and reports. The software has a fully-integrated mapping interface that does not require specialist GIS skills or additional software packages. SMART puts critical information on threats in the hands of wildlife managers and can serve to motivate rangers in their day-to-day work by providing regular feedback on results and performance. Because information is standardized, SMART can be scaled up to national and even regional levels across networks of protected areas. Implementation of SMART as a law enforcement monitoring tool is recommended as a priority action across all priority landscapes in this action plan, and will serve to improve landscape-level protection efforts as well as to collate key standardized data for our regional monitoring framework.

The SMART Partnership has developed a series of training materials and best practice guidance, and SMART is implemented in more than 120 protected areas worldwide. For more information, visit <<http://www.smartconservationtools.org>>.

- Regulatory reform of forest-land and resource tenure;
- Regulatory requirement for integrated land-use planning with ESAs (also referred to as Strategic Environmental and Social Assessments, SESAs);
- Road access control by industry, overseen by government officials, in areas with active resource extraction; road closure post-extraction;
- Law enforcement to control anarchic logging or illegal mining;
- For artisanal logging or mining, a government regulatory requirement that all domestic timber harvest or mineral extraction, transport and sale is from registered companies with legitimate rights to log or mine, respectively;
- Provision, by the employer, of carbohydrates and proteins priced below the going rate for bushmeat for company workers and their families;
- Restriction of in-migration of non-worker families;
- Civil society engagement with local communities that risk the loss of lands over which they have prior, legitimate, but currently unrecognized claims;
- Civil society engagement to raise awareness of the social and ecological impacts of un-transparent, un-regulated and un-planned expansion of logging, mining and industrial agriculture;
- Civil society and/or government engagement with industry to encourage and monitor impact mitigation.

Some of the above activities are specific to a particular type of extractive industry. See also IUCN guidelines to reduce the impacts of logging on great apes (Morgan & Sanz 2007; Morgan et al. 2013). Government regulatory requirements for (i) Forest Stewardship Council (FSC) certification of all logging concessions, and (ii) compliance of mining companies with the Business and Biodiversity Offsets Programme (BBOP) Mitigation Hierarchy for No Net Loss of biodiversity<sup>10</sup> are key to mitigating the negative impacts of logging and mining, respectively, on great apes and other wildlife. For mining, it is essential that governments remain or become fully compliant with the Extractive Industries Transparency Initiative (EITI) Standard<sup>11</sup>, which includes social, financial and governance components. For oil palm development, it is crucial that governments agree that plantation development must comply with the Roundtable on Sustainable Palm Oil (RSPO) principles and criteria for the production of sustainable oil palm. It is also critical that governments benefit from lessons learned in other parts of the tropics and proactively and rapidly apply them in Africa, (IUCN 2014b).

10 [http://bbop.forest-trends.org/pages/mitigation\\_hierarchy](http://bbop.forest-trends.org/pages/mitigation_hierarchy)

11 <https://eiti.org/document/standard>

## Corruption

It is now recognized that one of the major impediments to effective conservation is pervasive corruption (UNODC 2012), which is sometimes encouraged by the very government officials responsible for law enforcement. The result has been the facilitation of all aspects of the illegal wildlife trade, including poaching and trafficking of animals. Corruption takes place both nationally and internationally, at all points along the chain, from the forest through to the destination point, which may be on the other side of the world. For example, poachers may be forewarned of the impending arrival of ecoguards. If poachers are arrested, they or their ‘managers’ may offer payment to the ecoguards for a no-questions-asked release. Often, when firearms are seized by law enforcement officers, the weapons, ammunition and means of transport can be traced back to a government official, member of the army, or prominent community leader. If a case makes it to court, an array of court officials can facilitate illegal evasions or exploit legal loopholes in return for a bribe. Even after sentencing, penitentiary administration becomes yet another opportunity for criminals to bribe their way to freedom. There is, as such, a long list of obstacles to overcome before justice can deliver its dissuasive effect.

While international efforts are important, it is imperative to recognize that the dissuasive effect of the law comes from country-level application of national legislation. Because of visible complicity by state officials, citizens pay scant attention to wildlife laws as—until very recently—few arrests were made, and even fewer cases resulted in punishment. However, in the last decade it has been recognised that this failure of the system must be addressed. A methodology has been developed by the EAGLE Network whereby collaborative agreements are signed between governments and NGOs. The aim is to look beyond the poacher paradigm and address the larger, commercial wildlife-trafficking networks. The entire legal process is monitored, from investigation, case development and arrest, through to the judicial process, sentencing and punishment (usually a fine, incarceration, or both in the case of serious wildlife crimes). Independent observers, including conservation NGOs and their government and civil society partners, are now making significant inroads into the systematic corruption in the wildlife crime arena. Anti-corruption procedures are carried out strictly according to national and international law, and provide a powerful deterrent to active and would-be wildlife traders and traffickers. The principles behind these procedures are based on increasing the time and cost of conducting illegal wildlife trade, increasing the risk of arrest, prosecution, and punishment, improving governance and transparency, and raising public awareness about wildlife laws and their enforcement by widely exposing positive results obtained from successful enforcement efforts, and broadly publicizing instances where efforts are thwarted by corruption and the flagrant complicity of government officials.

Actions to be taken to increase transparency include use of the EAGLE network to help governments monitor and follow through with judicial processes, and signing up to the industry standards detailed in the logging, mining and oil palm sections above and in Box 2.

Orphaned infant gorilla confiscated from a poacher who had killed his mother near Impfondo, Republic of Congo  
© Michael Nichols courtesy of National Geographic





## Results Chain for Law Enforcement, Improved Legal Frameworks and Sanctions

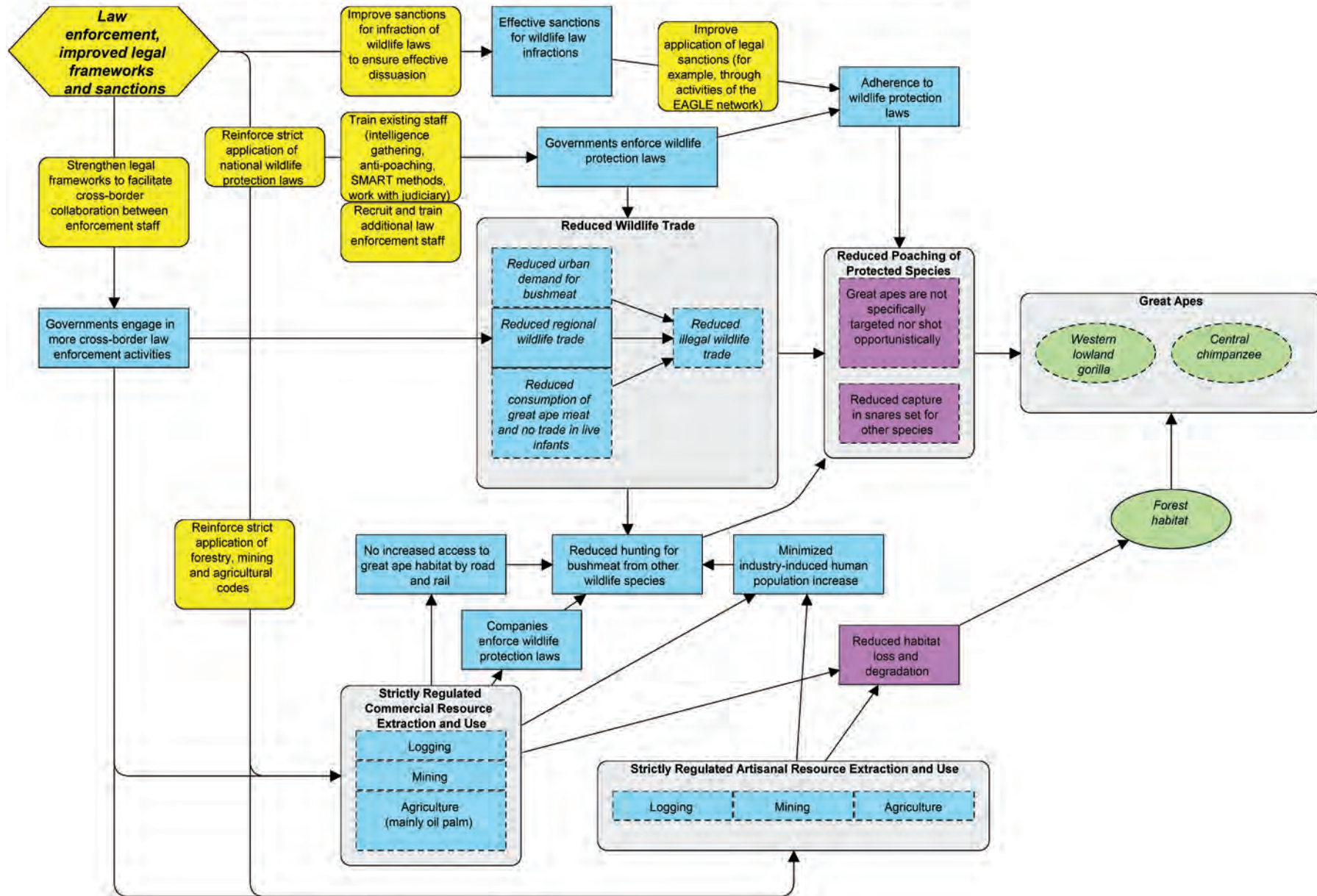


Figure 5a. Results chain corresponding to one of the key conservation strategies for great apes in WEA, namely law enforcement, improved legal frameworks and sanctions. The individual activities associated with the conservation strategy are shown (in yellow), as are the intermediate results (blue) and reductions in threats (purple) to the conservation targets (green) that one aims to achieve

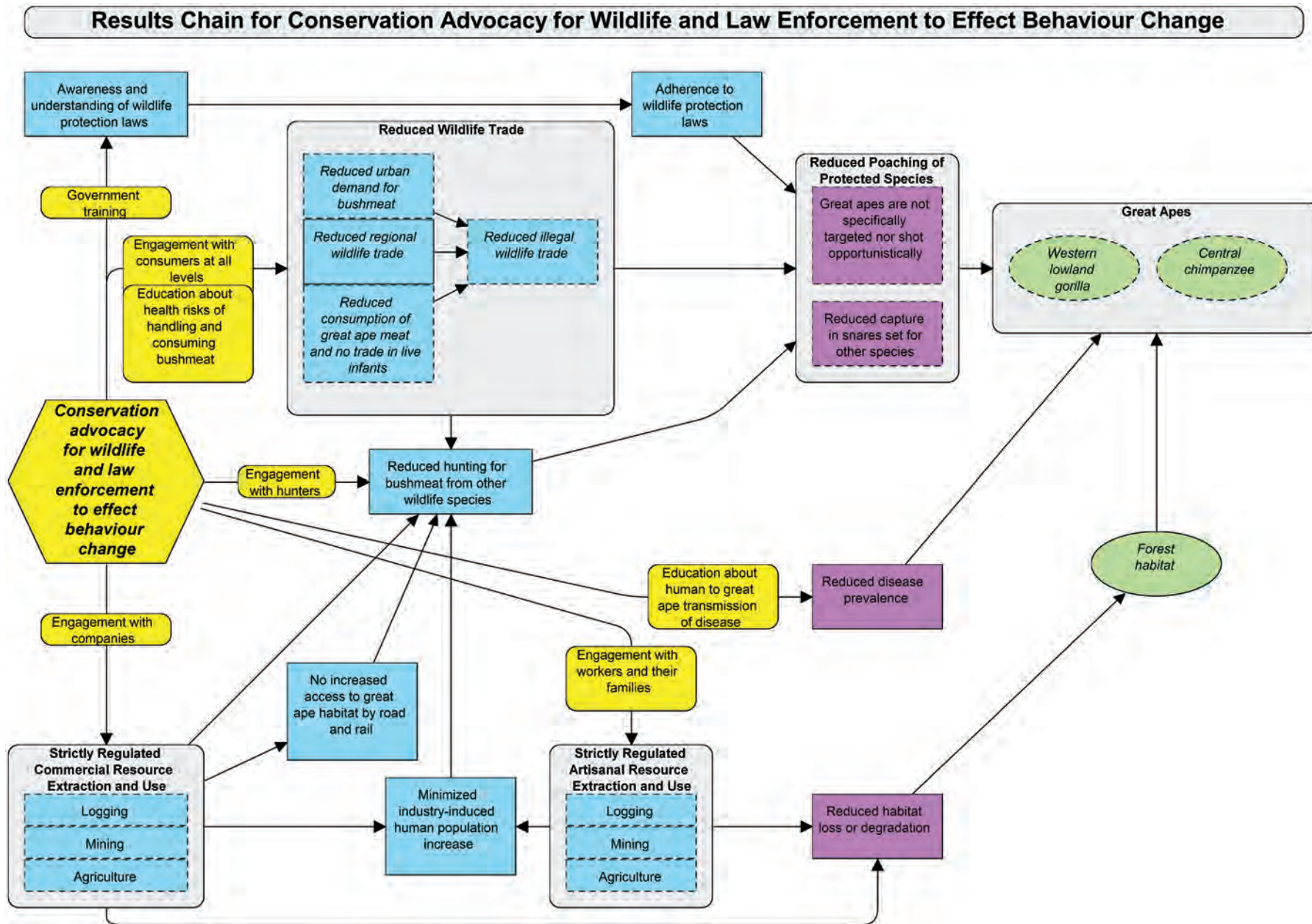


Figure 5b. Results chain corresponding to one of the key conservation strategies for apes in WEA, namely conservation advocacy for wildlife and law enforcements to effect behaviour change. The individual activities associated with the conservation strategy are shown (in yellow), as are the intermediate results (blue) and reductions in threats (purple) to the conservation targets (green) that one aims to achieve



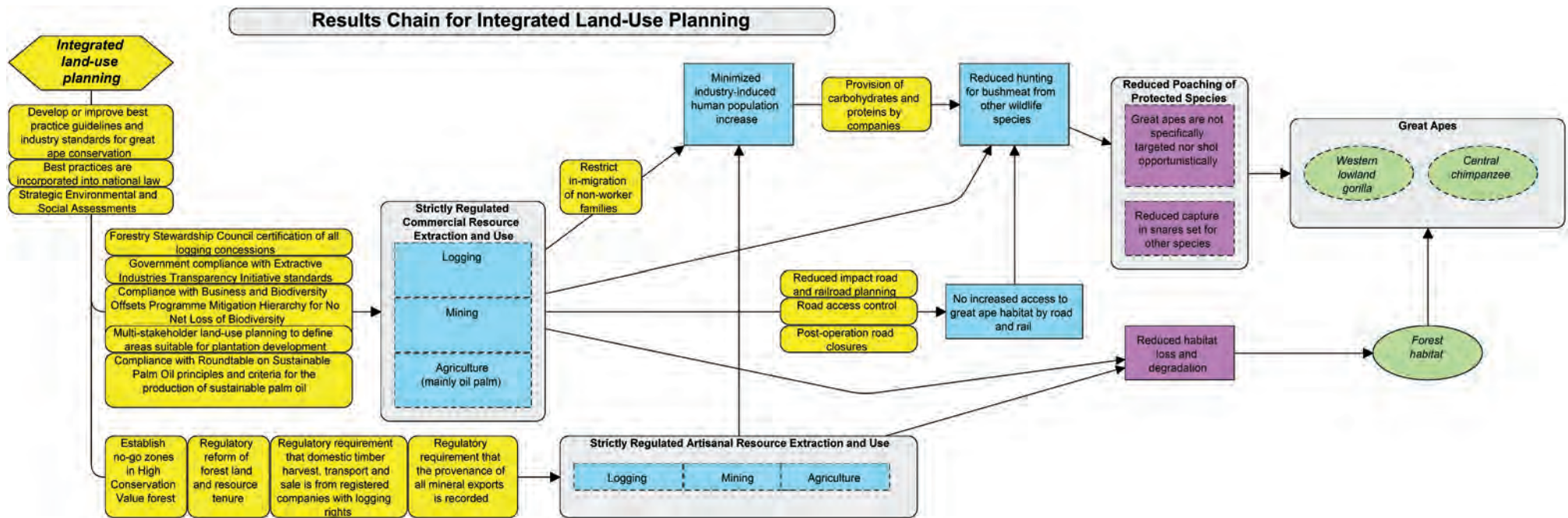


Figure 5c. The results chain corresponding to one of the key conservation strategies for apes in WEA, namely integrated land-use planning. The individual activities associated with the conservation strategy are shown (in yellow), as are the intermediate results (blue) and reductions in threats (purple) to the conservation targets (green) that one aims to achieve



## 4. PRIORITY LANDSCAPES AND SITE-SPECIFIC ACTIONS FOR WESTERN LOWLAND GORILLA AND CENTRAL CHIMPANZEE CONSERVATION

The 18 priority landscapes listed in Table 1 were grouped into four categories: Exceptional, Important, Ebola Recovery and Survey Priorities. By their nature, these landscapes are composed primarily of moist tropical forest and, according to the model, contain significant numbers of gorillas and chimpanzees at healthy densities. Almost all of them have a full complement of the species that are endemic to the region; exceptions are mentioned in the brief descriptions of the landscapes that accompany the tables below. Potential implementing partners and estimated costs are given for each of the activities that were deemed necessary to conserve gorillas and chimpanzees in Western Equatorial Africa by participants at the 2013 workshop. Please note that all estimated costs are per year; the total cost of any activity that occurs on a cycle has been averaged over the 10 years of this plan.

### EXCEPTIONAL PRIORITY LANDSCAPES

Here we present the six priority landscapes classed as exceptional in alphabetic order.

#### 1. Birougou-Batéké-Zanaga (Gabon and Congo)

The 41,520-km<sup>2</sup> Birougou-Batéké-Zanaga landscape is essentially the southern sector of the Massif du Chaillu. The Gabon sector covers 15,145 km<sup>2</sup> and incorporates two national parks, (Mont Birougou and Batéké Plateau), and the areas west of the N3 road and south of the Franceville-Koulamoutou road up to the Congo border. The west of the Batéké Plateau NP is forested, grading into a savanna-forest mosaic and eventually savanna in the east. The landscape overlays three logging concessions in Gabon, two of which are FSC certified. Anti-poaching is a key activity, as there is evidence of poaching between the park and the international border. Great ape population surveys in the Birougou NP, its buffer zone, and the concessions are required.

The Congo sector covers 25,570 km<sup>2</sup> of the Zanaga complex, including the forested sector of the 3,905-km<sup>2</sup> proposed Ogooué-Leketi NP (OLNP), plus forest to the southwest stretching into Mayoko. The most important area for great apes is the forest between the Ogooué and Djoumo rivers, but the area to the west should be explored as well. OLNP was created in 2012, but has yet to be officially gazetted, and remains vulnerable to unregulated logging. Three active logging concessions overlap the proposed park, none of which have a management plan. Commercial hunting, targeted mainly at elephants, is the biggest threat to wildlife in the area and reinforcement of anti-poaching efforts and updated population surveys are urgently needed. Although human population density in the area is low, poaching for both subsistence and the commercial trade is a threat, encouraged by easy access to markets in Pointe Noire and Brazzaville using new logging and mining roads. Formal protection awaits official gazettement of the OLNP and/or proactive implementation of an effective anti-poaching strategy by the logging companies. The Zanaga iron-ore mining project, located at the western limit of OLNP, is expected to begin operations by 2016. The mining company, MPD, is committed to assisting with the creation and management of the national park as part of a compensation strategy for the impact of the mine. Further to the west, the Mayoko area is also underlain by mining permits (Mayoko-Moussondji and Mayoko-Lekoumou), but is still a reasonably intact block of forest.

Action needed site #1	Countries	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards, with private sector support	Gabon	Ongoing	\$250,000	ANPN, MFEPRN, Compagnie Minière de l'Ogooué (COMILOG), Rougier Gabon

Action needed site #1 (cont.)	Countries	Timeframe	Cost per annum	Implementing partners
Establish protection strategy, including capacity and structures for effective law enforcement, recruitment training, equipping and deployment of ecoguards	Congo	Ongoing	\$200,000	MEFDD, WCS
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Congo & Gabon	Ongoing	\$100,000	ANPN, EAGLE, MEFDD, MFEPRN, other ministries, local government, WCS
Formal gazettelement of OLNP; create management plan, create structure and build capacity for OLNP	Congo	1 yr.	\$225,000	MEFDD, WCS
Maintain standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Gabon Congo	Every 4–5 yrs.	\$20,000 \$44,000	ANPN, WCS MEFDD, WCS
Implement exploratory surveys in Mayoko and the Chaillu forest block to the south	Congo	Within 5 yrs.	\$30,000	MEFDD, WCS
Develop best practice guidelines to control bushmeat hunting in collaboration with extractive industries	Gabon	2 yrs.	\$5,000	ANPN, WCS, WWF, FSC, private sector
Establish a long-term financing mechanism for park protection through collaboration with extractive industries	Congo	3 yrs.	\$8,000	MEFDD, WCS, private sector

## 2. Lac Télé-Likouala (Congo)

This 16,165-km<sup>2</sup> landscape lies to the west of the Oubangui River in the Likouala department of northeastern Congo and consists of the Bailly and Batanga swamps, swamps between the reserve and Loundougou logging concession, and Lac Télé Community Reserve (LTCR)—the only community reserve in Congo. The ecosystem is a vast swamp with patches of riparian and *terra firma* forest and savanna, which supports high densities of gorillas (Rainey *et al.* 2010). The relative inaccessibility of the swamp forests limits resource extraction and hunting has traditionally been carried out only during the rainy season using a network of temporary canals. However, intensification of poaching for commercial trade, overexploitation of fish stocks in the Likouala swamps, and the opening of a road to Impfondo all mean that in future great apes will be increasingly targeted by poachers. At present, however, LTCR and its surroundings still provide an unusually safe haven for plant and animal species that are threatened elsewhere.

Action needed site #2	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards	3 yrs.	\$200,000	MEFDD, WCS, WWF
Maintain standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Every 4–5 yrs.	\$40,000	WCS, WWF
Standardise and implement an epidemiological surveillance system and rapid response structure for emerging zoonotic diseases in collaboration with the ministry, with emphasis on Ebola	Ongoing; begin yr 1	\$20,000	MEFDD, WCS, WWF
Gazetting and incorporation of Bailly and Batanga swamps into the LTCR protected area	Begin yr 1	\$40,000	MEFDD, WCS, local communities
Continue conservation education awareness and outreach programmes in local communities	Ongoing	\$40,000	WCS, WWF

### 3. Lopé-Waka (Gabon)

In 2005, this priority landscape was limited to the Lopé NP and Waka NP and a corridor between them, but this landscape now incorporates the 'Forêt des Abeilles' that is east of Lopé-Okanda NP and is known for several species of endemic mammals. It has been extended to cover 26,520 km<sup>2</sup> and includes several logging concessions, none of which are certified, and numerous villages. This landscape is characterised by a diversity of habitat types that bear witness to a dynamic history of vegetation change influenced by past climate change and human activity, and harbour some of the highest plant and animal biomass in the country. The vegetation is predominantly lowland tropical forest, with patches of savanna. Mountains that form part of the Massif du Chaillu are found in the south. Degradation will be an increasing threat in coming years, as human settlements along the national roads encroach on the habitat. The *Station d'Etudes des gorilles et chimpanzés* has hosted world-class research for over 30 years, but attempts to develop tourism based on great apes have not been successful. Lopé was hit by Ebola in the 1990s and, although the impact on gorillas and chimpanzees is not well understood, this site is well suited for targeted research on specific disease threats and transmission processes. Poaching continues to pose the greatest threat to wildlife, and support for anti-poaching and law enforcement efforts is urgently needed.

Action needed site #3	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards; in collaboration with the private sector in the buffer zones	Ongoing	\$250,000	ANPN, MFEPRN, SETRAG, private companies
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Ongoing	\$50,000	ANPN, EAGLE, MFEPRN, other ministries, local government
Maintain standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Every 4–5 yrs.	\$20,000	ANPN, WCS
Standardise and implement epidemiological surveillance system and health education programmes to minimise risks of disease transmission between humans and great apes	Ongoing	\$50,000	ANPN, Stirling University, WCS
Strengthen research capacity to respond to threats to great apes, integrate research into PA management, support training, data collection and analysis, and implementation of field and laboratory protocols	Ongoing	\$50,000	ANPN, Stirling University, WCS

### 4. Monte Alén-Monts de Cristal-Abanga (Equatorial Guinea and Gabon)

This priority landscape (30,510 km<sup>2</sup>) incorporates the Monts de Cristal mountain chain running from northwest Equatorial Guinea to southeast Gabon. It includes Monte Alén NP, Estuario del Muni Natural Reserve and forests to the south, plus Monts de Cristal NP and the Abanga forest between the park and the Lopé-Waka/Ivindo complex. The montane forests of this area are renowned for their endemic species and exceptionally high floral and faunal diversity.

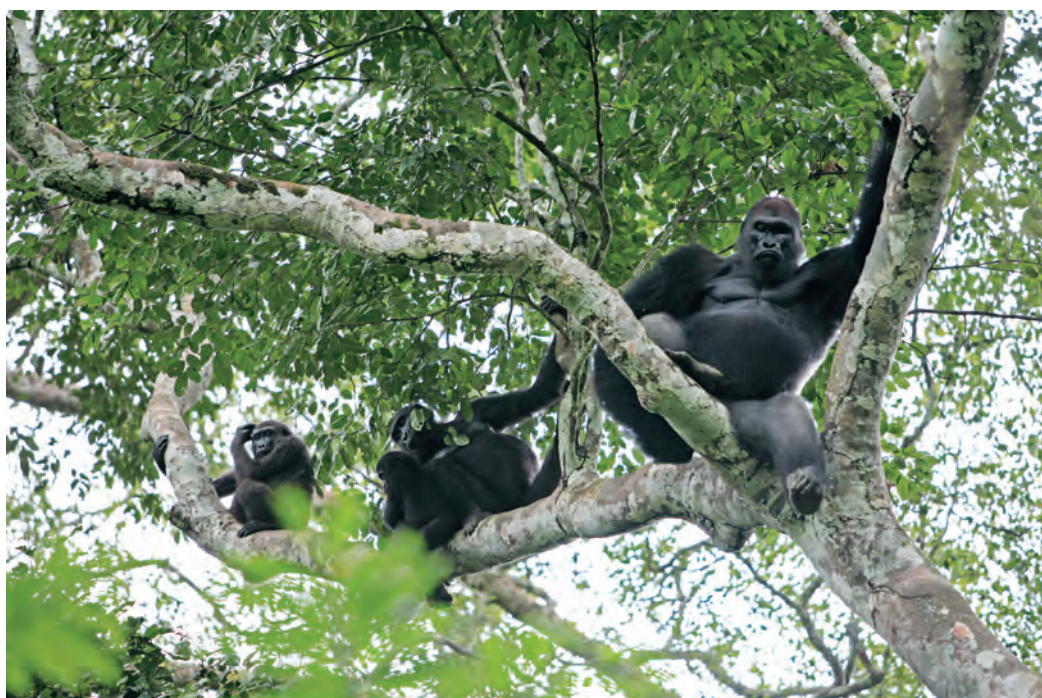
In the 5,570-km<sup>2</sup> Equatorial Guinea sector, Monte Alén NP grades to the southwest into the low-lying, partly wetland Estuario del Muni, which also contains mangrove and *terra firma* forest. A recent survey of Equatorial Guinea confirmed that this is one of the nation's most important areas for great apes (Murai *et al.* 2013).

The Gabon sector covers ~24,940 km<sup>2</sup>, including both sectors (Mbe and Mt Sene) of the Monts de Cristal NP and several logging concessions, two of which are FSC certified. The area is bisected by two main roads and includes dozens of villages. The Abanga forest is limited by the Kango-Ndjolé-Larara-Mitzic-Medouneu road, covers the Mbe sector, and contains the FSC-certified Rougier Gabon Abanga Forest Management Unit (FMU). The Monts Mokekou are further to the southeast, north of Lopé-Waka. Further east, between Mitzic and Ovan, is an 8,000-km<sup>2</sup> area that includes a second FSC-certified concession (Rougier Gabon Ogooué-Ivindo FMU). Population surveys in



the park and in the Abanga forest, combined with reinforced anti-poaching and law-enforcement efforts (including collaboration with the logging companies), are the activities most needed.

Action needed site #4	Countries	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement including recruitment, training and deployment of ecoguards, with private sector support; also ensuring transboundary protection efforts	Eq. Guinea & Gabon	Ongoing	\$300,000	ANPN, INDEFOR-AP, MFEPRN, ANDEGE, WWF, private sector
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Gabon	Ongoing	\$50,000	ANPN, EAGLE, MFEPRN, other ministries
Establish standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Eq. Guinea Gabon	Every 3–5 yrs.	\$20,000 \$50,000	INDEFOR-AP ANPN, WCS, WWF
Expand protected area by signing Presidential Decree, delineating and demarcating National Forest (Block C)	Eq. Guinea	3 yrs.	\$10,000	INDEFOR-AP, ANDEGE
Establish partnerships with extractive industries; adoption of management plans and IUCN and other relevant best practice guidelines	Eq. Guinea	Ongoing	\$5,000	INDEFOR-AP, private sector
Develop best practice guidelines to control bushmeat hunting in collaboration with extractive industries	Gabon	Ongoing	\$1,000	ANPN, MFEPRN, WCS, WWF, FSC, private sector
Strengthen institutional framework for transboundary collaboration and law enforcement between governments	Eq. Guinea & Gabon	Ongoing	\$5,000	ANPN, INDEFOR-AP, MFEPRN
Conduct a feasibility study of tourism potential in Monte Alén NP	Eq. Guinea	1 yr.	\$20,000	INDEFOR-AP, ANDEGE
Rehabilitate/maintain basic management infrastructure in Monte Alén NP and Estuary of Muni Nature Reserve	Eq. Guinea	Ongoing	\$10,000	INDEFOR-AP



Kingo's group at Mondika, Nouabalé-Ndoki National Park. Western lowland gorillas are more arboreal than mountain gorillas © Ian Nichols

## 5. Odzala-Lossi-Pikounda-Ngombe-Ntokou (Congo)

This 52,200-km<sup>2</sup> landscape covers mixed and Marantaceae forest types and an abundance of forest clearings and swamp forests. It incorporates Odzala-Kokoua NP (OKNP), the new Ntokou-Pikounda NP (NPNP), Lossi Gorilla Sanctuary, and the logging concessions surrounding the three protected areas. The vast *Industrie Forestière d'Ouessou* Ngombe concession is FSC certified. The complex harbours the largest population of western lowland gorillas in the world, at some of the highest densities ever recorded. This is in spite of three known outbreaks of Ebola since 2001 in OKNP and neighbouring Lossi (Caillaud *et al.* 2006; Genton *et al.* 2012, 2015), which may have killed thousands of gorillas (Bermejo *et al.* 2006). A hiatus in financial and technical support to OKNP management between 2007 and 2010 likely also contributed to the lowering of great ape densities through poaching. The arrival of African Parks in 2010 and the establishment of the Odzala-Kokoua Foundation has improved protection and helped substantially to promote investment in gorilla tourism and research. However, the area is experiencing dramatic change with the opening and tarring of a national road linking the previously remote north to the urban markets of Brazzaville in the south, and the concomitant increase in trafficking of bushmeat and other wildlife products. Ape habitat is also severely threatened by an oil-palm plantation, currently in the early stages of development, in the ecological corridor linking OKNP to NPNP. Efforts need to be placed on strengthening protection, establishing a permanent management presence in NPNP, promoting environmentally-appropriate land-use planning, and controlling the commercial trade in bushmeat.

Action needed site #5	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards	Ongoing	\$400,000	AP-OKF, EAGLE, MEFD
Maintain standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Every 4–5 yrs.	\$60,000	AP-OKF, WCS
Standardise and implement an epidemiological surveillance system and rapid response structure for emerging zoonotic diseases in collaboration with the ministry, with emphasis on Ebola	Ongoing	\$100,000	AP-OKF, MEFD
Establish an Ebola awareness campaign and a local community early-warning system	Ongoing	\$35,000	AP-OKF, WCS
Support the development of management plans in forestry concessions	2 yrs.	\$7,000	AP-OKF, MEFD, WCS
Establish partnerships with the private sector (extractive industries, agroindustry, tourism operators) to adopt and implement IUCN and other relevant best practices guidelines, and develop an offset mechanism	Ongoing	\$2,000	AP-OKF, WCS, private sector
Continue conservation education awareness and outreach programmes in local communities	Ongoing	\$40,000	AP-OKF
Continue to develop the gorilla habituation programme (for tourism); minimise human-great ape disease transmission in tourism activities through full implementation of IUCN best practice guidelines	Ongoing	\$50,000	AP-OKF, University of Barcelona

## 6. Sangha Trinational (Cameroon, CAR and Congo)

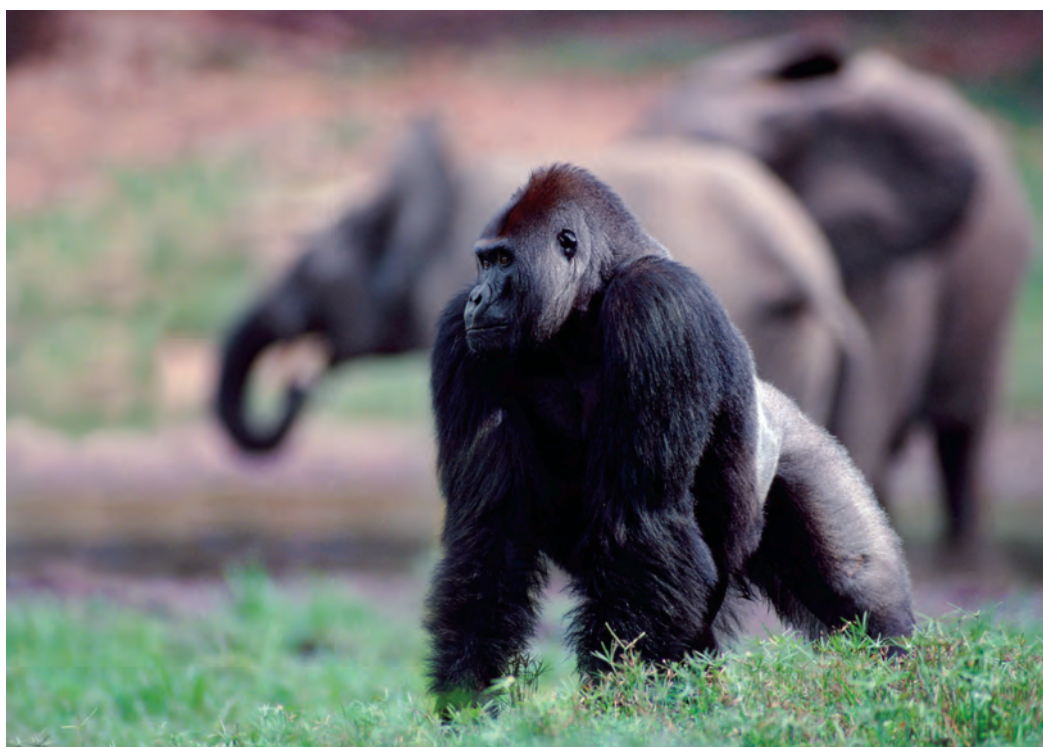
The Sangha Trinational (TNS) is of critical biological significance as one of the most pristine blocks of protected forest in Central Africa. This 37,308-km<sup>2</sup> landscape incorporates at its core the contiguous protected areas of Dzanga-Sangha Protected Areas (DSPA) in CAR, Lobéké NP in Cameroon, and Nouabalé-Ndoki NP (NNNP) in Congo. In Congo, the priority landscape extends to the NNNP buffer zone and specifically the Kabo, Pokola and Loundoungou logging concessions. The TNS received World Heritage Status in 2012 in recognition of the extent of its intact, contiguous forests, hydrological significance (as the source and drainage system for the Sangha river basin) and large diversity of habitat types and baies (forest clearings). This vast and ecologically-functional landscape is an important sanctuary for an intact faunal assemblage typical of the region. The three parks and their surrounding forests are unique in benefiting from a conservation and management presence of over 20 years, including well-established great ape research and tourism programmes. Increased pressure

on wildlife comes from infrastructure development, human population growth, and displacement from civil unrest in CAR.

In Cameroon, Lobéké National Park (2,179 km<sup>2</sup>) and the surrounding 37,308 km<sup>2</sup> are under increasing threat. The area recently suffered from intense national and transboundary poaching enabled by a network of roads and several navigable rivers. These access routes facilitate resupplying of poachers with arms and ammunition, as well as efficient evacuation of illegally-harvested wildlife products. Anti-poaching and ecological monitoring have been reinforced to counter these pressures. To assess the potential for transboundary tourism, field teams collect information on gorilla visits to the bays and gorilla social dynamics. However, recent surveys to monitor the status of great apes are lacking. Park administration seeks to ensure adoption of sustainable logging and agroforestry practices, meanwhile promoting controlled subsistence hunting beyond the buffer zone. A new management plan for 2015–2020 will be implemented with the participation of local communities (including indigenous peoples) and private companies.

In CAR, the 4,589-km<sup>2</sup> DSPA consists of Dzanga-Sangha Special Reserve and Dzanga-Ndoki National Park (DNNP), which has two sectors, the 495-km<sup>2</sup> Dzanga Park and the 725-km<sup>2</sup> Ndoki Park. Although great apes are still poached in DSPA and their parts sold in a clandestine local trade, the gorilla population of DNNP has remained stable (Princée 2013). Three groups of gorillas have been habituated for tourism, and research undertaken includes studies of socioecology, stress caused by habituation, and monitoring of pathogens. Prior to the escalation of violence that culminated in the 2013 coup d'état, at its most profitable, tourism provided 70% of the Primate Habituation Programme budget. Heavily armed rebels invaded the park in 2013 and early 2014, but thus far the habituated gorillas have survived the unrest. Although the interim government and a UN peacekeeping force are working towards restoring peace, fighting continues and stability appears to be far off.

In Congo, WCS has signed a public-private partnership agreement with the government for the management of NNNP (Hatchwell 2014), providing a strong governance framework for the long-term management of the park. NNNP and its periphery (including the Pokola FMU) is one of the most globally-important strongholds for great apes (Stokes *et al.* 2010), with relatively stable populations of both gorillas and chimpanzees (Maisels *et al.* 2012). In recent years, expansion of major road infrastructure in Congo and civil unrest in neighbouring CAR have resulted in increasing poaching pressure mainly for ivory, but also for bushmeat. This has caused significant declines in wildlife, for example, at the periphery of NNNP, particularly in the Loundoungou and Pokola concessions (Maisels *et al.* 2012). With the exception of Mokabi-Dzanga FMU, the concessions



Silverback gorilla, Maya-Nord, Odzala-Kokoua National Park, Republic of Congo © Jabruson 2015 all rights reserved



surrounding NNNP are FSC certified and practicing low-impact logging. Despite selective logging practices, it is also now becoming evident that even under FSC criteria, canopy openness is increased, and seedling recruitment and seed dispersal are disrupted (Poulsen *et al.* 2013; Medjibe *et al.* 2014), leading to immediate negative consequences for great apes and other wildlife as well as unforeseen long-term effects (Morgan *et al.* 2012).

Action needed site #6	Countries	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards; ensure transboundary protection efforts	Cameroon CAR Congo	Ongoing	\$274,000 \$500,000 \$400,000	MINFOF, WWF MEFET, WWF MEFDD, WCS
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Cameroon  CAR  Congo	Ongoing	\$70,000  \$70,000  \$70,000	MINFOF, EAGLE, WWF MEFET, MINJUSTICE, EAGLE, WWF MEFDD, EAGLE, WCS
Maintain standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Cameroon CAR Congo	Every 4–5 yrs.	\$54,000 \$45,000 \$60,000	MINFOF, WWF MEFET, WWF MEFDD, WCS
Standardise and implement epidemiological surveillance system and rapid response structure for emerging zoonotic diseases in collaboration with ministries, with emphasis on Ebola	Cameroon CAR Congo	1 yr. Ongoing Ongoing	\$75,000 \$75,000 \$110,000	MINFOF, WWF MEFET, WWF MEFDD, WCS
Obtain land titles for PAs	Cameroon CAR	Within 3 yrs.	\$8,000 \$7,000	MINFOF, WWF MEFET, WWF
Develop advocacy programmes to promote the integrity and importance of the TNS as a UNESCO World Heritage Site	Cameroon, CAR & Congo	Ongoing	\$5,000	MINFOF, MEFET, MEFDD, ministries of education, WCS, WWF
Monitor and control effects of industry on forest cover and great apes in buffer zones of TNS	Congo	Ongoing	\$50,000	WCS, WRI (Global Forest Watch)
Secure and promote private sector investment in transboundary great ape tourism operations	Congo	Ongoing	\$30,000	Ministry of Tourism, WCS, CCC, private investors
Expand and maintain forest infrastructure (guard posts, roadblocks)	Cameroon	3 yrs.	\$50,000	MINFOF, WWF

## IMPORTANT PRIORITY LANDSCAPES

Here we present the 10 priority landscapes classed as important in alphabetic order.

### 7. Belinga-Djoua-Mwagna (Gabon)

Covering 8,900 km<sup>2</sup>, this landscape in the northeast of Gabon includes Mwagna NP and is part of the Dja-Minkébé-Odzala (TRIDOM) landscape. It extends the 2005 Belinga-Djoua priority area and is now contiguous with Odzala NP in Congo. The habitat is characterised by mixed lowland and swamp forest and contains several noteworthy ‘bais’. It includes numerous villages, several logging concessions (none of which are FSC certified), and is 70 km from the town of Makokou. The area was affected by Ebola between 2001 and 2002 and, although the impact of this disease on great ape populations is not well understood, large declines in gorilla and chimpanzee abundance have been recorded since the 1980s. Commercial poaching continues to present a major threat to wildlife and has intensified in recent years, with poachers coming from Congo posing a particular challenge for protection efforts. In addition, Belinga lies on one of the world’s largest untapped reserves of iron ore, and plans to develop mining pose significant concern, although application of International Finance Corporation (IFC) standards to extraction projects should lead to significant biodiversity

offsets and support for great ape protection. Largely due to its remoteness and lack of infrastructure, Mwagna is likely to be one of the last parks developed for tourism. Focus is necessarily on protection, and while the park has increased capacity to conduct anti-poaching patrols with military support, reinforcement is urgently needed. Further surveys are necessary to understand post-Ebola recovery of gorillas and chimpanzees, and land-use development plans should be considered carefully to avoid habitat fragmentation. Finally, conservation planning in the Djoua-Zadie forests should be coordinated with similar actions in Congo, hopefully eventually leading to the long-term conservation of a continuous forest block stretching from Minkébé to Odzala.

Action needed site #7	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards in collaboration with the private sector	Ongoing	\$250,000	ANPN, MFEPRN, private sector
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Ongoing	\$50,000	ANPN, EAGLE, MFEPRN, other ministries
Establish a standardised great ape (and other large mammal) monitoring programme, including training in monitoring methods for personnel	Every 4–5 yrs.	\$25,000	ANPN, WWF
Carry out land-use planning in the Minkébé-Djoua-Odzala corridor (Congo and Gabon)	3 yrs.	\$70,000	ANPN, WCS, WWF, MFEPRN
Standardise and implement an epidemiological surveillance system and health education programmes to minimise risks of disease transmission between humans and great apes	Ongoing	\$25,000	ANPN, CIRMF, WCS, WWF
Develop best practice guidelines to control bushmeat hunting in collaboration with extractive industries	Ongoing	\$2,000	ANPN, WCS, WWF, FSC, private sector incl. OLAM, Sunly
Establish partnerships with mining companies (Belingah, Waratah) to mitigate and offset the impacts of mining development, and identify potential biodiversity offsets	Ongoing	\$50,000	ANPN, WWF, Ministry of Mines, Petroleum and Hydrocarbons, private sector
Control poaching and monitor impacts of artisanal gold miners on great apes	Ongoing	\$50,000	ANPN, WCS, WWF

## 8. Boumba Bek-Nki (Cameroon)

Together Boumba-Bek and Nki national parks constitute the largest contiguous block of protected forest in Cameroon. Including the area to the north between the Dja and Bek rivers, this 10,150-km<sup>2</sup> area of intact forest includes several forestry concessions, one of which is FSC certified (10-030). Although the two parks enjoy full legal status, the management plan for this biodiversity-rich zone awaits official validation from the government. Current conservation activities seek to consolidate park management and to develop community-based activities in the buffer zones. Relative isolation previously ensured a degree of protection for the wildlife; however, the zone is now surrounded by forestry concessions and a growing human population, while mineral extraction nearby brings poaching on a commercial scale and encroachment. Cross-border protection efforts are intended to mitigate threats to the integrity of the parks.



A silverback gorilla killed illegally in Cameroon © Edmond Dounias/CIFOR

Action needed site #8	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards	Ongoing	\$360,000	MINFOF, MINDEF, WWF
Maintain transboundary collaboration and protection efforts	Ongoing	\$50,000	MEFDD, MFEPRN, MINFOF, WWF
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Ongoing	\$75,000	MINFOF, MINDEF, MINJUSTICE, WWF
Maintain standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Every 4–5 yrs.	\$50,000	MINFOF, WWF
Standardise and implement an epidemiological surveillance system and rapid response structure for emerging zoonotic diseases	Ongoing	\$50,000	MINFOF, WWF
Obtain land titles for protected areas	3 yrs.	\$2,500	WWF, government partner
Implement conservation education awareness and outreach programmes in local communities and urban centres	Ongoing	\$15,000	MINFOF, WWF

#### 9. Conkouati-Mayumba (Congo and Gabon)

The Conkouati-Mayumba landscape (10,030 km<sup>2</sup>) forms one of the most biodiverse protected areas in the region, beginning in the Atlantic Ocean and characterised by coastal lowland forest extending eastward into higher altitude forest in the mountains, before descending to the inland savanna plain. The landscape includes Conkouati-Douli NP in Congo, Mayumba NP in Gabon (of which only a small portion is terrestrial) and a transboundary buffer zone, and is part of the Mayombe Transboundary Initiative (MTI). The Mayumba Complex is currently under management of the Grand Mayumba Development Company, a public-private partnership formed in 2012 between Gabon and SFM Africa (Limited), which aims to develop sustainable forestry, agribusiness and tourism. Careful land-use planning and best practices to mitigate the impacts of agroforestry development on great apes are to be managed within the framework of a Grand Mayumba Sustainable Development Plan, for which there is strong stakeholder support. However, lack of hunting controls and law enforcement combined with high demand for bushmeat in markets in Congo highlight the need for protection efforts to be improved, particularly cross-border collaborations. Despite years of logging in Conkouati-Douli NP, the great ape population has remained stable due to effective protection efforts.

Action needed site #9	Countries	Timeframe	Cost per annum	Implementing partners
In national parks and buffer zones, reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards; ensure transboundary protection efforts	Congo	Ongoing	\$50,000	MEFDD, MTI, WCS ANPN, WCS
	Gabon		\$50,000	
In logging concessions, reinforce capacity and structures for effective law enforcement, including recruitment and training of guards, in partnership with extractive industry	Congo	Ongoing	\$150,000	MEFDD, other ministries, WCS, private sector ANPN, MFEPRN, Mayumba Port Authority, other ministries, WCS, SFM Africa
	Gabon		\$200,000	
Strengthen legal and judicial procedures to ensure full application of the law through a wildlife crime unit with investigators and trained lawyers to counter crime and ensure effective judiciary process	Congo	Ongoing	\$50,000	MEFDD, EAGLE, WCS ANPN, EAGLE, MINEF, other ministries, WCS
	Gabon		\$40,000	



Action needed site #9 (cont.)	Countries	Timeframe	Cost per annum	Implementing partners
Maintain standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Congo Gabon buffer zone	Every 3 yrs. Every 3 yrs. Every 4–5 yrs.	\$30,000 \$30,000 \$15,000	MEFDD, WCS ANPN, WCS MTI, WCS
Land-use planning to designate strict conservation and no-hunting zones	Gabon	Within 2 yrs.	\$10,000	ANPN, MFEPRN, Min. Interior, EAGLE, WCS
Strengthen institutional framework for transboundary collaboration and law enforcement between governments	Congo & Gabon	Ongoing	\$4,000	ANPN, MEFDD, MTI, WCS
Develop best practice guidelines to control bushmeat hunting in collaboration with extractive industries	Congo & Gabon	Ongoing	\$2,000	ANPN, MEFDD, MFEPRN, WCS, SFM Africa, private sector
Implement conservation education awareness and outreach programmes in local communities and urban centres	Congo Gabon	Ongoing	\$35,000 \$50,000	MEFDD, MTI, WCS ANPN, WCS

#### 10. Deng Deng (Cameroon)

The Deng Deng landscape (2,751 km<sup>2</sup>) includes Deng Deng National Park (DDNP) and adjacent forestry concessions extending to about 20 km north of Bertoua. DDNP was created in 2010 to protect the most northerly of all populations of western lowland gorilla as a biodiversity offset for the Lom Pangar hydroelectric dam. By the same decree, a wildlife corridor was created between DDNP and the 21-km<sup>2</sup> FMU 10-065. Consultations with local communities and traditional authorities ensured support for the creation of the park and that the surrounding agricultural zones were excluded from the protected area. The initial area of 523 km<sup>2</sup> was extended to 683 km<sup>2</sup> in 2013. Part of the Deng Deng forest massif will be converted into the 5,000-km<sup>2</sup> Deng Deng Operational Technical Unit, which will include the national park, the wildlife corridor, FMUs 10-065 and 10-061, the 600-km<sup>2</sup> Belabo-Diang community forest, two forests dedicated to research and education, the 2,115-km<sup>2</sup> north periphery, and a 1,045-km<sup>2</sup> agroforestry zone in the south. The landscape is under high human pressure from the Lom Pangar dam construction, demographic changes accompanying this project, and political instability in neighbouring CAR, which has resulted in an influx of thousands of refugees.

Action needed site #10	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards	Ongoing	\$240,000	MINFOF, BRL
Maintain a standardised great ape (and other large mammal) monitoring programme, including training in monitoring methods for personnel	Every 4–5 yrs.	\$45,000	MINFOF, BRL
Obtain land title for NP	Within 3 yrs.	\$8,000	MINFOF, BRL
Create a management plan, create structures and build capacity for park management	1 yr.	\$35,000	MINFOF, BRL
Establish partnerships with private sector (forestry, mining, agroindustry, Lom Pangar dam) to adopt and implement IUCN and other relevant best practice guidelines	2 yrs.	\$25,000	MINFOF, BRL, private sector

## 11. Dja (Cameroon)

The 13,207-km<sup>2</sup> Dja landscape consists of the 5,281-km<sup>2</sup> Dja Biosphere Reserve (DBR), a mosaic of logging concessions (four of which are FSC certified), community forests, agroforestry and agroindustry zones, mining concessions, and a safari hunting concession. It extends east and north to about 15 km south of Abong Mbang. Furthermore, the Mekin hydroelectric dam is being constructed on the Dja River at the eastern edge of the reserve with potential implications for its biodiversity. A range of conservation approaches has been implemented in and around the DBR, including: engaging the timber sector to improve conservation management, community forestry, civil society capacity-building, and a gorilla research project. The DBR was inscribed as a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site in 1987; however, unless adequate measures to prevent or mitigate the negative impacts of development projects are undertaken, including improved anti-poaching and ecological monitoring, the DBR will be inscribed on the List of World Heritage in Danger in 2015. The DBR management plan has been updated and is under review.

Action needed site #11	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards	Ongoing	\$365,000	MINFOF, AWF, EAGLE, PGS, ZSL
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Ongoing	\$75,000	MINFOF, MINJUSTICE, AWF, EAGLE, ZSL
Establish a standardised great ape (and other large mammal) monitoring programme, including training in monitoring methods for personnel	Every 4–5 yrs.	\$80,000	MINFOF, AWF, PGS, ZSL
Clarify limits of the World Heritage property (with reference to the Decree of 9 July 2007), confirm on a geo-referenced map to be submitted to UNESCO, and demarcate boundaries; obtain land title for DBR	Within 2 yrs.	\$25,000	MINFOF, ZSL
Review and revise management plan for DBR	3 yrs.	\$25,000	MINFOF, AWF, BCSF, FCTV, LEF, PGS, ZSL
Establish partnerships with the private sector (forestry, mining, agroindustry) to adopt and implement IUCN and other relevant best practice guidelines	Ongoing	\$5,000	MINFOF, BCSF, FCTV, LEF, PGS, ZSL, private sector
Upgrade and maintain basic management infrastructure for reserve antennae; procure additional equipment for DBR conservation service	Ongoing	\$50,000	MINFOF, ZSL

An adult male and a juvenile chimpanzee prepare to ‘fish’ for insects. The chimpanzee of Goualougo make a unique set of tools, a skill passed from generation to generation © Ian Nichols



## 12. Ivindo (Gabon)

This 16,350-km<sup>2</sup> landscape includes Ivindo NP and a large buffer to the west and southeast that contains two FSC-certified logging concessions and several villages. It is covered by a mix of pristine and logged forest, and contains the noteworthy Langoué Bai. In addition, the Kongou waterfalls and rapids on the Ivindo River are considered to be among the most impressive natural spectacles in Central Africa. This landscape is rich in unexploited iron ore, and the waterfalls have been threatened in the past by plans to mine Belinga, which included hydroelectric power development and the construction of a dam on the Kongou falls; these plans have been halted in light of opposition but remain a future threat. An *Institute de Recherche en Ecologie Tropicale* (IRET) research station at Ipassa in the northeast of the park was extremely productive in the 1960s–1980s and has recently attracted renewed international research interest. The potential for world-class research and tourism is high but has not been fully exploited beyond monitoring of great apes and elephants at Langoué Bai. More targeted research is needed to understand the impacts on great ape population dynamics and recovery from a suspected Ebola outbreak in the 1990s. Outside the park, logging activities have decreased in recent years, but in areas where logging has stopped, commercially driven poaching has increased, particularly in the bays. This is the most serious immediate threat to wildlife, and support to improve protection and law enforcement is urgently required.

Action needed site #12	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards; in collaboration with the private sector in the buffer zones	Ongoing	\$250,000	ANPN, WCS, MFEPRN, private sector
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Ongoing	\$50,000	ANPN, EAGLE, MFEPRN, other ministries
Maintain a standardised great ape (and other large mammal) monitoring programme, including training in monitoring methods for personnel	Every 4–5 yrs.	\$40,000	ANPN, WCS, IRET, Duke University
Minimise human-great ape disease transmission in tourism activities at Langoué Bai through full implementation of IUCN best practice guidelines	Ongoing	\$50,000	ANPN, CIRMF, WCS
Strengthen research capacity to respond to threats to great apes, integrate research into PA management, support training, data collection and analysis, and implementation of field and laboratory protocols	Ongoing	\$50,000	ANPN, WCS, IRET, Duke University
Develop and promote responsible great ape tourism with full implementation of IUCN best practice guidelines	Ongoing	\$25,000	ANPN

## 13. Loango-Moukalaba-Doudou (Gabon)

This 19,620-km<sup>2</sup> landscape covers the entire Gamba complex of protected areas. It incorporates Loango NP and Moukalaba-Doudou NP and Ouanga Faunal Reserve, and includes coastal forest, lagoons, wetlands, savanna and montane forest (in Moukalaba-Doudou NP). The landscape also encompasses two onshore oil concessions and two FSC-certified logging concessions (Mandji and Kivoro). Also included is an area to the north of Moukalaba-Doudou and west of the national N1 road up to 20 km south of Lambaréné, along with the town of Gamba, which has a human population that exceeds 12,000. Research undertaken by Kyoto University and the Max Planck Institute for Evolutionary Anthropology (MPI), is advancing knowledge of sympatric gorilla and chimpanzee socioecology, and efforts to habituate great apes for tourism are being undertaken in both Loango and Moukalaba-Doudou NPs by ANPN and the *Association protectrice des grands singes de la Moukalaba* (PROGRAM), IRET and SFM Africa. Despite many years of effort elsewhere, Moukalaba-Doudou NP is the only site in Gabon where gorillas have been successfully habituated. With tourism initiatives underway and growing interest in this prime location from private operators, it is vital that appropriate procedures are put in place to minimise the risks of disease transmission to habituated great apes, and that monitoring of pathogen dynamics continues (e.g., van Zijll



Langhout *et al.* 2010). In the wake of diminishing offshore oil reserves, poaching poses an increasing threat, and reinforcement of anti-poaching and law enforcement is crucial.

Action needed site #13	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards in collaboration with the private sector in the buffer zones	Ongoing	\$250,000	ANPN, WCS, MFEPRN, WWF, private sector
Check points along new roads and maritime links	Ongoing	\$40,000	ANPN, MFEPRN, Ministry Interior
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Ongoing	\$50,000	ANPN, EAGLE, MFEPRN, other ministries
Maintain standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Every 4–5 yrs.	\$50,000	ANPN, WCS, WWF
Minimise human-great ape disease transmission in tourism activities through full implementation of IUCN best practice guidelines	Ongoing	\$50,000	ANPN, IRET, Kyoto University, MPI, PROGRAM, SFM Africa
Develop and promote responsible great ape tourism following IUCN best practice guidelines	Ongoing	\$25,000	ANPN
Strengthen research capacity to respond to threats to great apes, integrate research into PA management, support training, data collection and analysis, and implementation of field and laboratory protocols	Ongoing	\$50,000	ANPN, IRET, Kyoto University, MPI, PROGRAM, SFM Africa
Develop and implement strategies to mitigate the impacts of urban development	1 yr.	\$100,000	ANPN, ANG, ANUTTC, Ministry of Urbanisation

Adult female gorilla with her infant, Nouabalé-Ndoki National Park © Ian Nichols



#### 14. Ngoyla-Mintom-Kom-Mengamé (Cameroon)

This landscape covers 14,105 km<sup>2</sup> and includes Ngoyla-Mintom, the Kom-Mengamé Forest Conservation Complex (KM FCC), the areas between Kom and Dja, and the land south and west of the Dja River. Human population densities in the region are still quite low (~22,500 people with a density of ~1.5 inhab./km<sup>2</sup>). However, the rich biodiversity is exposed to increasingly intense poaching pressure, exacerbated by in-migration made possible by the systematic opening of the forest to build roads to support logging and mining in the area. Ngoyla-Mintom is an important corridor linking Dja, Nki, Minkébé (in Gabon) and the proposed Messok Dja NP (in Congo). Until 2012, when industrial logging began, the Ngoyla-Mintom massif contained a 65%-intact forest block. The government recently classified part of the area as a 1,600-km<sup>2</sup> Wildlife Reserve (former FMU 10-034). One of the biggest challenges in coming years will be to combat increasing levels of poaching, manage the newly classified reserve and limit habitat fragmentation by promoting sustainable forest management, best management practices in the mining and timber industries, and surveillance activities.

The 267-km<sup>2</sup> Mengamé Gorilla Sanctuary was established in 2008 but awaits official decree from the Prime Minister's office (WRI 2012). Much of KM FCC now under protection was logged until 2002 (Fongnzossie *et al.* 2014), but surveys conducted in 2002 recorded a healthy density of great apes (Halford *et al.* 2003). The complex is surrounded by multiple-use forests, including forestry concessions and partially protected forested reserves. A management plan was validated at the local level in 2007, and a revised version is ready for approval at the national level. Although 20 ecoguards have been assigned to Mengamé since 2009, management and protection efforts are hindered by the lack of legal status and clearly defined limits, and a weak management structure. Recent information indicates that a road has been constructed through the new 678-km<sup>2</sup> Kom NP (ITTO 2014).

Action needed site #14	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards, with the support of mining and logging companies; ensure transboundary protection efforts	Ongoing	\$240,000	MINFOF, MINDEF, WWF, private sector
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support, rigorous monitoring systems, and the promotion of stronger wildlife protection laws	Ongoing	\$75,000	MINFOF, MINJUSTICE, EAGLE, WWF
Establish a standardised great ape (and other large mammal) monitoring programme, including training in monitoring methods for personnel	Every 4–5 yrs.	\$60,000	WWF, MINFOF
Obtain land titles for Kom and Mengamé; delineate boundaries; finalise management plans for Kom and Mengamé	3 yrs.	\$25,000	MINFOF
Develop and sustain a human-gorilla conflict mitigation programme, including a disease-risk prevention strategy in Mengamé following IUCN best practice guidelines	2 yrs.	\$10,000	WWF, MINFOF
Establish partnerships with extractive industries to adopt and implement IUCN and other relevant best practice guidelines	2 yr	\$12,500	WWF, MINFOF, private sector
Finalise institutional framework for transboundary collaboration and law enforcement between governments	3 yrs.	\$30,000	MINFOF, MEFDD, MFEPRN, ANPN, WWF
Establish and maintain basic management infrastructure and procure equipment for the Ngoyla-Mintom Technical Operation Unit (TOU)	3 yrs.	\$70,000	WWF, MINFOF

## 15. Souanké-Sembe (Congo)

The Souanké-Sembe landscape of northwest Congo covers ~14,535 km<sup>2</sup> and includes the proposed 1,400-km<sup>2</sup> Messok Dja PA and the 9,000-km<sup>2</sup> Djoua Ivindo Forest (Minkébé-Odzala inter-zone) and surrounding forests bounded by the international border. The area is typified by a mix of swamp and *terra firma* forest with large stands of *Gilbertiodendron dewevrei*, and includes Congo's highest mountain, Mont Nabemba (1,020 m asl). It provides an important link between Nki NP in Cameroon, Minkébé NP in Gabon and Odzala-Kokoua NP in Congo. The Jua Ikié FMU (5,740 km<sup>2</sup>) has been allocated to a Chinese logging company, SEFYD, and Tala Tala FMU (6,211 km<sup>2</sup>) attributed to a Lebanese company, SIFCO (Groupe Fadoul). Both these concessions overlap with the proposed Messok Dja PA. Upon the recommendation of an inter-ministerial committee on zoning of TRIDOM, the Djoua Ivindo forest is to be zoned for mining, conservation and eco-development. However, in 2014, the Ministry of Forest Economy and Sustainable Development (MEFDD) created the Karagoua FMU (6,533 km<sup>2</sup>), that borders Minkébé NP and overlaps with the Djoua Ivindo Forest, and possible attribution of this uninhabited forest to a logging company is a new threat to this remote forest. Three large iron-ore mining projects are planned in Djoua Ivindo, and use of the mitigation hierarchy could contribute to the conservation of great apes through biodiversity offsets. Other pressures on wildlife come from artisanal gold mining, and the proposed 600-MW Chollet hydroelectric dam on the Dja River (which would impact great apes in Nki as well as Messok Dja). Tarmacking of the Ouessou-Sembe-Souanké-Ntam road is improving access to this once remote region, resulting in a booming bushmeat trade, which feeds into the markets of Ouessou and Brazzaville. Given the scale of development in the area, effective protection will require a long-term commitment to conservation that receives strong support from the extractive industries active in this landscape.

Action needed site #15	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards; conduct joint patrols with Cameroon (Messok Dja-Nki border) and Gabon (Minkébé border, Djoua River)	Ongoing	\$250,000	MEFDD, WWF
Establish ecoguard units in collaboration with mining companies in Djoua Ivindo	Ongoing	\$250,000 + company match	MEFDD, WWF, private sector
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Ongoing	\$70,000	EAGLE, ministries, WWF
Establish a standardised great ape (and other large mammal) monitoring programme, including training in monitoring methods for personnel	Every 4–5 yrs.	\$40,000	WWF
Conduct additional surveys in Djoua Ivindo, Tala Tala concession and Karagoua swamps	Within 2 yrs.	\$100,000	WWF
Formal gazettelement of Messok Dja as a protected area	2 yrs.	\$50,000	MEFDD, WWF
Identification and validation of biodiversity offsets by mining projects	3 yrs.	\$150,000	MEFDD, WWF, Ministry of Mines and Geology
Development and implementation of wildlife management plans by logging companies, including support for additional ecoguard units and roadblocks	Ongoing	\$150,000 + company match	MEFDD, WWF

## 16. Río-Campo-Ma'an (Cameroon and Equatorial Guinea)

Río Campo Natural Reserve (347 km<sup>2</sup>) in Equatorial Guinea and Campo Ma'an NP (CMNP, 2,640 km<sup>2</sup>) in Cameroon fall in the Atlantic coastal forest zone, known for high floral diversity and several endemic plant species. High-level meetings held in 2010 and 2011 supported the creation of the 'Río-Campo-Ma'an Binational' and establishment of a formal transboundary collaboration, which awaits political approval from both governments. This agreement will channel support for



transboundary conservation activities, and recent efforts have supported active law enforcement and to reduced political tensions. Support for the Río Campo Natural Reserve has enabled construction of a conservation base camp, recruitment of a small number of ecoguards and the purchase of vehicles critical to operations. Although not yet sufficient, protection of Río Campo seems to be improving. A recent nationwide survey of Equatorial Guinea confirmed that Río Campo is important for great apes (Murai *et al.* 2013).

CMNP is surrounded by agroforestry zones, logging concessions and, of particular concern, has a hydroelectric dam (35% completed) and a deep-sea port (75% completed) at its periphery. However, for the next 12 years CMNP will receive funding as compensation for the construction of the Chad-Cameroon pipeline and from a World Bank-supported project, the *Projet Compétitivité des Filières de Croissance*, which supports gorilla protection and habituation. The development projects, including the dam and the port, have pledged to provide conservation funding for administration of the national park. A substantial increase in ecoguards and patrol equipment has improved protection, although more intensive protection and engagement with the existing and future infrastructure developments will be essential. In 2011, a gorilla habituation site was established on Dipikar Island in the southern sector of the park, and ecological and ranging data collection are the beginnings of a research and tourism project. A wildlife inventory will be completed in 2014.

Action needed site #16	Countries	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards; ensure transboundary protection efforts	Cameroon Eq. Guinea	Ongoing	\$360,000 \$120,000	MINFOF, MINDEF, WWF INDEFOR-AP
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Cameroon	Ongoing	\$30,000	MINFOF, EAGLE, WWF
Establish standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Cameroon Eq. Guinea	Every 4–5 yrs.	\$50,000 \$10,000	MINFOF, WWF INDEFOR-AP
Extend Río Campo boundaries to meet CMNP using results of 2011 nationwide survey	Eq. Guinea	5 yrs.	\$10,000	INDEFOR-AP
Obtain land title for CMNP; review and revise management plan for CMNP	Cameroon	3 yrs	\$8,000	MINFOF, WWF
Finalize agreement for transboundary collaboration and law enforcement between governments	Cameroon & Eq. Guinea	1 yr.	\$75,000	MINFOF, INDEFOR-AP, WWF
Establish partnerships with the private sector (forestry, mining, agribusiness, industrial port complex, rail network) to adopt and implement management plans and IUCN and other relevant best practice guidelines	Cameroon Eq. Guinea	Ongoing	\$2,500 \$2,500	MINFOF, WWF INDEFOR-AP, ANDEGE, private sector
Continue the gorilla habituation programme (for tourism); minimise human-great ape disease transmission in tourism activities through full implementation of IUCN best practice guidelines	Cameroon	Ongoing	\$150,000	MINFOF, WWF
Conduct a feasibility study of tourism potential including barriers and opportunities	Eq. Guinea	1 yr.	\$25,000	INDEFOR-AP, ANDEGE
Upgrade and maintain basic management infrastructure and procure important equipment	Cameroon Eq. Guinea	3 yrs.	\$50,000 \$50,000	MINFOF, WWF ANDEGE

## PRIORITY LANDSCAPE FOR EBOLA RECOVERY

### 17. Minkébé (Gabon)

The Minkébé landscape covers an area of 13,000 km<sup>2</sup> and consists of Minkébé NP plus an area between the northern boundary of the park and the Cameroon border that 'buffers' the Kom and Mengamé PAs in Cameroon. This area comprises swampland and mixed forest, interspersed with

Researcher collecting samples of gorilla dung for genetic analysis, Goualougo Triangle © Ian Nichols



inselbergs. The remotest region of Gabon, it has a very low human population density—there are no villages in the park, but there are a few in the Kom-Mengamé buffer. Minkébé was greatly affected by multiple outbreaks of Ebola in the 1990s (Huijbregts *et al.* 2003) and more than 90% of great apes are thought to have been lost to disease and poaching in the past three decades. It is important that protection and population surveys to monitor great ape population dynamics post-Ebola are sustained. Many of the poachers originate from Cameroon and Congo, and although ANPN benefitted from military support to increase its capacity, protection of this landscape is particularly dangerous and fraught with challenges. Further reinforcement of anti-poaching and law enforcement activities is urgently needed.

Action needed site #17	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards in collaboration with the private sector and through transboundary cooperation	Ongoing	\$100,000	ANPN, MFEPRN, MINFOF, Rougier Gabon
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support	Ongoing	\$50,000	ANPN, EAGLE, MFEPRN, other ministries
Implement a standardised great ape (and other large mammal) monitoring programme, including training in monitoring methods for personnel	Every 4–5 yrs.	\$40,000	ANPN, WCS
Standardise and implement an epidemiological surveillance system, with emphasis on Ebola	Ongoing	\$25,000	ANPN, CIRMF, WCS, WWF

## PRIORITY LANDSCAPE FOR SURVEYS

### 18. Maiombe-Dimonika (Angola and Congo)

The Mayombe forest forms the southwest margin of Central Africa’s tropical rainforest and the geographical limit of western lowland gorillas and central chimpanzees. The 7,083-km<sup>2</sup> priority landscape incorporates Maiombe NP in the Cabinda enclave of Angola, Dimonika Biosphere Reserve in Congo and the area between the two. Despite surveys of Cabinda being recommended in the 2005 action plan, none were carried out, and information on the status of apes there is still much needed. Local reports suggest that important great ape populations remain, but that they are significantly threatened. The 1,930-km<sup>2</sup> Maiombe NP was gazetted in 2011; however, its limits are still under debate and may be moderately changed.

The Dimonika Biosphere Reserve is a mountainous UNESCO Man and the Biosphere (MAB) reserve in southwest Congo. The reserve is zoned, with a 910-km<sup>2</sup> core of intact Guineo-Congolian rainforest most important for gorillas and chimpanzees. With little management and protection structure in place over the last decade, the reserve has been somewhat degraded due to commercialized gold mining and bushmeat hunting. The national railway running from Brazzaville to Pointe Noire is

located along the reserve's southern border, facilitating transport to markets in these cities, as well as other main trading centres, such as Dolisie.

Efforts to protect the whole Mayombe forest ecosystem regained momentum under a formal agreement between the governments of Angola, Congo and DRC, with support from IUCN and the United Nations Environment Programme (UNEP). The Mayombe Transboundary Initiative (MTI) also includes Loki Biosphere Reserve in DRC. A strategic plan (Ron *et al.* 2011) was adopted in February 2013 and provides administration and protection capacity for the existing and proposed PAs and identified corridors.

Action needed site #18	Country	Timeframe	Cost per annum	Implementing partners
Reinforce capacity and structures for effective law enforcement, including recruitment, training and deployment of ecoguards and a protection strategy	Congo	Ongoing	\$150,000	MEFDD, JGI
Strengthen legal and judicial procedures to ensure full application of the law, including specialised training for local authorities, police, gendarmes, magistrates, legal counsel and case support, and transboundary cooperation	Angola & Congo	Ongoing	\$160,000	MTI, national law enforcement agencies, national wildlife crime enforcement unit
Establish standardised great ape (and other large mammal) monitoring programmes, including training in monitoring methods for personnel	Angola & Congo	Every 4–5 yrs.	\$58,000	MINAMB, MNP, MTI, JGI
Creation and implementation of a land-use and management plan for Maiombe NP	Angola	Planning 2 yrs., implementation ongoing	\$150,000	MINAMB, MNP
Pursue protected status for the forests acting as corridors in the greater Mayombe landscape	Congo	Ongoing	\$7,000	MEFDD, MTI, JGI, WCS, WWF
Conduct socioeconomic surveys of bushmeat trade, hunting pressure and local attitudes to conservation in the Mayombe	Angola	Every 3 yrs.	\$22,000	MINAMB, MNP
Implement conservation education awareness and outreach programmes in local communities and urban centres	Angola	Ongoing	\$60,000	MTI, MINAMB, MNP, NGOs

## 5. MONITORING AND EVALUATION

### Monitoring Framework for a Regional Conservation Strategy for Western Lowland Gorillas and Central Chimpanzees

In order to monitor and evaluate the success of this action plan in delivering tangible conservation results for great apes in Western Equatorial Africa, we propose a simple Pressure-State-Response (PSR) framework<sup>12</sup>, which aims to monitor the cause and effect of our actions ('responses') in reducing the threats ('pressures') that negatively impact great ape populations ('state'). We focus on a small suite of **headline indicators** that encompass the threats and actions that are common to all priority landscapes and which are proven (i.e., peer reviewed) to be important factors in great ape survival. These indicators can be applied to all priority landscapes in this action plan, without precluding individual sites that can provide further site-specific indicators, as needed. In addition to **landscape-level** indicators, we have selected a number of indicators at **national** and **regional** scales to evaluate the eventual impact of this action plan in improving gorilla and chimpanzee conservation,

<sup>12</sup> OCDE. 1993. OECD Core Set of Indicators for Environmental Performance Reviews. Paris.



Billboard installed to increase public awareness about great apes. Billboards have two sides: one encourages citizens to consider great apes as a part of their national heritage; the other informs about the consequences of being caught in possession of a great ape. Republic of Congo © Fernando Turmo/JGI



both in each range country and across their geographic range. National-level indicators will also contribute to reporting on other national biodiversity targets, such as National Biodiversity Action Plans. USFWS (2014) guidelines designed to measure effectiveness of conservation and threats to wildlife and habitats in the Central African region use the same general framework.

In selecting a suite of indicators (listed in Table 3), we used the following guiding principles:

- indicators are direct in that they focus on threats or other proximate factors highlighted in this action plan;
- indicators are scalable and comparable across all priority landscapes (or countries); and
- indicators are unambiguous, easy to measure (i.e., with clear protocols), and no assumptions are made about the local context in their interpretation.

### Implementation of the Monitoring Framework

An initial baseline assessment of the indicators in Table 3 will be coordinated at the regional scale by the IUCN SSC Ape Populations, Environments and Surveys (A.P.E.S.) project in Year 1 of implementation of this plan, reviewed in Year 5, and reported on in full in Year 10. Indicator-level data (i.e., not raw data) from these regional assessments will be publicly available and hosted on the A.P.E.S. Portal<sup>13</sup> website. A.P.E.S. staff will oversee data collation, quality control and analysis.

### Proposed budget<sup>14</sup>

Item	Estimated cost per annum
Researcher time for data collation/analysis	\$ 3,600
IUCN SSC A.P.E.S. Portal data hosting and reporting	\$ 6,500
Total	\$ 10,100

<sup>13</sup> <http://apesportal.eva.mpg.de>

<sup>14</sup> This budget includes costs for collating and reporting of indicators. Costs for data collection (e.g. population monitoring) are incorporated into priority actions and budgets for each landscape.

Table 3. Monitoring indicators

Scale	Name of indicator	Description of indicator(s)	10-year target	Indicator type*	Justification	Data source/ method of data collection	Frequency of collection	Frequency of indicator reporting
Landscape	Poaching and trafficking	No. of seizures of great apes (live or body parts)	Reduction of poaching and illegal trafficking of apes to zero	Pressure	Poaching is identified as the most significant threat to great apes across all priority areas in the region, primarily for bushmeat, but also for ape skulls for medicinal/spiritual purposes, and for the live trafficking of young apes as pets	Patrol data (e.g., SMART) and trafficking records (e.g., EAGLE projects)	Ongoing/ continuous	Monthly
Landscape	Disease	No. of ape carcasses reported <i>in situ</i> where death attributed to anthropogenic disease	No ape mortality caused by transmission of human diseases to apes as a result of conservation activities	Pressure	Disease is identified as an existing or potential threat in all landscapes	Rangers/field teams/hunter monitoring network§	Ongoing/ continuous	Annual
Landscape	Loss of suitable habitat	Annual rate of deforestation	No deforestation in protected areas/ conservation sites, and rate of deforestation across priority landscapes below national average	Pressure	% deforestation (defined here as >10% canopy cover loss) denotes loss of habitat‡	Global Forest Watch	Every 15 days	Annual
Landscape	Encroachment	Density of roads	Any increase in road density in ape landscapes is mitigated by adherence to reduced-impact road planning	Pressure	Roads result in both fragmentation of habitat and increased hunter access	WRI Forest Atlases (Cameroon/ Congo/Eq. Guinea/Gabon)	Annual	Annual
Landscape	Population size	Population size	Ape population is stable or increasing; in Ebola recovery landscapes must be increasing	State	Ape population size is the ultimate and most reliable measure of conservation effectiveness	IUCN best practice guidelines (Kühl <i>et al.</i> 2008)	Every 3–5 years	Every 3–5 years
Landscape	Population structure	Population structure†	Population structure remains stable. In Ebola recovery landscapes, ape population re-establishing normal structure	State	Population structure changes after Ebola outbreak (proportion of population living in groups drops; proportion of solitary males increases)	Long-term observations of known groups	Ongoing	Annually
Landscape	Protection spatial effort	% great ape habitat patrolled	100% of ape habitat patrolled annually or more frequently depending on site dimensions and threat levels	Response	This indicator measures extent of protection coverage. Active law enforcement is the primary predictor of ape survival; tourism and research are secondary indicators (Tranquilli <i>et al.</i> 2012)	Patrol data (e.g., SMART)	Ongoing/ continuous	Annual

Table 3. Monitoring indicators (cont.)

Scale	Name of indicator	Description of indicator(s)	10-year target	Indicator type*	Justification	Data source/ method of data collection	Frequency of collection	Frequency of indicator reporting
Landscape	Protection temporal effort	# patrol days/month	21 patrol-days/month; patrol presence	Response	This indicator measures frequency of protection activities. Active law enforcement is the primary predictor of ape survival; tourism and research are secondary indicators (Tranquilli <i>et al.</i> 2012)	Patrol data (e.g., SMART)	Monthly	Annual
Landscape	Management effectiveness	Management Effectiveness Tracking Tool (METT) score and Governance Assessment score (Authority, Capacity, Power)	90% of METT measures score a 3. Authority, Capacity and Power score at +1 or higher	State	The METT and Governance Assessment tools are the best available methods for evaluating effectiveness of wildlife management authorities with jurisdiction over conservation of great apes	METT scorecard and Governance Assessment	Annual	Annual
National	Enforcement	(a) No. of targeted arrests; (b) Proportion of targeted arrests resulting in (i) prosecution and (ii) sentencing	Proportion of targeted arrests following due legal and judicial process reaches 80%	Response	This indicator is a measure of both enforcement effectiveness and improved governance (i.e. proportion of judicial actions that follow due legal process)	Patrol data (e.g., SMART) and national databases (e.g., EAGLE records)	Ongoing/ continuous	Annual
National	Policy	Area of country where ape-friendly land-use policies are (a) in development, (b) adopted, (c) implemented	At least 4 of 6 countries in WEA range have national laws/policies that require adoption of ape-friendly land-use practices	Response	This indicator measures the extent to which IUCN and other relevant best practices are incorporated into national legislation in range states (best practice guidelines have been developed for production forests and FSC certification; Morgan <i>et al.</i> 2013)	National forest/land-use policies and audits by independent verification bodies (e.g., Veritas)	Ongoing/ continuous	Annual
Regional	Strategy implementation	% of priority sites that have implemented actions recommended in this document	100%	Response	Tracking of activity implementation	IUCN SSC Primate Specialist Group and A.P.E.S.	Every 5 years	Every 5 years
Regional	Strategy funding leverage	% of funding that has been secured for priority sites	100%	Response	Tracking of activity funding	IUCN SSC Primate Specialist Group and A.P.E.S.	Every 5 years	Every 5 years

\* Indicator type: Pressure – Direct threat to great apes, State – Status of great ape population, Response – Conservation investment

§ In only one landscape at present but that is an excellent model

‡ Global Forest Watch <http://www.globalforestwatch.org>

† Only in landscapes where long-term great ape research and monitoring is ongoing



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## 6. RESEARCH, TOURISM & CONSERVATION EDUCATION

### Survey Methods and Information Access

Among the issues flagged in the 2005 action plan was the need for refinements in survey methodology, the development of alternative methods to survey apes, such as genetic capture-recapture, and improved accessibility of data. Standardized methods for surveying and monitoring great ape populations were subsequently published by Kühl *et al.* (2008) and are freely available on the A.P.E.S. Portal (<http://apesportal.eva.mpg.de>). In addition, the issues of centralization and analysis of ape distribution and abundance data are being addressed through the IUCN SSC A.P.E.S. database, developed and managed by the Max Planck Institute for Evolutionary Anthropology (MPI), in collaboration with a large number of partners.

### Great Ape Habituation for Research and Tourism

Bai Hokou (in CAR), Odzala and Mondika (in Congo), soon to be joined by Moukalaba-Doudou (in Gabon), are the only places in the world where habituated western gorillas can be approached on foot. Gorilla habituation has been attempted at other sites, but it is challenging, not always successful and should only be undertaken with careful planning and evaluation (Macfie & Williamson 2010). Human presence and the process of habituation are known to cause stress in gorillas (Shutt *et al.* 2014) and alter their activity, levels of aggression and movement patterns (Cipolletta 2003; Blom *et al.* 2004; Doran-Sheehy *et al.* 2007; Klailova *et al.* 2010). Guidelines for great ape tourism and habituation (Macfie & Williamson 2010; Williamson & Feistner 2011) recommend that impact studies and monitoring play an integral part of habituation and tourism projects.

### Great Ape Socioecology, Life History and Culture

During the last two decades, our understanding of Central Africa's great apes has increased greatly thanks to studies of chimpanzees in the Goualougo Triangle (Congo), of habituated gorillas at Bai Hokou and Mondika, and observations at Mbeli and Lokoué bais (Congo), where gorillas and other animals are highly visible but sufficiently distant from observation platforms that they are not influenced by human presence. What we have learned from these studies has not only enhanced our scientific knowledge of both gorillas and chimpanzees, but has also provided important data that can be applied to conservation efforts. Over 20 years of research at these sites have revealed that western gorillas have a slower physical maturation and higher rate of infant mortality than do mountain gorillas (Breuer *et al.* 2009; Breuer *et al.* 2010), consequently western gorillas are even more vulnerable to poaching and disease than are mountain gorillas. Further research is needed to determine other ways in which western gorillas differ from their mountain counterparts and the degree to which their ecology and behaviour make them susceptible to alterations in their habitat.

Chimpanzee cultures are valued as being unique attributes to particular populations (Whiten *et al.* 1999). In the Goualougo Triangle, chimpanzees have developed unique and sophisticated techniques to exploit high-quality food items, such as termites and honey (Sanz *et al.* 2010). Their improved tool-designs and strategies increase foraging efficiency up to tenfold (Sanz *et al.* 2009). This chimpanzee population has one of the most diverse and complex tool-using repertoires of any wild apes, regularly using tool sets consisting of multiple types of tools to gather termites and honey (Sanz & Morgan 2007).

### Applying Best Practice to Gorilla and Chimpanzee Tourism

Great ape tourism is often proposed as (i) a strategy to fund conservation efforts; (ii) a way for local communities to benefit from conservation; and (iii) a business opportunity. While the success of tourism at a few sites demonstrates its considerable potential, logistical and market factors suggest that it will not be possible to replicate this success everywhere. With a large number of risks to great apes from tourism, a very cautious approach is required. If tourism is not based on sound conservation principles right from the outset, economic objectives will likely take precedence, resulting in over-exploitation and damage to the well-being and survival of the great apes and their habitat. Adhering to established best practices, the *IUCN Best Practice Guidelines for Great Ape*

*Tourism* provides details on decision-making, planning and implementing great ape tourism. To achieve best practice and optimise tourism impacts, all great ape tourism development in Western Equatorial Africa must be founded on and guided by the IUCN document.

**Tourism Impacts:** There are both positive and negative impacts of great ape tourism. Potential benefits of great ape tourism include enhanced behavioural and health monitoring, veterinary care, research and protection of habituated great apes. Revenue can be generated for protected areas, communities, private sector partners and national economies. Participation in tourism enhances community support for conservation, and generates political goodwill, local and national pride, regional cooperation, international awareness and donor support. As a result of all the above, conservation of great apes and their habitat can be enhanced.

The number and scope of potential negative impacts of great ape tourism are of great concern; increased risk of poaching, disease transmission, changes in behaviour, and stress are among the most worrying. Tourism is expensive to set-up and run, and conservation effort must not be given second place as a result. Tourism must be viable from a business perspective because, once habituated, great apes must have enhanced protection in perpetuity to protect them from the risks mentioned above. Habitat impacts as well as pollution in areas of tourist infrastructure are also of concern. Impacts in local communities may include increased human-great ape conflict, immigration, crime, cultural dilution and uncontrolled development, and may result in overall negative impact on great apes and their habitats.

### **Guiding Principles of Best Practice in Great Ape Tourism**

1. Tourism is not a panacea for great ape conservation or revenue generation.
2. Tourism can enhance long-term support for conservation of great apes and their habitat.
3. Conservation comes first—it must be the primary goal at any great ape site, and tourism can be a tool to help fund it.
4. Great ape tourism should only be developed if the anticipated conservation benefits, as identified by impact studies, significantly outweigh the risks.
5. Comprehensive understanding of potential impacts must guide tourism development; positive impacts from tourism must be maximised and negative impacts must be avoided or, if inevitable, better understood and mitigated.
6. Great ape tourism management must be based on sound and objective science.
7. Enhanced conservation investment and action at great ape tourism sites must be sustained in perpetuity.
8. Benefits and profit for communities adjacent to great ape habitat should be maximised.
9. Profit to private sector partners and others who earn income associated with tourism is also important, but should not be the driving force for great ape tourism development or expansion.

For full details and discussion, download the IUCN guidelines at: [www.primatesg.org/best\\_practice\\_tourism](http://www.primatesg.org/best_practice_tourism)

### **Conservation Education and Outreach to Promote Great Ape Conservation**

The long-term success of conservation activities depends on the engagement of the general public, as well as local communities, in the great ape range states. Given the charismatic nature of gorillas and chimpanzees, they serve as a particularly powerful tool to communicate with and reach a widespread audience. Recent decades have seen a variety of outreach projects focused on great apes. These initiatives all have a common goal: to change attitudes and behaviours to benefit ape conservation by raising awareness.

Of primary importance is to communicate that all great apes are legally protected throughout their range, that they are endangered, and that poaching has legal consequences. In addition, outreach typically focuses on the unique characteristics of gorillas and chimpanzees, including their slow life histories, similarity to humans, individual personalities and charisma.

Evaluating the effectiveness of education campaigns is crucial and challenging, given that such activities may have a gradual and long-term impact. Surveys and questionnaires are the most



School children wearing chimpanzee masks made during a Club Ebobo conservation education session Nouabalé-Ndoki National Park © Thomas Breuer

common forms of monitoring, but must be well designed to evaluate whether or not any change that occurred was due to outreach activities. Such monitoring should be done in conjunction with threat and wildlife monitoring to make a connection between outreach programmes, changes in behaviour and attitudes, and trends in the status of great ape populations.

Recommendations for the future:

- Develop strategies to integrate outreach programmes into community development projects (e.g., constituency building);
- Elaborate communication tools in light of human-great ape conflict resolution (crop-raiding; encounters in the forest)<sup>15</sup>;
- Assess whether behavioural changes are brought about by outreach programmes, and investigate the motivations for illegally consuming and trafficking great apes;
- Use local celebrities as ambassadors for great ape conservation to convey messages about, for example, the potential benefits of great ape tourism and the risks of disease transmission;
- Establish a regional platform for educators to share experiences, materials and communication tools, and elaborate best practices, linking with global initiatives, such as the Primate Education Network.

## 7. CONCLUSIONS

Building on a process that began in 2005, and benefitting from new data and new methods of analysis, 18 priority landscapes were identified using a combination of (i) western lowland gorilla and central chimpanzee population survey data gathered during the last 10 years, and (ii) the Marxan decision support tool, to select the best likely core areas for long-term conservation of great apes in Western Equatorial Africa. The 12 landscapes identified in 2005 were maintained, several increased in size to encompass logging concessions and buffer zones, and six new ones added.

These 18 priority landscapes cover 51% of the entire western lowland gorilla and central chimpanzee geographic range, but are estimated to hold over 77% of their numbers. Each landscape

<sup>15</sup> Human-great ape conflicts are relatively uncommon in this region. While not addressed in this action plan, guidance on conflict prevention and mitigation is freely available online at: [www.primatesg.org/best\\_practice\\_conflict](http://www.primatesg.org/best_practice_conflict)



The Director of Cabinet, Ministry of Forest Economy and Sustainable Development, Republic of Congo, giving the closing speech at the 2013 workshop



includes one or more existing or planned protected area; however, these protected areas hold only 21% of all great apes in this region, further underlining the need for appropriate management of forests that are not legally protected.

Much has been achieved since the 2005 action plan was produced, especially in terms of developing the management structures and approaches necessary for effective conservation. However, the goalposts continue to move as the human population grows and the region builds its extractive infrastructure in response to global demands for natural resources (particularly from Asia). What is needed going forwards is partly a continuation and improvement of tried

and tested activities that have proved effective in the last decade: anti-poaching, anti-trafficking and outreach, and, besides, sensitisation of all levels of society that interact with the land and influence natural resource protection, including protected area agencies, law enforcement and judiciary bodies, extractive and agricultural industries, anti-corruption agencies and local communities. These activities alone will not, however, be enough, and the search for novel solutions to address emerging threats to great apes and their habitats must continue. National and regional land-use planning is key to avoiding the fragmentation of great ape habitat into unconnected 'islands'. Legal frameworks need to be improved and extended to facilitate cross-border enforcement. Existing sanctions for illegal wildlife trade need to be strengthened, as well as enforced, to ensure that sufficient deterrents are in place. Governments make decisions that will reverberate hundreds of years into the future. If these decisions are made holistically, and integrity of the wild heritage of the range states is considered alongside the other national benchmarks of success, then both the biodiversity of rainforest ecosystems and the health and well-being of their citizens will be assured.

## 8. ACKNOWLEDGEMENTS

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## 9. ACRONYMS & ABBREVIATIONS

A.P.E.S. – Ape Populations, Environments and Surveys  
ACFAP – Agence congolaise de la faune et des aires protégées  
ANDEGE – Amigos de la Naturaleza y del Desarrollo de Guinea Ecuatorial  
ANGT – Agence Nationale des Grands Travaux (Gabon)  
ANPN – Agence Nationale des Parcs Nationaux (Gabon)  
ANUTTC – Agence nationale de l’urbanisme, des travaux topographiques et du cadastre (Gabon)  
AP – African Parks (NGO)  
AWF – African Wildlife Foundation  
BBOP – Business and Biodiversity Offsets Programme  
BRL – Consortium BRL Ingénierie, SFAB  
BCSF – Bristol Conservation and Science Foundation  
BR – Biosphere Reserve  
CAR – Central African Republic  
CARPE – Central African Regional Program for the Environment  
CCC – Congo Conservation Company  
CIRMF – Centre International de Recherches Médicales de Franceville  
CITES – Convention on International Trade in Endangered Species of Wild Fauna and Flora  
CMS – Convention on the Conservation of Migratory Species of Wild Animals  
COMIFAC – Commission des forêts d’Afrique centrale  
DRC – Democratic Republic of Congo  
EAGLE – Eco Activists for Governance and Law Enforcement (Network)  
EITI – Extractive Industries Transparency Initiative  
ESIA – Environmental and Social Impact Assessment  
EVD – Ebola Virus Disease  
FCTV – Fondation Camerounaise de la Terre Vivante  
FMU – Forest Management Unit  
FSC – Forestry Stewardship Council  
GRASP – Great Apes Survival Partnership  
HCV – High Conservation Value  
IFC – International Finance Corporation  
INDEFOR-AP – Instituto Nacional de Desarrollo Forestal y Manejo del Sistema de Áreas Protegidas  
IRET – Institute de Recherche en Ecologie Tropicale  
IUCN – International Union for Conservation of Nature  
JGI – Jane Goodall Institute  
LEF – Living Earth Foundation  
MINAMB – Ministério do Ambiente (Angola)  
MEFDD – Ministère de l’Economie Forestière et du Développement Durable (Congo)  
MEFET – Ministère de l’Economie Forestière, de l’Environnement et du Tourisme (CAR)  
MFEPRN – Ministère de la Forêt, de l’Environnement et de la Protection des Ressources Nat. (Gabon)  
MINDEF – Ministère de la Défense (Cameroon)  
MINEF – Ministère des Eaux et Forêts (Gabon)  
MINFOF – Ministère des Forêts et de la Faune (Cameroon)  
MINJUSTICE – Ministry of Justice (Cameroon)

MPI – Max Planck Institute for Evolutionary Anthropology  
 MTI – Mayombe Transboundary Initiative  
 NGO – Non-governmental organisation  
 NP – National Park  
 OKF – Odzala-Kokoua Foundation  
 PA – Protected Area  
 PALF – Projet d'appui à l'application de la Loi sur la Faune sauvage  
 PGS – Projet Grands Singes (Cameroon)  
 PROGRAM – Association protectrice des grands singes de la Moukalaba (Gabon)  
 PSG – Primate Specialist Group  
 RAPAC – Réseau des Aires Protégées d'Afrique Centrale  
 RSPO – Roundtable on Sustainable Palm Oil  
 SSC – Species Survival Commission  
 SETRAG – Société d'Exploitation du Transgabonais  
 SMART – Spatial Monitoring and Reporting Tool  
 TNS – Sangha Trinational (Trinational de la Sangha)  
 TRIDOM – Trinational Dja-Odzala-Minkébé  
 UN – United Nations  
 UNDP – United Nations Development Programme  
 UNESCO – United Nations Educational, Scientific and Cultural Organization  
 USAID – United States Agency for International Development  
 USFWS – United States Fish & Wildlife Service  
 WCS – Wildlife Conservation Society  
 WEA – Western Equatorial Africa  
 WRI – World Resource Institute  
 WWF – World Wide Fund for Nature  
 ZSL – Zoological Society of London

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## 10. BIBLIOGRAPHY

- Abernethy, K.A., Coad, L., Taylor, G., Lee, M.E. & Maisels, F. 2013. Extent and ecological consequences of hunting in Central African rainforests in the twenty-first century. *Philosophical Transactions of the Royal Society B: Biological Sciences* 368: 1471–2970.
- Airame, S., Dugan, J.E., Lafferty, K.D., Leslie, H., McArdle, D.A. & Warner, R.R. 2003. Applying ecological criteria to marine reserve design: a case study from the California Channel Islands. *Ecological Applications* 13: S170–184.
- Alves, R.R.N., Souto, W.M.S. & Barboza, R.R.D. 2010. Primates in traditional folk medicine: a world overview. *Mammal Review* 40: 155–180.
- Anthony, N.M., Johnson-Bawe, M., Jeffery, K., Clifford, S.L., Abernethy, K.A., Tutin, C.E., Lahm, S.A., White, L.J.T., Utley, J.F., Wickings, E.J. & Bruford, M.W. 2007. The role of Pleistocene refugia and rivers in shaping gorilla genetic diversity in central Africa. *Proceedings of the National Academy of Sciences of the United States of America* 104: 20432–20436.
- Ball, I., Possingham, H.P. & Watts, M.E. 2009. Marxan and Relatives: Software for Spatial Conservation Prioritization. In: *Spatial Conservation Prioritization*, Moilanen, A., Possingham, H.P. & Wilson, K.A. (eds.). Oxford University Press, Oxford, UK.
- Bermejo, M., Rodríguez-Tejedor, J.D., Illera, G., Barroso, A., Vilà, C. & Walsh, P.D. 2006. Ebola outbreak killed 5000 gorillas. *Science* 314: 1564.
- Blake, S., Deem, S.L., Strindberg, S., Maisels, F., Momont, L., Bila-Isia, I., Douglas-Hamilton, I., Karesh, W.B. & Kock, M.D. 2008. Roadless wilderness area determines forest elephant movements in the Congo Basin. *PLoS One* 3: e3546.
- Blom, A., Cipolletta, C., Brunsting, A.M.H. & Prins, H.T. 2004. Behavioral responses of gorillas to habituation in the Dzanga-Ndoki National Park, Central African Republic. *International Journal of Primatology* 25: 179–196.



- Breuer, T., Breuer-Ndoundou Hockemba, M., Olejniczak, C., Parnell, R.J. & Stokes, E.J. 2009. Physical maturation, life history classes and age estimates of free ranging western gorillas at Mbeli Bai, Republic of Congo. *American Journal of Primatology* 71: 106–119.
- Breuer, T., Robbins, A.M., Olejniczak, C., Parnell, R.J., Stokes, E.J. & Robbins, M.M. 2010. Variance in the male reproductive success of western gorillas: acquiring harems is just the beginning. *Behavioural Ecology and Sociobiology* 64: 515–528.
- Burivalova, Z., Sekerciogu, Ç.H., Koh, L.P. 2014. Thresholds of logging intensity to maintain tropical forest biodiversity. *Current Biology* 24: 1893–1898.
- Caillaud, D., Levréro, F., Cristescu, R., Gatti, S., Dewas, M., Douadi, M., Gautier-Hion, A., Raymond, M. & Ménard, N. 2006. Gorilla susceptibility to Ebola virus: the cost of sociality. *Current Biology* 16: 489–491.
- Chi, F., Leider, M., Leendertz, F., Bergmann, C., Boesch, C., Schenk, S., Pauli, G., Ellerbrok, H. & Hakenbeck, R. 2007. New *Streptococcus pneumoniae* clones in deceased wild chimpanzees. *Journal of Bacteriology* 189: 6085–6088.
- Cipolletta, C. 2003. Ranging patterns of a western gorilla group during habituation to humans in the Dzanga-Ndoki National Park, Central African Republic. *International Journal of Primatology* 24: 1207–1226.
- CMS 2009. *Gorillas – Gentle Giants in Need. Frankfurt Declaration on Gorilla Conservation*. United Nations Environment Programme (UNEP), Convention on the Conservation of Migratory Species of Wild Animals (CMS). Edited by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU), Bonn. <www.cms.int/en/document/frankfurt-declaration-gorilla-conservation>.
- Doran-Sheehy, D.M., Derby, A.M., Greer, D. & Mongo, P. 2007. Habituation of gorillas: the process and factors that influence it. *American Journal of Primatology* 69: 1354–1369.
- EarthSight. 2013. *Seeds of Destruction: Expansion of Industrial Oil Palm in the Congo Basin – Potential Impacts on the Forest and People*. Rainforest Foundation, UK.
- Edwards, D.P., Sloan, S., Weng, L., Dirks, P., Sayer, J. & Laurance, W.F. 2014. Mining and the African environment. *Conservation Letters* 7: 302–311.
- Fausther-Bovendo, H., Mulangu, S. & Sullivan, N.J. 2012. Ebolavirus vaccines for humans and apes. *Current Opinion in Virology* 2: 324–329.
- Fitzherbert, E.B., Struebig, M.J., Morel, A., Danielsen, F., Brühl, C.A., Donald, P.F. & Phalan, B. 2008. How will oil palm expansion affect biodiversity? *Trends in Ecology & Evolution* 23: 538–545.
- Fongzossie, E.F., Sonwa, D.J., Kemeuze, V., Auzel, P. & Nkongmeneck, B. 2014. Above-ground carbon assessment in the Kom-Mengamé forest conservation complex, South Cameroon: Exploring the potential of managing forests for biodiversity and carbon. *Natural Resources Forum* 38: 220–232.
- Fünfstück, T., Arandjelovic, M., Morgan, D.B., Sanz, C., Breuer, T. *et al.* 2014. The genetic population structure of wild western lowland gorillas (*Gorilla gorilla gorilla*) living in continuous rain forest. *American Journal of Primatology* 76: 868–878.
- Genton, C., Cristescu, R., Gatti, S., Levréro, F., Bigot, E., Caillaud, D., Pierre, J.S. & Menard, N. 2012. Recovery potential of a western lowland gorilla population following a major Ebola outbreak: results from a ten year study. *PLoS One* 7: e37106.
- Genton, C., Pierre, A., Cristescu, R., Levréro, F., Gatti, S., Pierre, J.-S., Ménard, N. & Le Gouar, P. 2015. How Ebola impacts social dynamics in gorillas: a multistate modelling approach. *Journal of Animal Ecology* 84: 166–176.
- Halford, T., Ekodek, H., Sock, B., Dame, M. & Auzel, P. 2003. Statut des populations de gorilles (*Gorilla gorilla gorilla*) et chimpanzés (*Pan troglodytes*) dans le sanctuaire à gorilles de Mengamé, province du sud Cameroun. Technical Report 2. Ministry of Environment and Forests & The Jane Goodall Institute, Yaoundé, Cameroon.
- Hansen, M.C., Potapov, P.V., Moore, R., Hancher, M., Turubanova, S.A. *et al.* 2013. High-resolution global maps of 21st-century forest cover change. *Science* 342: 850–853.
- Hatchwell, M. 2014. Public-private partnerships as a management option for protected areas. *Animal Conservation* 17: 3–4.
- Huijbregts, B., De Wachter, P., Obiang, L. & Akou, M.E. 2003. Ebola and the decline of gorilla *Gorilla gorilla* and chimpanzee *Pan troglodytes* populations in Minkebe Forest, north-eastern Gabon. *Oryx* 37: 437–443.
- Hund, K. & Megevand, C. 2013. *Deforestation Trends in the Congo Basin: Reconciling Economic Growth and Forest Protection*. Working Paper 4. Mining. World Bank Publications, Washington, DC.
- ITTO 2014. Establishment of the Mengamé-Minkébé Transboundary Gorilla Sanctuary (MMGS) in the Cameroon-Gabon Border (Cameroon) Project PD 66/01 Rev. 1 (F). International Tropical Timber Organization, Yokohama, Japan.
- IUCN 2014a. The IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>.
- IUCN 2014b. Industrial oil palm expansion in great ape habitat in Africa. IUCN SSC Primate Specialist Group, Section on Great Apes (SGA). <www.primatesg.org/statement\_on\_oil\_palm\_in\_Africa>
- Kaur, T., Singh, J., Tong, S., Humphrey, C., Clevenger, D. *et al.* 2008. Descriptive epidemiology of fatal respiratory outbreaks and detection of a human-related metapneumovirus in wild chimpanzees (*Pan troglodytes*) at Mahale Mountains National Park, Western Tanzania. *American Journal of Primatology* 70: 755–765.
- Klailova, M., Hodgkinson, C. & Lee, P.C. 2010. Behavioral responses of one western lowland gorilla (*Gorilla gorilla gorilla*) group at Bai Hokou, Central African Republic, to tourists, researchers and trackers. *American Journal of Primatology* 72: 897–906.
- Knauf, S., Liu, H. & Harper, K.N. 2013. Treponemal infection in nonhuman primates as possible reservoir for human yaws (letter). *Emerging Infectious Diseases* 19: 2058–2059.
- Kormos, R., Kormos, C.F., Humle, T., Lanjouw, A., Rainer, H., Victorine, R., Mittermeier, R.A., Diallo, M.S., Rylands, A.B. & Williamson, E.A. 2014. Great apes and biodiversity offset projects in Africa: the case for national offset strategies. *PLoS One* 9: e111671.

- Kuehl, H.S., Nzeingui, C., Yeno, S.L.D., Huijbregts, B., Boesch, C. & Walsh, P.D. 2009. Discriminating between village and commercial hunting of apes. *Biological Conservation* 142: 1500–1506.
- Kühl, H., Maisels, F., Ancrenaz, M. & Williamson, E.A. 2008. *Best Practice Guidelines for Surveys and Monitoring of Great Ape Populations*. IUCN/SSC Primate Specialist Group, Gland, Switzerland. <[www.primate-sg.org/best\\_practice\\_surveys](http://www.primate-sg.org/best_practice_surveys)>
- Laurance, W.F., Goosem, M. & Laurance, S.G.W. 2009. Impacts of roads and linear clearings on tropical forests. *Trends in Ecology & Evolution* 24: 659–669.
- Laurance, W.F., Useche, D.C., Rendeiro, J., Kalka, M., Bradshaw, C.J.A. *et al.* 2012. Averting biodiversity collapse in tropical forest protected areas. *Nature* 489: 290–294.
- Leendertz, F.H., Lankester, F., Guislain, P., Neel, C., Drori, O., Dupain, J., Speede, S., Reed, P., Wolfe, N., Loul, S., Jensen, S.A., Mundry, R., Nunn, C.L., Boesch, C. & Leendertz, F.H. 2009. Anthrax in Western and Central African great apes. *Journal of Wildlife Diseases* 68: 928–933.
- Levréro, F., Gatti, S., Gautier-Hion, A. & Ménard, N. 2007. Yaws disease in a wild gorilla population and its impact on the reproductive status of males. *American Journal of Physical Anthropology* 132: 568–575.
- Lovell, N.C., Jurmain, R. & Kilgore, L. 2000. Skeletal evidence of probable treponemal infection in free-ranging African apes. *Primates* 41: 275–290.
- Macfie, E.J. & Williamson, E.A. 2010. *Best Practice Guidelines for Great Ape Tourism*. IUCN/SSC Primate Specialist Group, Gland, Switzerland. <[www.primate-sg.org/best\\_practice\\_tourism](http://www.primate-sg.org/best_practice_tourism)>
- Maisels, F. & Ella Akou, M. 2013. Mwagna National Park: Report on WWF survey 2012. Unpublished report to Agence Nationale des Parcs Nationaux/Wildlife Conservation Society/World Wide Fund for Nature.
- Maisels, F., Herbinger, I. & Duvall, C. 2008. Section 5: Field Issues: Logistics and data collection protocols In: Kühl, H., Maisels, F., Ancrenaz, M. & Williamson, E.A. *Best Practice Guidelines for Surveys and Monitoring of Great Ape Populations*. IUCN/SSC Primate Specialist Group, Gland, Switzerland. <<http://apesportal.eva.mpg.de/database/surveyGuidelines>>
- Maisels, F., Abitsi, G., Arnhem, E., Breuer, T., Cameron, K. *et al.* 2013a. Review of progress on the regional action plan for the conservation of chimpanzees and gorillas in Western Equatorial Africa. 2013 update. Unpublished report to IUCN and CMS. <[www.primate-sg.org/WEA](http://www.primate-sg.org/WEA)>
- Maisels, F., Nishihara, T., Strindberg, S., Boudjan, P., Breuer, T. *et al.* 2012. Great ape and human impact monitoring training, surveys, and protection in the Ndoki-Likouala Landscape, Republic of Congo. GACF Agreement: 96200-9-G247. Unpublished report to USFWS.
- Maisels, F., Strindberg, S., Kiminou, F., Ndzai, C., Ngounga, R. *et al.* 2013b. Great apes and human impact survey 2012, and monitoring 2005–2008–2012. Unpublished report to Odzala-Kokoua National Park, Republic of Congo. Fondation Odzala-Kokoua Foundation/Wildlife Conservation Society.
- Meder, A. 1999. Gorillas in African culture and medicine. *Gorilla Journal* 18: 3–5.
- Medjibe, V.P., Poulsen, J.R., Clark, C.J. & Mbani, O.A. 2014. Natural regeneration of selected timber species in the Republic of Congo. *African Journal of Ecology* 52: 552–563.
- Megevand, C. 2013. *Deforestation Trends in the Congo Basin: Reconciling Economic Growth and Forest Protection*. World Bank Publications, Washington, DC.
- Morgan, D. & Sanz, C. 2007. *Best Practice Guidelines for Reducing the Impact of Commercial Logging on Great Apes in Western Equatorial Africa*. Gland, Switzerland: IUCN/SSC Primate Specialist Group. <[www.primate-sg.org/best\\_practice\\_logging](http://www.primate-sg.org/best_practice_logging)>
- Morgan, D., Sanz, C., Greer, D., Rayden, T., Maisels, F. & Williamson, E.A. 2013. *Great Apes and FSC: Implementing 'Ape Friendly' Practices in Central Africa's Logging Concessions*. IUCN/SSC Primate Specialist Group, Gland, Switzerland. <[www.primate-sg.org/best\\_practice\\_logging](http://www.primate-sg.org/best_practice_logging)>
- Morgan, D., Sanz, C., Onononga, J.R., Eyana Ayina, C. & Strindberg, S. 2012. Great apes and mechanized logging in the Kabo concession. In: *Tropical Forest Conservation and Industry Partnership: An Experience from the Congo Basin. Conservation Science and Practice*. C. J. Clark & J.R. Poulsen (eds.). Wiley-Blackwell, Oxford, UK. pp.55.
- Murai, M., Ruffler, H., Berlemont, A., Campbell, G., Esono, F., Agbor, A., Mbomio, D., Ebana, A., Nze, A. & Kuehl, H.S. 2013. Priority areas for large mammal conservation in Equatorial Guinea. *PLoS One* 8: e75024.
- Oates, J.F. 1986. *Action Plan for African Primate Conservation 1986–1990*. IUCN/SSC Primate Specialist Group & State University of New York, Stony Brook, NY.
- Olson, S., Reed, P., Cameron, K., Ssebide, B., Johnson, C., Morse, S., Karesh, W., Mazet, J. & Joly, D. 2012. Dead or alive: animal sampling during Ebola hemorrhagic fever outbreaks in humans. *Emerging Health Threats Journal* 5. doi:10.3402/ehth.v5i0.9134
- Palacios, G., Lowenstine, L.J., Cranfield, M.R., Gilardi, K.V., Spelman, L., Lukasik-Braum, M., Kinani, J.-F., Mudakikwa, A., Nyirakaragire, E., Bussetti, A.V., Savji, N., Hutchison, S., Egholm, M. & Lipkin, W.I. 2011. Human metapneumovirus infection in wild mountain gorillas, Rwanda. *Emerging Infectious Diseases* 17: 711–713.
- Pigott, D.M., Golding, N., Mylne, A., Huang, Z., Henry, A.J., Weiss, D.J., Brady, O.J., Kraemer, M.U.G., Smith, D.L., Moyes, C.L., Bhatt, S., Gething, P.W., Horby, P.W., Bogoch, I.I., Brownstein, J.S., Mearns, S.R., Tatem, A.J., Khan, K. & Hay, S.I. 2014. Mapping the zoonotic niche of Ebola virus disease in Africa. *eLife*. doi:10.7554/eLife.04395
- Poulsen, J.R., Clark, C.J. & Palmer, Todd M. 2013. Ecological erosion of an Afrotropical forest and potential consequences for tree recruitment and forest biomass. *Biological Conservation* 163: 122–130.
- Princée, F.P.G. 2013. Biomonitoring survey 2011–2012 in Dzanga-Sangha protected areas. Unpublished report to WWF, Bangui, CAR.

- Rainey, H.J., Iyenguet, F.C., Malanda, G.A.F., Madzoke, B., dos Santos, D., Stokes, E.J., Maisels, F. & Strindberg, S. 2010. Survey of *Raphia* swamp forest, Republic of Congo, indicates high densities of Critically Endangered western lowland gorillas *Gorilla gorilla gorilla*. *Oryx* 44: 124–132.
- Reed, P.E., Cameron, K.N., Ondzie, A.U., Joly, D., Karesh, W.B., Mulangu, S., Fabozzi, G., Bailey, M., Shen, Z., Sullivan, N.J., Bermejo, M., Rouquet, P., Keele, B.F. & Hahn, B. 2014. A new approach for monitoring Ebolavirus in wild great apes. *PLoS Neglected Tropical Diseases* 8: e3143. doi:10.1371/journal.pntd.0003143
- Rizkalla, C., Blanco-Silva, F. & Gruver, S. 2007. Modeling the impact of Ebola and bushmeat hunting on western lowland gorillas. *EcoHealth* 4: 151–155.
- Ron, T. 2011. Potential for designating protected areas for conservation and for identifying conservation corridors as part of the planning process of the Mayombe forest ecosystems transfrontier conservation area. Report prepared for the Governments of Angola, Congo and DRC, UNEP & IUCN.
- Ryan, S.J. & Walsh, P.D. 2011. Consequences of non-intervention for infectious disease in African great apes. *PLoS One* 6: e29030.
- Sanz, C.M. & Morgan, D.B. 2007. Chimpanzee tool technology in the Goulougo Triangle, Republic of Congo. *Journal of Human Evolution* 52: 420–433.
- Sanz, C., Call, J. & Morgan, D. 2009. Design complexity in termite-fishing tools of chimpanzees (*Pan troglodytes*). *Biology Letters* 5: 293–296.
- Sanz, C.M., Schöning, C. & Morgan, D.B. 2010. Chimpanzees prey on army ants with specialized tool set. *American Journal of Primatology* 72: 17–24.
- Sanz, C., Morgan, D., Strindberg, S. & Onononga, J.R. 2007. Distinguishing between the nests of sympatric chimpanzees and gorillas. *Journal of Applied Ecology* 44: 263–272.
- Segan, D.B., Carwardine, J., Klein, C., Grantham, H. & Pressey, R.L. 2010. Can we determine conservation priorities without clear objectives? *Biological Conservation* 143: 2–4.
- Schure, J., Marien, J.-N., de Wasseige, C., Drigo, R., Salbitano, F., Dirou, S. & Nkoua, M. 2012. Contribution of woodfuel to meet the energy needs of the population of Central Africa: prospects for sustainable management of available resources. In: *The Forest of the Congo Basin – State of the Forest 2010*. C. de Wasseige, P. de Marcken, N. Bayol, F. Hiol Hiol, P. Mayaux, B. Desclée, R. Nasi, A. Billand, P. Defourny & R Eba’a Atyi. (eds.). Publications Office of the European Union, Luxembourg. pp.109–122.
- Shutt, K., Heistermann, M., Kasim, A., Todd, A., Kalousova, B., Profosouva, I., Petrzalkova, K., Fuh, T., Dicky, J., Bopalanognako, J. & Setchell, J.M. 2014. Effects of habituation, research and ecotourism on faecal glucocorticoid metabolites in wild western lowland gorillas: Implications for conservation management. *Biological Conservation* 172: 72–79.
- Starkey, M. 2004. Commerce and subsistence: the hunting, sale and consumption of bushmeat in Gabon. Ph.D thesis, University of Cambridge, Cambridge, UK.
- Stickler, C., Coe, M., Nepstad, D., Fiske, G. & Lefebvre, P. 2007. *Readiness for REDD: A Preliminary Global Assessment of Tropical Forested Land Suitability for Agriculture*. The Woods Hole Research Center, Woods Hole, MA.
- Stiles, D., Redmond, I., Cress, D., Nellemann, C. & Formo, R.K. (eds.) 2013. *Stolen Apes – The Illicit Trade in Chimpanzees, Gorillas, Bonobos and Orangutans. A Rapid Response Assessment*. United Nations Environment Programme & GRID-Arendal, Arendal, Norway.
- Stokes, E.J., Strindberg, S., Bakabana, P.C., Elkan, P.W., Iyenguet, F.C., Madzoké, B., Malanda, G.A.F., Mowawa, B.S., Moukoubou, C., Ouakabadio, F.K. & Rainey, H.J., 2010. Monitoring great ape and elephant abundance at large spatial scales: measuring effectiveness of a conservation landscape. *PLoS One* 5: e10294.
- Strindberg, S., Maisels, F. *et al.* in prep. Guns, germs and trees: key factors influencing the status of gorillas and chimpanzees in Western Equatorial Africa.
- Tranquilli, S., Abedi-Lartey, M., Amsini, F., Arranz, L., Asamoah, A. *et al.* 2012. Lack of conservation effort rapidly increases African great ape extinction risk. *Conservation Letters* 5: 48–55.
- Tutin, C.E.G. & Fernandez, M. 1984. Nationwide census of gorilla (*Gorilla g. gorilla*) and chimpanzee (*Pan t. troglodytes*) populations in Gabon. *American Journal of Primatology* 6: 313–336.
- Tutin, C., Stokes, E., Boesch, C., Morgan, D., Sanz, C., Reed, T., Blom, A., Walsh, P., Blake, S. & Kormos, R. (2005). *Regional Action Plan for the Conservation of Chimpanzees and Gorillas in Western Equatorial Africa*. IUCN/SSC Primate Specialist Group and Conservation International, Washington, DC. <www.primatesg.org/action\_plans/>
- UNDP 2014. *Human Development Report 2014. Sustaining Progress: Reducing Vulnerabilities and Building Resilience*. United Nations Development Programme, New York. <http://hdr.undp.org/sites/default/files/hdr14-report-en-1.pdf>
- UNODC 2012. *Corruption, Environment and the United Nations Convention against Corruption*. United Nations Office on Drugs and Crime, Vienna.
- USFWS 2014. Standard Measures of Effectiveness and Threats for Wildlife Conservation in Central Africa: Guidance for USFWS Applicants. Version 1.0, October. <www.fosonline.org/resource/usfws-effectiveness-threats-measures>
- van Zijl Langhout, M., Reed, P. & Fox, M. 2010. Validation of multiple diagnostic techniques to detect *Cryptosporidium* sp. and *Giardia* sp. in free-ranging western lowland gorillas (*Gorilla gorilla gorilla*) and observations on the prevalence of these protozoan infections in two populations in Gabon. *Journal of Zoo and Wildlife Medicine* 41: 210–217.
- Warfield, K.L., Goetzmann, J.E., Biggins, J.E., Kasda, M.B., Unfer, R.C., Vu, H., Aman, M.J., Olinger, G.G. & Walsh, P.D. (2014). Vaccinating captive chimpanzees to save wild chimpanzees. *Proceedings of the National Academies of Science* 111: 8873–8876.



- Watson, J.E.M, Evans, M.C., Carwardine, J., Fuller, R.A., Joseph, L.N, Segan, D.B., Taylor, M.F.J, Fensham, R.J. & Possingham, H.P. 2011. The capacity of Australia's protected-area system to represent threatened species. *Conservation Biology* 25: 324–332.
- White, A. & Fa, J.E. 2014. The bigger picture: indirect impacts of extractive industries on apes and ape habitat. In: Arcus Foundation, *State of the Apes 2013: Extractive Industries and Ape Conservation*. Cambridge University Press, Cambridge, UK. pp.197–225.
- Whiten, A., Goodall, J., McGrew, W.C., Nishida, T., Reynolds, V., Sugiyama, Y., Tutin, C.E.G., Wrangham, R.W. & Boesch, C. 1999. Cultures in chimpanzees. *Nature* 399: 682–685.
- WHO Ebola Response Team 2014. Ebola virus disease in West Africa - the first 9 months of the epidemic and forward projections. *New England Journal of Medicine* 371: 1481–1495.
- Wich, S.A., Garcia-Ulloa, J., Lee, J.S.H., Kühl, H.S., Humle, T. & Koh, L.P. 2014. Will oil palm's homecoming spell doom for Africa's great apes? *Current Biology* 24: 1659–1663.
- Wilkie, D., Shaw, E., Rotberg, F., Morelli, G.A. & Auzel, P. 2000. Roads, development and conservation in the Congo Basin. *Conservation Biology* 14: 1614–1622.
- Wilkie, D.S., Bennett, E.L., Peres, C.A. & Cunningham, A.A. 2011. The empty forest revisited. *Annals of the New York Academy of Sciences* 1223: 120–128.
- Williamson, E.A. & Feistner, A.T.C. 2011. Habituating primates: processes, techniques, variables and ethics. In: *Field and Laboratory Methods in Primatology: A Practical Guide*. 2nd Edition. J.M. Setchell & D.J. Curtis (eds.). Cambridge University Press, Cambridge, UK, pp.33–49.
- World Bank. 2013. *Artisanal Mining in Critical Ecosystems: A Look at Gabon, Liberia, and Madagascar*. World Bank Publications, Washington, DC.
- WRI 2012. Interactive Forest Atlas of Cameroon - Version 3.0. World Resources Institute, Washington, DC.
- WWF 2003. *Biological Priorities for Conservation in the Guinean-Congolian Forest and Freshwater Region. Proceedings of Workshop held on March 30 – April 2, 2000 in Libreville, Gabon*. A. Kamdem Toham, D. Olson, R. Abell, J. D'Amico, N. Burgess, M. Thieme, A. Blom, R.W. Carroll, S. Gartlan, O. Langrand, R. Mikala Mussavu, D. O'Hara, H. Strand & L. Trowbridge (eds.). World Wildlife Fund, Libreville, Gabon.

Seasonally-inundated forest  
in the Dja Biosphere Reserve,  
Cameroon © Peter Howard



## Appendix 1. List of delegates who attended the great ape conservation workshop in Brazzaville, 21–24 May 2013

Name		Organisation	Country
Bermejo Espinet	Magdalena	University of Barcelona	Congo
Bizi	José	MINAMB	Angola
Breuer	Thomas	WCS	Congo
Byler	Dirck	USFWS	USA
Cameron	Ken	WCS	Congo
Chicaia	Agostinho	MTI	Angola
Cox	Debby	JGI	Congo
Cress	Doug	GRASP	Kenya
De Wachter	Pauwel	WWF	Gabon
Doungoube	Gustave	Prime Minister's Office	CAR
Dupain	Jef	AWF	Kenya
Ekó Mengué Mekina	Juvencio	INDEFOR	Equatorial Guinea
Engonga	Revelo	INDEFOR	Equatorial Guinea
Esbenshade	Claire	Xstrata	Congo
Esono Nchama	Pablo Esono	INDEFOR	Equatorial Guinea
Eyina Ayina	Crépin	Goualougo Triangle Ape Project	Congo
Feistner	Anna	WWF	CAR
Frank	Amalia	ZSL	Equatorial Guinea
Greer	David	WWF	Rwanda
Hessana	Djibrila	MINFOF	Cameroon
Honig	Naftali	PALF/EAGLE	Congo
Hund	Kirsten	World Bank	USA
Idiata Mambounga	Daniel	MFEPN	Gabon
Ikoli	Florent	CMS	Congo
Illera	Germán	Odzala	Congo
Jeffery	Kathryn	ANPN	Gabon
Kormos	Rebecca	PSG	USA
Lamprecht	Leon	African Parks	Congo
Mabiala	Noe	MEFDD	Congo
Maisels	Fiona	WCS	UK
Malonga	Richard	WCS	Congo
Mamang-Kanga	Jean Baptiste	MEFET	CAR
Mberi	Pierre	Xstrata	Congo
Mbolo	Victor	WWF	Congo
McLaughlin	Martin	USAID/CARPE	DRC
Mengamenya	Achile Goué	MINFOF	Cameroon
Mokoko Ikonga	Jerome	WCS	Congo
Moussa	Isaac	ACFAP	Congo
Murai	Mizuki	WWF	UK
Nganongo	Jean Bosco	MEFDD	Congo
Ngouémbé	Pierre	MEFDD	Congo
Ngueko	Raoul	Congo Iron S.A.	Congo
Nssi Bengone	Natacha	ANPN	Gabon
Nzoo Dongmo	Zacharie	WWF	Cameroon
Ononino	Alain Bernard	WWF	Cameroon

Name		Organisation	Country
Onononga	Jean Robert	WCS	Congo
Palla	Florence	RAPAC	Gabon
Phillipson	Adam	Arcus Foundation	UK
Pokempner	Amy	WCS	Congo
Rainer	Helga	Arcus Foundation	Uganda
Ransom	Chris	ZSL	UK
Ratanasingam	Reuban	ATAMA	Congo
Ratiarison	Sandra	ZSL	Cameroon
Rayden	Tim	WCS	Congo
Reed	Patricia	WCS	Congo
Refisch	Johannes	GRASP	Kenya
Robbins	Martha	MPI	Germany
Ron	Tamar	UNDP	Angola
Ruffler	Heidi	Conservation International (CI)	Equatorial Guinea
Ruggiero	Richard	USFWS	USA
Siex	Kirstin	WCS	USA
Smith	Vince	WCS	Congo
Sock	Benjamin	MINFOF	Cameroon
Stokes	Emma	WCS	Gabon
Strindberg	Samantha	WCS	USA
Telfer	Paul	WCS	Congo
van Opstal	Marcel	European Union (EU)	Congo
Vanleeuwe	Hilde	WCS	Congo
Vosper	Ashley	Global Initiatives	Gabon
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Zowoya	Florent	Projet ECOFAUNE	CAR

Delegates from Cameroon and Equatorial Guinea at the great ape conservation workshop in Brazzaville









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