



Taking ape conservation to heart



**A strategy for mainstreaming ape conservation into
World Bank policies and actions**

Editors: Rebecca Kormos¹, Annette Lanjouw², Cyril Kormos³, Helga Rainer⁴, Liz Williamson⁵

Contributors: Marc Ancrenaz⁶, Augustin Basabose⁷, Christophe Boesch⁸, Dirck Byler⁹, Chloe Cipolletta¹⁰, David Chivers¹¹, Lawrence Connell¹², Doug Cress¹³, Laura Darby¹⁴, Andrew Dunn¹⁵, David Greer¹⁶, Tatyana Humle¹⁷, Inaoyom Imong¹⁸, Kathryn Jeffery¹⁹, Maryke Gray²⁰, Hjalmar Kühl²¹, Darmawan Liswanto²², Elizabeth Macfie²³, Fiona Maisels²⁴, Erik Meijaard²⁵, Russell A. Mittermeier²⁶, Bethan Morgan²⁷, David Morgan²⁸, Aaron Nicholas²⁹, Stuart Nixon³⁰, John Oates³¹, William Olupot³², Madhu Rao³³, Benjamin Rawson³⁴, Johannes Refisch³⁵, Martha Robbins³⁶, Dilys Roe³⁷, Anthony Rylands³⁸, Crickette Sanz³⁹, Jo Thompson⁴⁰, Carl Traeholt⁴¹, Serge Wich⁴².

¹ Department of Integrative Biology, University of California, Berkeley, California, USA

² Strategic Initiatives and Great Apes Program, The Arcus Foundation, Cambridge, UK

³ The WILD Foundation, Berkeley, California, USA

⁴ Conservation Program, The Arcus Foundation, Cambridge, UK

⁵ School of Natural Sciences, University of Stirling, UK

⁶ Hutan, Borneo Futures Initiative & Sabah Wildlife Department, Sabah, Malaysia

⁷ International Gorilla Conservation Programme, Goma, Democratic Republic of Congo

⁸ Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany

⁹ Africa Programs, U.S. Fish and Wildlife Service, Falls Church, VA, USA

¹⁰ Wildlife Conservation Society, Kigali, Rwanda

¹¹ Department of Physiology, Development and Neuroscience, University of Cambridge, UK

¹² Conservation International, Arlington, Virginia, USA

¹³ Great Apes Survival Partnership, Nairobi, Kenya

¹⁴ Great Apes Survival Partnership, Nairobi, Kenya

¹⁵ Wildlife Conservation Society, Calabar, Nigeria

¹⁶ African Great Apes Programme, WWF International, Gland, Switzerland & Yaoundé, Cameroon

¹⁷ Durrell Institute of Conservation and Ecology, School of Anthropology and Conservation, University of Kent, Canterbury, UK

¹⁸ Wildlife Conservation Society, Calabar, Nigeria

¹⁹ Agence Nationale des Parcs Nationaux, Libreville, Gabon

²⁰ International Gorilla Conservation Programme, Nairobi, Kenya

²¹ Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany

²² Indonesia Programme Director, Fauna & Flora International, Jakarta,

²³ Independent consultant, Edinburgh, UK

²⁴ Wildlife Conservation Society, Bronx, New York, USA & School of Natural Sciences, University of Stirling, UK

²⁵ People and Nature Consulting International, Bali, Indonesia & Borneo Futures Initiative

²⁶ Conservation International, Arlington, Virginia, USA

²⁷ Institute for Conservation Research, Zoological Society of San Diego, San Diego, USA

²⁸ Lincoln Park Zoo, Chicago, USA

²⁹ Wildlife Conservation Society, Limbe, Cameroon

³⁰ Fauna & Flora International, Cambridge, UK

³¹ Dept. of Anthropology, Hunter College, CUNY, New York, USA

³² Bushmeat-free Eastern Africa Network, Kampala, Uganda

³³ IUCN Asian Species Action Partnership, Singapore

³⁴ Fauna & Flora International, Hanoi, Vietnam

³⁵ Great Apes Survival Partnership, Nairobi, Kenya

³⁶ Max-Planck Institute for Evolutionary Anthropology, Leipzig, Germany

³⁷ International Institute for Environment and Development, London, UK

³⁸ Conservation International, Arlington, Virginia, USA

³⁹ Washington University, St. Louis, USA

⁴⁰ Lukuru Foundation, Ohio, USA

⁴¹ Copenhagen Zoo, Kuala Lumpur, Malaysia

⁴² Liverpool John Moores University, Liverpool, UK

This strategy represents an unprecedented consensus from those working in ape conservation around the world for how the World Bank Group could help to prevent further decline of apes as well as contribute positively to their conservation.



Photos on front cover:

Male Grauer's Gorilla (*Gorilla beringei graueri*), Kahuzi-Biéga National Park, DRC (Photo credit: Stuart Nixon/Fauna & Flora International)

Juvenile male Western Chimpanzee (*Pan troglodytes verus*) resting during the day in a tree beside a paddy field in Bossou, southeastern Guinea, 6 km from the foothills of the Nimba Mountains. (Photo credit: Tatyana Humle)

Bonobo (*Pan paniscus*) feeding on fruit of *Dialium* sp. in the southern sector of Lomami National Park, DRC. (Photo credit: Tshuapa, Lomami and Lualaba landscape Project of the Lukuru Foundation)

Female Northern White-cheeked Gibbon (*Nomascus leucogenys*) (Photo credit: Clare Campbell/Wildlife Asia)

Bornean Orangutan (*Pongo pygmaeus*) in the forests of Sabah, Borneo, Malaysia (Photo credit: HUTAN-Kinabatangan Orangutan Conservation Programme)

ACKNOWLEDGMENTS

The first draft of this strategy was commissioned by the World Bank in 2012. We are most grateful to the following people for providing background material, suggestions and edits, and for participating in discussions on ideas for that first draft: Kate Abernethy, Mohamed Bakarr, Eric Dinerstein, James Warren Evans, Gustavo Fonseca, Frank Hawkins, Leslea Hlusko, Agi Kiss, George Ledec, Stephen Ling, John Oates, Anne Perrault, Yves Prevost, Idah Z. Pswarayi-Riddihough, Richard Ruggiero, Conrad Savy, Claudia Sobrevila, Lee White, and David Wilkie. With the support of the Arcus Foundation, the scope of the strategy was then expanded from African apes: gorillas, chimpanzees and bonobos, to include Asian apes: orangutans and gibbons. The strategy was then submitted to an extensive peer review by representatives of the ape conservation community. The result of this process is: *Taking ape conservation to heart: A strategy for mainstreaming ape conservation into World Bank Group policies and actions*. Thank you also to Sue Morrell for providing edits on this latest draft.

SUMMARY

Taking ape conservation to heart: Mainstreaming ape conservation into World Bank Group policies and actions presents a strategy and role for the World Bank Group to contribute to protecting apes and their habitat. We assert that focusing on ape habitats, and using apes as flagship and umbrella species for conservation, can be an effective way of protecting ecosystems that are critical to sustaining human livelihoods over the long term. We demonstrate that protection of apes and ape habitat contributes not only to supporting but also to enhancing livelihoods and the well-being of people.

In this document, we present a strategy for addressing ape conservation in a landscape context. We present ways in which ape conservation can be mainstreamed, implemented and operationalized within government, private sector and development planning, activities and policies. The aim is not only to prevent the decline of apes around the world but also to reverse it.

This strategy is based on the premise that functional ecosystems are essential to the future of our planet. The evidence is now conclusive that biodiversity and functional ecosystems, far from being luxuries, are vital to human health and well-being, food security, livelihoods, culture, and tradition, and that conservation objectives are integral to achieving economic development (UNEP 1992; Millennium Ecosystem Assessment 2005; Dudley *et al.* 2010; SCBD 2010; TEEB 2010; Turner *et al.* 2011; World Bank Group 2012; UNDP 2013). Despite this evidence, we are still failing to protect biodiversity: species extinctions are occurring at rates 100 to 1,000 times higher than in pre-human times (Pimm *et al.* 2005). Conservation interventions have slowed the biodiversity crisis in places, but have not reversed the overall decline, indicated by species loss continuing at an unprecedented rate (Thuiller *et al.* 2004; Pimm *et al.* 2005; Butchart *et al.* 2010; Hoffmann *et al.* 2010). Scientists warn that we are approaching a mass extinction crisis—the first to be caused by human impact (Barnosky *et al.* 2011).

One of the main reasons for this continued loss is that biodiversity conservation is frequently perceived as a goal that conflicts with economic development. Conservation is too often an afterthought—added to development strategies and development projects late, if at all, and often with ineffectual and expensive results. There is little effort to integrate environmental protection into economic development, and the contribution of intact ecosystems is seldom prevalent in economic development plans (UNDP 2013). As a result conservation remains under-prioritized and under-funded (McCarthy *et al.* 2012). Scarce resources mean conservationists have had to focus on addressing immediate threats and mitigating impacts rather than addressing underlying drivers. Too often the focus of conservation activities is on averting crises, rather than proactively preventing severe declines in habitat or species' numbers. At a time when industrial development—including extractive industries, transport infrastructure, hydroelectric projects and industrial

agriculture—is proliferating (e.g., Edwards *et al.* 2014), this approach is inadequate and leaves conservation efforts perpetually trailing behind development impacts. Thus, to reverse the biodiversity crisis, conservation must become an integral part of development planning.

Apes—bonobos, chimpanzees, gibbons, gorillas and orangutans—are human’s closest living relative. We have a moral responsibility to protect them. In addition, investment in the conservation of apes can have many consequential benefits for humans and other species. Apes are important elements of sustainable landscapes and an important component of broader conservation programs. They are ‘umbrella species’ with geographic ranges that overlap many regions of the world where biodiversity is at great risk. Apes are also important ‘keystone species’ in that they are important for the functioning of ecosystems, especially due to their role as seed dispersers. Apes are outstanding flagship species for conservation; they are charismatic and can help stimulate awareness, action and funding. They are one of the major draws in tourism and an important source of scientific understanding for our own biology and evolution.

Also, apes need urgent attention. Although they face many of the same threats as other threatened taxa, they are especially vulnerable due to their life history with long periods of maturation and low birth rates, resulting in very slow population growth rates (Williamson *et al.* 2014). Thus, even a slight increase in mortality rates can quickly result in negative growth rates and population declines, from which it can take decades or centuries to recover (Walsh *et al.* 2003). Almost all apes⁴³ are listed as either Endangered⁴⁴ or Critically Endangered⁴⁵ on the Red List of Threatened Species (IUCN 2014a)—the classifications given to species that are most at risk for extinction.

As part of the World Bank Group⁴⁶, the World Bank has 11,928 projects in 172 countries in sectors from trade and transport to energy, education, health care, water and sanitation. The International Finance Corporation (IFC) provides loans and direct investments to companies working in Africa and Asia and is a leader in developing environmental standards that are adopted by many of the largest banks in the world. The Global Environment Facility (GEF) is the world’s largest source of financing for biodiversity

⁴³ With the exception of the eastern hoolock gibbon, which is listed as Vulnerable

⁴⁴ A taxon is listed as Endangered when the available evidence indicates that it meets any of the criteria for Endangered and it is therefore considered to be facing a very high risk of extinction in the wild.

⁴⁵ A taxon is listed as Critically Endangered when the best available evidence indicates that it meets any of the criteria for Critically Endangered and it is therefore considered to be facing an extremely high risk of extinction in the wild.

⁴⁶ The World Bank Group consists of five organizations: 1) The International Bank for Reconstruction and Development (IBRD) lends to governments of middle-income and creditworthy low-income countries. 2) The International Development Association (IDA) provides interest-free loans—called credits—and grants to governments of the poorest countries. Together, IBRD and IDA make up the World Bank. 3) The International Finance Corporation (IFC) is the largest global development institution focused exclusively on the private sector. The IFC helps developing countries achieve sustainable growth by financing investment, mobilizing capital in international financial markets, and providing advisory services to businesses and governments. 4) The Multilateral Investment Guarantee Agency (MIGA) created in 1988 to promote foreign direct investment into developing countries to support economic growth, reduce poverty, and improve people’s lives. MIGA fulfills this mandate by offering political risk insurance (guarantees) to investors and lenders. 5) The International Centre for Settlement of Investment Disputes (ICSID) provides international facilities for conciliation and arbitration of investment disputes.

conservation projects in developing countries. The World Bank Group is ideally placed to play a leadership role in making a difference to ape conservation.

The World Bank has recognized that sustainable development must include biodiversity conservation (Lee *et al.* 2012; World Bank 2013). The World Bank has also recognized the importance of apes in conservation. In 2012 the World Bank Group Africa Program (AFTEN) commissioned a strategy concerning opportunities for World Bank Group engagement in conservation efforts for apes in Africa. This strategy was subsequently broadened to incorporate Asian apes, and has now been reviewed by, and received contributions from, many of the principal organizations working in ape conservation. The ideas in this document therefore represent a consensus and a united request for partnership with the World Bank, from those organizations listed on the cover.

The Strategy

The ultimate goal of ape conservation efforts is to ensure that genetically robust wild populations of apes survive and reproduce in their natural habitats by conserving the ecological integrity of landscapes and managing their ecosystem services sustainably. While this is the goal of ape conservation *in general*, here we present a strategy for how the *World Bank specifically* can contribute to this mission. In this strategy we emphasize that species decline can only be reversed if biodiversity conservation is “vertically” integrated throughout all operations within the World Bank group—from the broadest level strategic planning, down to project design and implementation. Our strategy focuses on four priorities:

Strategic Priority 1: Integrate conservation and sustainable landscape planning and management that supports ape conservation into upstream World Bank policies and planning processes (Strategic Country Diagnostics and Country Partnership Frameworks)

The first strategic priority focuses on the concept of *avoidance* of critical ape habitat from the onset. This incorporates activities that involve better national planning to delineate important ape habitat at the “upstream” level, i.e. *before* decisions are made about which projects the World Bank is to support, and implement. This involves the articulation of National Species Recovery Plans (NSRPs). It involves the strengthening of World Bank Safeguards and IFC Performance Standards that commit the World Bank Group to avoid projects in “no-go⁴⁷” zones and to support and implement only those projects that do not pose a threat to ape conservation in transition zones. It entails improving technical capacity and transparency in processes such as Critical Habitat Assessments and Environmental

⁴⁷ These areas include protected areas and World Heritage sites, but there may be other areas specifically outlined in the NSRP as critical for ape conservation. Therefore even if they are not currently protected, the World Bank Group should not support activities in these areas that would negatively impact apes.

Impact Studies that inform World Bank decision-making. And finally, this strategic priority also involves working with national governments in ape range states to incorporate conservation priorities into their national land-use planning processes.

Strategic Priority 2: Create mechanisms for improved management, mitigation and compensation in World Bank supported activities in ape habitat

While the first strategic priority focuses on putting into place mechanisms so that ape habitat can be avoided from the outset, this second strategic priority focuses on improved *mitigation* of negative impacts to apes—that is, in those unavoidable circumstances where projects do proceed in ape habitat. With many apes living outside of protected areas, not only is there a need for increased protection of their habitat, but better management of the ecosystems in transition zones that are not currently protected. The second strategic priority therefore presents mechanisms whereby the IUCN SSC Section on Great Apes (SGA) and Section on Small Apes (SSA) could support sound decision-making on project mitigation by the World Bank Group to avoid harm to apes. This would be done through the creation of a specific mitigation task force (MTF) for apes to provide technical support to World Bank and IFC funded projects in ape habitat. When unavoidable and residual negative impacts to apes and their habitat do occur, World Bank and IFC policies should require investment in a National Offset Strategy (NOS) for apes. Such an offset strategy at a national scale would outline comprehensive programs for offsets, aggregating them where appropriate, and would take into account cumulative environmental impact assessments of sectors such as mining, oil and gas, hydro-electric, and transport infrastructure.

Strategic Priority 3: Support a multifaceted program to combat the illegal killing of apes

The first two strategies focus on better land-use planning upstream as well as mitigation of impacts to ape habitats once projects are in course. In a cohesive strategy to protect apes, it is also of critical importance to put into place strategies to address the illegal killing of apes—one of the greatest threats to their survival. The third strategic priority therefore focuses on providing support to concerted efforts to combat illegal hunting of apes and the international trade in apes. The value of all transnational organized environmental crime is estimated to be between \$70–213 billion annually (Nelleman *et al.* 2014). Wildlife crime is of concern to the World Bank Group because such illicit activities are often linked with other international crimes, which undermines investments in biodiversity conservation, and deprives developing countries of valued resources. The World Bank has an existing program to fight wildlife crime that focuses on prevention, detection and suppression, and recovery. We suggest this existing program be extended to all ape range states through existing networks of projects already underway. In addition to improving law enforcement, we advocate for a holistic program that also provides appropriate alternatives for communities' dependent on this trade.

Strategic Priority 4: Provide incentives to private sector and development projects, range-state governments, and people living in and around the ranges of apes to protect apes and their habitat

Finally, for these strategic priorities to become a reality, it is important to provide incentives—financial and material—for industries and national governments, as well as people living in and around ape ranges, to protect apes and their habitat. Strategic priority four therefore focuses on putting these incentives into place. One of the most significant ways in which the World Bank Group could contribute positively to ape conservation would be to refrain from funding projects in the “no-go” zones outlined in the ape NSRP and to make their funding for projects in transition zones contingent upon engagement with the ape MTF, following best practices for ape conservation, and then contributing to the NOS when there are residual impacts to apes and their habitats after all mitigation has taken place. The World Bank could be of paramount importance in helping to establish a National Conservation Trust Fund (NCTF) to house offset and other funding to support NSRPs for apes in each ape range country. The World Bank could also provide support to governments to redraft national laws and policies that would require companies to buy into an NOS. The World Bank can provide incentives for participation in NSRPs through Poverty Reduction Support Credits. Finally, it is also critical for the World Bank to prioritize its funding to communities that are managing areas where apes occur, or to NGOs for conservation activities, rather than subsidizing extractive industries.

These four strategic priorities build on the World Bank’s strengths and comparative advantages to support a cohesive program that would have a tremendous positive impact globally for the conservation of apes and ape habitat. We emphasize that commitment and support to “no-go” zones underpin the future survival of apes, but that this must go hand-in-hand with better management of non-protected areas. We do not take a polarized view by drawing a dichotomy between protected areas and non-protected areas, but rather view all of these as part of an integrated landscape. To achieve an integrated and multi-sectoral approach that builds collaboration between stakeholders, we suggest the strategy would be best implemented by a partnership, rather than a single organization, and we recommend that a steering committee be created to monitor and evaluate its progress.

This strategy represents the unprecedented consensus of those working in ape conservation around the world. The strategy is ambitious, but only with this degree of commitment and integration of biodiversity conservation into the core of development planning can the decline of humanity’s closest relatives be reversed. The World Bank Group is uniquely placed to make a difference for the future of the apes on our planet by setting new standards for inserting biodiversity into the very heart of national and global policy and action.

TABLE OF CONTENTS

ACKNOWLEDGMENTS	6
SUMMARY	7
ACRONYMS	15
BACKGROUND	16
Why apes?	16
Apes as flagship species	18
Apes as umbrella species	18
Apes as keystone species	18
Great apes as ecosystem engineers	19
The intrinsic value of nature	19
Why now?	19
Ape numbers are rapidly declining	19
Threats to apes are increasing	20
The scale of the underlying drivers is also increasing	22
THE STRATEGY	30
Strategic Priority 1: Integrate conservation and sustainable landscape planning and management that supports ape conservation into upstream World Bank policies and planning processes (Strategic Country Diagnostics and Country Partnership Frameworks)	31
Activity 1.1 Formulate national land-use plans that fully integrate ape conservation	32
Activity 1.2 Strengthen World Bank safeguards and IFC performance standards that guide project lending	33
Activity 1.3 Ensure that landscape management incorporates ape conservation into national land-use plans through World Bank supported national planning processes	35
Activity 1.4 Improved quality and transparency of Critical Habitat studies and Environmental Impact Assessments	36
Strategic Priority 2: Create mechanisms for improved management, mitigation and compensation in World Bank supported activities in ape habitat	39
Activity 2.1 Increase capacity to design and carry out mitigation strategies for projects affecting apes and their habitats	39
Activity 2.2 Articulate National Offset Plans (NOSs) nested in NSRPs	40

Activity 2.3 Cumulative environmental impacts of industry sectors (e.g., mining, oil and gas, hydro-electric, and transport) on apes integrated into offset measurements	42
Strategic Priority 3: Support a multifaceted program to combat the illegal killing of apes	43
Activity 3.1 Improved law enforcement	44
Activity 3.2 Address issues of corruption in wildlife crime	45
Activity 3.3 Monitoring of wildlife crime	46
Activity 3.4 A multifaceted approach to addressing the biological, ethno-biological and socio-economic aspects of the illegal trade in ape meat	46
Strategic Priority 4: Provide incentives to private sector and development projects, range-state governments, and people living in and around apes' range to protect apes and their habitat	47
Activity 4.1 Establish a national conservation trust fund to support ape conservation in each range country	48
Activity 4.2 Provide technical support to governments to craft new international laws and policies to incentivize companies to buy into a NOS and invest in a NCTF	49
Activity 4.3 Place contingencies upon World Bank and IFC funding to private sector and development projects to ensure adherence to ape conservation priorities	49
Activity 4.4 Leverage climate funding in support of NSRPs for apes	50
Activity 4.5 Incentivize range-state governments' commitment to ape conservation through Poverty Reduction Support Credits	51
Activity 4.6 Provide incentives for people living in and around ape habitat to support ape conservation	51
CONCLUSIONS	52
REFERENCES	55
ANNEX 1. THE APES: WHO ARE THEY?	74
ANNEX 2. THE APES: WHERE ARE THEY?	76
ANNEX 3. THE DRIVERS	77
Poaching	77
Industrial Agriculture	78
Extractive industries	80
Oil and Gas	82
Logging	82

	14
Small holder agriculture	85
Fuel collection/charcoal production	86
Harvesting of natural resources (rattan, bamboo, etc.)	86
Artisanal Mining	86
Climate Change	87
ANNEX 4. APE CONSERVATION ACTION PLANS	89
ANNEX 5. BEST PRACTICE GUIDELINES FOR APE CONSERVATION	91
ANNEX 6. CONSIDERATIONS FOR GREAT APE TOURISM ACTIVITIES IN THE WORLD BANK APE PORTFOLIO – UTILISING BEST PRACTICE	93

ACRONYMS

ADB	Asian Development Bank
AfDB	African Development Bank
BBOP	Business and Biodiversity Offsets Programme
CAR	Central African Republic
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species of Wild Flora and Fauna
CPF	Country Partnership Framework
CR	Critically Endangered
CTF	Conservation Trust Fund
DRC	Democratic Republic of Congo
EIA	Environmental Impact Assessment
EITI	Extractive Industries Transparency Initiative
EN	Endangered
FAO	Food and Agriculture Organization of the United Nations
FSC	Forest Stewardship Council
GEF	Global Environment Facility
GRASP	Great Apes Survival Partnership
ICCN	Institut Congolais pour la Conservation de la Nature
IFC	International Finance Corporation
IUCN	International Union for Conservation of Nature
MTF	Mitigation Task Force
NCTF	National Conservation Trust Fund
NGO	Non-Governmental Organization
NOS	National Offset Strategy
NSRP	National Species Recovery Plan
NTFP	Non-Timber Forest Product
OECD	Organisation for Economic Co-operation and Development
PS	Performance Standards
REDD	Reduced Emissions from Degradation and Deforestation
SCD	Systemic Country Diagnostic
SGA	Section on Great Apes of the IUCN SSC Primate Specialist Group
SSA	Section on Small Apes of the IUCN SSC Primate Specialist Group
SSC	Species Survival Commission
TEEB	The Economics of Ecosystems and Biodiversity
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
USFWS	United States Fish and Wildlife Service

BACKGROUND

Apes are bonobos, chimpanzees, gibbons, gorillas and orangutans (Annex 1). Today, apes can be found living in 34 countries across tropical Africa and Asia (Annex 2), Figure 1a,b)—two regions of the world where rapid globalization, urbanization and accelerated infrastructure development have put biodiversity at particular risk.

These are regions that face enormous development challenges. In 2012, sub-Saharan Africa had the lowest Human Development Index⁴⁸ (HDI) value of any region (UNDP 2013). Close to half of the population of sub-Saharan Africa lives in extreme poverty⁴⁹ (UNDP 2013). The Asia Pacific region makes up only 30% of the world's land mass yet is home to more than half its human population. South Asia has the second-lowest Human Development Index (HDI) value of any region listed (UNDP 2013). In regions of the world facing such massive challenges, it is fair to ask: *Why apes? Why now? Why the World Bank?*

Why apes?

Functional ecosystems provide critical resources for the world's poor, and without them development is unsustainable (Cardinale 2012; Cardinale *et al.* 2012). On average, ecosystems must be at least 50% intact to maintain their full range of ecosystem services, and some tropical ecosystems require even higher levels of intactness (Schmiegelow *et al.* 2006; Noss *et al.* 2012). The answer to why the World Bank should care about apes is simple: Apes in particular can provide an important focus for conservation—a lens through which we can concentrate conservation efforts to protect a wide variety of species and ecosystems and through which wider conservation action can be targeted and landscape-level outcomes achieved.

⁴⁸ The Human Development Index (HDI) is a composite measure of indicators along three dimensions: life expectancy, educational attainment and command over the resources needed for a decent living (UNDP 2013)

⁴⁹ Extreme poverty is defined as \$1.25 a day or less in purchasing power parity terms (UNDP 2013)

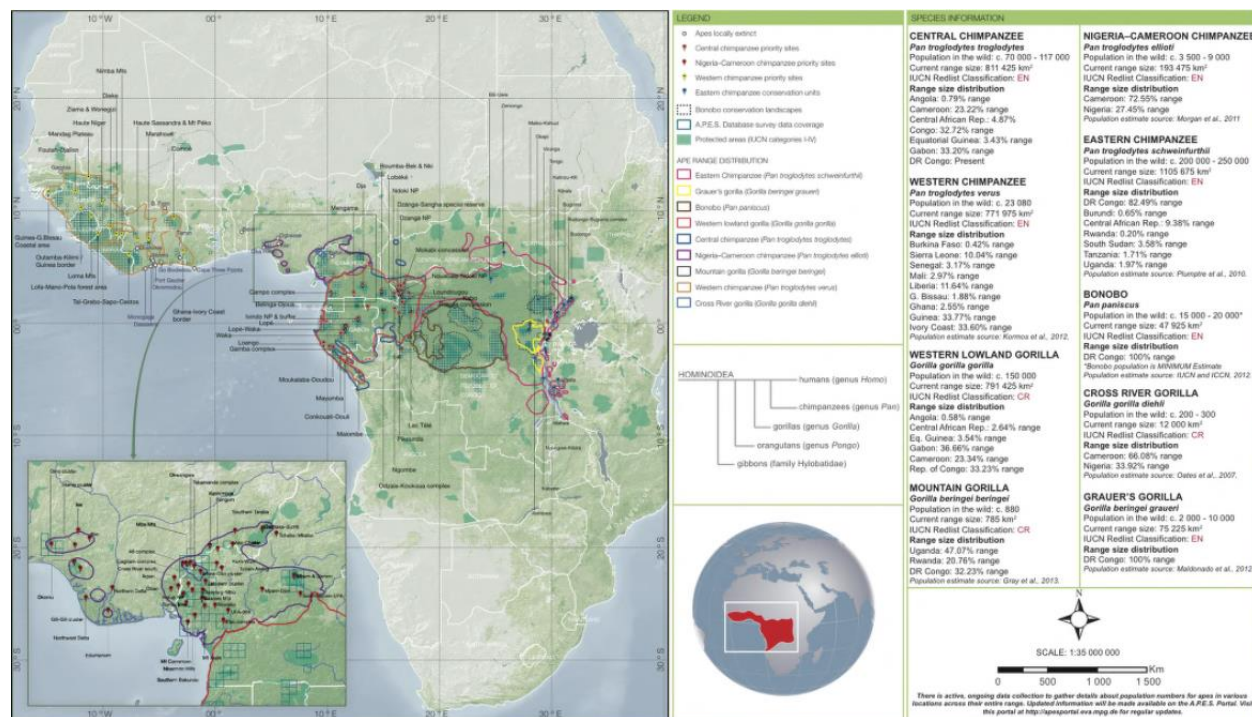


Figure 1a. Ape distributions in Africa

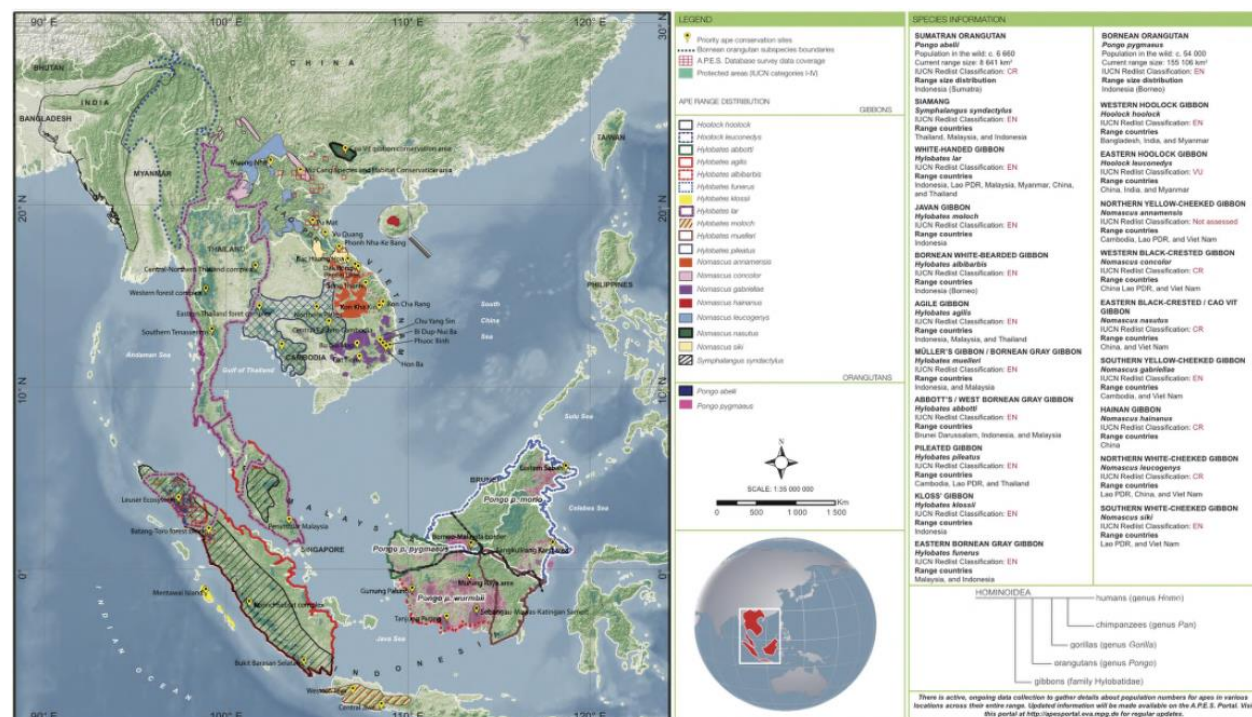


Figure 1b. Ape distributions in Southeast Asia

Apes as flagship species

Apes are excellent ‘flagship species,’ defined as “species that serve as symbols or a focus for stimulating conservation awareness, action and funding” (Dinerstein *et al.* 2010). From a conservation standpoint, the fact that apes have recognizable similarities to humans makes them some of the most powerful flagship species there are.

Apes are the closest living relatives to human beings. In fact, humans are more closely related to chimpanzees than chimpanzees are to gorillas and orangutans (Chen & Li 2001; Scally *et al.* 2012). Apes exhibit many of the same emotions as humans, such as mourning the death of their relatives in recognizable ways (Warren & Williamson 2004; Anderson 2011). They practice tool-use (McGrew 1992), hunt for meat (Boesch 1994; Boesch *et al.* 2002) and show evidence of culture and traditions (Whiten *et al.* 1999; Whiten and Boesch 2001; van Schaik *et al.* 2003). Chimpanzees, gorillas and bonobos have also mastered sign language and/or language lexicon systems (e.g., Gardner & Gardner 1980). Apes have long stimulated our curiosity. Indeed, studies of apes have provided an unique lens for understanding ourselves, allowing us to view our distant past by studying our ancestral origins, enhancing understanding of our own evolution, and generating important insights into human behavior.

Apes as umbrella species

Apes are also effective ‘umbrella species,’ defined as those species “with large area requirements, which if given sufficient protected habitat area, will bring many other species under protection” (Noss 1990; Caro 2003). There is a strong association between the geographic range of apes and the tropical forests in Africa and Asia that harbor some of the richest biodiversity in the world. Ape habitat overlaps with primary forests that are globally irreplaceable and under severe threat (Mackey *et al.* 2014). The countries in which apes are found are also home to almost one-third of threatened terrestrial mammal species (Baillie *et al.* 2004) and apes’ ranges also overlap extensively with those of many endemic species (Dinerstein *et al.* 2010). On a broader scale, the ranges of apes overlap with internationally-recognized priority areas for biodiversity, including Hotspots for Biodiversity (Myers *et al.* 2000), Key Biodiversity Areas (KBAs) (Langhammer *et al.* 2007), Important Bird Areas (IBAs), and Alliance for Zero Extinction (AZE) sites. Thus, protecting ape habitats will result in the protection of many other species as well.

Apes as keystone species

Apes are also keystone species: those that have a key role in maintaining the health and diversity of the landscapes in which they live. They play an important role as seed dispersers since fruit is an important part of their diets, and the passage of seeds through an ape's gut increases the speed and probability of germination of some plant species (e.g., Tutin *et al.* 1991; Rogers *et al.* 1998; Beaune *et al.* 2013). Gorillas, chimpanzees and bonobos all travel long distances, helping to carry seeds away from the parent tree, which is an important

factor for the viability of most tree species. Orangutans play a similar role in seed germination for some large-seeded tree species in Asia (Ancrenaz *et al.* 2006). The frugivorous gibbons are also key dispersers of medium-sized to small seeds; although their territories are small (ca. 30 ha), the chances of germination are enhanced in suitable habitat (McConkey & Chivers 2007).

Great apes as ecosystem engineers

Great apes are ‘ecosystem engineers’, which are defined as ‘organisms that directly or indirectly control the availability of resources to other organisms by causing physical state changes in biotic or abiotic materials’ (Jones *et al.* 1997; Boogert *et al.* 2006). Great apes shape forest structure by trampling, bending and breaking vegetation as they travel, forage and build nests (Plumptre 1995; Rogers *et al.* 1998). They create gaps in the forest cover that allow light to penetrate, enabling plants to germinate and grow, and contributing to forest regeneration. The threat to the survival of many species brought about by altering species composition in an ecosystem has been shown by many studies, such as that on elephants and *Baillonella toxisperma* seed dispersal in Cameroon (Bikié *et al.* 2000). The decline of apes could precipitate the decline of other culturally-, economically- or ecologically-important species.

The intrinsic value of nature

While the emphasis on apes as useful flagship, umbrella, and keystone species, and physical-ecosystem engineers is important, and while we believe that the protection of ape habitat is an essential component of sustainable landscape planning, protecting nature for its own intrinsic value is important (Oates 2006). As a conservation community we believe in the “right” of other species to exist, regardless of their monetary value to humans. But we also believe that this responsibility must be shouldered by all nations, not only the range states in which apes occur.

Why now?

Implementation of this strategy is both urgent and timely for the following reasons.

Ape numbers are rapidly declining

All great apes and all but one gibbon taxon are listed as “Endangered” (EN) or “Critical” (CR) on the IUCN Red List of Threatened Species. This is not just because they exist at low numbers (Box 1), but also because numbers of all ape taxa (except mountain gorillas) are declining at a tremendous rate (IUCN 2014a).

Box. 1. How many apes are there?

There is no definitive census as to the current population of apes. While it is easier to estimate ape numbers than it is for some other species, it is still extremely difficult to do so accurately because of the methodological challenges in counting them. Each survey method has its limitations, and studies throughout Africa and Asia have used a variety of them, producing results that are not always comparable. The size, impenetrability and remoteness of the apes' vast ranges are further hindrances to precision. With these caveats in mind, and summing all the available data, our best current estimate is that there are about 150,000 gorillas, 300,000 chimpanzees, and a minimum of 15,000–20,000 bonobos living in Africa; together with an estimated 6,600 Sumatran and 54,000 Bornean orangutans in Southeast Asia (Wich *et al.* 2008). Annex 5 provides estimates for each ape taxon for each country in which they occur.

The statistics are alarming. In West Africa, chimpanzees in Ivory Coast decreased by 90% over 17 years (Campbell *et al.* 2008). In southwestern Nigeria chimpanzees survive at only half of the sites that were surveyed (Greengrass 2009). In Gabon, central Africa, apes declined by more than half between 1983 and 2000 (Walsh *et al.* 2003). In Southeast Asia, the current range of orangutans is probably only 5% of their original range. The western hoolock gibbon has been extirpated from 18 locations between 2001 and 2005, 10 in India and eight in Bangladesh. Of about 100 locations where the western hoolock gibbon lives in India, 77 of those locations now have fewer than 20 individuals, and 47 had fewer than 10 in 2005. A 95% decline is predicted for the population in Bangladesh by 2025 (Molur *et al.* 2005).

Threats to apes are increasing

The reasons for the rapid decline of apes are many. The greatest direct threats to apes are disease, hunting, and habitat loss (Ancrenaz *et al.* 2008; Brockelman *et al.* 2008; Fruth *et al.* 2008; Oates *et al.* 2008; Robbins & Williamson 2008; Singleton *et al.* 2008; Walsh *et al.* 2008). Not all of these threats are ape-specific, but apes are particularly vulnerable because of their reproductive ecology. Overall, apes have long periods of maturation and low reproductive rates, resulting in very low population growth rates (Williamson *et al.* 2014), and typically apes live at relatively low population densities. Even a slight increase in mortality rates can quickly result in negative growth rates and population declines.

Below we summarize the main threats direct threats to apes, outlining in each case why these threats are growing.

Disease

Disease is one of the most significant factors causing the decline in great ape numbers, especially in Africa. Disease has had devastating effects on ape numbers, especially in the last

two decades. Due to the physiological, anatomical and genetic similarities between non-human apes and humans, apes are particularly susceptible to disease transfer from humans (Wolfe *et al.* 1998). The Ebola virus for example, has resulted in the deaths of perhaps one third of the world's gorillas and chimpanzees (Ryan & Walsh 2011). Other diseases such as acute respiratory syndromes, polio-like viruses, monkey pox, anthrax, and tuberculosis have also resulted in losses of many apes (Goodall 1986; Boesch & Boesch-Achermann 2000; Formenty *et al.* 2003; Leendertz *et al.* 2004; Bermejo *et al.* 2006; Caillaud *et al.* 2006; Hanamura *et al.* 2008; Kaur *et al.* 2008; Köndgen *et al.* 2008; Humle 2011; Palacios *et al.* 2011; Spelman *et al.* 2013). Disease transmission is most often from humans to apes, but the Ebola virus is known to transfer from apes to humans with devastating consequences. The 2003 outbreak of Ebola in the Republic of Congo killed 114 people as well as gorillas and chimpanzees.

Poaching

Even though all killing and capture of apes is illegal, they are easily targeted because they are large and conspicuous. Orangutans are particularly vulnerable because of their deliberate and slow locomotion (Sugardjito 1995). Gibbons are easily found because they are very vocal (Rawson *et al.* 2011). Despite being illegal, hunting is still one of the most significant threats to the apes' survival (Fruth *et al.* 2008; Oates *et al.* 2008; Robbins & Williamson 2008; Walsh *et al.* 2008; Wich *et al.* 2012a). Poaching has been identified as the greatest direct threat to the survival of bonobos in DRC (ICCN & IUCN 2012) and one of the most immediate threats to gibbons in both China and Laos PDR (Zhou *et al.* 2005; Ministry of Agriculture and Forestry 2011). Two gibbon taxa have gone extinct in these areas: the Yunnan white-handed gibbon, *Hylobates lar yunnanensis* (Grueter *et al.* 2009), and the northern white-cheeked gibbon, *Nomascus leucogenys* (Fan *et al.* 2014). With their habitat reduced to tiny fragments of forest, poaching was the eventual cause of their demise.

Habitat loss and degradation

Habitat loss and fragmentation is one of the most significant factors threatening ape survival and the greatest threat in some regions of their range. The distribution of apes is strongly associated with forests and “within the last decade global forest loss has continued at a rate of between 10 and 13 million ha of forest each year (FAO 2011)—an area the size of Portugal. This rate of loss has been highest in Africa and Asia where apes range (see Box 2 for more detail) (FAO 2011).”

It is not only the amount of forest loss that affects apes, but the extent of fragmentation and isolation of the forest. In the long term, isolated populations of apes face an additional threat arising from the side effects of small population size, due to limited genetic variability (Islam *et al.* 2006). Small populations are more susceptible to catastrophic events that may result in the mortality of a significant proportion of the population, and are likely to have very low levels of genetic diversity. In Bangladesh, for example, some forest

fragments have such small populations of gibbons (fewer than five individuals) that they are no longer genetically viable (Islam *et al.* 2006; Muzaffar *et al.* 2007).

Box 2. Deforestation rates in ape habitat

Africa

Deforestation rates in Africa are second only to those of Latin America and the Caribbean (FAO 2011). Currently, the estimated forest cover in Africa is about 675 million ha; about 23% of Africa's total land area and about 17% of global forest cover (FAO 2011). The deforestation rate in the decade 1990-2000 was 4 million ha per year. In the decade from 2000 to 2010 deforestation rates slowed, but only to 3.4 million ha per year (FAO 2011). Specifically for apes in Africa, Junker *et al.* (2012) estimated that the area of land that provides 'Suitable Environmental Conditions' (SEC) declined between the 1990s and the 2000s from about 2,015 ha to 1,808 ha.

Asia

Southeast Asia has had a net loss of forest in the last 10 years of more than 0.9 million ha/year (FAO 2011). During the second half of the 20th century, more than half the forest cover on Borneo disappeared and more than 80% of the orangutan habitat was lost. Indonesia has had the largest increase in forest loss overall; from 10 million ha/year from 2000 through 2003 to over 20 million ha/year in 2011 to 2012 (Hansen *et al.* 2013).

In the two Indonesian provinces where Sumatran orangutans occur – Aceh and North Sumatra – there has been a loss of 22.4% and 43.4% of the forest respectively from 1985 to 2009. The total area of natural Sumatran orangutan habitat remaining today is only about 8.6 million ha (Wich *et al.* 2011). For orangutans, habitat loss has been identified as the single largest threat to their populations (Sugardjito & van Schaik 1993; Sugardjito 1995; Rijksen & Meijaard 1999; Wich *et al.* 2012b).

The scale of the underlying drivers is also increasing

The underlying drivers of these direct threats to apes are complex interactions of social, economic, political and cultural processes that are often far from their area of impact. Figure 2 shows the factors influencing ape abundance and how these are interrelated with underlying drivers. In Annex 3 we describe these drivers in more detail.

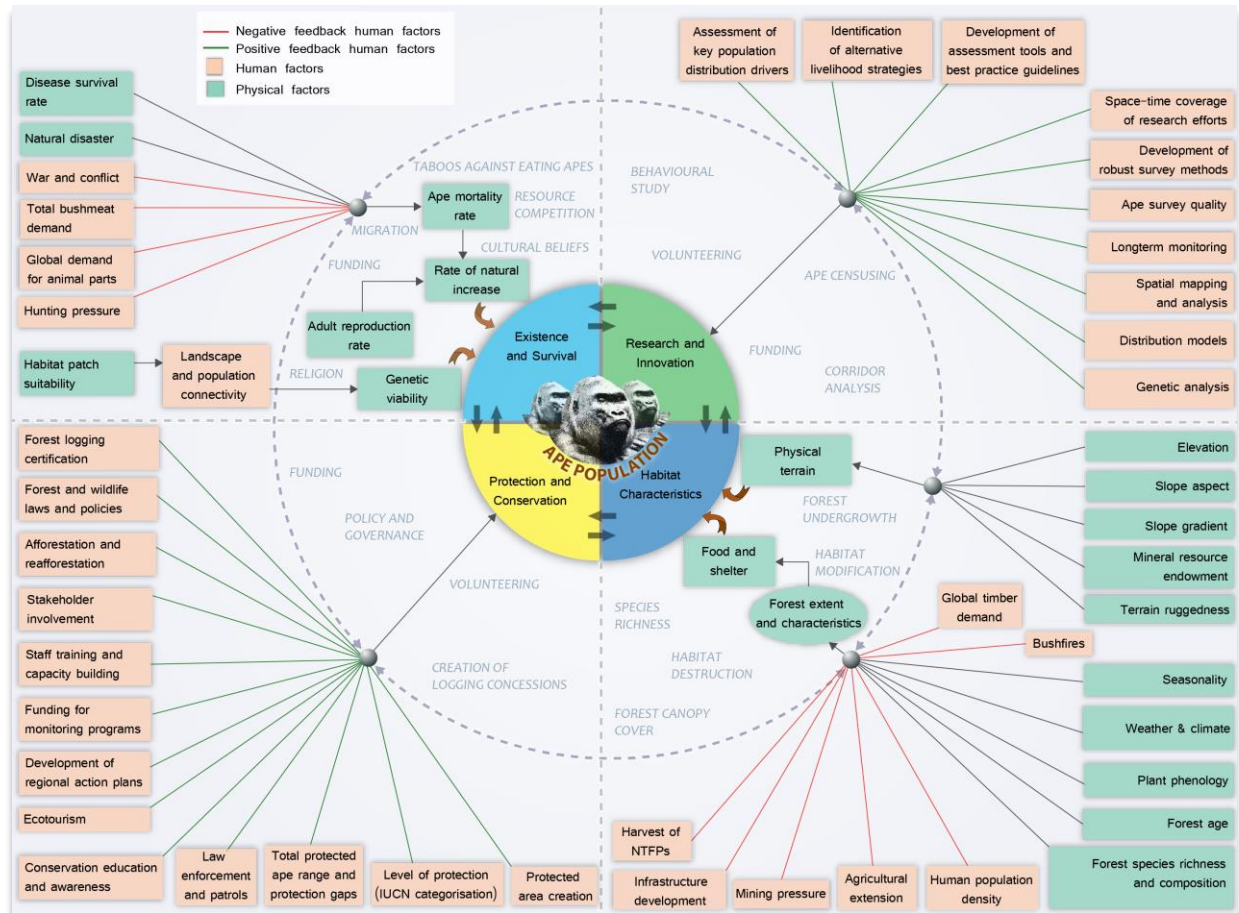


Figure 2. Representation of factors influencing ape abundance (Funwi-Gabga *et al.* 2014)

The risk of disease outbreaks in great apes, for example, is growing as a result of their habituation to humans for tourism and the growth of human populations living at the edges of protected areas (Woodford *et al.* 2002; Ryan & Walsh 2011). Large-scale poaching of apes, on the other hand, is primarily a result of the mostly illegal commercial trade in the meat (for human consumption) of wild animals, the demand for primate-derived medicinal products (Qingyong & Xuelong 2009), the illegal international trade in live apes (Rosen & Byers 2002; Stiles *et al.* 2013), the killing of apes to protect crops or when they are perceived to be in conflict for resources with humans (Hockings & Humle 2009; Meijaard *et al.* 2011b) and their crippling or demise when caught in snares set for other animals, such as antelopes (e.g., Reynolds 2005; Robbins *et al.* 2011). The scale of poaching of apes is often magnified by road development for the extraction and transport of minerals and timber, since this facilitates the transport and trade in hunted wild meat (Brashares *et al.* 2004; Brugière & Magassouba 2009; Poulsen *et al.* 2009; White & Fa 2014). Although laws to protect apes exist in all countries, they are often inadequately enforced. Even if arrests are made, it is rare for cases to be prosecuted and for perpetrators to be fined or imprisoned.

All transnational organized environmental crime is estimated to be valued between \$70–213 billion USD annually (Nelleman *et al.* 2014), behind only illegal drugs, counterfeit goods, and human trafficking. The international scale of this problem has more recently manifested itself in the form of increasingly well-armed poachers (with automatic weapons obtained from national militaries) capable of eliminating significant populations of important wildlife in a short time. And the wildlife trade has sustained armed insurgencies in sub-Saharan Africa (e.g., northern CAR and Cameroon, South Sudan, northern Kenya, eastern DRC). Civil conflict in countries such as DRC has also intensified the commercial wild meat trade as a result of increased access to firearms, and since internally displaced people (IDP) and militia groups may rely heavily on wild meat. The results of this increased violence and instability have immeasurable impacts on national economies, national and regional security, social liberties, political stability and food security as well as numerous other fundamental benefits that are otherwise enjoyed by less corrupt nations.

The underlying drivers for habitat loss are many but those at the forefront are industrial agriculture and the extractive industries (logging, mining, oil, and gas). Such industrial activity is expected to expand rapidly, and most of this growth is expected to occur in developing countries (Millennium Ecosystem Assessment 2005, Butler & Laurance 2008). Agriculture is responsible for about 80% of deforestation worldwide. Of particular significance to apes has been the expansion of oil-palm plantations, and demand for palm oil is expected to double by 2020. The palm oil industry has resulted in 43% of forest lost in northern Sumatra, and an estimated 92% reduction of the Sumatran orangutan population (Wich *et al.* 2012b). Converting a forest area into an industrial plantation is believed to result in the death or displacement of more than 95% of the orangutans originally present (Wich *et al.* 2012b).

Industrial logging is also a major driver of ape habitat loss. Commercial timber extraction and logging are responsible for more than 70% of forest degradation in subtropical Asia (Kissinger *et al.* 2012). Industrial logging in the tropics leads not only to forest degradation, but often to complete deforestation over the long term because logging frequently acts as a precursor for conversion of forests to other uses and is closely associated with road building to facilitate logging operations (SCBD 2007; Laporte *et al.* 2007; Laurance *et al.* 2009; Shearman *et al.* 2012; Zimmerman & Kormos 2012; Bryan *et al.* 2013; Laurance & Balmford 2013; Mayaux *et al.* 2013). Legal and illegal logging have resulted in widespread losses of apes throughout their ranges (Rijksen & Meijaard 1999; van Schaik *et al.* 2001). Almost a third of the range of orangutans in Borneo and half of the range of chimpanzees and gorillas in Western Equatorial Africa is allocated to logging concessions (Morgan & Sanz 2007; Wich *et al.* 2012b).

Mining and oil and gas exploration have already increased rapidly, and large-scale agricultural land acquisition has proliferated across much of Africa and is likely to continue to increase over the next generation (Weng *et al.* 2013; Edwards *et al.* 2014). Africa produces many of the world's most important minerals and metals, and has the world's largest

reserves of platinum, gold, diamonds, chromite, manganese, and vanadium (Edwards *et al.* 2014).

Megatrends (major forces in the development of society globally that are likely to affect the future in the next 10–15 years⁵⁰) lead to impacts on the environment and the ability of the earth's ecosystems to provide the basis for sustained growth (Arcus Foundation 2014). Those that impact the environment include globalization, economic growth and prosperity, technological development, demographic change (e.g., human population growth), trade and commercialization, infrastructure development, urbanization and geopolitics (Oates 2013; Arcus Foundation 2014). Of this list, human population growth has been singled out as one of the most important factors and this has undoubtedly put pressure on natural resources. Overall, human population has expanded from around one billion in the middle of the 19th century to over seven billion today. Infrastructure development is accelerating in attempts to address increasing needs for electricity, drinking water, transport, and other basic services for people. In sub-Saharan Africa specifically, the human population increased 10% from 900 million to over 1 billion⁵¹ from 1990 to 2009. Africa's population is expected to double in the next 28 years⁵². The Asia-Pacific region already makes up only one-quarter of the total land area of the earth, yet is home to over 60% of the world's population⁵³.

It is not just population growth that is increasing reliance on natural resources. It is also the rapid increase in the urban population. In Africa, for example, the urban population is expected to double from 40% of the total population in 2010 to 84% by 2060. At that time, the rural population is predicted to represent only 18% of the total population (AfDB 2011). In East Asia and the Pacific, more than half of the human population is living in urban areas⁵⁴. This increase in the urban population does not decrease pressure on natural resources as might be thought. This is because there is also a concurrent worldwide increase in the middle class in both developing and developed countries. The African Development Bank has reported that Africa's middle class grew by 60% from 2000 to 2010 (Juma 2011). Asia accounts for less than one-quarter of today's middle class and it is predicted that this will double by 2020. It is also likely that more than half the world's middle class will be in Asia and that Asian consumers will account for over 40% of global middle-class consumption (OECD 2010). The Asia region has had the strongest economic growth, accounting for close to 20% of global growth⁵⁵. Africa is also one of the fastest-growing developing regions in the world⁵⁶.

⁵⁰ <http://www.cifs.dk/scripts/artikel.asp?id=1469>

⁵¹ http://siteresources.worldbank.org/INTAFRICA/Resources/Africa-factoids_hi-res_FINAL_Sept_9-2011_11.pdf

⁵² <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,contentMDK:21709116~menuPK:258659~pagePK:2865106~piPK:2865128~theSitePK:258644,00.html>

⁵³ <http://www.unescap.org/stat/data/syb2011/1-People/Population.asp>

⁵⁴ http://siteresources.worldbank.org/DATASTATISTICS/Resources/eap_wdi.pdf

⁵⁵ <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/0,,contentMDK:20248880~pagePK:146736~piPK:146830~theSitePK:226301,00.html>

⁵⁶ <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/AFRICAEXT/0,,menuPK:258652~pagePK:146732~piPK:146828~theSitePK:258644,00.html>

We cannot just look, however, to the growing middle class in developing countries as the source of increased consumption levels. A large number of species are threatened even more as a result of consumers in developed countries due to their demand for commodities produced in developing countries (Lenzen *et al.* 2012). Globally, the size of the middle class is predicted to increase from 1.8 billion people in 2010 to 3.2 billion by 2020, and to 4.9 billion by 2030 (OECD 2010). The threat from developed countries extracting and importing resources from developing countries will only increase.

In summary, poverty and human population growth are no longer considered as the main drivers for overreliance on natural resources. Rather it now seems that the main threats and drivers of biodiversity loss are underpinned by unsustainable levels of consumption by burgeoning urban middle classes across both the developing world and developed nations (Pearce 2012). This unsustainable level of consumption is being fed by global industrial activity. And such activity is expected to expand exponentially (Millennium Ecosystem Assessment 2005, Butler & Lurance 2008). It is this increasing global demand for commodities—a result of a growing population and increasing wealth and economic development—that is manifesting itself in unsustainable natural resource use that is negatively impacting apes.

Current conservation efforts have been insufficient

Given the scale and the magnitude of the above, it is not surprising that the decline of apes continues. Projects aiming to protect apes have certainly lessened the rate of decline, in many cases saving local populations or even entire subspecies from extinction. Nonetheless, ape populations are still declining overall, and even where conservation projects have been implemented successfully they are often vulnerable and long-term prospects are uncertain.

Current conservation efforts focus resources and energy at many levels. Some of these strategies are part of traditional conservation approaches that date back to the 1920s. For example, the oldest national park in Africa was established in 1925 to protect mountain gorillas (Albert now Virunga National Park). Some are more recent approaches, taking advantage of current trends and opportunities in the global economy. Due to the increased recognition of links between biodiversity and human welfare, more recently, the emphasis has been on integrating conservation goals with human economic development goals. The following outlines major areas where conservation programs for apes have concentrated their focus and efforts to date.

Protected areas are undoubtedly, an essential component for the survival of many species and have been instrumental in slowing the decline of biodiversity in general (Mulongoy & Chape 2004; Possingham *et al.* 2006; Barr *et al.* 2011), and apes particularly. A paper by Porter-Bolland *et al.* (2011) has indicated, however, that community-managed forests suffer lower annual deforestation rates than legally protected forests. A study by Tranquilli *et al.* (2012) demonstrated that the persistence of apes in protected areas is

significantly and positively affected by the number of years of conservation effort, primarily through the presence of NGOs and law enforcement guards, followed by secondary conservation activities, such as tourism and research. Similarly, apes in protected areas that are surrounded by buffer zones with controlled extraction and resource use may be less susceptible to population declines and local extinctions than those without buffer zones. Clearly, the type of protection and objectives of forest management are a major issue for forest/biodiversity conservation. It is clear, however, that parks which receive enough support to build management capacity over time *are* effective at protecting apes (Tranquilli *et al.* 2012).

Despite the recognition of the importance of protected areas, they remain severely underfunded (Emerton & Pabon-Zamora 2009). Funding sources are often unreliable and unsustainable, and protected areas are under-prioritized by national governments and therefore suffer from weak capacity. As a result, the creation of protected areas is more often based on political opportunity than on careful and systematic evaluation of biodiversity and ecosystem needs (Joppa *et al.* 2008), and there is a need for more systematic planning, as many vulnerable species and habitats have very little or no formal protection (Rodrigues *et al.* 2004; Barr *et al.* 2011; Olson *et al.* 2001). Protected area coverage is still generally inadequate. The extent of protected area coverage in each ape range country is highly variable. A recent analysis of the amount of suitable habitat for apes in and outside of protected areas showed that less than a quarter of suitable habitat for all African apes is in legally protected areas (Junker *et al.* 2012).

Given the above, there is obviously a tremendous need for conservation to focus on better protection of apes and the management of their habitat outside of protected areas. Diversifying the livelihoods of communities dependent on natural resources and finding sustainable ways of benefitting financially from forest ecosystems is a focus that has been increasingly reflected in conservation efforts, including those on apes. An emerging trend to support ape conservation is to ensure that traditional and new land-use and economic development activities are integrated with conservation objectives. These include tools such as conservation agriculture, watershed protection and management, mangrove management, tourism, conservation markets (e.g., gorilla coffee), sustainable harvesting of forest resources such as honey, NTFPs and lianas, and waste management for energy production. Such activities have been piloted throughout Asia and Africa with significant impact (Kinabatangan Orangutan Conservation Project in Sabah, Malaysia; Greater Mahale Ecosystem Project, Tanzania). Community-managed forest reserves have also been established/considered for the conservation of forests and bonobos in DRC (Sankuru/Kokolopori) (Almquist *et al.* 2010; IUCN & ICCN 2012). One of the main challenges with these initiatives has been scaling them to ensure large areas and numbers of people are involved and benefit.

A more recent conservation focus for protecting apes has been that of improving legislation and law enforcement. Wildlife conservation organizations have been supporting

anti-poaching activities in ape range states for decades; however, only more recently have conservation organizations begun to become witness and advisor to the entire law enforcement process. Indeed, new organizations—pioneered by the Last Great Ape organization (LAGA) in Cameroon—base their entire mandate on ensuring the full application of existing wildlife laws from start to finish—from the forest, through the court, to the prison. LAGA has seen its model replicated in Benin, Central African Republic, Gabon, Guinea, Republic of Congo, Senegal, and Togo, together forming the EAGLE Network (Eco Activists for Governance and Law Enforcement). EAGLE members are not only making tremendous strides in wildlife law enforcement, but are also prompting a cultural shift from one that condones corruption to one that fosters accountability outside the wildlife enforcement realm as well. The critical linking of these two important approaches—field-level enforcement supported by mobilizing anti-poaching patrols in and around protected areas and the assurance of achieving thorough judiciary process once a wildlife poacher or trafficker has been arrested—has resulted in great progress in the law enforcement process and its *de facto* purpose of establishing an effective deterrent to committing wildlife crime. As most range states start from a baseline arrest rate of zero, even the slightest progress has proven to be substantial. In some countries, no prosecutions had been made and rampant abuse of the law prevailed even decades after wildlife laws had been passed. Unfortunately, the illegal wildlife trade is fully active, and extremely lucrative for those willing to take the risk that is, at present, considered to be minimal. Moreover, the risks are often markedly reduced due to high-level networks of powerful politicians, businessmen and others, who cover for the trade's ringleaders by paying bribes to officials to halt the legal process.

International and regional strategies aimed at protecting apes and other fauna, including the UN conventions such as the Convention on Biological Diversity (CBD) and the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES), have solicited formal buy-in from range-state governments. Few of these agreements function in a manner, however, that significantly reduces illegal wildlife trade in corrupt range states. Indeed, the falsification of documents to facilitate the illegal trade is commonplace, and accurate reporting and monitoring of existing agreements is largely lacking.

Why the World Bank?

Given the magnitude and diversity of the underlying drivers, it is only through commitments across sectors that the decline of apes worldwide can be reversed. The World Bank is ideally placed to help, given its broad reach across sectors and across geographical boundaries.

The World Bank achieves its mission by providing resources, sharing knowledge, building capacity and forging partnerships in the public and private sectors. It provides low-interest loans, interest-free credit, and grants to developing countries, making investments in education, health, public administration, infrastructure, financial and private sector development, agriculture, and environmental and natural resource management. It is uniquely positioned to make a difference in African and Asian countries through leadership in knowledge management⁵⁷ and partnerships, and by bringing together governments, the private sector and other donors and thought leaders. The influence of the World Bank is wide, partnering in 11,928 projects in 172 countries⁵⁸ in sectors from trade and transport to energy, education, health care, water and sanitation.

As part of the World Bank Group⁵⁹, the International Finance Corporation (IFC) provides loans and direct investments to companies working in Africa and Asia. In 2012, the IFC invested \$2.9 billion in 71 projects in the Asia Pacific region and \$2 billion in 2011 in sub-Saharan Africa. The IFC sets lending standards that include consider the environment. These are frequently adopted as the “gold standards” by other banks, and referred to as the “Equator Principles.” They could be hugely influential in ensuring that biodiversity priorities are integral to project planning and execution. The 79 financial institutions⁶⁰ that have adopted the Equator Principles make up well over half of international project finance.

The Global Environment Facility (GEF) is the world’s largest source of financing for improving the global environment in developing countries. The GEF provides grants for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer, and persistent organic pollutants. Since it was established in 1991 the GEF has provided \$11.5 billion in grants, and leveraged \$57 billion in co-financing for over 3,215 projects in over 165 countries. The GEF has also awarded more than 16,030 small grants through its Small Grants Program (SGP); given directly to civil society and community-based organizations and totalling \$653.2 million. The GEF works in partnership with 182 countries and with international institutions, civil society organizations and the private sector, addressing global environmental issues at the same time as supporting national sustainable-development initiatives.

The World Bank can help to better connect governments to the private sector to ensure sustainable landscapes through shared accountability for outcomes (on both sides). This is especially important as private capital flows are, as the largest source of development finance across a range of states, far greater even than Official Development Assistance (ODA).

⁵⁷ “The Knowledge Sharing (KS) Program, located in the World Bank Group Institute (WBI), assists World Bank Group staff, clients, and partners in capturing and organizing systematically their wealth of knowledge and experiences; making this knowledge easily available to a wide audience both internally and externally; and creating linkages between individuals and groups working to address similar development challenges.” <http://web.worldbank.org/WBSITE/EXTERNAL/WBI/0,,contentMDK:20212624~menuPK:575902~pagePK:209023~piPK:207535~theSitePK:213799,00.html>

⁵⁸ <http://www.worldbank.org/projects>

⁵⁹ Throughout this report, we use the term “World Bank Group” to refer collectively to the International Bank for Reconstruction and Development (IBRD), the International Development Association (IDA), the International Finance Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA), and the International Centre for Settlement of Investment Disputes (ICSID).

⁶⁰ www.equator-principles.com/index.php/members-reporting/members-and-reporting

In addition, the World Bank can continue to improve the participation of communities, ensuring that receive a fair share of benefits from natural resource uses. The World Bank can renegotiate the role of government to put them at the center of conservation by linking conservation to economic wealth. It can engage with NGOs and civil society to provide technical and advocacy services in pursuit of better decision-making. Finally, the World Bank can improve concerted efforts to combat illegal international trade in endangered species. In this way the Bank can influence policy, investments, and technical expertise deployed in development programs.

In summary, because of its leverage with governments, programs in capacity building, and influence on environmental policies, the World Bank Group has an unprecedented opportunity for significant influence on the conservation of biodiversity in general, and of apes and ape habitat specifically. Failure to use this influence will almost certainly result in even greater loss of biodiversity.

THE STRATEGY

Based on the understanding that biodiversity is an essential component of sustainable development policies and that biodiversity should be managed as a public good (Rands *et al.* 2010), this section outlines steps that can be taken to integrate the value of biodiversity into development, from policy and planning through to mitigation and project implementation. We present a strategy that uses cross-sectoral methods and a landscape approach to conservation. This approach entails viewing and managing multiple land uses in an integrated manner, considering both the natural environment and the human systems that depend on it. The result is a broad framework that aims to reconcile different, sometimes opposing, demands by understanding how land-use choices in one area affect other areas, negotiating competing demands for land use in a given landscape, and integrating policies across sectors.

While the focus of our strategy is at this broad level, we also believe that this landscape approach is essential to understand the needs of individual species that make up the larger ecosystem. It is critical to understand how land-use changes affect individual species, and what the implications of this might be. Species have widely varying biological needs and react differently to disturbances. In the United States, studies have demonstrated that species with dedicated or single-species habitat conservation plans fare better than those dealt with in multispecies plans (Rahn *et al.* 2006, Taylor *et al.* 2005). Here we present a forward-looking conservation strategy for apes.

The **overall goal** of ape conservation is *to ensure that genetically robust wild populations of apes survive and reproduce in their natural habitats*. Below we outline

how the World Bank can play its part in this mission while maintaining its institutional focus on ending extreme poverty and boosting shared prosperity in a sustainable manner.

The strategy has four priorities:

1. Integrate conservation and sustainable landscape planning and management that supports ape conservation into upstream World Bank policies.
2. Create mechanisms for improved management, mitigation and compensation for World Bank supported activities in ape habitat.
3. Create financial mechanisms and provide financial incentives for ape conservation.
4. Combat illegal poaching of apes and the illegal international trade in apes.

The following examines each of these priorities and suggests activities under each.

Strategic Priority 1: Integrate conservation and sustainable landscape planning and management that supports ape conservation into upstream World Bank policies and planning processes (Strategic Country Diagnostics and Country Partnership Frameworks)

International development banks such as the World Bank, the Asian Development Bank (ADB), and the African Development Bank (AfDB), finance the improvement of infrastructure for transport and energy development, and promote industry to spur economic growth. Such projects frequently open up previously inaccessible habitats and enable exploitation of resources formerly protected by their inaccessibility and by poor infrastructure. The landscapes in question often include protected or endangered species (e.g., apes, elephants), and protected or fragile ecosystems (peatlands, wetlands) or unprotected areas that deliver key ecosystem services.

Biodiversity decline will only be reversed if biodiversity conservation becomes a core component of planning and decision-making at national and regional levels. Examples from countries such as Costa Rica, where forest cover was expanded from 21% in 1987 to 52% in 2012, along with a GDP/pc increase from \$3,570 to \$9,219 in the same period, can guide us in integrating biodiversity priorities into private sector and development agency planning (e.g., OECD 2011; UNEP 2011). There are also cases in Africa where countries are beginning to make biodiversity conservation central to policy. Gabon, for example, has expanded and reinforced its protected area network and is putting in place innovative approaches that value the environment as part of the national economy.

Integrating environmental concerns into initial planning (such as the Strategic Country Diagnostics and Country Partnership Frameworks) is less expensive than dealing with the future impacts of environmental degradation on poverty and economic development. Yet many development agencies, lenders and private sector organizations are still failing to integrate biodiversity concerns into their strategies; they do not recognize that environmental degradation generally results in increased poverty. This objective, therefore, highlights the need for a more explicit understanding of this relationship and for strategies to link them in ape range states. A mere adjustment in the way environmental strategies are drafted and integrated into organization policy is not enough: a paradigm shift is needed. The following are recommendations for how the World Bank Group could better achieve the objective of incorporating biodiversity conservation into *upstream* development planning (the point at which decisions about where and when projects may proceed are made), policy analysis, and pre-investment planning for all countries within the ranges of apes.

Activity 1.1 Formulate national land-use plans that fully integrate ape conservation

Effective conservation depends on a clear understanding of what is needed to ensure the long-term viability of a particular species or ecosystem. If conservation and development efforts do not keep these needs clearly in mind, progress will be sporadic at best – and ultimately may fail to protect vulnerable species. To truly integrate biodiversity conservation into upstream planning, countries should engage in processes of national land-use planning that result in:

- Establishment of no-go areas where no development takes place and access is severely restricted;
- Identification and management of “transition zones,” where controls are established for how economic development activities can take place; and
- Delineation of prioritized areas for economic development and investment in infrastructure.

This requires national development plans that provide spatial information and guidelines for development to prevent damage to the environment. We therefore suggest a national land-use planning process in each ape range state that sets out what is needed to provide the conditions for ape populations to remain viable. Developing such plans does not mean starting from scratch. There is already much information on priorities for ape conservation at regional levels thanks to action plans for different ape taxa emerging from multi-stakeholder workshops organized by the IUCN SSC Primate Specialist Group (PSG), by the IUCN SSC Conservation Breeding Specialist Group (CBSG), and by governments (e.g., the Indonesian or Malaysian government). For some species (bonobos, Grauer's gorillas, Sumatran and Bornean orangutans) these plans have already been developed at the national or state level, and some countries and states (e.g., Laos PDR, Sabah) have undergone action-

planning processes for all ape taxa within their boundaries (Annex 4). These plans need to be taken a step further in several respects.

First, many of these plans have been written with the ecology of a species or subspecies in mind and, therefore, the focus is on regions instead of countries. While it is essential to outline how to protect viable populations, governments, multilateral banks and development organizations often work with a strong country, rather than regional, focus. To integrate information on priority areas for apes into documents that define national priorities and projects, national plans must be derived from these regional plans for all ape range countries. Each range state country should therefore aim to implement a process that will result in what we are calling: National Species Recovery Plans (NSRPs) for each taxon of ape in their country. This strategy is based loosely on the methods used for Species Recovery Plans (SRPs) in the United States. The United States has active SRPs for 132 species⁶¹, describing protocols for protecting threatened species. They provide details on necessary research and management actions to support the recovery of a particular species, but do not themselves commit manpower or funds. Instead they are used to provide guidance to local, national and regional planning efforts and to set funding priorities. These recovery plans have been instrumental in the recovery of a number of species (Suckling *et al.* 2012).

Second, NSRPs should outline precise targets, including not only protected areas that must be created, but also how management and ownership should be defined. Protected areas must be managed as a coherent network rather than as isolated habitat islands (Hole *et al.* 2009). Putting into place schemes for monitoring changes in ape populations should be an integral part of the NSRPs as this is a key component for determining the success of a strategy and ensures adaptive management of activities.

Third, failure to include all stakeholders in the process, and to consider government priorities or other planned land uses, is an obstacle to integrating action plans into private sector and development activities. While it is essential to know the biological ideal for protecting viable populations of apes, socio-economic information is also important, and effective national plans have to identify and integrate stakeholders from many different sectors and levels of society in the planning process.

Ideally, such plans should be an integral part of the National Biodiversity Strategy that each country is required to develop for the Convention on Biological Diversity (CBD).

Activity 1.2 Strengthen World Bank safeguards and IFC performance standards that guide project lending

The first activity is concerned with the creation of the NSRP. This second activity provides the mechanisms by which these plans can be integrated into World Bank Group decision-making.

⁶¹ <https://www.fws.gov/endangered/species/recovery-plans.html>

The World Bank Group includes a number of environmental safeguards in its lending decision-making process. Environmental Assessment is one of the 10 environmental, social, and legal Safeguard Policies of the World Bank but there are also specific safeguards for natural habitats and forests. Operational Policy 4.04: Natural Habitats seeks to ensure that World Bank-supported infrastructure and other development projects take into account the conservation of biodiversity as well as the numerous environmental services and products that natural habitats provide to human society. The policy limits the circumstances under which any Bank-supported project can damage natural habitats. Specifically, it prohibits Bank support for projects that would lead to the significant loss or degradation of any Critical Natural Habitats, the definition of which includes those natural habitats that are either: legally protected, officially proposed for protection, or unprotected but of known high conservation value.

The IFC environmental standards include the Performance Standard Six (PS6) and Performance Standard One (PS1), which guide lending to projects that impact apes and their habitat (IFC 2012a, Box 3). These principles form a separate framework for environmental and social risk management standards for lending to private sector projects.

Box 3. International Finance Corporation (IFC) Performance Standards

The IFC's "Sustainability Framework" (IFC 2012a) articulates its strategic commitment to sustainable development. The Sustainability Framework includes eight Performance Standards on Environmental and Social Sustainability which provide guidance to clients on how to identify avoid, mitigate, and manage risks and impacts. Performance Standard 1: *Assessment and Management of Environmental and Social Risks and Impacts* focuses on identifying and evaluating environmental and social risks and impacts of the project and the mitigation hierarchy. Performance Standard 6: *Biodiversity Conservation and Sustainable Management of Living Natural Resources* focuses on addressing "how clients can sustainably manage and mitigate impacts on biodiversity and ecosystem services throughout the project's lifecycle." (IFC 2012a).

Combined, these operational directives and principles provide a strong basis for ensuring that biodiversity priorities are given serious consideration in World Bank lending decisions. In 2012, the IFC launched a revised set of Performance Standards. In some respects the standards were strengthened, but with regard to endangered and critically endangered species they were weakened in several significant ways. The new IFC standards permit IFC funding for projects in areas that have Critical Habitat for endangered species, even if the project results in their loss, provided that the loss is offset regionally or even globally. The World Bank recently redrafted its environmental and social safeguard policies,

and these too are being weakened to permit projects in sensitive areas such as protected areas⁶².

As the review of the World Bank Safeguard Policies continues, an important opportunity exists for the World Bank to set the highest standards for protection of Endangered and Critically Endangered species by ensuring that these policies are strengthened to increase the World Bank's commitment to no-go zones and to remove loopholes in language that would allow World Bank or IFC funding to convert or degrade Critical Habitat or to allow projects in protected areas.

In summary, the World Bank and the IFC can provide their critical support to ape conservation through their commitment to refrain from supporting development and private activities in the "no-go zones" articulated in the NSRP for apes, and by permitting only activities that do not pose a threat to ape conservation in transition zones.

Activity 1.3 Ensure that landscape management incorporates ape conservation into national land-use plans through World Bank supported national planning processes

It is not only important for the World Bank to increase its commitment to avoiding "no-go zones" for development, it is essential that this commitment is also made by governments of ape range states. The World Bank can facilitate this through its support for the national planning processes involved Country Partnership Frameworks (CPFs). CPFs identify objectives that the World Bank Group activities will help countries achieve, and link these objectives to the country's development goals, and indicators of progress. They also demonstrate how these objectives contribute to the World Bank goals of "reducing absolute poverty and boosting shared prosperity in a sustainable manner."

To develop these CPFs, the Bank first gathers and develops background materials called the Systemic Country Diagnostic (SCD). The SCD provides the justification and rationale for the CPF. The SCD will "provide analysis and grounding for determining the opportunities and constraints to poverty alleviation in a country. The SCD along with the government's national development plan will then be used to begin a discussion with the government about priority areas for the country and where the Bank's added value could be."⁶³ These documents are developed in consultation with country authorities, civil society organizations, development partners, and other stakeholders and therefore, provide an ideal entry point for ensuring that ape conservation through landscape management is incorporated into national land-use plans. The World Bank can play a vital role in ensuring commitment in both the SCD and the CPF that no-go zones are avoided and that only those activities that pose no threat to ape conservation are planned in transition zones.

⁶² Civil Society Statement on ESS6 – Biodiversity, World Bank Environmental and Social Framework CODE Draft July 25 2014.

⁶³ <http://www.bicusa.org/wp-content/uploads/2014/05/CPF-primer-FINAL-May-2014.pdf>

Activity 1.4 Improved quality and transparency of Critical Habitat studies and Environmental Impact Assessments

One of the factors influencing where and how private sector and development projects are established is the existence and extent of Critical Habitat. Many countries in ape range states require Environmental Impact Assessments (EIAs) before projects are granted concessions or project loans. Both of these processes offer important entry points for ensuring that ape conservation is mainstreamed into World Bank Group decision-making at the upstream level.

Critical Habitat is defined by the IFC as “areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes” (Box 4).

Unfortunately, Critical Habitat is often identified *after* activities have already begun. For example, in Guinea, West Africa, exploratory drilling, and mining and processing plans for Global Alumina Corporation’s project were in place before Critical Habitat studies for chimpanzees were conducted. In Sierra Leone, most infrastructure and building for the Bumbuna Dam project had already taken place when Critical Habitat studies for wildlife were carried out (Kormos *et al.* 2014). It is important for Critical Habitats to be identified and avoided at the outset of the project cycle.

Box 4. Defining Critical Habitat for Apes

The International Finance Corporation (IFC 2012a) defines Critical Habitat as follows:

“Critical habitats are areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.”

There are two “tiers” of Critical Habitat as defined by the IFC’s Performance Standard 6 Guidance Note (IFC 2012a,b) defined as follows:

Tier 1:

- Habitat required to sustain ≥ 10 percent of the global population of an IUCN Red-listed CR or EN species where there are known, regular occurrences of the species and where that habitat could be considered a discrete management unit for that species.
- Habitat with known, regular occurrences of CR or EN species where that habitat is one of 10 or fewer discrete management sites globally for that species.

Tier 2:

- Habitat that supports the regular occurrence of a single individual of an IUCN Red-listed CR species and/or habitat containing regionally-important concentrations of an IUCN Red-listed EN species where that habitat could be considered a discrete management unit for that species.
- Habitat of significant importance to CR or EN species that are wide-ranging and/or whose population distribution is not well understood and where the loss of such a habitat could potentially impact the long-term survivability of the species.
- As appropriate, habitat containing nationally/regionally-important concentrations of an EN, CR or equivalent national/regional listing.

In the Guidance note it states that: “Both a Tier 1 and a Tier 2 habitat would qualify as critical but the likelihood of project investment in a Tier 1 habitat is generally considered to be substantially lower than in a Tier 2 habitat.”

With respect to great apes, the Guidance note to PS6 contains a footnote (IFC 2012b):

“In terms of the definition of Tier 1 habitat, special consideration might be given to some wide-ranging, large EN and CR mammals that would rarely trigger Tier 1 thresholds given the application of the discrete management unit concept. For example, special consideration should be given to great apes (i.e., family Hominidae) given their anthropological and evolutionary significance in addition to ethical considerations. Where populations of CR and EN great apes exist, a Tier 1 habitat designation is probable, regardless of the discrete management unit concept.”

Implementation of EIAs in Africa and Asia is plagued with problems. The core function of an EIA is to outline a series of detailed project design alternatives, to provide a thorough assessment of the costs and benefits of the selected project design based on the analysis of a qualified expert, and to provide opportunities for public comment throughout the decision-making process. Unfortunately this process is rarely respected and is not required under national law in many ape range states.

Moreover, Critical Habitat Studies and EIAs often fail to involve appropriate experts, and even when they do, they are rarely transparent and peer reviewed. Large consultancy firms are frequently contracted to perform EIAs. Such companies are seldom experts in ape conservation. While the IFC and other development or private banks require external experts to be involved, there is no current standard as to what qualifies anyone as an expert to make decisions or advise on apes. Despite detailed guidance on the definition of Critical Habitat, determination of whether or not Critical Habitat exists, and its extent and boundaries is only as good as the experts involved in evaluating it. With current and future development projects affecting a large area of ape habitat, demand for ape conservation expertise is unlikely to diminish.

There is, therefore, an urgent need for stronger capacity to conduct EIAs in Africa and Asia according to best practices for ape conservation. As a solution to this, hugely beneficial would be the creation of a task force of qualified experts from the Section on Great Apes (SGA) and the Section on Small Apes (SSA) of the IUCN SSC Primate Specialist Group specifically to work with the World Bank in Critical Habitat Studies and EIAs.

In addition, while certain information collected during EIAs and Critical Habitat studies can be sensitive, it is of the utmost importance that these studies be peer reviewed, transparent and not constrained by confidentiality. Not only is the engagement of ape specialists important, but increased transparency and a process to ensure that information about EN or CR species is compiled without bias or pressure from the client or lender is essential. Information sharing is essential so that learning about effective mitigation techniques can take place.

We thus ask that all information from Critical Habitat studies be contributed to an open source database, such as the Ape Populations, Environments and Surveys (A.P.E.S.) Portal, an online tool that provides real-time, visual representation of information about apes, their habitats, populations, threats and conservation efforts around the world. This tool is useful to provide banks, agencies and corporations access to the most recent information available on apes (see <http://apesportal.eva.mpg.de/>). The World Bank already partners with UNEP to map natural resources in fragile states, and relevant data layers and maps could be linked to the A.P.E.S. Portal to highlight overlap of current and planned concessions with important ape areas.⁶⁴ It would also be useful to link the A.P.E.S. Portal with the Integrated Biodiversity Assessment Tool (IBAT) for Business⁶⁵

⁶⁴ <http://extractivesfragilestates.github.io/ExtractivesFragileStates/about/>

⁶⁵ <https://www.ibatforbusiness.org/login>

In addition, the World Bank Group should encourage governments and companies to build on voluntary disclosure schemes such as the World Bank-funded Extractive Industries Transparency Initiative (EITI)⁶⁶, which is managed under Norwegian law, and ultimately encourages governments to develop legislation to promote transparency. Most ape range states are candidate countries or compliant to the EITI.

Strategic Priority 2: Create mechanisms for improved management, mitigation and compensation in World Bank supported activities in ape habitat

Strategic Priority 1 concentrates on integrating ape conservation into upstream planning and focuses on avoidance of ape habitat. In Strategic Priority 2, we focus on what happens when development and private sector projects are planned in ape habitat and avoidance is not possible. This strategic priority focuses on improving management, mitigation and compensation in these circumstances.

Activity 2.1 Increase capacity to design and carry out mitigation strategies for projects affecting apes and their habitats

The IUCN Best Practice Guidelines for great ape conservation⁶⁷ provide excellent information to guide industries on mitigating harm to apes during project design and implementation for a range of topics, including conflict with humans (Hockings & Humle 2009), FSC (Morgan *et al.* 2013), logging (Morgan & Sanz 2007), re-introduction (Beck *et al.* 2007), surveys and monitoring (Kühl *et al.* 2008), and tourism (Macfie & Williamson 2010) (see Annex 5 and 6). Unfortunately these guidelines have not yet been widely adopted by the private sector and development organizations, which are often unaware of their existence. In Strategic Priority 1, we outlined the value of a specific task force made up of SGA and SSA members to provide transparent technical advice for Critical Habitat Studies and EIAs. Engagement of this same group in mitigation design for projects in ape habitats would promote and mainstream best practice guidelines for ape conservation into project design and implementation.

A partnership between this task force and the World Bank and IFC could ensure monitoring of ape populations before, during and after project activities take place, providing information that is essential for assessing impacts on apes so that projects can be

⁶⁶ <https://eiti.org/>

⁶⁷ http://www.primatesg.org/best_practices

adaptively managed. This information would also be useful for improving mitigation in future projects

Guidance exists for mitigating harm to apes from development projects in some sectors (e.g., logging), however, very little information exists on short-, medium- and long-term impacts on apes, or on how to mitigate impacts of other sectors such as mining or palm-oil production. Similarly, documenting strategies for mitigating the effects of dams on apes would be helpful. As the largest single source of funds for large dam construction, providing more than \$50 billion for construction of more than 500 large dams in 92 countries⁶⁸, the World Bank Group would be the ideal promoter of such an initiative. Guidelines for oil and gas exploration, pipeline construction, and oil palm and other industrial plantations would also be valuable. Centralizing this information and ensuring its transparency and accessibility is crucial for future projects to benefit from lessons learned. The SGA and the SSA provide excellent focal points with the A.P.E.S. Portal acting as a clearinghouse for this information.

Activity 2.2 Articulate National Offset Plans (NOSs) nested in NSRPs

International best practice requires that development and private sector projects in the habitat of Endangered or Critically Endangered species follow the mitigation hierarchy, which requires projects to prevent or avoid impacts on biodiversity, then minimize and reduce, and then repair or mitigate adverse effects (BBOP 2013). Any significant residual impacts should be addressed through a biodiversity offset (BBOP 2013). While mitigation measures are vital to minimize damage to Endangered or Critically Endangered species, ape numbers will most likely decline if their habitat is lost. When, after all mitigation, possibilities have been exhausted and residual impacts on apes and ape habitat remain (which is often the case), projects are required to invest in compensating for these impacts through offsets. Companies engaged in activities that impact ape habitat, therefore, will need to invest in biodiversity offsets in addition to maximizing on-site mitigation. The objective of biodiversity offsets is to compensate for unavoidable or residual biodiversity impacts of a development project by implementing a conservation project off site.

There are several problems, however, with the way biodiversity offsets operate in many developing countries (Kormos *et al.* 2014). One challenge is that most companies explore offsets on a project-by-project basis. While developing offsets on this basis may result in no net loss of apes for each project, it poses a number of risks. Without coordination, a project-by-project approach can lead to the protection of multiple small sites, while failing to identify synergies that could generate real conservation impact (e.g., by establishing connectivity, buffering conservation areas, and creating larger protected areas). The result is isolated offsets and decreased species viability over time (Figure 3).

⁶⁸ <http://www.whirledbank.org/environment/dams.html>

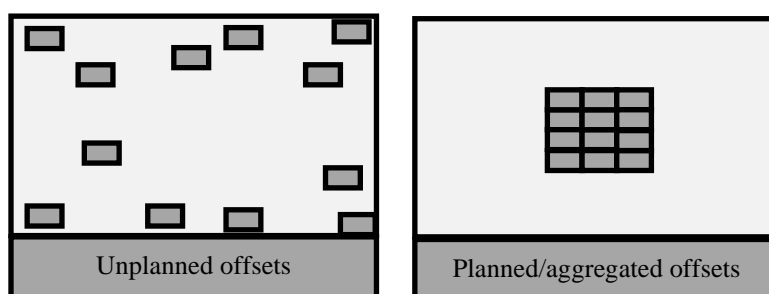


Figure 3. Consequences of multiple project-by-project offsets and aggregated offsets

Species viability in forest patches depends on many factors, including the area of habitat, the size and shape of habitat patches, and the connectivity between patches (Debinski & Holt 2000). Not only does fragmentation disrupt the distribution and abundance of species, but it also affects the ecological processes that are part of the ecosystem (Leader-Williams & Dublin 2000; Walpole & Leader-Williams 2002). It is of utmost significance, therefore, that offset sites are designed as part of an overall plan based on what makes most ecological sense for ape conservation (Kormos *et al.* 2014). That is not to say that offsets should always be aggregated. A national strategy for offsets may include several sites that are geographically isolated from one another to, for example, buffer against the spread of diseases such as Ebola, and protect distant and genetically diverse populations. The point is that their location is planned in advance of development.

Failure to coordinate also creates a risk that individual offset projects will not account for the cumulative impact of multiple projects. Lack of coordination could even result in duplication if companies inadvertently target the same sites for offsets. A project-by-project approach can also increase transaction costs, for example, if each company develops offset methods independently, or if mining companies fail to pool resources for scientific study.

A number of countries have faced these challenges and some, including New Zealand, South Africa, the United States and Malaysia, have pioneered systems of biodiversity banking in which biodiversity offsets are aggregated as a solution. In the United States conservation banks are areas that are protected for threatened species. Conservation bank owners hold a specified number of “credits” that they can sell to potential developers needing to compensate for unavoidable residual impact from their projects. These credits are typically measured in hectares, although some are measured in “species pairs” or even “individuals”. The species bank in which developers trade credits is typically an endowment that supports the designated areas in perpetuity. Thus the offsetting needs of multiple developers are aggregated (Box 5). Currently, the Malua BioBank project is the only biodiversity banking system in the range of apes.

Box 5. United States Conservation Banks

“Conservation banks are permanently protected lands that contain natural resource values. These lands are conserved and permanently managed for species that are endangered, threatened, candidates for listing, or are otherwise species-at-risk. Conservation banks function to offset adverse impacts to these species that occurred elsewhere, sometimes referred to as off-site mitigation. In exchange for permanently protecting the land and managing it for these species, the U.S. Fish and Wildlife Service (FWS) approves a specified number of habitat or species credits that bank owners may sell. Developers or other project proponents who need to compensate for the unavoidable adverse impacts their projects have on species may purchase the credits from conservation bank owners to mitigate their impacts.” (http://www.fws.gov/endangered/esa-library/pdf/conservation_banking.pdf)

Ideally such conservation banks will be nested in national recovery plans for each threatened taxon as national strategies for biodiversity offsets. Therefore, in addition to defining conservation areas and no-go zones, recovery plans would also articulate where funding for biodiversity offsets should be directed.

Such a process would in many respects be analogous to “conservation banking” in the United States, where offset sites are coordinated within management plans for EN species. It is of the utmost importance to stress that offsets should only be considered as a last result. *Avoidance* of ape habitat using methods outlined in Strategic Priority 1 should be the greatest focus, followed by all mitigation possible, before even considering the use of offsets. However, due to the vulnerability of apes to disturbance to their habitat, many projects that do proceed in ape habitat will result in a decline in ape numbers. It is therefore vital that these impacts are compensated for in a well-planned way.

Activity 2.3 Cumulative environmental impacts of industry sectors (e.g., mining, oil and gas, hydro-electric, and transport) on apes integrated into offset measurements

It is critical that the true size of the impacts on apes is understood in order to determine what size of offset is needed. This can only be estimated once the cumulative impacts of projects have been taken into account. Industrial development projects rarely occur in isolation and the environmental impacts of these projects may be magnified by other projects in the same geographic area. It is difficult, if not impossible, to gauge the full impact of a project and determine an effective strategy to offset impacts to Endangered or Critically Endangered species if the project is viewed in isolation from other development schemes. This is another serious concern that can arise from project-by-project lending and case-by-case offset design (Kormos *et al.* 2014)

As part of the NOS, national cumulative impact studies for relevant sectors (e.g., mining, oil and gas, infrastructure, hydroelectric and other projects) should therefore be

conducted in each of the ape range countries in Africa and Asia where there are multiple projects in the same sector. These sectoral impact assessments should form an integral part of the NSRP for each country and will also help to guide the design of a more realistic estimate of the size required when offsetting impacts to species. There are tools to aid such an analysis, including the Cumulative Impact Assessment (CIA), the Regional Cumulative Impact Assessment (RCIA), and the Strategic Environmental Assessment (SEA). The IFC recognizes that the “CIA should be an integral component of a good environmental and social impact assessment (ESIA) or a separate stand-alone process.” But the IFC also states that the “CIA is evolving and there is no single accepted state of global practice.” Importantly, the IFC “does not expressly require, or put the sole onus on, private sector clients to undertake a CIA” (IFC 2013). Better coordination and accounting for cumulative impacts is, therefore, needed or compensation projects risk being insufficient. The Mitigation Task Force for apes mentioned earlier (p.8) could assist with the preparation of CIAs specifically for apes.

Currently the IFC assigns responsibility for conducting sectoral assessments almost entirely to governments. Governments are unlikely, however, to undertake such analysis without international funding and/or technical assistance. The cumulative impacts requirement in IFC PS1 should therefore provide a clearer and much lower threshold for sectoral environmental analyses, both for the IFC and its clients.

Strategic Priority 3: Support a multifaceted program to combat the illegal killing of apes

Throughout the range of apes there are areas of “empty forest” where ape habitat is intact, yet no apes remain because they have been extirpated (Wilkie *et al.* 2011). If poaching is not addressed, ape populations will continue to decline no matter how much land use is planned. Hunting of apes is illegal throughout their range. In Strategic Priority 3, therefore, we focus on this illegal hunting and trade in live apes.

Environmental and natural resource crime is a global industry—more than the market for heroin⁶⁹. Programs to provide appropriate alternative livelihoods are important to reduce unsustainable subsistence hunting, but they often fail to address the complex networks behind poaching and the commercial wild meat trade, a much greater threat to apes. On the other hand, programs that emphasize law enforcement only will not address reliance on hunting for cash or protein and could even worsen the situation by turning communities against protected areas. What is needed, therefore, is a holistic program that addresses all of these factors simultaneously (Nasi *et al.* 2011).

⁶⁹ <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/0,,contentMDK:23264957~menuPK:2643897~pagePK:64020865~piPK:149114~theSitePK:244381,00.html>

Activity 3.1 Improved law enforcement⁷⁰

Wildlife conservation organizations have recently begun to address this historically politically sensitive issue of becoming witness and advisor to the entire law enforcement process. The World Bank Group is already paying attention to this serious issue for other species. The World Bank recently launched a program with a focus on law enforcement as part of an approach to wildlife crime that encompasses prevention, detection, suppression, and recovery. It also helped to launch the International Consortium on Combating Wildlife Crime (ICWC)—a collaboration between five inter-governmental organizations (1) the CITES Secretariat, (2) INTERPOL, (3) the United Nations Office on Drugs and Crime (UNODC), (4) the World Bank Group, and (5) the World Customs Organization (WCO), with the goal of bringing “coordinated support to the national wildlife law enforcement agencies and to the sub-regional and regional networks that, on a daily basis, act in defense of natural resources.”⁷¹

Attention to wildlife crime in Africa and Asia, however, is focused mainly on the trade of ivory and rhino horn and the illegal export of tropical timber and illegal fisheries, with little attention being given to crimes involving apes, despite the fact that it is a huge drain on their endangered populations. Rather than this being a missed opportunity for the World Bank, we suggest expanding current programs in wildlife crime to incorporate apes. This could easily be done through the networks mentioned above. Working with these networks, the World Bank could support a program to improve law enforcement through various interventions, including 1) investigations to gather information on wildlife trade that lead to arrests and provide evidence in courts, 2) technical assistance to national governments to arrest violators, 3) legal assistance in the administrative procedures needed to prosecute criminals, and 4) outreach to inform the public about legislation and enforcement. Promoting widespread communication about important wildlife cases, especially those implicating the military and government staff, to provide a strong deterrent for the trade’s ringleaders and kingpins would be an influential aspect of this activity.

Finally, The World Bank could also support existing law-enforcement and general thematic strategies that complement and strengthen rather than duplicate existing initiatives. These include PAPECALF⁷², PEXULAB⁷³ and the Association of Southeast Asian Nations Wildlife Enforcement Network (ASEAN-WEN).

⁷⁰ The ideas and text for this section were contributed by David Greer, African Great Ape Program WWF <dgreer@wwfcarpo.org>

⁷¹ http://cites.org/eng/prog/iccwc_new.php

⁷² <http://www.comifac.org/Members/webmaster/atelier-sous-regional-des-pays-des-l2019espace-comifac-sur-les-aires-protégées-et-la-faune-sauvage/>

⁷³ http://pfb-cbfp.org/news_en/items/ECCAS-LAB-EN.html

Activity 3.2 Address issues of corruption in wildlife crime⁷⁴

Although corruption exists across the globe in varying degrees of prevalence, most ape range states score poorly on the Corruption Perception Index (CPI), particularly the equatorial African countries (Transparency International 2014), which harbor the majority of Africa's apes. A recent publication by Maisels *et al.* (2013) empirically demonstrated that elephant densities were inversely related to a country's level of corruption, as measured by the CPI. For rule of law to be able to function in an efficient and effective manner, a robust framework of strong governance is essential, as this catalyzes a legal system free from external influence and corrupt practices. Corruption readily permeates legal sectors, directly affecting the livelihoods and civil rights of citizens, so it is no surprise when wildlife crimes are taken less than seriously and legal process is impeded by systematic acts of corruption. Although nearly all ape range states have adequate legislation to protect apes from illegal harvest and trade, these very laws are rendered inconsequential where there is no entity present to 1) act as witness to prevent acts of corruption from occurring and 2) promote the swift and just application of wildlife law as it is inscribed.

As the World Bank continues to strengthen its capacity to support and ensure improved governance and transparency with its partners, it endeavors to support the reversal of this trend, which is one of the driving detrimental forces fuelling impunity in the illegal wildlife trade. The increasing prevalence of government and military staff implication in this illegal trade, evidenced by an increasing number of arrests and convictions, demonstrates that governments and their partners are obliged to take this problem seriously, and 1) not tolerate corrupt elements among its ranks and in the justice system, and 2) refuse to impede appropriate legal process for those convicted of wildlife crime (e.g., by shielding government agents or traffickers). Indeed, this effort must go beyond opposing complicity in Environment and Forestry ministries to ensure that Defense, Interior, Customs, Justice and other ministries, play an equal, vigilant role to eradicate corruption. It has also been found that illegal wildlife trade is frequently associated with the trafficking of other forms of contraband (e.g., drugs, human parts).

World Bank support for an effective ape strategy will require clear, direct support from the highest government authority—the Head of State or Prime Minister—to eradicate corruption in the wildlife legal system. First, this would demonstrate the degree of seriousness warranted and send a strong message to both pertinent government departments and civilians. Second, more ministries would be implicated in the implementation of strategies that address cross-cutting themes (law enforcement, PA management, the judiciary, and so on). Third, support to investigations of government and civilian ringleaders in the illegal wildlife trade, and prosecution of those individuals, would demonstrate that no one is above the law.

⁷⁴ The ideas and text for this section were contributed by David Greer, African Great Ape Program WWF <dgreer@wwfcarpo.org>

Activity 3.3 Monitoring of wildlife crime

Monitoring wildlife crime is a challenging task and for the most part has been carried out in a haphazard manner; while producing data that are meaningful at a local scale (e.g., conservation field projects), it is generally limited to scanty reporting at a regional level. Consequently, while many governments, organizations and researchers hold extensive data measuring and monitoring wildlife law enforcement activities and illegal trade, these data are rarely compiled, analyzed and summarized in a manner that provides a coherent picture of the problem and an understanding of how effectively the issue is being addressed.

This problem has been exacerbated by the fact that range state governments often fail to report on formal engagements intended to monitor progress, even in cases where data are readily available. One useful, systematic approach—the Elephant Trade Information System⁷⁵ framework for recording elephant deaths—could be replicated to capture similar data on apes and provide a better overall picture of the numbers of apes removed from their natural habitat. We therefore suggest that the World Bank supports training activities focused on the effective monitoring of anti-poaching activities, such as SMART, MIST and Cybertracker, and of prosecution of wildlife crimes.

Activity 3.4 A multifaceted approach to addressing the biological, ethno-biological and socio-economic aspects of the illegal trade in ape meat

While in some areas there are religious or cultural taboos against eating ape meat (Ham 1998; Ancrenaz *et al.* 2007; IUCN & ICCN 2012), in most regions, hunting for meat constitutes an important threat to apes. Great apes make up a small percent (2% on average) of wild meat sold in Ivory Coast (Caspary *et al.* 2001). Therefore, enforcing the law to prevent selling of ape meat in urban markets has little impact on protein intake. Ensuring that the law was enforced however, would make a huge difference to ape survival in that even the removal of a small percent of apes from the wild can still have catastrophic implications for a population because of their slow reproductive rates.

Even if activities to address the illegal wildlife trade are successful, engagement in a comprehensive, multidisciplinary program that focuses on sustainable harvesting of species that are not endangered (i.e. not apes) and providing livelihood alternatives would be a more robust method and would achieve greater long-term results (Nasi *et al.* 2011).

Such a program would, however, need to build on lessons from former projects. Many projects attempt to provide protein alternatives to wild meat, such as farming of goats, chickens, cane rats and fish, but few of these have been able to claim great success to date. One reason for this lack of success is because the animals are hunted not only for the protein that they provide, but also because they have commercial value and can be sold to obtain cash. Revenues gained from the sale of meat enable people to purchase other foods and medicines or pay school fees for their children. Reviews of such projects, therefore, suggest

⁷⁵ ETIS <http://www.cites.org/eng/prog/etis/index.php>

that provision of *alternative protein* alone will not succeed in reducing hunting to zero, as these initiatives do not necessarily provide sources of revenue.

Since domestic animal proteins can be purchased in most villages (although often at high prices compared to wild meat), some projects aiming to decrease hunting have focused on the provision of *alternative revenues* (such as beekeeping). The challenges with this strategy is that increasing income may enable people to purchase better hunting equipment and inadvertently result in an increase in poaching. In addition, studies have found that the individuals who switched livelihoods were often those doing the least hunting, and therefore this change did very little to decrease pressure on wildlife (Coad *et al.* 2010).

A distinction therefore needs to be made between “village” or “subsistence” hunters—who hunt close to the village and generally have lower “offtakes”—and “commercial” hunters, who hunt further afield and are responsible for most of the offtake (Kuehl *et al.* 2009). These commercial hunters must be targeted to reduce hunting. Even decreasing the number of hunters overall may not decrease pressure on wildlife as hunting remains the primary livelihood of those hunters who remain, and offtake does not decrease. In summary, a multifaceted approach to address the biological, ethno-biological and socio-economic aspects of the commercial wild meat trade is needed (Coad *et al.* 2010; van Vliet & Nasi 2008; Wicander & Coad 2014). It must be stressed however that this strategy pertains to species for which it is legal to hunt. Apes are protected by national and international laws throughout their geographic range and it is, therefore, illegal to kill, capture or trade in live apes and their body parts—this includes consumption.

Strategic Priority 4: Provide incentives to private sector and development projects, range-state governments, and people living in and around apes’ range to protect apes and their habitat

For the fourth strategic priority, we outline ways in which the World Bank can put incentives in place—financial and other—for industries, governments, and people living in the apes’ range, to protect apes and their habitat. Creatively harnessing economic forces to alleviate poverty with tight linkages to biodiversity conservation will contribute to synergistic outcomes for biodiversity—in this case ape conservation—and human communities. Strategic Priority 4 therefore aims at establishing mechanisms and financial incentives to ensure that ape conservation is better integrated into upstream planning by avoiding ape habitat, as well as to better mitigate and compensate for projects that negatively impact apes and their habitat. It also addresses the need to provide incentives for protecting apes against illegal killing.

Activity 4.1 Establish a national conservation trust fund to support ape conservation in each range country

McCarthy *et al.* (2012) estimated the annual cost of reducing the extinction risk of all globally threatened species (by at least one IUCN Red List category) by 2020 to be \$3.41–4.76 billion. Currently, only 12% of this goal is funded, so innovative public-private partnerships are needed to help countries undertake large-scale conservation planning and to address the chronic underfunding of protected area systems and the improvement of management in transitional zones.

In Strategic Priority 1, we proposed the establishment of NOSs that would designate specific areas where compensation for losses of ape habitat could be directed. Best practices require that offsets be fully funded at the outset of a development project and that they are funded in perpetuity. These requirements, combined with the fact that several companies are likely to be financing offsets in a particular country, point to the need for national conservation trust funds (NCTFs)—offshore if necessary—to accommodate offset project financing. Conservation trust funds (CTFs) remain the preferred mechanism for establishing independent sources of long-term funding for biodiversity conservation in developing countries. Directing funding for offsets via a NCTF endowed by private companies activities of which impact ape habitat, as well as by multilateral, bilateral and private donors, could help finance new and existing protected areas. Offset projects would come under the NSRP, ensuring that offsets target the highest priority sites for ape conservation, with transparent and peer-reviewed offset site selection.

The operation of some CTFs has been hampered by long start-up phases and inadequate capitalization. Both concerns would be mitigated if the private sector companies responsible for offset projects (1) fully finance their projects until a trust fund is established and operational, and (2) provide adequate capitalization to ensure the long-term financing of their offset.

CTFs not only provide stable funding but also provide a number of additional functions. One is that they can remove the burden of offset oversight and management from companies engaged in development projects, passing this task on to the fund, its secretariat and the stakeholders implementing the project. A CTF in combination with an NOS and an NSRP that have been peer reviewed by independent experts would also make it much easier for companies to participate in offset programs. In essence, an NOS, together with an NCTF could play a role analogous to a conservation bank. The World Bank Group and GEF in partnership with bilateral development agencies could play a key role in setting up conservation trust funds for each ape range country. In countries where CTFs already exist, these can likely be adapted to accommodate offset projects.

One CTF option, which the World Bank is uniquely placed to offer, is a debt buy-down fund (personal communication with Lawrence Connell⁷⁶). In this option, the Bank makes

⁷⁶ For more information contact Lawrence Connell lconnell@conservation.org, t: +1 (703) 341-2557

loans from its standard resources (IBRD and IDA) to sovereign borrowers, who commit to a set of verifiable and quantifiable conservation actions. Upon achievement of these actions, the third party resources are applied to buy down all or a portion of the World Bank loan at its net present value (the discount reflecting the initial concessionality of the loan). This is a win-win situation: the borrower repayment obligation is reduced by the amount of the buy-down (up to 100%); the Bank has a greater assurance of re-payment; and the third party pays only for results, and at the discounted rate. The World Bank has already conducted such operations with the Global Polio Eradication Initiative, whereby the Gates, Rotary International and UN foundations bought down some \$320 million of loans to fund administration of polio vaccines.

Activity 4.2 Provide technical support to governments to craft new international laws and policies to incentivize companies to buy into a NOS and invest in a NCTF

Currently, only 17 countries worldwide have national policies requiring biodiversity offsets, although more than 29 countries have national policies that propose or enable the use of offsets (TBC 2013). However, no Central or West African countries in the apes' range have policies guiding or requiring offsets. Currently biodiversity offsets are, therefore, guided by private sector internal standards or those of lenders, rather than by government policy (Rio Tinto 2008; IFC 2012a, 2012b). As a result, only those companies borrowing from the IFC or from a private lender that follow IFC policies (via the Equator Principles⁷⁷) or engage in offsetting voluntarily will pursue offsets when there is damage to ape habitat. Thus, it would be hugely beneficial if governments of ape range states put into place legislation that requires participation in such expert-endorsed plans. The World Bank Group is ideally placed to provide the sort of technical expertise that would be helpful to governments redrafting their law and policies.

Activity 4.3 Place contingencies upon World Bank and IFC funding to private sector and development projects to ensure adherence to ape conservation priorities

One of the most fundamental ways in which the World Bank Group could make a huge difference to the future of ape conservation would be for the IFC and World Bank to refrain from supporting activities that pose a threat to ape conservation, and for their financing to be contingent upon any given project's adherence to ape conservation priorities.

In Strategic Priority 1 we stress the need for better national land-use planning that would establish “no-go zones” where no development takes place and access is severely restricted; “transition zones” where controls are established for how economic development activities can take place; and prioritized areas for economic development and investment in

⁷⁷ http://www.equator-principles.com/resources/equator_principles_III.pdf

infrastructure. If apes are to have a future, it will be necessary to have the commitment of the IFC and World Bank as leaders in development and private funding to refrain from supporting or implementing projects in these no-go zones, and adherence to these land-use plans. It will also be necessary to have the commitment of the World Bank Group to fund only those projects that adhere to Best Practices in the transition zones, and to invest in NOSs to compensate for any negative residual impacts on the apes. The IFC could make its private sector funding contingent upon a company's adherence to the mitigation hierarchy, and the guarantee of full compensation for damage to ape habitat by investing in these NOSs.

Activity 4.4 Leverage climate funding in support of NSRPs for apes

Climate change funding may provide an important opportunity for ape conservation. A challenge for REDD+ projects is to ensure that they do no harm to biodiversity (Moss & Nussbaum 2011), but REDD+ should go much further than this by systematically prioritizing projects in areas high in carbon and biodiversity. Conservation and restoration of natural ecosystems can promote both mitigation and other social and environmental benefits, and result in greater positive impact than if mitigation is pursued alone (Busch 2013). Proposals on how to integrate biodiversity priorities into REDD+ planning are emerging (Epple *et al.* 2011; Gardner *et al.* 2012; Law *et al.* 2012). UN-REDD is partnering with the Great Apes Survival Partnership (GRASP) to overlay carbon data with ape distribution and habitat maps and assess where the optimum overlap between carbon rich areas and ape populations and habitats may be. Since countries must undertake significant planning to generate national REDD+ strategies, adding a biodiversity component to the process would not constitute a major additional burden, particularly where distributional data already exist, as is the case for most ape species. The World Bank Group could work with countries undertaking REDD+ readiness through the Forest Carbon Partnership Facility to ensure that they include biodiversity priorities in their readiness planning, including ape priorities as outlined in an NSRP.

Rather than simply targeting habitat, REDD+ designs should also seek to generate financing specifically for wildlife protection. Focusing exclusively on intact habitat can result in the protection of areas devoid of large vertebrates as a result of hunting, a phenomenon known as "empty forest syndrome" (e.g., Wilkie *et al.* 2011). The concept of Wildlife Premium Market + REDD as articulated in Dinerstein *et al.* (2010) provides a useful way forward for protecting wildlife by linking emerging carbon markets to a wildlife premium. This mechanism, with World Bank Group funding to catalyze it, could provide direct benefits to local communities and create an incentive to include apes and other wildlife in REDD+ national planning.

The Wildlife Premium Market + REDD proposal relies on a REDD+ market mechanism, and the question of carbon markets remains politically charged in REDD+ debates (The Munden Project 2011; Karsenty & Ongolo 2012). However, voluntary projects focused on protecting carbon and biodiversity, designed to use the right mix of activities (see

below) and rigorously follow best practice for social and environmental standards, could be implemented in a way that addresses the concerns over market-based approaches.

Another way in which development agencies could support integration of ape priorities into REDD+ national strategies is by prioritizing activities that maintain existing forest cover, while enhancing carbon stocks through restoration of natural forests. This should be the next level of prioritization, as the Wildlife Premium Market + REDD does not clarify which type of REDD+ activities could benefit from wildlife premium payments. In light of the considerable risks associated with industrial logging, wildlife premium projects and other REDD+ projects should be used to keep forests intact or to restore habitat (e.g., Wildlife Works Carbon⁷⁸), but not for projects that degrade natural habitats.

Activity 4.5 Incentivize range-state governments' commitment to ape conservation through Poverty Reduction Support Credits

The World Bank Group provides Poverty Reduction Support Credits⁷⁹ (PRSCs) to support implementation of national poverty reduction strategies. As these credits come with clear performance benchmarks, the World Bank Group could include conservation benchmarks as a criterion when awarding these credits. Such benchmarks could include:

- Requiring the strict adherence of governments to “no-go zones”
- Requiring the commitment of governments to adhering to upholding current wildlife legislation, with particular emphasis on removing corrupt elements within government ranks from service
- Obliging partner governments to actively contribute increasingly more resources to wildlife law enforcement, in an effort to encourage autonomy and self-reliance.

Activity 4.6 Provide incentives for people living in and around ape habitat to support ape conservation

Equally as important as providing incentives for ape conservation to private sector, development projects and governments, is providing incentives to people living in and around ape habitats. This is important as profit from resource extraction or compensation for damages to natural resources upon which the rural poor rely often never filter down to the local level.

Across Africa, less than 2% of natural forest is formally owned or administered by local communities, leaving states free to allocate much of the remainder to development and private sector projects. In some parts of southern Africa, local communities have long-term rights to much of the land, but in most of forested Central and West Africa local land tenure and user rights are extremely limited. Approximately 33.5 million ha of forest in DRC are under concessions for timber, diamonds or mining, and none of the concessions are owned

⁷⁸ <http://www.wildlifeworks.com/redd/>

⁷⁹ <http://www1.worldbank.org/publicsector/civilservice/acrext/vol1page3.htm>

by local communities (Molnar *et al.* 2011). Similarly, Gabon and CAR have 18.9 million and 5.4 million ha respectively under concession, including national parks, and none are controlled by local communities (Pearce 2012). Although several African countries are among the faster growing economies in the world, the rate of poverty reduction is slowed by inequality. In fact, there is a positive correlation between the level of resources African countries export and their levels of inequality (Fuentes-Nieva & Galasso 2014). Finding sustainable ways of benefitting financially from forest ecosystems is a focus needed in both conservation and development (Walker Painemilla *et al.* 2010).

In addition, rather than providing subsidies for unsustainable industrial logging, the World Bank could shift to sustainable systems that promote the rights of traditional owners/users as well as conserving biodiversity and ecosystems. As noted above, industrial logging has long been advanced as a component of conservation strategies based on the hope that primary tropical forests could be logged sustainably (Fisher *et al.* 2011), which has now proven not to be possible in the long term (Zimmermann & Kormos 2012).

Finally, it is extremely important that funding from offsets as compensation for damage to habitats where apes live, compensates the people who are most dependent on those resources. It is of the utmost importance, therefore, that NOSs also outline effective and efficient ways of allocating this funding to the local level.

CONCLUSIONS

In this document, we emphasize that current conservation initiatives have been insufficient to reverse the global decline of apes. We therefore highlight opportunities for the World Bank Group to play a significant role in ape conservation specifically, and in biodiversity conservation in general. Our strategies take a landscape approach to conservation, aiming to integrate different land uses under one cohesive and coherent plan. The overall strategy aims to incorporate ape conservation into upstream development planning, policy analysis and pre-investment planning through landscape-level planning that clearly articulates the requirements for ape survival in NSRPs. We propose a unique partnership with expert organizations to augment the capacity of the World Bank Group for informed decision-making on land-use planning and on mitigating development project impacts on apes and their habitat. This partnership would help to mainstream ape conservation priorities into relevant types of development projects by providing technical and financial support for EIAs, Critical Habitat studies and the creation of NSRPs to guide project investment in sectors affecting ape habitat. For those projects that proceed in ape habitat, this same expert group could ensure the incorporation of best practices for ape conservation into World Bank-supported investment projects. A pivotal part of the strategy is to ensure full compensation for any residual damage to ape habitat that may occur as a

result of World Bank- or IFC-funded projects through the creation of NOSs for apes that take into account the predicted cumulative impacts of development and private sector projects. We propose the establishment of NCTFs supported by offsets project funding, and the incorporation of other funding opportunities such as climate change funding. The strategy also asks the World Bank Group to engage in combatting wildlife crime with a focus on apes through improved law enforcement and a cohesive multidisciplinary and multifaceted program to address the trade in wild meat in general. Finally, we present methods for setting up incentive mechanisms for the private sector, development projects, governments, and local communities living in and around ape habitat, to participate in the strategy and thus the conservation of apes in Africa and Asia.

Through its actions to address poverty and improve lives across the globe, the World Bank has an essential role in ensuring that important environmental criteria (including a focus on specific vulnerable taxa and fragile ecosystems) are taken into consideration, and that measures are taken to safeguard them. Across the breadth of development issues, including economic reform, infrastructure, health, education and private sector development, the World Bank can influence how biodiversity and ecosystems are integrated into planning and implementation.

As a bank and an agency that provides funding through loans and grants, the World Bank Group could also build commitment to conservation goals within the private sector (e.g., through IFC Performance Standards) and the World Bank Group safeguards, as well as through the GEF and programs that explicitly support environmental and biodiversity conservation objectives.

The World Bank Group's expertise in integrating development with environmental management and conservation, together with its expert analysis and research, generates important knowledge that can influence and support improved practices around the world. More coordinated effort could ensure that this also results in knowledge transfer and enhanced capacity to improve and strengthen conservation and development impacts in numerous sectors.

One of the World Bank Group's clearest advantages is its convening power, enabling it to facilitate partnerships between governments, NGOs and the scientific community towards the development of effective conservation solutions at national levels. In addition, since actions taken in isolation in a particular country will not prevent overall ape declines, the World Bank Group's presence in the majority of ape range states is a further advantage, enabling it to bring together stakeholders across the entire geographic range of apes. This synergy is vital given the issues that span national boundaries and demand transboundary cooperation. With its national, regional and global reach, the World Bank Group is among the few organizations that could facilitate action for ape conservation at the scale needed.

The strategy presented here is ambitious, but we believe that only with this degree of commitment and integration of biodiversity conservation into the core of development planning will we be able to reverse the decline of humanity's closest relatives. The World

Bank Group is uniquely placed to make a crucial difference, setting new standards for inserting biodiversity into the very heart of national and global policy and action.

REFERENCES

- ABCG. 2011. Impacts from mining on biodiversity conservation in the Democratic Republic of Congo. Africa Biodiversity Collaborative Group. <http://rmportal.net/news/news-usaid-rmp/abcg-newsletter-mining-biodiversity-dmc>
- 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*: 368: 1471–2970.
- Abram, N.K., Xofis, P., Tzanopoulos, J., MacMillan, D.C., Ancrenaz, M., Chung, R., Peter, L., Ong, R., Lackman, I., Goossens, B., Ambu, L. & Knight, A.T. 2014. Synergies for improving oil palm production and forest conservation in floodplain landscapes. *PLoS One* 9: e95388.
- Almquist, L.A., Lokasola, A.L., Coxe, S.A., Hurley, M.J. & Scherlis, J.S. 2010. Kokolopori and the Bonobo Peace Forest in the Democratic Republic of Congo: prioritizing the local in conservation practice. In: K. Walker Painemilla, A.B. Rylands, A. Woofter & C. Hughes (eds.). *Indigenous Peoples and Conservation: From Rights to Resource Management*. Conservation International, Arlington, VA, pp. 311–326.
- Andam, K.S., Ferraro, P.J., Pfaff, A., Sanchez-Azofeifa, G.A. & Robalino, J.A. 2008. Measuring the effectiveness of protected area networks in reducing deforestation. *Proceedings of the National Academy of Sciences* 105: 16089–16094.
- AfDB. 2011. Africa in 50 Years' Time: The Road Towards Inclusive Growth. African Development Bank. (Tunis, September 11). <http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Africa%20in%2050%20Years%20Time.pdf>
- Ancrenaz, M., Dabek, L. & O'Neil, S. 2007. The costs of exclusion: recognizing a role for local communities in biodiversity conservation. *PLoS Biology* 5: 2443–2448.
- Ancrenaz, M., Lackman-Ancrenaz, I. & Elahan, H. 2006. Seed spitting and seed swallowing by wild orang-utans (*Pongo pygmaeus morio*) in Sabah, Malaysia. *Journal of Tropical Biology and Conservation* 2: 65–70.
- Ancrenaz, M., Gimenez, O., Goossens, B., Sawang, A. & I. Lackman-Ancrenaz. 2004. Determination of ape distribution and population size with ground and aerial surveys: a case study with orang-utans in lower Kinabatangan, Sabah, Malaysia. *Animal Conservation* 7: 375–385.
- Ancrenaz, M., Marshall, A., Goossens, B., van Schaik, C., Sugardjito, J., Gumal, M. & Wich, S. 2008. *Pongo pygmaeus*. In: IUCN 2014. IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>. Downloaded on 16 November 2014.
- Ancrenaz M., Ambu L., Sunjoto I., Ahmad E., Manokaran K., Meijaard, E. & Lackman, I. 2010. Recent surveys in the forests of Ulu Segama Malua, Sabah, Malaysia, show that

- orangutans (*P. p. morio*) can be maintained in slightly logged forests. *PLoS One* 5: e11510.
- Anderson, J.R. 2011. A primatological perspective on death. *American Journal of Primatology* 73: 410–414.
- Arcus Foundation. 2014. *State of the Apes 2013: Extractive Industry and Ape Conservation*, Cambridge University Press, Cambridge.
- Arnold, M. & Persson, R. 2003. Reassessing the fuelwood situation in developing countries. *International Forestry Review* 5: 379–383.
- Baillie, J.E.M., Hilton-Taylor, C. & Stuart, S.N. (eds). 2004. *2004 IUCN Red List of Threatened Species. A Global Species Assessment*. IUCN, Gland, Switzerland and Cambridge, UK.
- Barnosky, A.D., Matzke, N., Tomiya, S., Wogan, G.O.U., Swartz, B., Quental, T.B., Marshall, C., McGuire, J.L., Lindsey, E.L., Maguire, K.C., Mersey, B. & Ferrer, E.A. 2011. Has the earth's sixth mass extinction already arrived? *Nature* 471: 51–57.
- Barr, L.M., Pressey, R.L., Fuller, R.A., Segan, D.B., McDonald-Madden E. *et al.* 2011. A new way to measure the world's protected area coverage. *PLoS One* 6: e24707.
- BBOP. 2013. *To No Net Loss and Beyond: An Overview of the Business and Biodiversity Offsets Programme (BBOP)*. Business and Biodiversity Offsets Programme, Washington, D.C. http://www.forest-trends.org/documents/files/doc_3319.pdf
- Beaune, D., Bretagnolle, F., Bollache, L., Hohmann, G., Surbeck, M., Fruth, B., Beaune, D., Bretagnolle, F., Bollache, L., Bourson, C., Hohmann, G. & Fruth, B. 2013. The bonobo-*Dialium* positive interactions: seed dispersal mutualism. *American Journal of Primatology* 75: 394–403.
- Beck, B., Walkup, K., Rodrigues, M., Unwin, S., Travis, D. & Stoinski, T. 2007. *Best Practice Guidelines for the Re-introduction of Great Apes*. IUCN/SSC Primate Specialist Group, Gland, Switzerland.
- Bermejo, M., Rodríguez-Teijeiro, J.D., Illera, G., Barroso, A., Vilà, C. & Walsh, P.D. 2006. Ebola outbreak kills 5000 gorillas. *Science* 314 (5805): 1564.
- Bikié, H., Collomb, J.-G., Djomo, L., Minnemeyer, S., Ngoufo, R. & Nguiffo, S. 2000. *An Overview of logging in Cameroon*. A Global Forest Watch Cameroon Report.
- Blaser, J., Sarre, A., Poore, D. & Johnson, S. 2011. *Status of Tropical Forest Management 2011*. ITTO Technical Series No 38. International Tropical Timber Organization, Yokohama, Japan.
- Boesch, C. 1994. Cooperative hunting in wild chimpanzees. *Animal Behaviour* 48: 653–667.
- Boesch, C. & Boesch-Achermann, H. 2000. *The Chimpanzees of the Tai Forest: Behavioural Ecology and Evolution*. Oxford University Press, Oxford.
- Boesch, C., Uehara, S. & Ihobe, H. 2002. Variations in chimpanzees-red colobus interactions. In: C. Boesch, G. Hohmann & L. Marchant (eds.). *Behavioural Diversity in Chimpanzees and Bonobos*. Cambridge University Press, Cambridge, pp. 221–230.

- Boesch, C., Crockford, C., Herbinger, I., Wittig, R., Moebius, Y. & Normand, E. 2008. Intergroup conflicts among chimpanzees in Taï National Park: lethal violence and the female perspective. *American Journal of Primatology* 70: 519–532.
- Boogert, N.J., Paterson, D.M. & Laland, K.N. 2006. The implications of niche construction and ecosystem engineering for conservation biology. *BioScience* 56: 570–578.
- Bowles, I.A., da Fonseca, G.A.B., Mittermeier, R.A. & Rice, R.E. 1998. Logging and tropical forest conservation. *Science* 280: 1899–1900.
- Brashares, J.S., Arcese, P., Sam, M.K., Coppolillo, P.B., Sinclair, A.R.E. & Balmford, A. 2004. Bushmeat hunting, wildlife declines, and fish supply in West Africa. *Science* 306: 1180–1183.
- Brockelman, W. & Geissmann, T. 2008. *Hoolock leuconedys*. In: IUCN 2014. IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>. Downloaded on 16 November 2014.
- Brugière, D. & Magassouba, B. 2009. Pattern and sustainability of the bushmeat trade in the Haut Niger National Park, Republic of Guinea. *African Journal of Ecology* 47: 630–639.
- Bryan, J.E., Shearman, P.L., Asner, G.P., Knapp, D.E., Aoro, G. *et al.* 2013. Extreme differences in forest degradation in Borneo: comparing practices in Sarawak, Sabah, and Brunei. *PLoS One* 8: e69679.
- Busch, J. 2013. Supplementing REDD+ with biodiversity payments: The paradox of paying for multiple ecosystem services. *Land Economics* 89: 655–675.
- Butchart S.H.M., Walpole M., Collen B., van Strien A., Scharlemann J.P.W. *et al.* 2010. Global biodiversity: indicators of recent declines. *Science* 328: 1164–1168.
- Butler, R.A. & Laurance, W.F. 2008. New strategies for conserving tropical forests. *Trends in Ecology and Evolution* 974: 469–472.
- Butler, R.A., Koh, L.P. & Ghazoul, J. 2009. REDD in the red: palm oil could undermine carbon payment schemes. *Conservation Letters* 2: 67–73.
- Caillaud, D., Levrero, F., Cristescu, R., Gatti, S., Dewas, M. *et al.* 2006. Gorilla susceptibility to Ebola virus: the cost of sociality. *Current Biology* 16: R489–R491.
- Campbell, G., Kuehl, H., N’Goran, K.P. & Boesch, C. 2008. Alarming decline of West African chimpanzees in Côte d’Ivoire. *Current Biology* 18: R903–R904.
- Cardinale, B. 2012. Impacts of biodiversity loss. *Science* 336(6081): 552–553.
- Cardinale B.J., Duffy J.E., Gonzalez A., Hooper D.U., Perrings C. *et al.* 2012. Biodiversity loss and its impact on humanity. *Nature* 486: 59–67.
- Caro, T.M. 2003. Umbrella species: Critique and lessons from East Africa. *Animal Conservation* 6: 171–181.
- Caspary, H.U., Kone, I., Prouot, C. & de Pauw, M. 2001. La chasse et la filiere viande de brousse dans l’espace Tai, Cote d’Ivoire. *Tropenbos-Cote d’Ivoire Serie 2*. Programme Tropenbos-Cote d’Ivoire, Abidjan, Cote d’Ivoire.

- Chan, B.P.L., Fellowes, J.R., Geissmann, T. & Zhang, J. (eds.). 2005. *Status Survey and Conservation Action Plan for the Hainan Gibbon – version I*. Kadoorie Farm & Botanic Garden Technical Report No. 3, Hong Kong SAR.
- Chen, F.C. & Li, W.H. 2001. Genomic divergences between humans and other hominoids and the effective population size of the common ancestor of humans and chimpanzees. *American Journal of Human Genetics* 68: 444–456.
- Cochrane, M.A. 2003. Fire science for rainforests. *Nature* 421: 913–919.
- Coad, L., Abernethy, K., Balmford, A., Manica, A., Airey, L. & Milner-Gulland, E.J. 2010. Distribution and use of income from bushmeat in a rural village, Central Gabon. *Conservation Biology* 24: 1510–1518.
- Debinski, D.M. & Holt, R.D. 2000. A survey and overview of habitat fragmentation experiments. *Conservation Biology* 14: 342–355.
- Dinerstein, E., Varma, K., Wikramanayake, E. & Susan Lumpkin, S. 2010. Wildlife Premium Market+REDD: Creating a financial incentive for conservation and recovery of endangered species and habitats. [http://www.hcvnetwork.org/resources/folder.2006-09-29.6584228415/Wildlife Premium-REDD%20Oct%2013%202010%20-2-%20-2.pdf](http://www.hcvnetwork.org/resources/folder.2006-09-29.6584228415/Wildlife%20Premium-REDD%20Oct%2013%202010%20-2-%20-2.pdf)
- Dudley, N., Sue, S., Belokurov, A., Krueger, L., Lopoukhine, N., MacKinnon, K., Sandwith, T. & Sekhran, N. 2010. *Natural solutions: Protected Areas Helping People Cope With Climate Change*. IUCN World Commission on Protected Areas, The Nature Conservancy, UNDP, Wildlife Conservation Society, World Bank & WWF.
- Dunn, A., Bergl, R., Byler, D., Eben-Ebai, S., Etiendem, D.N., Fotso, R., Ikfuingei, R., Imong, I., Jameson, C., Macfie, L., Morgan, B. Nchanji, A., Nicholas, A., Nkembi, L., Omeni, F., Oates, J., Pokempner, A., Sawyer, S. & Williamson, E.A. 2014. *Revised Regional Action Plan for the Conservation of the Cross River Gorilla (Gorilla gorilla diehli) 2014–2019*. IUCN/SSC Primate Specialist Group & Wildlife Conservation Society, New York.
- 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
- Emerton, L. & Pabon-Zamora, L. 2009. *Valuing Nature: Why Protected Areas Matter for Economic and Human Wellbeing*. The Nature Conservancy, Arlington, VA.
- Emery Thompson, M., Kahlenberg, S.M., Gilby, I.C. & Wrangham, R.W. 2007. Core area quality is associated with variance in reproductive success among female chimpanzees at Kibale National Park. *Animal Behaviour* 73: 501–512.
- Epplé, C., Dunning, E., Dickson, B. & Harvey, C. 2011. *Making Biodiversity Safeguards for REDD+ Work in Practice. Developing Operational Guidelines and Identifying Capacity Requirements*. Summary Report. UNEP-WCMC, Cambridge, UK.
- Fan, P.-F. & Ai, H.-S. 2011. Conservation status of the eastern hoolock gibbon (*Hoolock leuconedys*) in China. *Gibbon Journal* 6: 22–25

- Fan, P.-F., Fei, H.-L. & Luo, A.D. 2014. Ecological extinction of the Critically Endangered northern white-cheeked gibbon *Nomascus leucogenys* in China. *Oryx* 48: 52–56.
- Fan, P.-F., Xiao, W., Huo, S., Ai, H.-S., Wang, T.-C. & Lin, R.-T. 2011. Distribution and conservation status of the Vulnerable eastern hoolock gibbon *Hoolock leuconedys*. *Oryx* 45: 129–134.
- Fisher, B., Edwards, D.P., Larsen, T.H., Ansell, F. A., Hsu, W. W., Roberts, C.S. & Wilcove, D.S. 2011. Cost-effective conservation: calculating biodiversity and logging trade-offs in Southeast Asia. *Conservation Letters* 4: 443–450.
- FAO. 2010. Global Forest Resources Assessment. Food and Agriculture Organization. <http://www.fao.org/forestry/fra/fra2010/en/>
- FAO. 2011. *State of the World's Forests 2011*. Food and Agriculture Organization of the United Nations, Rome. <http://www.fao.org/docrep/013/i2000e/i2000e.pdf>
- Formenty, P., Karesh, W., Froment, J.-M. & Wallis, J. 2003. Infectious diseases as a threat to chimpanzees in West Africa. In: R. Kormos, C. Boesch, M.I. Bakarr & T.M. Butynski (eds.). *Status Survey and Conservation Action Plan: West African Chimpanzees*. IUCN, Gland, Switzerland and Cambridge, UK, pp. 169–174.
- Fossey, D. 1983. *Gorillas in the Mist*. Houghton Mifflin, Boston.
- Fruth, B., Benishay, J.M., Bila-Isia, I., Coxe, S., Dupain, J., Furuichi, T., Hart, J., Hart, T., Hashimoto, C., Hohmann, G., Hurley, M., Ilambu, O., Mulavwa, M., Ndunda, M., Omasombo, V., Reinartz, G., Scherlis, J., Steel, L. & Thompson, J. 2008. *Pan paniscus*. In: IUCN 2014. IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>. Downloaded on 10 November 2014.
- Fuentes-Nieva, R. & N. Galasso. 2014. *Working for the Few: Political capture and economic inequality*. Oxfam GB for Oxfam International. <http://www.oxfam.org/en/policy/working-for-the-few-economic-inequality>
- Funwi-Gabga, N., Kuehl, H.S., Maisels, F.G., Cheyne, S.M., Wich, S.A. & Williamson, E.A. 2014. The status of apes across Africa and Asia. In: Arcus Foundation (ed.). *State of the Apes 2013: Extractive Industries and Ape Conservation*. Cambridge University Press, Cambridge, UK. pp. 253–277.
- Gardner, A. & Gardner, B.T. 1980. Comparative psychology and language acquisition. In: T.A. Sebeok & J. Umiker-Sebeok (eds.). *Speaking of Apes: A Critical Anthology of Two-way Communication with Man*. Plenum Press: New York. pp. 287–329.
- Gardner, T.A., Burgess, N.D., Aguilar-Amuchastegui, N., Barlow, J., Berenguer, E., Clements, T., Danielsen, F., Ferreira, J., Foden, W., Kapos, V., Khan, S.M., Lees, A.C., Parry, L., Roman-Cuesta, R.M., Schmitt, C.B., Strange, N., Theilade, I. & Vieira, I.C.G. 2012. A framework for integrating biodiversity concerns into national REDD+ programmes. *Biological Conservation* 154: 61–71.
- Gaveau, D.L.A., Sloan, S., Molidena, E., Yaen, H., Sheil, D. *et al.* 2014. Four decades of forest persistence, clearance and logging on Borneo. *PLoS One* 9: e 101654.

- Gibbs, H.K., Ruesch A.S., Achard F., Clayton M.K., Holmgren P., Ramankutty N. & Foley J.A. 2010. Tropical forests were the primary sources of new agricultural land in the 1980s and 1990s. *Proceedings of the National Academy of Sciences* 107: 16732–16737.
- Greengrass, E.J. 2009. Chimpanzees are close to extinction in southwest Nigeria. *Primate Conservation* 24: 77–83.
- Gregory, S.D., Ancrenaz, M., Brook, B.W., Goossens, B., Alfred, R., Ambu, L.N. & Fordham, D.A. 2014. Forecasts of habitat suitability improve habitat corridor efficacy in rapidly changing environments. *Diversity and Distribution* 20: 987–1107.
- Goodall, J. 1986. *The Chimpanzees of Gombe: Patterns of Behavior*. Harvard University Press, Cambridge, Massachusetts.
- Goosem, M. 2007. Fragmentation impacts caused by roads through rainforests. *Current Science* 93: 1587–1595.
- Goossens, B., Chikhi, L., Ancrenaz, M., Lackman-Ancrenaz, I., Andau, P. & Bruford, M.W. 2006. Genetic signature of anthropogenic population collapse in orang-utans. *PLoS Biology* 4: e25. doi:10.1371/journal.pbio.0040025.
- Gregory, S.D., Brook, B.W., Goossens, B., Ancrenaz, M., Alfred, R. *et al.* 2012. Long-term field data and climate-habitat models show that orangutan persistence depends on effective forest management and greenhouse gas mitigation. *PLoS One* 7: e43846.
- Grueter, C.C., Xuelong Jiang, Konrad, R., Peng-fei Fan, Zhenhua Guan & Geissmann, T. 2009. Are *Hylobates lar* extirpated from China? *International Journal of Primatology* 30: 553–567.
- Ham, R. 1998. Nationwide chimpanzee census and large mammal survey, Republic of Guinea. Unpublished report to the European Union, Conakry, Guinea. <http://www.primatesg.org/Ham1998Guinea/>
- Hanamura, S., Kiyono, M., Nakamura, M., Lukasik-Braum, M., Mlengeya, T., Fujimoto, M. & Nishida, T. 2008. Chimpanzee deaths at Mahale caused by a flu-like disease. *Primates* 49: 77–80.
- Hansen, M.C., Potapov, P.V., Moore, R. Hancher, M., Turubanova, S.A., Tyukavina, A., Thau, D., Stehman, S.V., Goetz, S.J., Loveland, T. R., Kommareddy, A., Egorov, A., Chini, L., Justice, C.O. & Townshend, J.R.G. 2013. High-resolution global maps of 21st-century forest cover change. *Science* 15(342): 850–853.
- Hein, L., Miller, D.C. & de Groot, R. 2013. Payments for ecosystem services and the financing of global biodiversity conservation. *Current Opinion in Environmental Sustainability* 5: 87–93.
- Hockings, K. & Humle, T. 2009. *Best Practice Guidelines for the Prevention and Mitigation of Conflict Between Humans and Great Apes*. IUCN/SSC Primate Specialist Group, Gland, Switzerland.
- Hoffmann, M., Hilton-Taylor, C., Angulo, A., Böhm, M., Brooks, T.M. *et al.* 2010. The impact of conservation on the status of the world's vertebrates. *Science* 330(5899): 1503–1509.

- Hole, D. G., Willis, S. G., Pain, D. J., Fishpool, L. D., Butchart, S. H. M., Collingham, Y. C., Rahbek, C. & Huntley, B. 2009. Projected impacts of climate change on a continent-wide protected area network. *Ecology Letters* 12: 420–431.
- Hruschka, F. & Echavarría C. 2013. Rock-solid chances for responsible artisanal mining. ARM series on responsible ASM No. 3. Medellin, Colombia: Alliance for Responsible Mining (ARM).
- Humle, T. 2011. The 2003 epidemic of a flu-like respiratory disease at Bossou. In: T. Matsuzawa, T. Humle & Y. Sugiyama (eds.). *The Chimpanzees of Bossou and Nimba*. Springer, New York, pp. 325–333.
- IEA. 2002. Energy and Poverty. Chapter 13. In: *World Energy Outlook 2002*. International Energy Agency, Paris.
- IFC. 2012a. *Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources*. International Finance Corporation, Washington D.C.
- IFC. 2012b. *Guidance Note 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources*. International Finance Corporation, Washington D.C.
- IFC. 2013. *Good Practice Handbook: Cumulative Impact Assessment and Management: Guidance for the Private Sector in Emerging Markets*. International Finance Corporation, Washington D.C.
- Ingram, V., Tieguhong, J., Schure, J., Nkamgnia, E. & Tadjuidje, M. 2011. Where artisanal mines and forest meet: socio-economic and environmental impacts in the Congo Basin. *Natural Resources Forum* 35: 304–320.
- Islam, M.A., Feeroz, M.M., Muzaffar, S.B., Kabir, M.M. & Begum, S. 2006. Conservation of the hoolock gibbons (*Hoolock hoolock*) of Bangladesh: Population estimates, habitat suitability and management options. Unpublished report to U.S. Fish & Wildlife Service.
- IUCN. 2014a. IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>. Downloaded on 16 November 2014.
- IUCN. 2014b. *Regional Action Plan for the Conservation of Western Lowland Gorillas and Central Chimpanzees 2015–2025*. IUCN SSC Primate Specialist Group, Gland, Switzerland.
- IUCN & ICCN. 2012. *Conservation Strategy for the Bonobo (Pan paniscus) 2012–2022*. IUCN/SSC Primate Specialist Group, Gland, Switzerland.
- Jetz, W., Wilson, D.S. & Dobson, A.P. 2007. Projected impacts of climate and land use changes on global diversity of birds. *PLoS Biology* 5: 1211–1219.
- Johns, A.D. 1992. Species conservation in managed tropical forests. In: J. Sayer & T.C. Whitmore (eds.). *Realistic Strategies for Tropical Forest Conservation*, IUCN, Gland, Switzerland, pp. 15–53.
- Johns, A.D. & Skorupa, J.P. 1987. Responses of rain forest primates to habitat disturbance: A review. *International Journal of Primatology* 8: 157–191.

- Jones, C.G., Lawton, J.H. & Shachak, M. 1997. Positive and negative effects of organisms as physical ecosystem engineers. *Ecology* 78: 1946–1957.
- Joppa, L.N., Loarie, S.R. & Pimm, S.L. 2008. On the protection of “protected areas”. *Proceedings of the National Academy of Sciences of the United States of America* 105: 6673–6678.
- Juma, C. 2011. Africa’s new engine. *Finance & Development* (December): 6–11.
- Junker, J., Blake, S., Boesch, C., Campbell, G., du Toit, L. *et al.* 2012. Recent decline in suitable environmental conditions for African great apes. *Diversity and Distributions* 18: 1077–1091.
- Karsenty, A. & Gourlet-Fleury, S. 2006. Assessing sustainability of logging practices in the Congo Basin’s managed forests: the issue of commercial species recovery. *Ecology and Society* 11: 26. <http://www.ecologyandsociety.org/vol11/iss1/art26/>
- Karsenty, A. & Ongolo, S. 2012. Can “fragile states” decide to reduce their deforestation? The inappropriate use of the theory of incentives with respect to the REDD mechanism. *Forest Policy and Economics* 18: 38–45.
- Kaur, T., Singh, J., Tong, S., Humphrey, C., Clevenger, D., Tan, W., Szekely, B., Wang, Y., Li, Y., Alex Muse, E., Kiyono, M., Hanamura, S., Inoue, E., Nakamura, M., Huffman, M.A., Jiang, B. & Nishida, T. 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.
- Kissinger, G., Herold, M. & De Sy, V.S. 2012. *Drivers of Deforestation and Forest Degradation: A Synthesis Report for REDD+ Policymakers*. Lexeme Consulting, Vancouver Canada. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/66151/Drivers_of_deforestation_and_forest_degradation.pdf
- Köndgen, S., Köhl, H., N’Goran, P.K., Walsh, P.D., Schenk, S. *et al.* 2008. Pandemic human viruses cause decline of endangered great apes. *Current Biology* 18: 260–264.
- Kormos, R. & Boesch, C. (eds). 2003. *Regional Action Plan for the Conservation of Chimpanzees in West Africa*. IUCN/SSC Primate Specialist Group and Conservation International, Washington DC.
- Kormos, R. & Kormos, C. 2011. Towards a Strategic National Plan for Biodiversity Offsets for Mining in the Republic of Guinea, West Africa With a Focus on Chimpanzees. Unpublished report to the Arcus Foundation.
- Kormos, R., Boesch, C., Bakarr, M.I. & Butynski, T.M. (eds.). 2003. *West African Chimpanzees: Status Survey and Conservation Action Plan*. IUCN/SSC Primate Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK.
- Kormos, R., Kormos, C.F., Humle, T., Lanjouw, A., Rainer, H., Victurine, 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.
- Kothari, A. 2008. Protected Areas and people: the future of the past. *Parks* 17: 23–34.

- 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.
- 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.
- Langhammer, P.F., Bakarr, M.I., Bennun, L.A., Brooks, T.M., Clay, R.P., Darwall, W., De Silva, N., Edgar, G.J., Eken, G., Fishpool, L.D.C., Fonseca, G.A.B., Foster, M.N., Knox, D.H., Matiku, P., Radford, E.A., Rodrigues, A.S.L., Salaman, P., Sechrest, W. & Tordoff, A.W. 2007. Identification and gap analysis of key biodiversity areas: targets for comprehensive protected area systems IUCN Best Practice Protected Areas Guidelines Series No. 15. IUCN, Gland, Switzerland.
- Languy, M. & de Merode, E. (eds.). 2006. *Virunga: The Survival of Africa's First National Park*. Editions Lannoo, Tielt, Belgium.
- Lanjouw, A. 2014. Mining/oil extraction and ape populations and habitats. In: Arcus Foundation (ed.), *State of the Apes 2013: Extractive Industries and Ape Conservation*. Cambridge University Press, Cambridge, UK. pp. 127–161.
- Laporte N.T., Stabach J.A., Grosch R., Lin T.S. & Goetz S.J. 2007. Expansion of industrial logging in Central Africa. *Science* 316: 1451.
- Laurance, W.F., Goosem, M. & Laurance, S.G.W. 2009. Impacts of roads and linear clearings on tropical forests. *Trends in Ecology and Evolution* 24: 659–669.
- Laurance, W.F. & Balmford, A. 2013. A global map for road building. *Nature* 495: 308–309.
- Law, E.A., Thomas, S., Meijaard, E., Dargusch, P.J. & Wilson, K.A. 2012. A modular framework for management of complexity in international forest-carbon policy. *Nature Climate Change* 2: 155–160.
- Lawson, S. & MacFaul, L. 2010. *Illegal Logging and Related Trade: Indicators of the Global Response*. Chatham House, London. <http://www.chathamhouse.org/publications/papers/view/109398>
- Leader-Williams, N. & Dublin, H. 2000. Charismatic megafauna as 'flagship species'. In: A. Entwistle & N. Dunstone (eds.). *Priorities for the Conservation of Mammalian Diversity: Has the Panda had its Day?* Cambridge University Press, Cambridge, pp. 53–81.
- Lee, J., Ledec, G. & Sobrevila, C. 2012. *Toward Africa's green future*. Washington, DC: World Bank. <http://documents.worldbank.org/curated/en/2012/10/16795968/toward-africas-green-future>
- Leendertz, F.H., Ellerbrok, H., Boesch, C., Couacy-Hymann, E., Mätz-Rensing, K., Hakenbeck, R., Bergmann, C., Abaza, P., Junglen, S., Moebius, Y., Vigilant, L., Formenty, P. & Pauli, G. 2004. Anthrax kills wild chimpanzees in a tropical rainforest. *Nature* 430: 451–452.
- Lenzen, M., Moran, D., Kanemoto, K., Foran, B., L. Lobefaro, L. & Geschke, A. 2012. International trade drives biodiversity threats in developing nations. *Nature* 486: 109–112.

- Macfie, E.J. & Williamson, E.A. 2010. *Best Practice Guidelines for Great Ape Tourism*. IUCN/SSC Primate Specialist Group, Gland, Switzerland.
- Mackey, B., DellaSala, D.A., Kormos, C., Lindenmayer, D., Kumpel, N., Zimmerman, B., Hugh, S., Young, V., Foley, S., Arsenis, K. & Watson, J.E.M. 2014. Policy options for the world's primary forests in multilateral environmental agreements. *Conservation Letters* doi: 10.1111/conl.12120.
- Maisels, F., Strindberg, S., Blake, S., Wittemyer, G., Hart, J. *et al.* 2013. Devastating decline of forest elephants in Central Africa. *PLoS One* 8: e59469.
- Maldonado, O., Aveling, C., Cox, D., Nixon, S., Nishuli, R., Merlo, D., Pintea, L. & Williamson, E.A. 2012. *Grauer's Gorillas and Chimpanzees in Eastern Democratic Republic of Congo (Kahuzi-Biega, Maiko, Tayna and Itombwe Landscape): Conservation Action Plan 2012–2022*. IUCN/SSC Primate Specialist Group, Ministry of Environment, Nature Conservation & Tourism, Institut Congolais pour la Conservation de la Nature & Jane Goodall Institute, Gland, Switzerland.
- Matricardi, E.A.T., Skole, D.L., Pedlowski, M.A., Chomentowski, W. & Fernandes, L.C. 2010. Assessment of tropical forest degradation by selective logging and fire using Landsat imagery. *Remote Sensing of Environment* 114: 1117–1129.
- Mayaux, P., Pekel, J-F., Descle'e, B., Donnay, F., Lupi, A., Achard, F., Clerici, M., Bodart, C., Brink, A., Nasi, R. & Belward, A. 2013. State and evolution of the African rainforests between 1990 and 2010. *Philosophical Transactions of the Royal Society, Series B* 368: @20120300. <http://dx.doi.org/10.1098/rstb.2012.0300>
- McCarthy @et al. 2012. Financial costs of meeting global biodiversity conservation targets: Current spending and unmet needs. *Science* 338 (6109): 946–949. See more at: <http://www.conservation.cam.ac.uk/resource/journal-articles/financial-costs-meeting-global-biodiversity-conservation-targets-current#sthash.zXQDUKwX.dpuf>
- McConkey, K.R. & Chivers, D.J. 2007. Influence of gibbon ranging patterns on seed dispersal distance and deposition site in a Bornean forest. *Journal of Tropical Ecology* 23: 269–275.
- McGrew, W.C. 1992. Tool-use by free-ranging chimpanzees: the extent of diversity. *Journal of Zoology, London* 228: 689–694.
- Meijaard, E., Sheil, D., Nasi, R. & Stanley, S.A. 2006. Wildlife conservation in Bornean timber concessions. *Ecology and Society* 11: 47.
- Meijaard, E., Wich, S.A., Ancrenaz, M. & Marshall, A.J. 2012. Not by science alone: why orangutan conservationists must think outside the box. *Annals of the New York Academy of Sciences* 1249: 29–44.
- Meijaard, E., Sheil, D., Guariguata, M.R., Nasi, R., Sunderland, T. & Putzel, L. 2011a. Report on barriers and constraints to ecosystem services certification. *CIFOR Occasional Paper* No. 66.

- Meijaard, E., Buchori, D., Hadiprakarsa, Y., Utami-Atmoko, S. *et al.* 2011b. Quantifying killing of orangutans and human-orangutan conflict in Kalimantan, Indonesia. *PLoS One* 6: e27491.
- Millennium Ecosystem Assessment. 2005. *Ecosystems and Human Well-Being: Current State and Trends*. Findings of the conditions and trends working group. Millennium Ecosystem Assessment Series, Vol. 1. Island Press, London.
- Ministry of Agriculture and Forestry. 2011. *Gibbon Conservation Action Plan for Lao PDR*. Division of Forest Resource Conservation, Department of Forestry. Vientiane, Lao PDR.
- Mitani, J.C., Watts, D.P. & Amsler, S.J. 2010. Lethal intergroup aggression leads to territorial expansion in wild chimpanzees. *Current Biology* 20: R507–R508.
- Molnar, A., France, M., Purdy, L. & Karver, J. 2011. *Community-based Forest Management: The Extent and Potential Scope of Community and Smallholder Forest Management and Enterprises*. Washington, DC: Rights and Resources Institute. http://www.rightsandresources.org/documents/files/doc_2065.pdf
- Molur, S., Walker, S., Islam, A., Miller, P., Srinivasulu, C., Nameer, P., Daniel, B. & Ravikumar, L. 2005. *Conservation of western hoolock gibbon (Hoolock hoolock hoolock) in India and Bangladesh*. Zoo Outreach Organisation/CBSG-South Asia, Comibatore, India.
- Morgan, B., Adeleke, A., Bassey, T., Bergl, R., Dunn, A., Fotso, R. Gadsby, E., Gonder, K., Greengrass, E., Koulagna, D.K., Mbah, G., Nicholas, A., Oates, J.F., Omeni, F., Saidu, Y., Sommer, V., Sunderland-Groves, J., Tiebou, J. & Williamson, E. 2011. *Regional Action Plan for the Conservation of the Nigeria-Cameroon Chimpanzee (Pan troglodytes ellioti)*. IUCN/SSC Primate Specialist Group and Zoological Society of San Diego, CA.
- Morgan, D. & Sanz, C. 2007. *Best Practice Guidelines for Reducing the Impact of Commercial Logging on Great Apes in Western Equatorial Africa*. IUCN/SSC Primate Specialist Group, Gland, Switzerland.
- 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.
- Moss, N. & Nussbaum, R. 2011. A Review of Three REDD+ Safeguard Initiatives, Forest Carbon Partnership Facility and UN-REDD Programme. www.cbd.int/forest/doc/analysis-redd-plus-safeguard-initiatives-2011-en.pdf
- Mulongoy, K.J. & Chape, S. 2004. *Protected Areas and Biodiversity: An Overview of Key Issues*. CBD Secretariat, Montreal, Canada and UNEP-WCMC, Cambridge, UK.
- Muzaffar, S.B., Islam, M.A., Feeroz, M.M., Kabir, M., Begum, S., Mahmud, S. & Chakma, S. 2007. Habitat characteristics of the endangered hoolock gibbons (*Hoolock hoolock*) of Bangladesh: the role tree species richness. *Biotropica* 39: 539–545.
- Myers, N., Mittermeier, R.A., Mittermeier, C.G., da Fonseca, G.A.B. & Kent, J. 2000. Biodiversity hotspots for conservation priorities. *Nature* 403: 853–858.

- Nasi, R. & Frost, P.G.H. 2009. Sustainable forest management in the tropics: is everything in order but the patient still dying? *Ecology and Society* 14: 40.
- Nasi, R., Taber, A. & van Vliet, N. 2011. Empty forests, empty stomachs? Bushmeat and livelihoods in the Congo and Amazon basins. *International Forestry Review* 13: 355–368.
- Nawir A.A. & Rumboko L. 2007. History and state of deforestation and land degradation. In: A.A. Nawir, Murniati & L. Rumboko (eds.). *Forest Rehabilitation in Indonesia: Where to after More Than Three Decades?* Center for International Forestry Research, Bogor, Indonesia, pp. 11–32.
- Nellemann, C., Miles, L., Kaltenborn, B.P., Virtue, M. & Ahlenius, H. (eds.). 2007. *The Last Stand of the Orangutan – State of Emergency: Illegal Logging, Fire and Palm Oil in Indonesia's National Parks*. United Nations Environment Programme, GRID-Arendal, Birkeland Trykkeri AS, Norway.
- Nellemann, C., Redmond, I. & Refisch, J. (eds.). 2010. *The Last Stand of the Gorilla – Environmental Crime and Conflict in the Congo Basin*. United Nations Environment Programme, GRID-Arendal, Birkeland Trykkeri AS, Norway.
- Nellemann, C., Henriksen, R., Raxter, P., Ash, N. & Mrema, E. (eds.). 2014. *The Environmental Crime Crisis – Threats to Sustainable Development from Illegal Exploitation and Trade in Wildlife and Forest Resources. A UNEP Rapid Response Assessment*. United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, www.grida.no
- Nepstad, D., Schwartzman, S., Bamberger, B., Santili, M., Ray, D., Schlesinger, P., Lefebvre, P., Alencar, A., Prinz, E., Fiske, G. & Rolla, A. 2006. Inhibition of Amazon deforestation and fire by parks and indigenous lands. *Conservation Biology* 20: 65–73.
- Noss, R., Dobson, A.P., Bladwin, R., Beier, P., Davis, C.R., Dellasala, D.A., Francis, J., Locke, H., Nowak, K., Lopez, R. Reining, C., Trombulak, S.C. & Tabor, G. 2012. Bolder thinking for conservation. *Conservation Biology* 26: 1–4.
- Noss, R.F. 1990. Indicators for monitoring biodiversity: a hierarchical approach. *Conservation Biology* 4: 355–364.
- Oates, J.F. 2006. Conservation, development and poverty alleviation: time for a change in attitudes. In: D.M. Lavigne (ed.), *Gaining Ground: In Pursuit of Ecological Stability*. Guelph: International Fund for Animal Welfare, Guelph, pp. 277–284
- Oates, J.F. 2013. Primate Conservation: unmet challenges and the role of the International Primatological Society. *International Journal of Primatology* 34: 235–245.
- Oates, J.F., Tutin, C.E.G., Humle, T., Wilson, M.L., Baillie, J.E.M., Balmforth, Z., Blom, A., Boesch, C., Cox, D., Davenport, T., Dunn, A., Dupain, J., Duvall, C., Ellis, C.M., Farmer, K.H., Gatti, S., Greengrass, E., Hart, J., Herbinger, I., Hicks, C., Hunt, K.D., Kamenya, S., Maisels, F., Mitani, J.C., Moore, J., Morgan, B.J., Morgan, D.B., Nakamura, M., Nixon, S., Plumptre, A.J., Reynolds, V., Stokes, E.J. & Walsh, P.D. 2008. *Pan troglodytes*. In: IUCN 2014. IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>. Downloaded on 10 November 2014.

- OECD. 2010. The Emerging Middle Class in Developing Countries. Organisation for Economic Co-operation and Development (OECD), *Development Centre Working Paper* No. 285.
- OECD. 2011. Towards Green Growth. Organisation for Economic Co-operation and Development, (OECD), Paris. <http://www.oecd.org/greengrowth/48224539.pdf>
- Olson, D.M., Dinerstein, E., Wikramanayake, E.D., Burgess, N.D., Powell, G.V.N. *et al.* 2001. Terrestrial ecoregions of the world: a new map of life on earth. *BioScience* 53: 933–938.
- BioScience 51: 933–938. 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.
- Pearce, F. 2012. Turning Point: What future for forest peoples and resources in the emerging world order? Rights and Resources Initiative, Washington DC. [file:///C:/Users/Rebecca/Downloads/2012%20Turning%20Point Annual%20Review.pdf](file:///C:/Users/Rebecca/Downloads/2012%20Turning%20Point%20Annual%20Review.pdf)
- Phalan, B., Bertzky, M., Butchart, S.H.M., Donald, P.F., Scharlemann, J.P.W. *et al.* 2013. Crop expansion and conservation priorities in tropical countries. *PLoS One* 8: e51759.
- Pimm, S.L., Russell, G.J., Gittleman, J.L. & Brooks, T.M. 2005. The future of biodiversity. *Science* 269: 347–350.
- Plumptre, A.J. 1995. The effects of trampling damage by herbivores on the vegetation of the Parc National des Volcans, Rwanda. *African Journal of Ecology* 32: 115–129.
- Plumptre, A.J., Rose, R., Nangendo, G., Williamson, E.A., Didier, K., Hart, J., Mulindahabi, F., Hicks, C., Griffin, B., Ogawa, H., Nixon, S., Pintea, L., Vosper, A., McClennan, M., Amsini, F., McNeillage, A., Makana, J.R., Kanamori, M., Hernandez, A., Piel, A., Stewart, F., Moore, J., Zamma, K., Nakamura, M., Kamenya, S., Idani, G., Sakamaki, T., Yoshikawa, M., Greer, D., Tranquilli, S., Beyers, R., Furuichi, T., Hashimoto, C. & Bennett, E. 2010. *Eastern Chimpanzee (Pan troglodytes schweinfurthii): Status Survey and Conservation Action Plan 2010–2020*. IUCN, Gland, Switzerland.
- Porter-Bolland, L., Ellis, E.A., Guariguata, M.R., Ruiz-Mallén, I., Negrete-Yankelevich, S. & Reyes-García, V. 2011. Community managed forests and forest protected areas: An assessment of their conservation effectiveness across the tropics. *Forest Ecology and Management* 268: 6–17.
- Possingham, H.P., Wilson, K.A., Andelman, S.J. & Vynne, C.H. 2006. Protected areas: goals, limitations and designs. In: M.J. Groom, G.K. Meffe & C.R. Carroll (eds.). *Principles of Conservation Biology*. 3rd ed. Sinauer Associates, Inc., Sunderland, MA, pp. 509–533.
- Poulsen, J.R., Clark, C.J., Mavah, G. & Elkan, P.W. 2009. Bushmeat supply and consumption in a tropical logging concession in northern Congo. *Conservation Biology* 23: 1597–1608.
- Putz, F.E., Zuidema, P.A., Synnott, T., Peña-Claros, M., Pinard, M.A., Sheil, D., Vanclay, J.K., Sist, P., Gourlet-Fleury, S., Griscom, B., Palmer, J. & Zagt, R. 2012. Sustaining conservation

- values in selectively logged tropical forests: The attained and the attainable. *Conservation Letters* 5: 296–303.
- Qingyong, N. & Xuelong, J. 2009. Crested gibbons in southeastern Yunnan, China: status and conservation. *Gibbon Journal* 5: 36–43.
- Rabanal, L.I., Kuehl, H.S., Mundry, R., Robbins, M.M. & Boesch, C. 2010. Oil prospecting and its impact on large rainforest mammals in Loango National Park, Gabon. *Biological Conservation* 143: 1017–1024.
- Rands, M.R.W., Adams, W.M., Bennun, L., Butchart, S.H.M. Clements, A., Coomes, D., Entwistle, A., Hodge, I., Kapos, V., Scharlemann, J.P.W., Sutherland, W.J. & Vira, B. 2010. Biodiversity conservation: Challenges beyond 2010. *Science* 329(5997): 1298–1303.
- Rahn, M.E., Doremus, H. & Diffendorfer, J. 2006. Species coverage in multispecies habitat conservation plans: where's the science? *BioScience* 56: 613–619.
- Rawson, B.M., Insua-Cao, P., Nguyen Manh Ha, Van Ngoc Thinh, Hoang Minh Duc, Mahood, S., Geissmann, T. & Roos, C. 2011. *The Conservation Status of Gibbons in Vietnam*. Hanoi, Fauna & Flora International & Conservation International, Hanoi, Vietnam.
- Reynolds, V. 2005. *The Chimpanzees of the Budongo Forest: Ecology, Behaviour, and Conservation*. Oxford University Press, Oxford.
- Ricketts, T.H., Soares-Filho, B., da Fonseca, G.A.B., Nepstad, D., Pfaff, A. *et al.* 2010. Indigenous lands, protected areas, and slowing climate change. *PLoS Biology* 8: e1000331.
- Rijksen, H.D. & Meijaard, E. 1999. *Our Vanishing Relative: The Status of Wild Orangutans at the Close of the Twentieth Century*. Tropenbos Publications, Wageningen.
- Rio Tinto. 2008. *Rio Tinto and Biodiversity: Biodiversity Offset Design*. Rio Tinto PLC & Rio Tinto Ltd.
- Robbins, M. & Williamson, E. 2008. *Gorilla beringei*. In: IUCN 2014. IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>. Downloaded on 10 November 2014.
- Robbins, M.M., Gray, M., Fawcett, K.A., Nutter, F.B., Uwingeli, P. *et al.* 2011. Extreme conservation leads to recovery of the Virunga mountain gorillas. *PLoS One* 6: e19788.
- Rodrigues, A.S.L, Andelman, S.J., Bakarr, M.I., Boitani, L., Brooks T.M. *et al.* 2004. Effectiveness of the global protected area network in representing species diversity. *Nature* 428: 640–643.
- Rogers, M.E., Voysey, B.C., McDonald, K.E., Parnell, R.J. & Tutin, C.E.G. 1998. Lowland gorillas and seed dispersal: the importance of nest sites. *American Journal of Primatology* 45: 45–68.
- Rosen, N. & Byers, O. (eds.). 2002. Orangutan Conservation and Reintroduction Workshop: Final Report; 2002 June 19–22. IUCN/SSC Captive Breeding Specialist Group, Palangka Raya, Kalimantan, Indonesia & Apple Valley MN.
- Ryan, S.J. & Walsh, P.D. 2011. Consequences of non-intervention for infectious disease in African great apes. *PLoS One* 6: e29030.

- Scally, A., Dutheil, J., Hillier, L., Jordan, G., Goodhead, I., Herrero, J. *et al.* 2012. Insights into hominid evolution from the gorilla genome sequence. *Nature* 483: 169–175.
- SCBD. 2007. *In-depth Review of the Expanded Programme of Work on Forest Biodiversity*. UNEP/CBD/SBSTTA/13/3. Secretariat of the Convention on Biological Diversity (SCBD), Montreal, Canada.
- SCBD. 2010. *Global Biodiversity Outlook 3*. Secretariat of the Convention on Biological Diversity (SCBD), Montreal, Canada.
- Schmiegelow, F.K.A., Cumming, S.G., Harrison, S., Leroux, S., Lisgo, K., Noss, R. & Olsen, B. 2006. *Conservation Beyond Crisis Management: A Conservation-Matrix Model*. BEACONS Discussion Paper No. 1.
- Seidel, A. 2008. *Charcoal in Africa: Importance, Problems and Possible Solution Strategies*. Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, Household Energy Programme – HERA, Eschborn, Germany. [http://www.cocinasmejoradasperu.org.pe/Publicaciones/Charcoal in Africa Importance Problems and Possible Solution Strategies.pdf](http://www.cocinasmejoradasperu.org.pe/Publicaciones/Charcoal%20in%20Africa%20Importance%20Problems%20and%20Possible%20Solution%20Strategies.pdf)
- Shearman, P., Bryan, J. & Laurence, W.F. 2012. Are we approaching 'peak timber' in the tropics? *Biological Conservation* 151: 17–21.
- Singleton, I., Wich, S.A. & Griffiths, M. 2008. *Pongo abelii*. In: IUCN 2014. IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>. Downloaded on 16 November 2014.
- Skorupa, J.P. 1988. *The effects of selective timber harvesting on rain-forest primates in Kibale Forest, Uganda*. Ph.D. thesis, University of California, Davis.
- Spelman, L.H., Gilardi, K.V.K., Lukasik-Braum, M., Kinani, J.-F., Nyirakaragire, E., Lowenstine, L.J. & Cranfield, M.R. 2013. Respiratory disease in mountain gorillas (*Gorilla beringei beringei*) in Rwanda. 1990–2010: Outbreaks, clinical course, and medical management. *Journal of Zoo and Wildlife Medicine* 44: 1027–1035.
- Stiles, D., Redmond, I., Cress, D., Nellemann, C. & Formo, R.K. (eds). 2013. *Stolen Apes – The Illicit Trade in Chimpanzees, Gorillas, Bonobos and Orangutans*. United Nations Environment Programme, GRID-Arendal, Arendal, Norway.
- Struebig, M., Fischer, M., Gaveau, D., Meijaard, E., Wich, S.A., Gonner, C., Sykes, R., Wilting, A. & Kramer-Schadt, S. (in press) Anticipated climate and land-cover changes reveal refuge areas for Borneo's orang-utans. *Global Change Biology*. doi: 10.1111/gcb.12814
- Struhsaker, T.T. 1997. *Ecology of an African Rain Forest: Logging in Kibale and the Conflict between Conservation and Exploitation*. University of Florida Press, Gainesville.
- Suckling, K., Greenwald, N. & Curry, T. 2012. *On time on target: how the Endangered Species Act Is Saving America's Wildlife*. Centre for Biological Diversity: 16. [http://www.esasuccess.org/pdfs/110 REPORT.pdf](http://www.esasuccess.org/pdfs/110%20REPORT.pdf)

- Sugardjito, J. 1995. Conservation of orangutans: threats and prospects. In: R.D. Nadler, B.F. M. Galdikas, L.K. Sheeran & N. Rosen (eds.). *The Neglected Ape*. Plenum Press, New York, pp. 45–49.
- Sugardjito, J. & van Schaik, C.P. 1993. Orangutans: current population status, threats, and conservation measures. In: R. Tilson, K. Traylor-Holzer & U.S. Seal (eds.). *Orangutan Population and Habitat Viability Analysis Workshop: Briefing Book*; 1993 January 18–20; Medan, North Sumatra, Indonesia. IUCN/SSC Captive Breeding Specialist Group, Apple Valley, MN, pp. 142–152.
- Taylor, M.F.J., Suckling K.F. & Rachlinski J.J. 2005. The effectiveness of the Endangered Species Act: A quantitative analysis. *BioScience* 55: 360–367.
- TBC. 2013. Government Policies on biodiversity offsets. The Biodiversity Consultancy. <http://www.thebiodiversityconsultancy.com/wp-content/uploads/2013/07/Government-policies-on-biodiversity-offsets3.pdf>. Accessed 16 November 2014.
- TEEB. 2010. The Economics of Ecosystems and Biodiversity Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB. <http://www.teebweb.org/publication/mainstreaming-the-economics-of-nature-a-synthesis-of-the-approach-conclusions-and-recommendations-of-teeb/>
- Teleki, G. 1980. *Hunting and Trapping Wildlife in Sierra Leone: Aspects of Exploitation and Exportation Nationwide survey of Sierra Leone's wildlife resources, emphasizing primates and other large mammals, conducted from November 1979 through May 1980 in collaboration with the Ministry of Agriculture and Forestry in Freetown*. Unpublished report to Office of the President, State House, Ministry of Agriculture and Forestry, Njala University College, Sierra Leone Nature Conservation Association, New York Zoological Society, Fauna Preservation Society, World Wildlife Fund US, World Wildlife Fund International, International Union for the Conservation of Nature and Natural Resources, IUCN/SSC TRAFFIC US, IUCN/SSC TRAFFIC International, IUCN/SSC Primate Specialist Group, International Primate Protection League.
- The Munden Project. 2011. REDD and Forest Carbon: Market-Based Critique and Recommendations. <http://www.redd-monitor.org/wp-content/uploads/2011/03/Munden-Project-2011-REDD-AND-FOREST-CARBON-A-Critique-by-the-Market.pdf>
- Thuiller, W., Araujo, M.B., Pearson, R.G., Whittaker, R.J., Brotons, L. & Lavorel, S. 2004. Biodiversity conservation: uncertainty in predictions of extinction risk. *Nature* 430 (6995) doi:10.1038/nature02716.
- 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.
- Transparency International. 2014. <http://www.transparency.org/country>

- Turner, W.R., Brandon, K., Brooks, T.M., Gascon, C., Gibbs, H.K., Lawrence, K.S., Mittermeier, R.A. & Selig, E.R. 2011. Global biodiversity conservation and the alleviation of poverty. *BioScience* 62: 85–92.
- Tutin, C.E.G., Williamson, E.A., Rogers, M.E. & Fernandez, M. 1991. Gorilla dispersal of *Cola lizae* in the Lopé Reserve, Gabon. *Journal of Tropical Ecology* 7: 181–199.
- UNDP. 2013. *The 2013 Human Development Report – The Rise of the South: Human Progress in a Diverse World*. United Nations Development Programme.
- UNEP. 1992. *Convention on Biological Diversity*. Montreal. Available at: <http://www.cbd.int/convention/text/>
- UNEP. 2011. *Toward a Green Economy – Pathways to Sustainable Development and Poverty Eradication*. Available at: <http://www.unep.org/greeneconomy/>
- UNEP. 2012. *République Démocratique du Congo Évaluation Environnementale Post-Conflit*. http://postconflict.unep.ch/publications/UNEP_DRC_PCEA_full_FR.pdf
- van Schaik, C.P., Monk, K.A. & Robertson, J.M.Y. 2001. Dramatic decline in orang-utan numbers in the Leuser Ecosystem, Northern Sumatra. *Oryx* 35: 14–25.
- van Schaik, C.P., Ancrenaz, M., Borgen, G., Galdikas, B., Knott, C., Singleton, I., Suzuki, A., Utami, S.S. & M. Merrill. 2003. Orangutan cultures and the evolution of material culture. *Science* 299: 102–105.
- van Vliet, N. & Nasi, R. 2008. Hunting for livelihood in northeast Gabon: patterns, evolution, and sustainability. *Ecology and Society* 13: 33.
- Villegas, C., Weinberg, R., Levin, E. & Hund, K. 2012. *Artisanal and Small Scale Mining in Protected Areas and Critical Ecosystems: Global Scoping and Solutions*. Cambridge, U.K: ASM-PACE Programme. Estelle Levin Ltd and World Wild Fund for Nature. Available at: <http://www.amazonia-andina.org/sites/default/files/asm-pace.pdf>
- Walker Painemilla, K., Rylands, A.B., Woofter, A. & Hughes, C. (eds.). 2010. *Indigenous Peoples and Conservation: From Rights to Resource Management*. Conservation International, Arlington, VA. Available at: http://www.conservation.org/publications/Pages/indigenous_peoples_and_conservation_rights_resource_management.aspx
- Walpole, M.J. & Leader-Williams N. 2002. Tourism and flagship species in conservation. *Biodiversity Conservation* 11: 543–547.
- Walsh, P.D., Abernethy, K.A., Bermejo, M., Beyersk, R., De Wachter, P., Akou, M.E., Huijbregts, B., Mambounga, D.I., Toham, A.K., Kilbourn, A.M., Lahm, S.A., Latour, S., Maisels, F., Mbinak, C., Mihindouk, Y., Ndong Obiang, S., Ntsame Effa, E., Starkey, M.E., Telfer, P., Thibault, M., Tutin, C.E.G., White, L.J.T. & Wilkie, D.S. 2003. Catastrophic ape decline in western equatorial Africa. *Nature* 422: 611–614.
- Walsh, P.D., Tutin, C.E.G., Oates, J.F., Baillie, J.E.M., Maisels, F., Stokes, E.J., Gatti, S., Bergl, R.A., Sunderland-Groves, J. & Dunn, A. 2008. *Gorilla gorilla*. In: IUCN 2014. IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>. Downloaded on 10 November 2014.

- Warren, Y. & Williamson, E.A. 2001. Carriage of infants by a silverback mountain gorilla. *Folia Primatologica* 72: 245–247.
- Weng, L., Boedhihartono A.K., Dirks P.H.G.M., Lubis, M.I., Sayer, J.A. & Dixon, J. 2013. Mineral industries, growth corridors and agricultural development in Africa. *Global Food Security* 2: 195–202.
- White, A. & Fa, J.E. 2014. The bigger picture: indirect impacts of extractive industries on apes and ape habitat. In: Arcus Foundation (ed.), *State of the Apes 2013: Extractive Industries and Ape Conservation*. Cambridge University Press, Cambridge, UK, pp. 197–225.
- White, L.J.T. & Tutin, C.E.G. 2001. Why chimpanzees and gorillas respond differently to logging: A cautionary tale from Gabon. In: W. Weber, L.J.T. White, A. Vedder & L. Naughton-Treves (eds.), *African Rain Forest Ecology and Conservation: An Interdisciplinary Perspective*, Yale University Press, New Haven, pp. 449–462.
- 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.
- Whiten, A. & Boesch, C. 2001. The cultures of chimpanzees. *Scientific American* 284: 48–54.
- Wicander, S. & Coad, L. 2014. Learning our Lessons: A Review of Alternative Livelihood Projects in Central Africa. ECI, University of Oxford. Oxford, and IUCN, Gland, Switzerland.
- Wich, S., Riswan, Jenson, J., Refisch, J. & Nellemann, C. (eds.) 2011. *Orangutans and the Economics of Sustainable Forest Management in Sumatra*. UNEP/GRASP/PanEco/YEL/ICRAF/GRID-Arendal, Birkeland Trykkeri AS, Norway.
- Wich, S., Struebig, M., Refisch, J., Wilting, A., Kramer-Schadt, S. & Meijaard, E. (in press). *The Future of the Bornean Orangutan: Impacts of a Changing Climate and Land Use*. UNEP-GRASP, Nairobi.
- Wich S.A., Fredriksson G.M., Usher G., Peters H.H., Priatna, D. *et al.* 2012a. Hunting of Sumatran orang-utans and its importance in determining distribution and density. *Biological Conservation* 146: 163–169.
- Wich, S.A., Gaveau, D., Abram, N., Ancrenaz, M., Baccini, A. *et al.* 2012b. Understanding the impacts of land-use policies on a threatened species: is there a future for the Bornean orang-utan? *PLoS One* 7: e49142.
- Wich, S.A., Meijaard, E., Marshall, A.J., Husson, S., Ancrenaz, M., Lacy, R.C., van Schaik, C.P., Sugardjito, J., Simorangkir, T., Traylor-Holzer, K., Doughty, M., Supriatna, J., Dennis, R., Gumal, M., Knott, C.D. & Singleton, I. (2008). Distribution and conservation status of the orang-utan (*Pongo* spp.) on Borneo and Sumatra: how many remain? *Oryx* 42: 329–339.
- Wilkie, D., Shaw, E., Rotberg, F., Morelli, G. & 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., Rawson, B.M., Cheyne, S.M., Meijaard, E. & Wich, S.A. 2014. Ecological impacts of extractive industries on ape populations. In: Arcus Foundation (ed.), *State of the Apes 2013: Extractive Industries and Ape Conservation*. Cambridge University Press, Cambridge, UK, pp. 65–99.
- Woodford, M.H., Butynski, T.M. & Karesh, W.B. 2002. Habituating the great apes: the disease risks. *Oryx* 36: 153–160.
- Wolfe, N.D., Escalante, A.A., Karesh, A.A., Kilbourn, A., Spielman, A & Lala, A.A. 1998. Wild primates populations in emerging infectious disease research: The missing link? *Emerging Infectious Disease*, 4: 451–457.
- World Bank. 2013. The World Bank Annual Report 2013. Washington, DC: World Bank. DOI: 10.1596/978-0-8213-9937-8.
- World Bank Group. 2012. *Toward a Green, Clean, and Resilient World for All: A World Bank Group Environment Strategy 2012–2022*. Washington, DC: World Bank Group.
- Zimmerman B.L. & Kormos C.F. 2012. Prospects for sustainable logging in tropical forests. *BioScience* 62: 479–487.
- Zhou, J., Fuwen, W., Ming, L., Jianfeng, Z., Deli, W. & Ruliang, P. 2005. Hainan black-crested gibbon is headed for extinction. *International Journal of Primatology* 26: 453–465.

ANNEX 1. THE APES: WHO ARE THEY?

Great Apes

Chimpanzees

There are two species of chimpanzees (*Pan*): (1) the common chimpanzees (*Pan troglodytes*) with four subspecies (i) western chimpanzee (*P. troglodytes verus*), (ii) Nigeria-Cameroon chimpanzee (*P. troglodytes ellioti*), (iii) central chimpanzee (*P. troglodytes troglodytes*), and eastern chimpanzee (*P. troglodytes schweinfurthii*); and (2) the bonobo (*P. paniscus*).

Chimpanzees are the most widely distributed great ape, occurring in 23 countries: Angola (Cabinda), Benin, Burkina Faso, Burundi, Cameroon, CAR, Côte d'Ivoire, Congo, DRC, Equatorial Guinea, Gabon, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Nigeria, Rwanda, Senegal, Sierra Leone, South Sudan, Tanzania and Uganda. The most westerly subspecies, the western chimpanzee, is found in Côte d'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Senegal and Sierra Leone. It is possibly extinct already in Benin and Burkina Faso; it is regionally extinct in the Gambia and Togo (IUCN 2014). The Nigeria-Cameroon chimpanzee is found in Cameroon and Nigeria, north of the Sanaga River. The central chimpanzee is found in Angola (Cabinda), Cameroon, CAR, Congo, DRC, Equatorial Guinea and Gabon, and the eastern chimpanzee is found in Burundi, CAR, DRC, Rwanda, South Sudan, Tanzania and Uganda.

Bonobos

There is one species of bonobo: *Pan paniscus*. Bonobos occur in DRC only, in a discontinuous population south of the Congo River.

Gorillas

There two species of gorillas (*Gorilla*): (1) western gorillas (*Gorilla gorilla*) with two subspecies (i) western lowland gorilla (*G. gorilla gorilla*), and (ii) Cross River gorilla (*G. gorilla diehli*); and (2) eastern gorillas (*Gorilla beringei*) also with two subspecies (i) mountain gorilla (*G. beringei beringei*), and (ii) Grauer's gorilla (*G. beringei graueri*).

Gorillas are found in discontinuous populations in 10 countries across Central Africa. The westernmost subspecies—the Cross River gorilla—is found in Nigeria and Cameroon. The western lowland gorilla is found in Angola (Cabinda), Cameroon, CAR, Congo, Equatorial Guinea and Gabon. Eastern gorillas are found in DRC, Rwanda and Uganda. The mountain gorilla subspecies lives in the Virunga Volcanoes that straddle the border between Uganda (Mgahinga Gorilla National Park), Rwanda (Volcanoes National Park) and DRC (Virunga National Park), and the Bwindi Impenetrable National Park in southwestern Uganda and Sarambwe forest in DRC. Grauer's gorillas are found only in eastern DRC.

Orangutans

There are two species of orangutans (*Pongo*): Bornean orangutans (*Pongo pygmaeus*) with three subspecies (i) Northwest Bornean orangutan (*P. pygmaeus pygmaeus*), (ii) Southwest Bornean orangutan (*P. pygmaeus wurmbii*), and (iii) Northeast Bornean orangutan (*P. pygmaeus morio*); and (2) Sumatran orangutan (*P. abelii*).

Orangutans used to be part of a diverse taxon distributed across Europe and mainland Asia. Until about 40,000 years ago they were found from southern China to the island of Java. Today they live in remnant populations on only two islands – Borneo and Sumatra. Sumatran orangutans remain only in the northern part of Sumatra in Indonesia, while Bornean orangutans live in the two states of Sabah and Sarawak in Malaysia and in four provinces of Kalimantan in Indonesia.

Small Apes

There are four groups (genera) of small apes and 18 species in total: (1) siamang (*Symphalangus*) with one species – *S. syndactylus*; (2) dwarf gibbons (*Hylobates*) with nine species (i) lar or white-handed gibbons (*H. lar*) with five subspecies, (ii) Bornean white-bearded gibbon (*H. albibarbis*), (iii) agile or black-handed gibbon (*H. agilis*), (iv) Müller's Bornean gibbon (*H. muelleri*), (v) Abbott's gray gibbon (*H. abbotti*), (vi) east Bornean gray gibbon (*H. funereus*), (vii) Moloch or Javan gibbon (*H. moloch*), (viii) Kloss's gibbon (*H. klossi*), and (ix) pileated gibbon (*H. pileatus*); (3) hoolock gibbons (*Hoolock*) with two species (i) western hoolock gibbons (*H. hoolock*) with two subspecies, and (ii) eastern hoolock gibbon (*H. leuconedys*); and (4) the black crested or concolor gibbons (*Nomascus*) with seven species (i) western black crested gibbons (*N. concolor*) with two subspecies, (ii) eastern black crested gibbon (*N. nasutus*), (iii) Hainan crested gibbon (*N. hainanus*), (iv) northern yellow-cheeked crested gibbon (*N. annamensis*), (v) northern white-cheeked crested gibbon (*N. leucogenys*), (vi) southern white-cheeked crested gibbon (*N. siki*), and (vii) southern yellow-cheeked crested gibbon (*N. gabriellae*).

Gibbons are found across the rainforests of Southeast, South and East Asia in 11 countries – Bangladesh, Brunei, Cambodia, China, India, Indonesia, Laos, Malaysia, Myanmar, Thailand, and Vietnam. The two species of hoolock gibbon (*Hoolock*) occur in four countries: Bangladesh, northwest India, Myanmar, and south China. The nine species of dwarf gibbons (*Hylobates*) have the widest range, across seven countries: Malaysia, Brunei, Laos, Cambodia, Thailand, Indonesia, and Myanmar (until very recently also China and Vietnam, but now extinct there). Crested gibbons (*Nomascus*) are found in only four countries – Vietnam, China, Laos, and Cambodia. The northern white-cheeked crested gibbon (*N. leucogenys*) was recently reported extinct in China. The siamang (*Symphalangus*) is found only in Peninsular Malaysia and Indonesia (Sumatra).

ANNEX 2. THE APES: WHERE ARE THEY?

a. Countries in Africa with great apes (*Pan* and *Gorilla*)

Country	Western chimpanzee	Nigeria-Cameroon chimpanzee	Central chimpanzee	Eastern chimpanzee	Bonobo	Mountain gorilla	Grauer's gorilla	Western lowland gorilla	Cross River gorilla	Total
Angola	0	0	Yes	0	0	0	0	Yes	0	1
Benin	Probably extinct	0	0	0	0	0	0	0	0	0
Burkina Faso	Probably extinct	0	0	0	0	0	0	0	0	0
Burundi	0	0	0	Yes	0	0	0	0	0	1
Cameroon	0	Yes	Yes	0	0	0	0	Yes	Yes	4
CAR	0	0	Yes	?	0	0	0	Yes	0	2
Congo	0	0	Yes	0	0	0	0	Yes	0	2
Cote d'Ivoire	Yes	0	0	0	0	0	0	0	0	0
DRC	0	0	Relict population	?	Yes	Yes	Yes	Extinct	0	3
Equatorial Guinea	0	0	Yes	0	0	0	0	Yes	0	2
Gabon	0	0	Yes	0	0	0	0	Yes	0	2
Ghana	Yes	0	0	0	0	0	0	0	0	1
Guinea	Yes	0	0	0	0	0	0	0	0	1
Guinea-Bissau	Yes	0	0	0	0	0	0	0	0	1
Liberia	Yes	0	0	0	0	0	0	0	0	1
Mali	Yes	0	0	0	0	0	0	0	0	1
Nigeria	0	Yes	0	0	0	0	0	0	Yes	2
Rwanda	0	0	0	Yes	0	Yes	0	0	0	2
Senegal	Yes	0	0	0	0	0	0	0	0	1
Sierra Leone	Yes	0	0	0	0	0	0	0	0	1
South Sudan	0	0	0	Yes	0	0	0	0	0	1
Uganda	0	0	0	Yes	0	Yes	0	0	0	2
Tanzania	0	0	0	Yes	0	0	0	0	0	1
Total	8(10?)	2	7	5(?)	1	3	1	6	2	

b. Countries in Asia with great apes (*Pongo*)

Country	Sumatran orangutan (<i>Pongo abelii</i>)	Bornean orangutan (<i>Pongo pygmaeus morio</i>)	Bornean orangutan (<i>Pongo pygmaeus wurmbii</i>)	Bornean orangutan (<i>Pongo pygmaeus pygmaeus</i>)	Total
Indonesia	Yes	Yes	Yes	Yes	4
Malaysia	0	Yes	0	Yes	2
Total	1	2	1	2	

c. Countries in Asia with gibbons (*Hylobates*, *Hoolock*, *Nomascus* and *Symphalangus*)

Country	Lar gibbon or white-handed gibbon (<i>Hylobates lar</i>)	Bornean white-bearded gibbon (<i>Hylobates albibarbis</i>)	Agile gibbon or black-handed gibbon (<i>Hylobates agilis</i>)	Müller's Bornean gibbon (<i>Hylobates muelleri</i>)	Abbott's grey gibbon (<i>Hylobates abbotti</i>)	East Bornean grey gibbon (<i>Hylobates funereus</i>)	Silvery gibbon (<i>Hylobates moloch</i>)	Pileated gibbon or capped gibbon (<i>Hylobates pileatus</i>)	Kloss's gibbon, Mentawai gibbon or bilou (<i>Hylobates klossii</i>)
Bangladesh									
Myanmar	Yes								
Cambodia								Yes	
China	Extinct								
India									
Indonesia	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
Laos	Yes							Yes	
Malaysia	Yes		Yes		Yes	Yes			
Thailand	Yes		Yes					Yes	
Vietnam								?	
Total	5	1	3	1	2	2	1	3	1

Country	Concolor or black crested gibbon (<i>Nomascus concolor</i>)	Eastern black crested gibbon or Cao Vit black crested gibbon (<i>Nomascus nasutus</i>)	Hainan black crested gibbon (<i>Nomascus hainanus</i>)	Northern white-cheeked gibbon (<i>Nomascus leucogenys</i>)	Southern white-cheeked gibbon (<i>Nomascus siki</i>)	Yellow-cheeked gibbon (<i>Nomascus gabriellae</i>)	Northern yellow-cheeked crest gibbon (<i>Nomascus annamensis</i>)	Siamang (<i>Symphalangus syndactylus</i>)
Bangladesh								
Myanmar								
Cambodia						Yes	Yes	
China	Yes	Yes	Yes	Extinct?				
India								
Indonesia								Yes
Laos	Yes			Yes	Yes		Yes	
Malaysia								Yes
Thailand								Yes
Vietnam	Yes	Yes		Yes	Yes	Yes	Yes	
Total	3	2	1	2	2	2	3	3

ANNEX 3. THE DRIVERS

Poaching

Large-scale hunting of apes is primarily a result of the domestic demand for meat. Often referred to as the “bushmeat trade,” it is the commercial trade in the meat (for human consumption) of wild animals. Apes are eaten in many parts of their range, although studies have found that ape meat forms only a small percentage (2% on average) of wild meat sold in Ivory Coast (Caspary *et al.* 2001). This is an underestimate as the trade is clandestine; nonetheless, ape meat has very little importance as a source of protein. Even such a small percentage of ape meat in markets, however, can have catastrophic implications for all ape

populations due to their slow reproductive rates, as mentioned above. Apes are also killed as a result of the demand for primate-derived medicinal products. This trade is an especially significant threat to gibbons in Vietnam and China (Qingyong & Xuelong 2009).

Extractive industries, such as logging and mining, exacerbate the scale of hunting, especially because of the associated construction of road networks, as this facilitates transport and trade in wild meat (Brashares *et al.* 2004; Brugière & Magassouba 2009; Poulsen *et al.* 2009; White & Fa 2014). Civil conflict in countries such as the DRC has also intensified the commercial wild meat trade due to increased access to firearms and since Internally Displaced People (IDP) and militia groups may rely heavily on wild meat. Some national parks in the Congo Basin have lost up to 80% of their large mammals (Nellemann *et al.* 2010).

The illegal international trade in live apes has not received much attention, although it is significant. In 2013, the Great Apes Survival Partnership (GRASP) released the report, *Stolen Apes*, the first attempt to gauge the scale and scope of the trade, and estimated that over 2,200 chimpanzees, gorillas, bonobos and orangutans are lost from the wild each year (Stiles *et al.* 2013). In recent years 130 chimpanzees have been exported from the Republic of Guinea to China using falsified CITES permits. On average, two orangutans are smuggled from Borneo to Singapore every week (Rosen & Byers 2002), and many illegal pet orangutans have been apprehended in transit to or in Taiwan, which is the principal destination for illegally-trafficked orangutans. For every live ape in captivity, many have been killed in the process of capture and transport. This has been estimated to be somewhere between five and 15 individuals killed for every ape in captivity (Teleki 1980). Extrapolating from this number, Stiles *et al.* (2013) suggest that as many as 22,218 great apes may have been lost from the wild between 2005 and 2011 due to the illegal trade, and that chimpanzees make up 64% of that number. For other apes, especially orangutans, entering the pet trade is a byproduct of losing their habitat. Apes are also killed intentionally to protect crops or when they are perceived to be in conflict with humans for resources (Hockings & Humle 2009; Meijaard *et al.* 2011b), and unintentionally when caught in snares.

Industrial Agriculture

Overall, agriculture is the main driver for about 80% of deforestation worldwide. Gibbs *et al.* (2010) found that, across the tropics, between 1980 and 2000 more than 55% of new agricultural land was created at the expense of intact forests. In subtropical Asia, industrial agriculture is responsible for about one-third of deforestation and is of similar importance to subsistence agriculture (Kissinger *et al.* 2012).

In the last decade there has been a major surge in demand for land for agriculture, linked to increases in demand for commodities such as palm oil, sugar and rubber; land acquisition by multinational and international companies is expanding in countries with weak governance and insecure land rights. In tropical countries the area of cropland has

expanded by about 48 million ha/year from 1999–2008 (Phalan *et al.* 2013). Although the emphasis on this expansion does not entirely cover forested areas, with a considerable portion occurring in already degraded land, the domino effects of this expansion are nonetheless likely to be significant on ape forest habitat, as existing agriculture and livelihood activities are displaced and human populations settle further into ape ranges.

One of the crops that has been most threatening to apes is the oil palm (*Elaeis guineensis*). Oil-palm plantations covered about 7.8 million ha in 2010. Worldwide demand for palm oil is expected to double by 2020 and further loss of natural forest is expected. Experience from Malaysia and Indonesia has demonstrated that the palm oil industry has contributed overwhelmingly to total forest loss, carbon emissions and devastation of wildlife populations. Overall, an estimated 10 million ha—or 5% of the total orangutan range—was converted to oil palm plantations between 2000 and 2010 (Meijaard *et al.* 2012). In Sumatra specifically, the palm oil industry has resulted in 43% of forest lost in northern Sumatra, and an estimated 92% reduction of the Sumatran orangutan population (Wich *et al.* 2012b). The populations of orangutan most affected are those in the lowlands of eastern Sabah, a Malaysian state in north Borneo (Ancrenaz *et al.* 2004; Goossens *et al.* 2006), and in the coastal peat swamps in the Indonesian province of Sumatra (Meijaard *et al.* 2011a). It is estimated that converting a forest area into an industrial plantation results in the death or displacement of more than 95% of the orangutans originally present (Wich *et al.* 2012b).

Cropland expansion is not only a threat in the Asia region. In fact, Central Africa is one of the regions expected to be targeted for most of the cropland expansion in the future (Phalan *et al.* 2013). Although in the past deforestation rates for crop expansion in Central Africa have not been as high as in other areas of the world, this discrepancy was mostly a result of low human population densities, low road density and political instability. As these factors change and as intact primary forests become fragmented and more accessible, conversion to cassava, oil palm, rice and sugar-cane plantations following logging is the most frequent scenario (Zimmerman & Kormos 2012). Crop expansion in Central Africa is predicted to increase significantly as a result.

Although forest conversion to agriculture is linked to economic growth, there are significant costs related to the drying of rivers, erosion and flooding, loss of food security, deteriorating human health and climate change. In addition, infrastructure built to support agro-industrial plantations open the forest to logging (legal and illegal) and hunting activities. The costs of these impacts to local people and the ecosystem are not calculated in the price (and profits) of the palm oil industry. These costs need to be weighed against the fact that agricultural expansion is predicted to result in only a 20% increase in food production in developing countries in coming decades (Phalan *et al.* 2013). Poor planning and “business as usual” approaches for intensive agriculture development also result in huge economic losses and environmental damage. A recent study in eastern Sabah showed that a significant proportion of the extensive oil palm landscape of Kinabatangan was redundant

and a net source of economic losses to the companies that had converted the forest (Abram *et al.* 2014). Better informed land-use planning would easily prevent this from happening.

Significant expertise exists in the ways to halt and reverse land degradation due to deforestation and inadequate land management through improved land-use systems and land-management practices. These include the use of degraded rather than forested land for agriculture, and the improvement of degraded land by focusing on soil and water conservation and improved biofertilizers.

Extractive industries

Mining results in deforestation in Africa and Asia as a result of the removal of forest and topsoil for the excavation of minerals, the flooding of forested areas, the building of roads to transport the material, the building of other infrastructure such as the processing plants. Sometimes the greatest destruction occurs, however, as a result of migration of workers, and those seeking employment into the area. This influx of people not only puts pressure on the forests, but also often results in an increase in the consumption and trade of wild meat. Worldwide demand for minerals and metals is rising and therefore mineral resources will be further exploited, resulting in further forest degradation, pollution, erosion, and deforestation.

Africa produces many of the world's most important minerals and metals and has the world's largest mineral reserves of platinum, gold, diamonds, chromite, manganese, and vanadium (Edwards *et al.* 2014). Mining and oil and gas exploration have already increased rapidly and large-scale agricultural land acquisition has proliferated across much of Africa and is likely to continue to increase over the next generation (Weng *et al.* 2013; Edwards *et al.* 2014).

State of the Apes 2013: Extractive Industries and Ape Conservation (Arcus Foundation 2014)

The State of the Apes series was conceived to draw attention to the evolving context within which great apes and gibbons exist. Aimed at a broad range of policy and decision makers in government and industry, donors, researchers and civil society these publications ultimately seek to help reconcile ape conservation and welfare, and economic and social development through objective and rigorous analysis.

The pilot edition focuses on Extractive Industries and Ape Conservation. It includes detail of examples of improved practice that can inform decision makers although there are significant knowledge gaps, and much more expertise is needed to inform government, financial institutions and industry on likely impacts and options for avoidance or mitigation early on in the planning process. This edition also highlights the importance that all information and potential impacts are considered at the landscape level, not just on a site-by-site basis; not only because of the potential cumulative impact of multiple projects, but also because the indirect impacts of extractive industries are shared by other industries and extend well outside the concession boundaries.

Areas in African ape habitat particularly under threat from mining include Guinea, Gabon, Republic of Congo, Democratic Republic of Congo, Cameroon and Liberia. Guinea holds the world's largest bauxite reserves (used to make aluminum) and Guinea's Simandou iron-ore deposit is thought to be one of the largest in Africa. Guinea is also the country believed to harbor the largest population of the western chimpanzee. Gorillas in DRC in the Kahuzi-Biéga National Park have also been affected by the illegal artisanal mining of columbium and tantalum (coltan, which is used in electrical capacitors for numerous purposes including airbags, mobile phones and computers), and gold (Nellemann *et al.* 2010).

In Asia, the threat of mining is expected to increase as a result of declining revenues from oil and gas production in Aceh as well as increased stability with the end of the civil conflict in 2005. In Aceh there is potential for mining coal, iron ore and bauxite. In northern Sumatra there is a major gold mine near the town of Batang Toru, iron ore mining has been proposed in the Alas valley, and development of coal mining is planned in the hill forests inland of the Tripa swamps (Wich *et al.* 2011). Open-cast and gold mining is also planned in the Heart of Borneo, and Central Kalimantan. The effects of mining on apes are likely to be even more dramatic and long term than logging impacts (assuming logging does not lead to forest fires, intense hunting or conversion to agriculture) because mining often leads to the immediate excavation and destruction of significant areas of forest and topsoil, as well as the migration of large numbers of people. While the effects of logging on ape populations have been documented in several studies, there have been few studies on the impact of mining on apes and the effects remain largely unknown. Impacts will most likely be dependent on the

availability and state of nearby forests where ape populations can immigrate while mining occurs and in the decades following the mining if the forest is allowed to regenerate.

Oil and Gas

As with logging and mining, oil and gas pipelines open up previously remote areas giving increased access to hunters and facilitating the transport of bush meat to markets. Drilling sites also impact biodiversity in general and oil spills have had catastrophic effects on wildlife worldwide. Oil and gas exploration have had significant impacts on gorillas and chimpanzees and their habitats in several countries. The ExxonMobil/ChevronTexaco Chad-to-Cameroon oil pipeline project, for example, traversed important ape habitat in Cameroon. This project aimed to compensate for losses to apes, but the results, in terms of both area protected and sustainable finance were inadequate (Kormos & Kormos 2011).

Recent research on the impact of oil exploration on large rainforest mammals in Loango National Park in Gabon revealed that seismic activity resulted in behavioral changes in western lowland gorillas as they avoided areas where seismic activity had occurred (Rabanal *et al.* 2010). Research on the impacts of oil extraction on ape populations however, is limited and further research is required (Lanjouw 2014). The Virunga National Park, a World Heritage Site designated for its exceptional biodiversity value and importance, as well as being the home of the endangered mountain gorillas, is currently the site of extensive oil exploration, based on extraction occurring on the opposite side of the border, in Uganda.

Logging

Massive destruction of forests is occurring worldwide, with tropical forests being lost at a rate of 10–13 million ha each year (FAO 2010; Hansen *et al.* 2013). This loss is occurring primarily as a result of the intense pressure to maximize short-term timber profits and to convert forest to more economically valuable industrial monocultures. Impacts on apes result not just from the degradation of their habitats but also from the logging roads that facilitate human colonization of formerly-inaccessible areas and consequent widespread illegal logging in the face of weak governance in the forest sectors of many tropical countries (Lawson & MacFaul 2010).

Logging concessions frequently overlap with ape habitat. For example, more than 29% of the range of orangutans in Borneo has been allocated to logging concessions, and likewise 50% of the range of chimpanzees and gorillas in Western Equatorial Africa, including 36% of the total area of the exceptional priority apes conservation sites (Morgan & Sanz 2007; Wich *et al.* 2012b). Both legal and illegal logging have resulted in widespread losses of apes throughout their ranges (Rijksen & Meijaard 1999; van Schaik *et al.* 2001).

The effects of logging on apes have been documented in several studies (Johns & Skorupa 1987; Skorupa 1988; Johns 1992; Struhsaker 1997; White & Tutin 2001; Meijaard *et al.* 2006). The most likely immediate response of apes to logging is that they move rapidly away from the noise, machinery, human activity and the loss of their habitat (White & Tutin

2001; Reynolds 2005; Ancrenaz *et al.* 2010). This can result in mortality of apes for a number of reasons. Moving into new areas can result in conflict with neighboring communities of apes, especially amongst chimpanzees where invading groups may be injured or killed (Goodall 1986; White & Tutin 2001; Boesch *et al.* 2008; Mitani *et al.* 2010). The territorial gibbons show an extreme reluctance to move. Apes that eat primarily fruit may also have difficulty in finding available in-season fruiting trees in an unfamiliar habitat. Keystone resources that may be vital to help apes survive through periods of fruit scarcity may not be abundantly available in a new territory. Water can also be more difficult to find in the new territory, compounding the difficulties for ape populations forced to relocate due to logging activities. Animals subject to stress are more vulnerable to diseases and parasite loads, which can in turn affect great ape health and reproduction (e.g., Emery Thompson *et al.* 2007).

The indirect effects of logging on ape populations can be even more severe. Access created by logging roads often increases pressure on natural resources and, critically, increases hunting to supply wild meat for logging camps (Wilkie *et al.* 2000; Laporte *et al.* 2007; Abernethy *et al.* 2013). Road construction by logging companies may also lead to habitat fragmentation (Goosem 2007). Isolating small populations of apes can result in decreased genetic diversity in a group, which in turn can result in increased susceptibility to disease.

More importantly, however, industrial logging leads not only to forest degradation, but often to complete deforestation over the long term. This is due to several factors. One factor is that logging makes forests more fire prone by creating large light gaps that dry out the forest. Logging operations also tend to leave large amounts of combustible dry slash on the forest floor (Cochrane 2003; Nawir & Rumboko 2007; Matricardi *et al.* 2010; Shearman *et al.* 2012).

A significant cost factor, however, is that logging frequently acts as a precursor for conversion of tropical forests to other uses (SCBD 2007; Shearman *et al.* 2012; Zimmerman & Kormos 2012; Mayaux *et al.* 2013), a process closely associated with road building to facilitate logging operations (Laporte *et al.* 2007; Laurance *et al.* 2009; Bryan *et al.* 2013; Laurance & Balmford 2013). In Asia, logging and logging roads have played a key role in opening up forests for conversion to industrial agriculture, in particular oil palm plantations (Shearman *et al.* 2012; Wich *et al.* 2012b; Bryan *et al.* 2013). In Malaysian Borneo and Brunei alone, almost 365,000 km of logging roads were built between 1990 and 2009 (Bryan *et al.* 2013; Gaveau *et al.* 2014).

In the Congo Basin, roads have facilitated human colonization of formerly inaccessible areas, which has in turn resulted in forest loss through activities such as fuelwood extraction and small-scale agriculture (Mayaux *et al.* 2013). Conversion of forest to industrial agriculture on the scale that has happened in Asia has not yet occurred in Africa, probably because the human population density in the Congo Basin remains relatively low (Mayaux *et al.* 2013). However, 30% of the Congo Basin has already been awarded to forest

concessions, 52 million ha of logging roads have been built, and many more roads are expected. An exponential amount of deforestation is predicted in coming decades as a result of human population increases (Laporte *et al.* 2007; Mayaux *et al.* 2013).

Because there is such a high overlap in the percentage of ape habitat in logging concessions, the need to mitigate the impacts of logging is considerable and urgent. Apes may be able to persist if disturbance is light and areas are available for apes to migrate during active disturbance (Ancrenaz *et al.* 2010).

Some conservationists have argued that logging concessions might play a more strategic role in conservation, for example, by systematically protecting apes on concessions that are closely monitored and lightly logged or, at larger scales, by providing buffers and connectivity for protected areas in a larger landscape (Ancrenaz *et al.* 2010; Fisher *et al.* 2011; Putz *et al.* 2012). Unfortunately, after decades of trying to achieve sustainability, the evidence now clearly demonstrates that logging tropical forest leads to complete deforestation over time (Shearman *et al.* 2012; Zimmerman & Kormos 2012). Working towards more sustainable logging practices may result in mitigation of ape losses in the short term, but it is not resulting in protection of ape habitat in the long-term.

The reasons that industrial logging is not sustainable are many. First, high value tropical hardwood species have low growth rates, occur at low densities and need large areas of continuous, undisturbed forest to reproduce (Karsenty & Gourlet-Fleury 2006; Nasi & Frost 2009; Putz *et al.* 2012; Shearman *et al.* 2012; Zimmerman & Kormos 2012). Logging in a manner that would be sustainable for these species would therefore require logging at such low densities and over such long rotation periods that achieving sustaining yields in an economically-viable manner would not be possible and would require substantial subsidy (Bowles *et al.* 1998; Karsenty & Gourlet-Fleury 2006; Nasi & Frost 2009; Shearman *et al.* 2012; Zimmerman & Kormos 2012). This provides little incentive for companies to log sustainably. This is reflected in the recent finding by the International Tropical Timber Organization report that 90% of logging was poorly managed or not managed at all (Blaser *et al.* 2011) and that few logging concessions have attempted to obtain Forest Stewardship Council (FSC) certification. Even FSC certification does not reflect that a logging company has achieved sustained timber yields or has maintained a forest's full biodiversity, structure and composition—it only indicates compliance with good logging practices.

Second, very high rates of corruption and illegal logging in tropical forest sectors (Lawson & MacFaul 2010) provide little hope that good governance can be ensured in the near future. Even if industrial logging could be sustainable, there is a strong likelihood that the *status quo* would persist and that many companies would continue overharvesting on their concessions because of the strong financial incentive to maximize profits in the short term.

Third, the higher economic value of industrial agriculture creates a powerful incentive to convert forests to plantations once the most valuable timber has been removed and roads have been built. Even subsidizing timber operations would probably not be

sufficient to counteract this financial incentive (Butler *et al.* 2009). Thus, even achieving sustainability and good governance, both of which are currently remote possibilities, is probably insufficient to keep forests standing.

So what hope is there for apes living in logging concessions that are doomed to full conversion in the long term? The large areas of habitat in these concessions make it essential for conservation organizations to continue to work with logging companies within these concessions to mitigate logging impacts on ape populations. Implementing logging best practice guidelines such as those produced by the IUCN *Best Practice Guidelines for Reducing the Impact of Commercial Logging on Great Apes in Western Equatorial Africa* is also important (Morgan & Sanz 2007). This may not protect ape populations in the long term, but it does buy time until other conservation measures and management schemes can be put in place.

Because roads and logging operations greatly increase the risk of conversion and the costs of protecting these forests, effective conservation probably requires areas to remain roadless (Bryan *et al.* 2013). The management mechanisms that have demonstrated the capacity to keep tropical forests intact at large scales over time are protected areas and indigenous and community conserved areas (Nepstad *et al.* 2006; Andam *et al.* 2008; Kothari 2008; Rands *et al.* 2010; Ricketts *et al.* 2010; Zimmerman & Kormos 2012; Hein *et al.* 2013). International conservation funding should therefore support these mechanisms, rather than subsidize industrial logging. Support for plantations must be strictly limited areas where the forests have already been destroyed and are no longer viable ape habitats.

Small holder agriculture

Habitat destruction and degradation as a result of slash-and-burn and other smallholder agricultural activities has significant impacts on populations of apes. Slash-and-burn agriculture has severely reduced chimpanzee habitat, especially in West Africa. More than 80% of the region's original forest cover has been lost, and rapid growth in human populations across Africa is expected to lead to continued widespread conversion of forest and woodland to agricultural land. A study on the impact of smallholder agriculture on the Guinean rainforests of West Africa indicated that for the period 1988–2007 an area of 68 million ha was encroached by farmers planting cacao, oil palm and cassava. This increase in agricultural expansion has been linked to the rapid growth of urban populations and the associated increase in demands for stable food commodities (such as palm oil and cassava) that it engenders.

In Asia, smallholder agriculture has also resulted in the major destruction of forest areas, causing a decline in ape populations. Cardamom plantations, for example, have caused a major decline of the hoolock gibbon population in Nankang (Fan & Huai-Sen Ai 2011) and a high percentage of forest where the Sumatran orangutan occurs has also been converted for smallholder agriculture (Wich *et al.* 2011).

Fuel collection/charcoal production

Fuelwood and charcoal comprise the main sources of energy for cooking, heating and food preservation in rural households in most developing countries (Arnold & Persson 2003). Patterns of fuelwood use have shifted over the last 15 years. Using wood for fuel increased significantly in Africa and Latin America, but decreased in Asia by about half. Wood continues to be a significant source of domestic energy worldwide, and the amount of wood used for energy is expected to remain relatively stable over the next 20 years. The demand for charcoal, however, is expected to increase as a result of an increasingly urbanized population since urban households use more charcoal than rural households. An International Energy Agency (IEA) study estimated that, in 2000, in Africa, 80–90% of the biomass used as fuel was wood. In Asia more than half was agricultural residues and dung (IEA 2002). The majority of the demand is driven from urban centers, with 80% of the wood used in many African cities. Estimates of the consumption of charcoal from cities such as Dar-es-Salaam are from 1997–2000 at 471,000 tons each year and Kampala in Uganda are approximately 230,000 tons each year (Seidel 2008). With an estimated two million people economically dependent on charcoal trade, transport and production in Kenya, the impacts on ape habitats are increasing. In areas such as Virunga National Park in DRC, habitat destruction as a result of illegal fuelwood collection and charcoal production is considered the greatest threat to habitat, with an estimated 3 million cubic meters of wood harvested each year. This level of extraction has a drastic effect on mountain gorilla and chimpanzee populations (Languy & de Merode 2006).

Harvesting of natural resources (rattan, bamboo, etc.)

Bamboo is found in many of the higher altitude forests in Africa. It is harvested by people for poles (for planting beans), making of mats and baskets, and in housing construction. Mountain and Grauer's gorillas live in high-altitude forests in the Albertine Rift of Africa, where the large, mature bamboo stands are found. The illegal entry of people into the national parks to collect bamboo is generally accompanied by poaching, harvesting of honey (fires to smoke out the bees), and the collection of water and other NTFPs. The disturbance in the forest, the fires caused by honey-collection, the potential for disease transmission, and the snares that are laid in the forest are likely to impact the wildlife; introduced diseases and snares have caused some gorilla mortalities (Fossey 1983; Robbins *et al.* 2011). Although the collection of NTFPs such as bamboo and rattan can be done in a controlled and sustainable manner, the reality is that it is often accompanied by other activities that have a direct and deleterious effect on biodiversity (and ape) conservation.

Artisanal Mining

Artisanal and small-scale mining (ASM) refers to mining that uses manual labor and low-level technologies (Hruschka & Echavarria 2011). It is "largely a poverty driven activity, typically practiced in the poorest and most remote rural areas of a country by a largely

itinerant, poorly educated populace with few employment alternatives”⁸⁰. Over 13 million people are directly involved in artisanal or small-scale mining in developing countries, and about 80 million to 100 million people depend on such mining for their livelihoods (Ingram *et al.* 2011). A Global Solutions Study (Villegas *et al.* 2012) found that worldwide ASM is occurring in about 96 of 147 protected areas and in 32 out of 36 countries studied. Artisanal mining is common in areas of Asia and Africa that are ape habitat. In Asian countries in particular, the financial crises in recent decades drove many poor, including women and children, into artisanal mining,

Artisanal mining is significant in Africa. Sixty percent of artisanal-mined diamonds are produced in Sub-Saharan Africa. There are an estimated 20,000 to 30,000 artisanal miners in Cameroon and 80,000 artisanal miners in the Central African Republic (Ingram *et al.* 2011). Artisanal mining is particularly widespread in DRC, with an estimated 10 million people supported by the industry (ABCG 2011).

The impact of artisanal mining on wildlife populations includes the pollution of nearby streams, erosion, and increased hunting and fishing (Ingram *et al.* 2011). Additional threats particularly pertinent to apes include increased exposure to disease due to sewage run off from camps.

Impacts on miners and their families are often severe. Miners expose themselves to harsh working conditions for minimal income, endangering their health. They are also often in danger from conflicts resulting from the mining activities, working on the lands of indigenous or tribal peoples, there are often serious cultural conflicts, and even warfare. Unfortunately, much of the actual economic potential is lost in small-scale artisanal mining as a result of the absence of a legal framework (Nellemann *et al.* 2010).

Climate Change

Climate change could pose a significant danger to all species of apes in Africa and Asia as a result of direct and indirect impacts of changes in rainfall patterns, temperatures, extreme weather events, and sea level rise (e.g., Gregory *et al.* 2012, 2014; Wich *et al.* in press). Increases in global temperatures may result in changes in the fruiting patterns of trees important in ape diets. Severe weather events may affect crops. With shortages of food, rural people will predictably rely more heavily on non-timber forest products. Rising sea levels may cause migrations of human populations into habitats of apes, further increasing the human pressures on the forests.

In terms of global threats to species and ecosystems, the threat from climate change is currently small in comparison to that of changes in land use (Jetz *et al.* 2007), but over the long term the impact of climate change could potentially surpass it (Struebig *et al.* in press; Wich *et al.* in press). A focus on protecting natural habitat is the best strategy to make

⁸⁰<http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTOGMC/0,,contentMDK:20246087~menuPK:509392~pagePK:148956~piPK:216618~theSitePK:336930~isCURL:Y,00.html>

ecosystems more resilient, increase their ability to store carbon and to allow species to adapt to the effects of climate change.

ANNEX 4. APE CONSERVATION ACTION PLANS

Taxa	Countries	Reference	Link
West African chimpanzees	Cameroon, Cote d'Ivoire, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Nigeria, Senegal, Sierra Leone	Kormos & Boesch (2003) Kormos <i>et al.</i> (2003)	www.primate-sg.org/WACRAP.pdf www.primate-sg.org/WACAP.pdf
Cross River gorilla	Cameroon, Nigeria	Dunn <i>et al.</i> (2014)	www.primate-sg.org/CRG2014.pdf
Eastern chimpanzee	Burundi, CAR, DRC, Rwanda, South Sudan, Tanzania, Uganda	Plumptre <i>et al.</i> (2010) Maldonado <i>et al.</i> (2012)	www.primate-sg.org/ECCAP.pdf www.primate-sg.org/Grauers.pdf
Western lowland gorilla and central chimpanzee	Angola, Cameroon, CAR, Congo, Equatorial Guinea, Gabon	IUCN (2014b)	www.primate-sg.org/WEA2014.pdf
Bonobo	DRC	IUCN & ICCN (2012)	www.primate-sg.org/bonobo.pdf
Grauer's gorilla	DRC	Maldonado <i>et al.</i> (2012)	www.primate-sg.org/Grauers.pdf
Nigeria-Cameroon chimpanzee	Cameroon, Nigeria	Morgan <i>et al.</i> (2011)	www.primate-sg.org/NCCAP.pdf
Bornean orangutan	Malaysia		www.primate-sg.org/SabahOUAP.pdf
Sumatran orangutan	Indonesia		www.primate-sg.org/IndonesiaOUAP.pdf
Western black crested gibbon, northern white-cheeked crested gibbon, southern white-cheeked crested gibbon, white-handed gibbon, pileated gibbon, and northern	Lao PDR	Ministry of Agriculture & Forestry (2011)	http://cmsdata.iucn.org/downloads/lao_gibbon_action_plan_2011_en.pdf

yellow-cheeked crested
gibbon

Hainan gibbon

China

Chan *et al.* (2005)

<http://www.gibbons.de/main/books/2005hainan-gibbon-status.pdf>

ANNEX 5. BEST PRACTICE GUIDELINES FOR APE CONSERVATION

FSC 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. 36 pp.

Morgan, D., Sanz, C., Greer, D., Rayden, T., Maisels, F. et Williamson, E.A. (2013). *Les grands singes et le FSC: Mise en oeuvre de pratiques d'exploitation favorables aux grands singes dans les concessions forestières en Afrique centrale*. Groupe de spécialistes des primates de la CSE/UICN, Gland, Suisse. 44 pp.

HUMAN-WILDLIFE CONFLICT www.primate-sg.org/best_practice_conflict

Hockings, K. & Humle, T. (2009). *Best Practice Guidelines for the Prevention and Mitigation of Conflict Between Humans and Great Apes*. IUCN/SSC Primate Specialist Group, Gland, Switzerland. 40 pp.

Hockings, K. et Humle, T. (2009). *Lignes directrices pour de meilleures pratiques en matière de prévention et d'atténuation des conflits entre humains et grands singes*. Groupe de spécialistes des primates de la CSE/UICN, Gland, Suisse. 52 pp.

Hockings, K. dan T. Humle (2010). *Panduan Pencegahan dan Mitigasi Konflik antara Manusia dan Kera Besar*. IUCN/SSC Primate Specialist Group, Gland, Switzerland. 72 pp.

LOGGING www.primate-sg.org/best_practice_logging

Morgan, D. & Sanz, C. (2007). *Best Practice Guidelines for Reducing the Impact of Commercial Logging on Great Apes in Western Equatorial Africa*. IUCN/SSC Primate Specialist Group, Gland, Switzerland. 32 pp.

Morgan, D. et Sanz, C. (2007). *Lignes directrices pour de meilleures pratiques en matière de réduction de l'impact de l'exploitation forestière commerciale sur les grands singes en Afrique centrale*. Groupe de spécialistes des primates de la CSE/UICN, Gland, Suisse. 40 pp.

RE-INTRODUCTION www.primate-sg.org/best_practice_reintroduction

Beck, B., Walkup, K., Rodrigues, M., Unwin, S., Travis, D. & Stoinski, T. (2007). *Best Practice Guidelines for the Re-introduction of Great Apes*. IUCN/SSC Primate Specialist Group, Gland, Switzerland. 48 pp.

Beck, B., Walkup, K., Rodrigues, M., Unwin, S., Travis, D. et Stoinski, T. (2007). *Lignes directrices pour de meilleures pratiques en matière de réintroduction des grands singes*. Groupe de spécialistes des primates de la CSE/UICN, Gland, Suisse. 51 pp.

Beck, B., Walkup, K., Rodrigues, M., Unwin, S., Travis, D. dan Stoinski, T. (2009). *Panduan Re-introduksi Kera Besar*. IUCN/SSC Primate Specialist Group, Gland, Switzerland. 56 pp.

SURVEYS www.primate-sg.org/best_practice_surveys

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. 28 pp.

Kühl, H., Maisels, F., Ancrenaz, M. et Williamson, E.A. (2009). *Lignes directrices pour de meilleures pratiques en matière d'inventaire et de suivi des populations de grands singes*. Groupe de specialists des primates de la CSE/UICN, Gland, Suisse. 32 pp.

Kühl, H., Maisels, F., Ancrenaz, M. dan Williamson, E.A. (2010). *Panduan Amalan Terbaik Survei dan Pemantauan. Populasi Kera Besar*. IUCN/SSC Primate Specialist Group, Gland, Switzerland.

Kühl, H., Maisels, F., Ancrenaz, M. dan Williamson, E.A. (2011). *Panduan Survei dan Pemantauan Populasi Kera Besar*. IUCN/SSC Primate Specialist Group, Gland, Switzerland.

A series of online modules present detailed information on survey design, field techniques, analytical approaches, and practical issues such as logistics, finance and standardized reporting and can be downloaded at: <http://apesportal.eva.mpg.de/database/surveyGuidelines>

- Chapter 3: Survey design
- Chapter 5 [Section 5.1–5.3] Field Issues: Logistics and data collection protocols.
- Chapter 5 [Section 5.4] Conducting Interviews in the Field.
- Chapter 6: Training.
- Chapter 8: Standardized reporting.

TOURISM www.primate-sg.org/best_practice_tourism

Macfie, E.J. & Williamson, E.A. (2010). *Best Practice Guidelines for Great Ape Tourism*. IUCN/SSC Primate Specialist Group, Gland, Switzerland.

Macfie, E.J. et Williamson, E.A. (2010). *Lignes directrices pour de meilleures pratiques en matière de tourisme de vision des grands singes*. Groupe de spécialistes des primates de la CSE/UICN, Gland, Suisse. 85 pp.

Macfie, E.J. dan Williamson, E.A. (2010). *Panduan Wisata Kera Besar*. IUCN/SSC Primate Specialist Group, Gland, Switzerland. 86 pp.

ANNEX 6. CONSIDERATIONS FOR GREAT APE TOURISM ACTIVITIES IN THE WORLD BANK APE PORTFOLIO – UTILISING BEST PRACTICE

Elizabeth J. Macfie, D.V.M.¹

¹ Co-author, *Best Practice Guidelines for Great Ape Tourism*, IUCN SSC Primate Specialist Group

Great ape tourism is often proposed 1) as a strategy to fund conservation efforts to protect great apes and their habitats, 2) as a way for local communities to participate in, and benefit from, conservation activities on behalf of great apes, or 3) as a business. The success of great ape tourism at a few sites points to the considerable potential of conservation-based great ape tourism, but it will not be possible to replicate this success everywhere. The number of significant risks to great apes that can arise from tourism require a cautious approach. If great ape tourism is not based on sound conservation principles right from the start, the odds are that economic objectives will take precedence, the consequences of which in all likelihood would be damaging to the well-being and eventual survival of the apes, and detrimental to the continued preservation of their habitat.

All great ape species and subspecies are classified as Endangered or Critically Endangered on the IUCN Red List of Threatened Species (IUCN 2014a), therefore it is imperative that great ape tourism adheres to best practice. The IUCN Primate Specialist Group (PSG) Section on Great Apes (SGA) has developed a series of best practice guidelines as a toolkit for conservation managers and NGOs working on great ape conservation in the field, and for the donors funding these efforts. The *Best Practice Guidelines for Great Ape Tourism* (Macfie and Williamson 2010) are a part of this toolkit.

Any great ape tourism developed or supported with World Bank support should follow IUCN Best Practice guidelines in their entirety, and the reader is encouraged to access the document in full (available from www.primate-sg.org/best_practice_tourism). Excerpts from this document are below, including the guiding principles for best practice in great ape tourism, and tables summarizing the risks and benefits.

Nine 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 in impact studies, significantly outweigh the risks.

5. Enhanced conservation investment and action at great ape tourism sites must be sustained in perpetuity.
6. Great ape tourism management must be based on sound and objective science.
7. Benefits and profit for communities adjacent to great ape habitat should be maximised.
8. 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.
9. 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.

Tourism Impact Management: Potential impacts of great ape tourism, both positive and negative, are summarised below.

Table 1: Potential benefits of great ape tourism (*adapted from Macfie and Williamson 2010*)

<i>Benefits</i>	<i>Assumptions</i>	<i>Notes and Actions Required</i>
Monitoring: Regular visitation enhances monitoring.	<ul style="list-style-type: none"> Funding for monitoring programmes is secured. 	<ul style="list-style-type: none"> Monitoring plan must be in place before habituation begins.
Veterinary surveillance and care: Habituation and regular visits facilitate health monitoring, quicker diagnoses and rapid intervention.	<ul style="list-style-type: none"> Funding for veterinary surveillance and response team is secured. Expertise and lab facilities available. 	<ul style="list-style-type: none"> Finalise health monitoring, treatment and disease outbreak contingency plans before habituation begins.
Law enforcement: Known home ranges, habituation and increased observer presence improve protection of ape groups or individuals by law-enforcement teams.	<ul style="list-style-type: none"> Security in the region allows law-enforcement monitoring. Finance, logistics and staff are in place to support/implement enforcement. 	<ul style="list-style-type: none"> Increase enforcement presence in area before habituation.
Revenue generation: Potential source of tourism revenue for the protected area, through fees for ape viewing, tracking and associated activities (e.g., nature walks, accommodation).	<ul style="list-style-type: none"> Local, regional, international security. Financial systems in place to ensure sufficient revenue for conservation. Tourists are interested and willing to visit and take up permits. Tourism is well managed. 	<ul style="list-style-type: none"> Financial analysis of potential revenue to be generated through great ape tourism activities is essential to impact assessment.
Community benefits: Potential source of monetary and non-monetary benefits for communities.	<ul style="list-style-type: none"> Methods to ensure revenue streams to communities in place. Project designed so that communities are involved at all stages. 	<ul style="list-style-type: none"> Develop or expand benefit-sharing systems to absorb revenue. Build capacity to ensure that communities play an active role.
Benefits to private sector: Tourism revenues accruing through multiplier effects to private sector in tourism and service industries—state, national, regional, international.	<ul style="list-style-type: none"> Tourists are interested and willing to visit, take up permits and visit other attractions. Private sector tourism industry well managed, with training ensured. 	<ul style="list-style-type: none"> Marketing to enhance revenue streams that spin-off from tourism permits.
National economic benefits: Increased government earnings from taxes, visas and other income associated with tourism.	<ul style="list-style-type: none"> Effective national finance systems. Transparency. 	
Community participation and support: Increased participation by and support from local communities for protected areas, forest	<ul style="list-style-type: none"> Methods are in place to ensure community participation in tourism development and to maximise tourism benefit streams flowing to 	<ul style="list-style-type: none"> Promote and facilitate active engagement by communities. Ensure support for community capacity to run these projects.

<i>Benefits</i>	<i>Assumptions</i>	<i>Notes and Actions Required</i>
management and ape conservation as a result of community benefit streams.	communities, through revenue sharing and other spin-offs.	<ul style="list-style-type: none"> • Ensure benefits are understood as linked to protecting forest and apes.
Research and learning: Potential for increasing knowledge base about apes.	<ul style="list-style-type: none"> • Research and ranger-based monitoring provide data for centralised databases and information systems. 	<ul style="list-style-type: none"> • Research opportunities may be more limited in tourism groups.
Political goodwill, local and national pride and image: Apes and habitat valued as a means to enhance development and local/national image.	<ul style="list-style-type: none"> • Political value of tourism revenue outweighs perceived value of land conversion away from conservation. 	<ul style="list-style-type: none"> • Decision not to habituate may result in loss of political goodwill and/or loss of support to protected area or forest.
Regional cooperation: Regional tourism initiatives can stimulate further regional collaboration on ape conservation actions.	<ul style="list-style-type: none"> • Political will and transboundary relations supportive of regional cooperation. 	
International awareness and support: Donors interested in financial self-sustainability. Internationally-recognised programme will enhance long-term government commitment.	<ul style="list-style-type: none"> • Tourism is well-managed and seen as sustainable source of revenue. 	<ul style="list-style-type: none"> • Document and distribute tourism impact studies. • International tourists often return home as long-term supporters.
Enhanced conservation of apes and their habitat as a result of all the above.		

Table 2: Potential Costs and Disadvantages of Great Ape Tourism *(adapted from Macfie and Williamson 2010)*

<i>Disadvantages</i>	<i>Mitigation measures</i>	<i>Notes and Actions Required</i>
Poaching: Habituated apes are more vulnerable to poaching and conflict if not adequately protected, due to their loss of fear of humans.	<ul style="list-style-type: none"> • Once habituated, apes must be protected through daily monitoring and patrols. • Protection for habituated or previously habituated groups by ranger surveillance patrols – in perpetuity. • Assumption—management continuity and security. 	<ul style="list-style-type: none"> • Discussion required on potential for de-habitation, if any.
Disease – 1: Habituation makes apes more vulnerable to the introduction of disease during habituation process.	<ul style="list-style-type: none"> • Disease prevention activities for apes. • Strict habituation-team protocols. 	<ul style="list-style-type: none"> • Veterinary advice on minimising stress and disease risk during habituation.
Disease – 2: Habituation allows close approach of humans to apes, therefore increases risk of disease transmission through ongoing disease exposure.	<ul style="list-style-type: none"> • Strict enforcement of rules and regulations on tourist visits to apes. • Training and continual evaluation. • Regular review of protocols in light of new research. • Education of tourists prior to visit. 	<ul style="list-style-type: none"> • Design and implement visit evaluations to assess compliance. • Develop veterinary response and outbreak contingency plan. • Discuss disease-risk document with stakeholders. • Continual analysis of ape morbidity and mortality data.
Cost implications – 1: Financial implications of the costs of habituation are high—timeframe of years.	<ul style="list-style-type: none"> • Financial support for habituation process must be guaranteed before launch. 	<ul style="list-style-type: none"> • Ensure adequate funding before habituation launch.

<i>Disadvantages</i>	<i>Mitigation measures</i>	<i>Notes and Actions Required</i>
Cost implications – 2: Operating costs (staff, equipment and infrastructure) are high for tourism activities and for protection and monitoring of habituated groups in perpetuity.	<ul style="list-style-type: none"> • Tourism development stakeholders need to ensure that there is a long-term financial plan to cover costs even if there is a slump in the tourism market. 	<ul style="list-style-type: none"> • Carry out economic and market surveys to analyse sustainability before developing tourism plan. • Develop emergency support plan to cover operations in periods of unstable tourism market.
Diversion of management attention: Tourism may take resources away from core conservation focus.	<ul style="list-style-type: none"> • Reinforce conservation as primary goal in strategic plans and tourism development plans. 	<ul style="list-style-type: none"> • Source tourism development funds from additional/new sources. • Recruit additional personnel.
In-migration: Successful tourism development may encourage growth of human communities around ape habitat.	<ul style="list-style-type: none"> • Local/district development plans should limit uncontrolled growth. 	<ul style="list-style-type: none"> • EIA process should address potential for over-development and population increase.
Range alteration: Habituated apes may alter their range into areas with heightened poaching pressure, or into proximity with human infrastructure, resulting in increased risks of disease, poaching, injury and conflict.	<ul style="list-style-type: none"> • Daily monitoring essential during habituation and tourism operations. This monitoring must continue in perpetuity. • Law enforcement patrols in entire home range of habituated individuals/groups. 	<ul style="list-style-type: none"> • Monitoring of groups or individuals under habituation is critical to judge the extent to which range adjustment may take place as a result of habituation process.
Human-great ape conflict – 1: Potential for increased conflict with humans if apes leave protected habitats or overlap with human activities (for example in multiple-use zones).	<ul style="list-style-type: none"> • Sensitisation. • Revenue sharing. • Human-great ape conflict mitigation. • Community/livestock health outreach. • Home range assessment in group choice. 	<ul style="list-style-type: none"> • Additional research needed on whether habituation leads to increase in crop-raiding behaviour.
Human-great ape conflict – 2: Conflict heightened if tourism is conducted with apes that crop-raid on private land.	<ul style="list-style-type: none"> • Explore idea of 'entry' fee if tourism visits might be conducted on community land/farms. 	
Over-habituation: Long-term habituation may lead to over-habituation, with potential for more contact with humans, injury to humans and apes, and increased disease risk.	<ul style="list-style-type: none"> • Research reducing over-habituation. • Enforce rules! • Deter approach of apes. • Review guidelines for human behaviour when close to apes. 	<ul style="list-style-type: none"> • Continued assessment and research into the effects of long-term habituation.
Stress – 1: Habituation is a stressful process for apes—initial stress during habituation may potentially lead to increased vulnerability to disease, as well as reduced reproductive rates.	<ul style="list-style-type: none"> • Develop and use 'best practices' for habituation to minimise stress. • Develop and implement research protocol for stress monitoring during habituation. 	<ul style="list-style-type: none"> • Develop best practice guidelines for great ape habituation. • If new habituation undertaken, design monitoring programme to assess stress factors.
Stress – 2: Chronic stress following habituation during tourism operation.	<ul style="list-style-type: none"> • Strict adherence to reviewed regulations to minimise chronic stress. 	<ul style="list-style-type: none"> • Review tourism management to minimise stress inducers. • Develop stress-monitoring plan.
Behaviour change and social disruption: Research has revealed significant impacts of tourism on ape behaviour.	<ul style="list-style-type: none"> • Design visit/visitor regulations in light of behavioural changes observed. • Strict adherence to regulations. 	<ul style="list-style-type: none"> • Synthesise and present research results to staff and decision-makers. • Tourism management review to reduce impact on behaviour. • Ongoing research/monitoring of habituated groups.
Reduced reproductive success: Behavioural impact, stress, disease and immunosuppression may all lead to reproductive failure, with impacts on population size over time.		<ul style="list-style-type: none"> • Research on habituation impact on reproductive behaviour, maternal care and infant mortality.

<i>Disadvantages</i>	<i>Mitigation measures</i>	<i>Notes and Actions Required</i>
International condemnation: Lack of support if perception is of excessive tourism.	<ul style="list-style-type: none"> • Carry out a feasibility study and impact review before any new tourism habituation is initiated. • Circulate feasibility study report if habituation is recommended. 	<ul style="list-style-type: none"> • Funding for feasibility/impact studies should be included in tourism development initial scoping plan.
Habitat impact: Negative impact of tracking activities on habitat—vegetation and other animal species.	<ul style="list-style-type: none"> • Conduct tracking with only essential cutting of trails. • Limit number of tourists in a group. • Limit number of groups in an area. 	<ul style="list-style-type: none"> • Develop protocol for trackers and guides to minimise impacts on habitat.
Pollution and habitat impact of tourism infrastructure and activities.	<ul style="list-style-type: none"> • Conduct EIA prior to development of tourism infrastructure. 	<ul style="list-style-type: none"> • Additional regulations to minimise waste associated with tourism.
Military escorts for tourists, if required, increase all impacts	<ul style="list-style-type: none"> • Develop code of conduct for military escorts to minimise impact. 	
Uncontrolled development: Tourism, if not controlled with conservation objectives, may stimulate construction of unplanned, unsightly lodges and camps with negative environmental impacts.	<ul style="list-style-type: none"> • Zoning plans to be developed to control infrastructure in tourist area. 	<ul style="list-style-type: none"> • Market surveys will provide potential developers with occupancy estimates to inform plans.
Knock-on effect to other ape sites: Development of ape tourism at one site will lead to requests/raised expectations for tourism to be developed at other sites.	<ul style="list-style-type: none"> • Manage expectations in nearby sites. • Conduct market surveys to analyse potential market for ape tourism in any site under consideration. 	<ul style="list-style-type: none"> • Failed expectations may result in backlash against conservation of apes and habitat.
Negative impact on local people: Lack of benefits compounded by rising crime and costs, social or cultural impacts, etc.	<ul style="list-style-type: none"> • Develop and implement plans to optimise community impacts. 	<ul style="list-style-type: none"> • Community impacts will affect attitudes towards conservation.
Negative impact on apes and habitat as a result of all the above.		

Discussion

The ultimate success or failure of great ape tourism can lie in variables that may not be obvious to policymakers who base their decisions primarily on earning revenue for struggling conservation programmes. However, a number of biological, geographical, economic and global factors can affect a site so as to render ape tourism ill-advised or unsustainable. This can be due, for example, to the failure of the tourism market for a particular site to provide revenue sufficient to cover the development and operating costs, or it can result from failure to protect the target great apes from the large number of significant negative aspects inherent in tourism. Either of these failures will have serious consequences for the great ape population. Once apes are habituated to human observers, they are at increased risk from poaching and other forms of conflict with humans. They must be protected in perpetuity even if tourism fails or ceases for any reason. Great ape tourism should not be developed without conducting critical feasibility analyses to ensure there is sufficient potential for success. Strict attention must be paid to the design of the enterprise, its implementation and continual management capacity in a manner that avoids, or at least minimises, the negative impacts of tourism on local communities and on the apes themselves. Monitoring programmes to track costs and impacts, as well as benefits, are essential to inform management on how to optimise tourism for conservation benefits.

Conclusion

These guidelines have been developed for both existing and potential great ape tourism sites that wish to improve the degree to which their programme contributes to the conservation rather than the exploitation of great apes.

Any great ape tourism developed or supported with World Bank support should follow IUCN Best Practice guidelines in their entirety

References

IUCN (2014a). The IUCN Red List of Threatened Species. Version 2014.3. <www.iucnredlist.org>. Downloaded on 14 February 2015.

Macfie, E.J. and Williamson, E.A. (2010). *Best Practice Guidelines for Great Ape Tourism*. Gland, Switzerland: IUCN/SSC Primate Specialist Group (PSG). 78 pp. Available from: www.primate-sg.org/best_practice_tourism