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Photo: King, orphan gorilla in Gabon. © Alison White



INTRODUCTION

C urrent dominant thinking and practice in both the private and public sectors continually assert that people’s development needs are in conflict with, or mutually exclusive to, the need to conserve the biosphere on which we depend. As a consequence, we are asked to either diminish development in the name of conservation or diminish conservation in the name of development. The efforts to identify complementary objectives, or mutually acceptable trade-offs and compromises, described in this publication indicate, however, that this does not always need to be the case. *State of the Apes: Extractive Industries and Ape Conservation*, the first in a series, draws attention to the evolving context within which great ape and gibbon habitats are increasingly interfacing with extractive industries.

Commissioned by the Arcus Foundation, the *State of the Apes* objective is to raise awareness about the status of apes around the world and the impacts of human activities on apes and ape habitat. Apes are closely related to humans and vulnerable to many threats posed to their habitat

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Bonobo (formerly known as the “pygmy chimpanzee”)



Male adult bonobos reach a height of 73–83 cm and weigh about 40 kg, while females are slightly smaller and tend to weigh around 30 kg. Bonobos live in communities of up to 100 individuals. The lifespan of bonobos in the wild is unknown but in captivity they can live for 40 years.

Unlike chimpanzees, in bonobo society the females are dominant over the males and establish a social hierarchy, and the status of a male appears to be derived from his mother's hierarchical position.

Bonobos are frugivorous, but they appear to consume more herbaceous plants than chimpanzees. They also consume small vertebrates and invertebrates, and hunting of monkeys and duikers has also been reported.

Bonobos occur only in the Democratic Republic of Congo (DRC).

There are estimated to be fewer than 50 000 bonobos remaining in the wild, but accurate population estimates are difficult to obtain.

Classified as endangered (EN), also listed on Appendix I of CITES (for more information see text box: IUCN Red List categories and criteria, and CITES Appendices, at the end of the Introduction).

Chimpanzee



Adult males are less than 170 cm in height when standing and weigh up to 70 kg, but females are somewhat smaller. Chimpanzees live in multi-male, multi-female communities of up to 150 individuals. Chimpanzees live for up to 50 years.

There is a strong dominance hierarchy within chimpanzee groups and males are dominant over females.

Chimpanzees are ripe-fruit specialists, but they also consume nuts and leaves, in addition to insects and small mammals, including monkeys and duikers. Chimpanzees are well known for their use of tools in obtaining food: they use stones to crack open nuts, and modify sticks to extract termites from underground or to get honey from beehives.

Chimpanzees are split into four subspecies, which occur in different regions of tropical Africa. Chimpanzees inhabit not only lowland rainforests, but also dry savanna and montane forest regions up to 3000 m elevation.

There are estimated to be between 170 000 and 300 000 chimpanzees remaining in the wild, but accurate population estimates are difficult to obtain.

All subspecies are classified as endangered (EN) and listed on Appendix I of CITES.

Together with the bonobos, chimpanzees are the closest living relatives to humans, sharing 98.7% of our DNA.

Gibbon



Gibbons form the family of *Hylobatidae*, which can be divided into four genera: *Hoolock*, *Hylobates*, *Symphalangus*, and *Nomascus*, which in total comprise 19 species in some taxonomic schemes. They inhabit a wide range of habitats across Southeast Asia, occurring in ten countries. Gibbons have been confirmed to live for upwards of 40 years in captivity, in some instances, but in the wild they likely live for 25–30 years.

Depending on the species, adult size ranges from 45–90 cm and weight from 5–12 kg, and there is little difference in body size between males and females.

Gibbons are largely monogamous, with family groups consisting of an adult male and female and their offspring; however, considerable variation and flexibility have

been noted. They are also territorial, defending an area against neighboring groups, advertised through the production of loud vocalizations.

Gibbons are generally characterized as frugivorous, with a significant part of their diet composed of fruits, with additional elements of leaves, flowers, and, in some instances, insects and small vertebrates.

All gibbons are classified as critically endangered (CR) or endangered (EN) with the exception of the eastern hoolock (*Hoolock leuconedys*), which is classified as vulnerable (VU) and the northern yellow-cheeked gibbon (*Nomascus annamensis*), which was recently described and has not yet been assessed. They are all listed on Appendix I of CITES.

Gorilla



Gorillas are the largest of the great apes, with adult males reaching a height of 140–200 cm and a weight of 120–210 kg. Gorillas are very social animals that typically live in groups of between 2 and 40 individuals. Normally a group consists of one or more mature adult males (silverbacks) who lead the group, and several females and their offspring. Gorillas live for up to 40 years.

Gorillas inhabit a variety of environments across equatorial Africa, from lowland swamp to montane forest.

Gorillas are largely herbivorous and/or frugivorous, with their diets consisting mainly of leaves and herbs or a large amount of fruit.

There are estimated to be approximately 150 000 gorillas left in the wild, but accurate population estimates are difficult to obtain.

All subspecies of gorilla are classified as critically endangered (CR), except for Grauer's gorilla (*Gorilla beringeigraueri*), which is classified as endangered (EN). They are all listed on Appendix I of CITES.

Gorilla DNA is about 97.7% identical to human DNA.

Orangutan



Adult male orangutans can reach a height of 150 cm and a weight of 100 kg, while females are smaller and typically do not exceed 125 cm and 45 kg. Orangutans are largely solitary, and strong social bonds exist only between adult females and their offspring. Adults of both sexes live either as resident individuals in a defined home range or as transient individuals. In defined ranges, the dominant flanged adult male is the primary breeder. Orangutans live for up to 50 years.

Orangutans are divided into two species that are each endemic to the islands of Borneo and Sumatra in Southeast Asia.

The orangutan diet consists mainly of fruits, but also of leaves, shoots, and bark.

There are estimated to be around 60 000 orangutans left in the wild, but accurate population estimates are difficult to obtain.

The three subspecies of Bornean orangutan are classified as endangered (EN), whereas the Sumatran orangutan is classified as critically endangered (CR). They are all listed on Appendix I of CITES.

Their DNA is about 97% identical to human DNA.

All information from the A.P.E.S. Portal: <http://apesportal.eva.mpg.de/>

Additional information from Elizabeth A. Williamson and Ben Rawson.

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and their survival, by humans. To understand both the severity and extent of those threats, as well as the possibilities and potential for avoiding and mitigating the threats, the publication brings together leading scholars and practitioners from various sectors, including conservation, industry, and academia.

The aim of this Arcus Foundation initiative is to create a biennial series of publications that influence debate, practice and policy by seeking to reconcile ape conservation and welfare, and economic and social development through objective and rigorous analysis of relevant issues. Robust statistics on the status and welfare of apes will be derived from the Ape Populations, Environments and Surveys (A.P.E.S.) Portal (apesportal.eva.mpg.de).

This first publication presents a narrative of research, analysis, case studies, and

best practice from a range of key stakeholders relating to the interface between ape/biodiversity conservation and extractive industries. The publication incorporates related factors such as governance, corporate social responsibility (CSR), land tenure, social development, and international trade and trends. Through objective presentation, the contents of this publication can contribute to further improvements in current conservation practice and inform and influence communities that include commerce (logging, mining, oil and gas), law (legislative protections, industry regulation) and development (human) by showing how they interrelate and affect the current and future status and welfare of apes, and of people who are dependent on their habitats. As a policy document, the aim is to introduce ape conservation into local, national, regional,

BOX I.1

Definition of extractive industry

The State of the Apes uses the term “extractive industry” to cover the extraction of specific resources from the land for commercial exploitation. The term is used to encompass mineral (industrial and artisanal), oil, gas, and round wood or industrial timber extraction. The term does not cover the clearing of land for agriculture or plantations, nor does it cover non-timber forest products (NTFPs) or the hunting of wildlife living in the forest.

Oil and gas: refers to the extraction of petroleum oil hydrocarbons and/or natural gas through drilling and pumping of drilling fluids (a mix of chemicals and fluids) into a borehole and extracting the oil or gas.

Mining: there are two general types of mining techniques, surface mining and underground mining. Surface mining removes the surface vegetation and soil or rock that covers the mineral deposits. Open pit/open cast mining consists of removing minerals from a pit, and strip mining consists of removing strips of surface layers to expose the minerals underneath. Mountaintop removal refers to the removal of mountaintops to get at deep mineral deposits below. Underground mining consists of digging tunnels or shafts to reach the minerals.

Industrial, large-scale mining (LSM): typically involves capital intensive and high technological input to extract minerals.

Artisanal and small-scale mining (ASM): refers to the use of low-level technology and manual labor to extract minerals.

Round wood or industrial timber extraction: refers to the extraction of wood from natural forest or timber plantations and includes saw logs, veneer logs, and pulpwood. There are two types of industrial logging: clear felling and selective logging. Clear felling normally results in the conversion of forests to plantation or some other land use. Selective logging incorporates reduced-impact logging (RIL), which is a limited form of extraction that maintains minimal removal rates and stem diameter, undertaken in conjunction with minimizing the impact on the environment of the removal of timber. Other forms of selective logging remove specific valuable species from a forest with no regard to the environmental effects of extraction.

and international policy dialogs, as well as into development and economic planning.

The focus of the publication is on all non-human ape species, including chimpanzees, gorillas, bonobos, orangutans, and gibbons, and the specific analysis is for countries where apes are found. This encompasses much of the tropical belt of Africa and South-east Asia. To achieve this, contributions commissioned from a range of expertise that includes conservation organizations and individuals, industry, academics, and social and environmental justice organizations are collated to present a holistic overview of current thinking and practice in this arena.

Chapter highlights

Eight of the ten chapters examine various aspects of the interface of extractive industries with ape conservation from impacts on the individual species of ape through to global processes that drive the demand for commodities. The first thematic chapter (Chapter 1) discusses the various global drivers that impact extractive industry action and how this in turn impacts ape habitats and ape populations. The chapter highlights a number of cases that consider trade, finance, and law. The subsequent chapter (Chapter 2) considers the implications for land tenure, in particular protected areas and community lands that overlap with ape habitat and extractive industries. Chapter 3 presents detail on current understanding of ape socioecology in relation to impacts from mining, oil and gas extraction, and industrial-scale logging. Although a relatively new area of focus with few long-term studies (particularly on mining and oil and gas), the data are reviewed in light of extractive industry trends in ape range states. The following chapters (Chapters 4 and 5) describe the various phases of logging and mining industries, respectively, and how they impact apes. The chapters present some

of the mitigation strategies that can potentially protect conservation goals in areas where there is an overlap of ape distribution with logging or mining activities. Chapter 6 is also concerned with mining but focuses on the interface of ASM, and the implications for ape conservation. Chapters 7 and 8 consider the broader impacts of extractive industries, including the indirect impacts of all the extractive industries (Chapter 7), and how national responses in three ape range countries (Guinea, Gabon, and Indonesia) are reframing their extractive industry practice to more explicitly consider the environment (Chapter 8).

Section 2 presents two chapters that focus on the status of apes *in situ* (Chapter 9) and in captivity (Chapter 10). Chapter 10 concludes by highlighting some of the linkages between captive apes and extractive industry.

Photo: Great ape and gibbon habitats are increasingly interfacing with extractive industries ... a lone orangutan.
© Serge Wich



Section 1: the interface of extractive industries and ape conservation

Chapter 1 (Global drivers)

Rapidly growing global demand for natural resources is at the center of the encroachment of extractive industries into ape habitats. With human populations expected to increase to 10.1 billion by 2100 (UN, 2011) and the global economy expected to grow 2–4 times by 2050 (OECD, 2012; Randers, 2012; Ward, 2012), this trajectory is not expected to simply continue to grow, but to become increasingly complex. This chapter presents an overview of some of the megatrends that influence extractive industry action within ape ranges and how their impacts, such as infrastructure development and biodiversity loss and deforestation, are particularly relevant. It also presents detail on the role that trade agreements can play in influencing industrial logging, although the extent of the impact of this is still unknown. The complexity of ensuring the conservation of apes in projects financed by the International Finance Corporation (IFC) is considered. There are pragmatic approaches that civil society can engage with through contract law, but poor understanding of how megatrends interact limits the extent to which global processes can be influenced to the benefit of ape conservation.

Chapter 2 (Land tenure)

Land tenure is a critical issue for conservation and in clarifying its relevance in relation to extractive industries, this chapter presents detail across two themes – extraction within protected areas and extraction from community lands. By illustrating the contested nature of tenure within these two contexts, it presents detail on how weak some of the current tenure legislation relating to rights and access really is. It shows how the economic

pressures to exploit resources regardless of the negative impacts result in direct conflict with conservation and contribute to the issue of “land grabbing.” Further detail on the role that civil society plays in increasing transparency and an analysis of mitigation strategies that promote stakeholder engagement are also included. Unless mitigation occurs across all levels, supplemented with clear land-use planning, little in terms of redressing encroachment onto protected areas or community lands will change. In general, policy and regulatory frameworks do not provide adequate protection for conservation and it is through multi-stakeholder engagement that opportunities for reconciliation potentially exist.

Chapter 3 (Ecological impacts)

Our analysis suggests that there are no simple conclusions to be drawn about the impact of the extractive industry on apes. The severity and extent of impact vary significantly depending on the type of industry, quality of management, type of forest in which a company operates, and a range of other factors. This chapter reviews the socioecology of great apes and gibbons, and the ways in which this can be influenced by different extractive industries. There is significant variation between ape species in their social organization and ecology, yet all apes reproduce slowly and infants remain dependent on the care of their mother for many years. This leads any population of apes to recover slowly when mortality rates are increased, due to killing, increased morbidity from disease or stress, or loss of habitat and food. The impacts of the extractive industry, such as habitat disturbance, building of roads and infrastructure, and the introduction of noise and pollution, as well as influx of people, resulting in a range of impacts (hunting, introduction of disease, agriculture and habitat disturbance, etc.) are examined in relation to how they affect



different ape species. The different impacts of oil and gas extraction at a local scale are presented and compared with the more extensive, but sometimes less severe, impact of forestry practices. Some forms of forestry, such as RIL, can be compatible with ape conservation in some areas, but this depends on the ape species (with some apes being more sensitive to habitat disturbance than others) and the type of management practices adhered to.

Chapter 4
(Industrial timber extraction)

The recent trend towards more ecologically informed logging practices is changing the nature of how decisions are made and offers a chance to remedy policy failures and lack of accountability that has typified most timber operations in the past. However, there has been a slow uptake of some of these logging practices within tropical forests and there is also a lack of clarity regarding the impacts on biodiversity and ape conservation. This chapter examines the various facets

of Sustainable Forestry Management (SFM) and showcases examples of where conservation practitioners are engaging with logging companies to mitigate their impacts on apes and other species. While some changes in current practice result in relatively positive impacts to forest biodiversity, there is consensus that any form of logging results in changes in ape behavior. The lack of long-term research makes it difficult to evaluate the true sustainability of large-scale logging. Economic pressures complicate the challenges of influencing logging practice more broadly and working with logging companies in general is about mitigating the impact of logging rather than achieving conservation.

Chapter 5
(Industrial mining, oil and gas)

Extraction of minerals and oil/gas overlaps with ape habitat in both Asia and Africa, but the impact of these industries has been little studied, compared with forestry. Although the scale of overlap tends to be small, the growth in mineral and hydrocarbon development

Photo: Apes are closely related to humans . . . a bonobo relaxes in the forest. © Takeshi Furuichi, Wamba Committee for Bonobo Research

has led to significant loss of forest, through both the direct and the indirect impacts of the industry. This chapter describes the phases of mining and hydrocarbon project development, and the impacts of each phase on habitat and wildlife. Where specific data on the impacts on apes exist, these are presented. Examples are provided of projects that have developed strategies based on the conservation “mitigation hierarchy” of prevention, avoidance, minimization, and reduction, prior to reparation and restoration. Reviewing the overall impact of industrial mining and oil and gas extraction on ape populations and habitats, the chapter presents the extent of overlap (only 5 of 27 ape taxa have no mining projects in their range) and emphasizes the importance of gathering evidence on the effect on ape distribution, ecology, and behavior.

Chapter 6
(Artisanal and small-scale
mining (ASM))

ASM is known to occur in or around 96 of 147 protected areas in 32 countries of a 36

country study (Villegas *et al.*, 2012). It represents a serious and growing threat to biodiversity due to extraction methods and as a result of large numbers of miners in areas of high biodiversity. Artisanal miners have also been described as being amongst the poorest and most marginalized members of society. This chapter integrates the extent of artisanal mining activity within previously identified ape habitats and presents detail on mitigation strategies currently in existence. In the context of conservation, economic activity, and human rights, it illustrates the negative environmental impacts of uncontrolled ASM, which encompass direct impacts such as habitat destruction, and indirect impacts such as water pollution and increased hunting pressure. As ASM further encroaches into critical ape habitats, approaches that include policy and legislative development, coupled with poverty alleviation measures, are likely to have the greatest impacts. However, little has been achieved in this direction as ASM continues to remain poorly understood and regulated, further exacerbated by inadequate and corrupt governance structures.

Photo: Cooked and smoked bushmeat for sale, including ape meat, at a market in the Central African Republic.
© David Greer/WWF



Chapter 7 (Indirect impacts)

The preceding chapters describing the direct impacts of extractive industries on apes all highlight the relative significance of the indirect impacts. These are similar for industrial timber extraction, industrial mining, oil and gas extraction, as well as for ASM. The influx of people, linked to the opportunities for employment and economic benefit, brings with it a range of impacts on habitat and ape populations. The chapter looks at the impacts of road and rail construction, pipeline and industry transects, in-migration and development of population centers, individually driven logging and fuel-wood collection, clearing of land for agriculture, and the introduction of exotic species and livestock, while focusing on three of the most pressing threats: (1) increased levels of hunting and poaching, (2) habitat fragmentation and degradation, and (3) the spread of disease. Whereas the direct impacts of extractive industries come to an end after a project is closed, the indirect impacts generally continue, and continue to grow. The chapter also illustrates areas of best practice and describes some of the efforts of industry to contain and limit these indirect impacts, and ensure that conservation objectives can be maintained.

Chapter 8
(Range state responses)

Industry and national governments face a number of challenges to ensure that natural habitats and wildlife populations are not destroyed in the process of natural resources exploitation and economic development. With the ever-increasing demands for raw materials in an advancing global society, commercially viable areas for exploitation will continue to be identified and developed. Mining and logging operations can be significant economic engines and can contribute to broad development goals. This chapter

examines three specific cases where efforts have been made to ensure that exploitation of natural resources is undertaken in a manner compatible with biodiversity conservation. In the Republic of Guinea, West Africa, efforts to develop a national strategy to offset the impacts of mining on biodiversity are described and evaluated. In Gabon, Central Africa, the efforts of the government to ensure environment and protected area legislation are considered in the development of extractive industries are described, and the history of this process examined. Finally, in Indonesia, the experience of the government in establishing and implementing a logging moratorium is evaluated, in light of the history of logging and its contribution to Indonesia's high greenhouse gas emissions.

Section 2: The status and welfare of great apes and gibbons

Chapter 9
(Global distribution and environmental conditions)

This chapter presents detail on the spatial distribution of apes across Africa and Asia derived from the A.P.E.S. Portal. Declines in "suitable environmental conditions" for African apes between the 1990s and 2000s have resulted in varying impacts on different species and ape range states. Further analysis of the interaction of ape densities with levels of protection, socioeconomic contexts, and human population density presents some insights into the interrelation between great apes and gibbons and human presence and action.

Finally, a global overview of current knowledge of ape population hotspots is presented, drawing attention to areas of critical importance for the survival of great apes and gibbons.