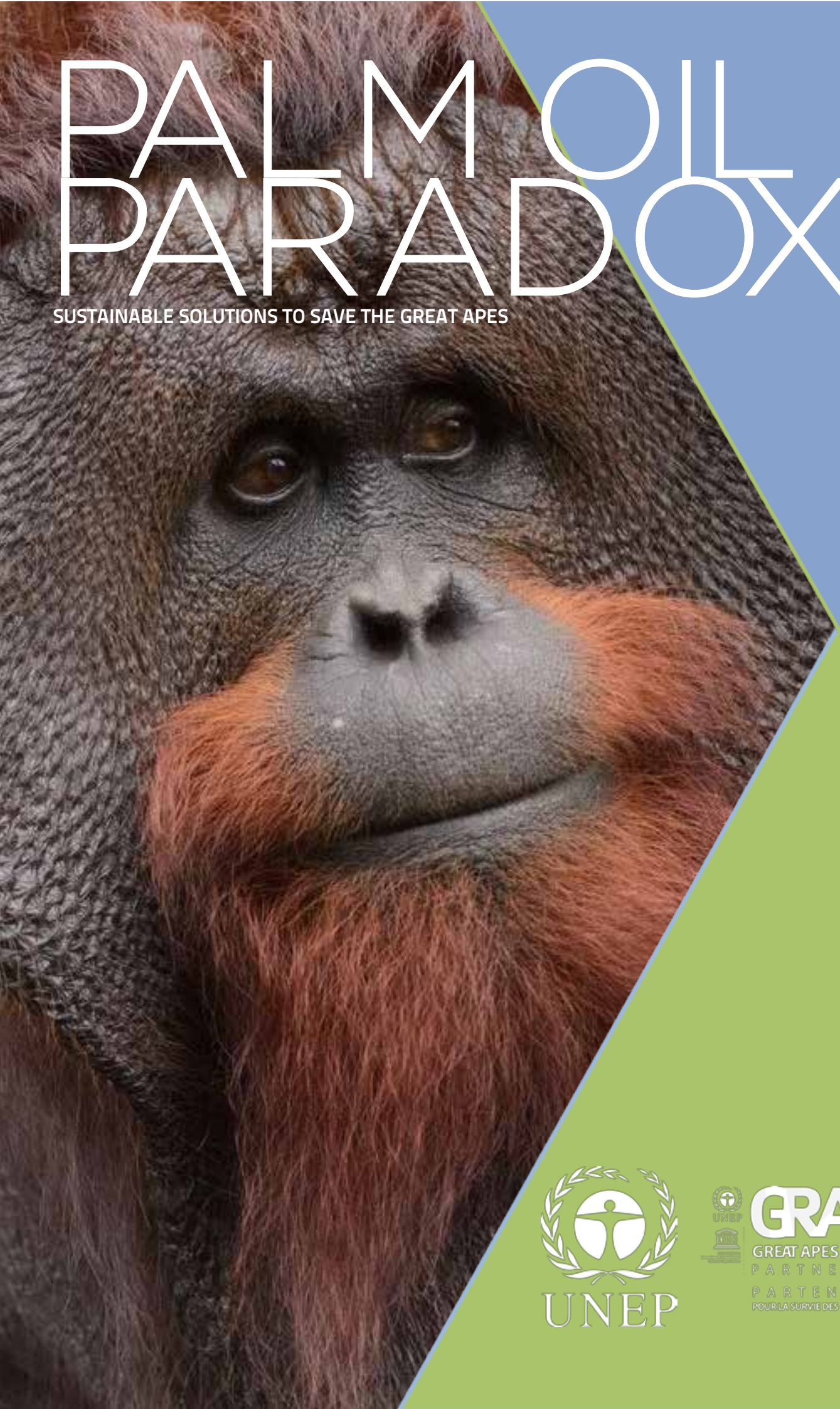
PALM OIL PARADOX

SUSTAINABLE SOLUTIONS TO SAVE THE GREAT APES



UNEP

GRASP 15

GREAT APES SURVIVAL PARTNERSHIP

PARTENARIAT POUR LA SURVIE DES GRANDS SINGES

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SUSTAINABLE SOLUTIONS TO SAVE THE GREAT APES

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GRASP 15 ANNIVERSARY 2001-2016 GREAT APES SURVIVAL PARTNERSHIP PARTENARIAT POUR LA SURVIE DES GRANDS SINGES

SUMMARY

The palm oil industry has grown rapidly over the past 20 years. From a subsistence crop in Africa to its establishment as a major global commodity in Southeast Asia, this agro-industry has had tremendous positive impacts, but also dramatic negative consequences. The surface of land suitable for oil palm production is shrinking in Southeast Asia, forcing the palm oil industry to return to Africa, and develop new horizons in Central and South America. This expansion requires a careful examination of the advantages and disadvantages of oil palm development and the identification of more effective ways to maximize benefits while minimizing social and environmental costs.

The conservation community cannot afford to sit on the fence with the issues posed by oil palm developments. A strong consensus must be reached on whether the community wants to reject the industry because of its negative impact on ecosystems and wildlife, or if it can accept to co-exist if certain conditions are in place. Based on the industry's trajectory in Southeast Asia and its negative impact on orangutan populations, it is clear that the palm oil industry is here to stay and that without careful planning that same industry could dramatically affect the long-term survival of great apes. A key strategic objective for great ape conservation will be to seek support from the industry to embed stricter responsible practices for the development of oil palm, which can also be applied to other agricultural commodities.

To develop meaningful recommendations for oil palm development, a better understanding of what drove its expansion in Southeast Asia is needed. From there, it is possible to assess the different strategies that exist to reduce the environmental impacts of oil palm, in particular when they affect orangutan populations, the only Asian great ape. Focusing on studies produced on Southeast Asia, this report makes specific recommendations for better land-use planning and plantation management, but also policy support and market-based incentives such as certification.

To highlight the potential risks for biodiversity in Africa, a special attention was given to the anticipated effects on the three African great apes: the gorilla, the chimpanzee, and the bonobo. These species inhabit 21 countries in equatorial Africa, but some species and subspecies are confined to small areas, in which case large-scale land conversion could seriously threaten their survival in the wild. For example, the bonobo is only found in the Democratic Republic of Congo and about 99% of its habitat is situated in areas suitable for oil palm cultivation. Looking at different case studies in Cameroon, Nigeria, Liberia and Gabon, where oil palm developments have increased in recent years, this report highlights a range of issues, from legislation surrounding land leases to the local impacts of hunting and loss of great ape habitat.

With this insight on the development of the industry in Southeast Asia and Africa, it is imperative that the conservation community and the oil palm industry find common ground on which to collaborate, and works towards the development of a global sustainable palm oil strategy for the benefit of humankind and biodiversity.

IN A NUTSHELL

BUSINESS AS USUAL		ALTERNATIVE STRATEGIES
ACTIVITIES	CONSEQUENCES	OPPORTUNITIES
Boycotts and anti-palm oil campaigns	Polarization of the debate that leads to industry absence of transparency and a civil society poorly aware of the real challenges and solutions; severe economic impact in terms of image and market	Engaging with the industry directly for greater transparency and to educate consumers to make more informed choices
No proper land-use planning	Concessions allocated on an ad hoc basis; lack of spatial analysis at the landscape level results in fragmented and degraded landscapes with sharp reductions in biodiversity	Jurisdictional approach': land-use decisions are made at the highest possible administrative level, including national, state, or provincial
Conversion of great ape habitat / sensitive areas	Destruction and endangerment of ape populations; no certification possible; negative image	Priority ape habitats and populations need to be recognized and set aside as 'no-go' zones; no conversion of peat, flood prone areas, or mangroves; strictly certified companies allowed in 'certified' oil palm zones close to great ape habitats
Destruction of all forests and environmental services	Increased ecological problems, including flooding, pollution, erosion, disease, and social conflicts' negative image; loss of productivity over time	Precise spatial analysis that identifies all HCVs, HCS and other values and keeps them as 'set-aside'
Poor consultation with local communities	Social conflicts and economic losses	Proper FPIC (Free and Prior Informed Consent processes) are conducted and adhered to; real engagement and empowerment
Poor management of HCVs / ecosystem services	Erosion of ecosystem services; species loss	Need to employ a team of trained professionals that will be in charge of monitoring and managing all HCVs and ecosystem services
Poaching and conflict killing	Species loss; extremely negative image	Develop and enforce a strict 'no-kill' policy

FINDINGS

Oil palm industry will continue to expand, and saying ‘no” to oil palm development will be unlikely to yield positive conservation outcomes in Africa.

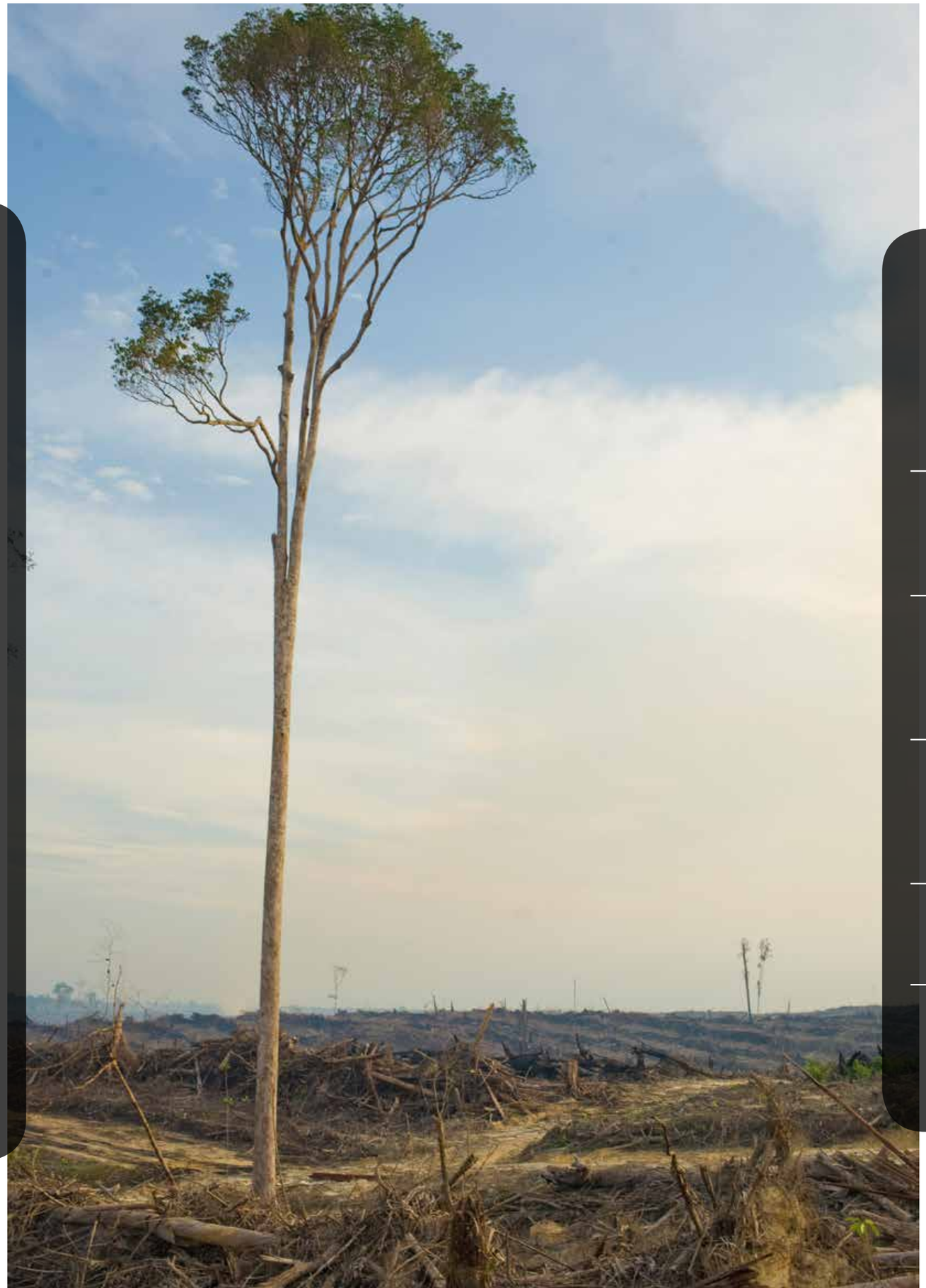
Oil palm plantation management and great ape conservation objectives can be reconciled through best-management practices.

Orangutans require well managed forests within the oil palm matrix to survive, and corridors of natural forest within plantations are essential to allow apes to disperse throughout the entire landscape.

Land-use planning must avoid high-priority orangutan habitats if the species is to survive, and avoiding forest areas and peat lands that contain viable populations is the best way to protect the species.

Ecological expertise is required to manage orangutan populations in oil palm areas, and positive outcomes can be achieved through careful management of areas where orangutans and oil palm overlap.

Peat swamp areas, mangroves and floodplains must not be developed for oil palm production as conversion of these areas can lead to increased flooding, soil erosion, temperature rise and other which outcomes that negatively impact local communities.



RECOMMENDATIONS

Oil palm plantations should not be developed in priority great ape habitat ranges, and ‘No-Go” zones for oil palm development must be classified. Suitable areas for oil palm development should not be ignored, and responsible sustainable oil palm is best concentrated in ‘certified zones’.

Locating ‘certified oil palm zones’ close to great ape habitats minimizes the overall impacts of irresponsible production on great apes habitats.

Multi-stakeholder processes must be undertaken for oil palm planning near areas with priority populations of great apes, and strict ‘no-kill” policies must be enforced.

Environmental teams must be established in each plantation that are trained to monitor, manage, and protect great apes and high conservation value (HCV) forests

Land-use planning exercises should be developed at national, state, or provincial levels.

Support food security by avoiding areas used for small-scale agriculture or natural resource use by local communities

INTRODUCTION

RAPID RISE OF PALM OIL

The global palm oil (*Elaeis guineensis)* industry grew from virtually non-existent in the 1960s to the fourth biggest agricultural commodity in the early 2010s (after soy beans, wheat, and prepared foods) and was worth US$42 billion in 2011 (FAO 2015). It is one of the most rapidly expanding crops in the world today (Fitzherbert et al. 2008; Sheil et al. 2009; Wich et al. 2014). In 2012, over 17.1 million hectares of permanent cultivated cropland worldwide consisted of oil palm, compared with 15 million in 2009, and 9.97 million in 2000 (Image 2).

Oil palm is now grown in over 40 countries (FAO 2012) and contributes significantly to the global supply of edible oils. In 2013, palm oil accounted for 40% of the 169 million tons of global vegetable and fruit oils produced (RSPO 2014), with predicted global consumption estimated to increase to about 80 million tons by 2020 (Mielke 2013). Of all the palm oil produced globally in 2013, 91% originated from Southeast Asia, with Indonesia and Malaysia contributing 51% and 36% respectively (FAO 2015). Some estimates suggest that as much as half of packaged consumer goods contain palm oil,

TEXT BOX 1: VEGETABLE OIL CONSUMPTION

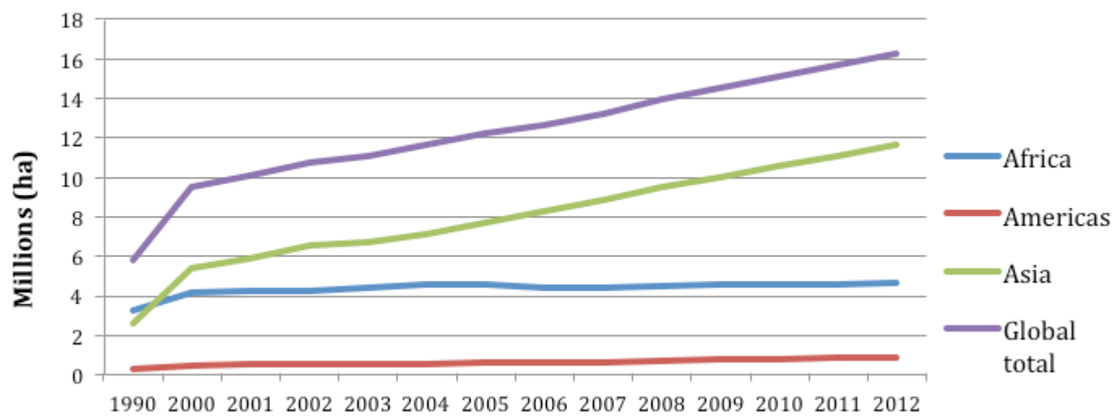
At the global scale, the palm oil industry is competing with producers of other vegetable oils, produced from olives, rape seed, maize, coconut and soy. The expansion or reduction of the oil palm sector therefore needs to be considered in the light of its impact on other oil-producing crops, each of which has its own environmental and social impacts. Based on past trends and the projection of oil crop output to 2025, the global demand for vegetable oil crops will be achieved through the global expansion of 73 million hectares of oil crop: 36 million for soy, 22 million for rapeseed, 11 million for oil palm and 4 million for sunflower (HCS 2015). Considering that oil palm can produce 3–8 times more oil than any tropical or temperate crop (Sheil et al. 2009), replacing this output with another type of vegetable oil would require larger areas of land: for the period 2013-2025, an additional 85 million ha of soy would be necessary to produce the same amount of oil as that originating from oil palm (HCS 2015).

indicating the great versatility of palm oil, its high yields, and its low production costs. The huge opportunities in terms of socio-economic development for exporting countries represented by this tropical crop and the high global demand explain why this industry is currently expanding further into tropical Africa and Central and South America (FAO 2012; Gilbert 2012).

Compared to other vegetable oils such as rapeseed and soya, palm oil consistently achieves the fastest production growth (Carrasco et al. 2014; Fitzherbert et al. 2008) because it has the highest yield by land area of all the vegetable oil crops (Kurki et al. 2014). Another reason why this crop has proved so successful is that two separate oils can be extracted from the fruit -- palm kernel oil (PKO) and crude palm oil (CPO) -- and because up to 87% of its output is produced as oil, as opposed to 20% for soya bean and 40% for rapeseed and sunflower (HCS 2015). Palm oil has also played a significant role in the expansion of the biofuel industry, representing another important demand for the product (Gilbert 2012; Savage 2011).

Oil palm plantation development has been exceptionally high in recent years in response to high prices for crude palm oil driven by higher global demand (Sheil et al. 2009). This is expected to lead to a further rapid expansion in palm oil production in years to come (Fry & Fitton 2010). Different countries make different decisions on which vegetable oil to favor (Text Box 1); decisions are influenced by national regulations, public perceptions, local industry demand, and other factors.

Image 2. Annual increase in the extent (ha) of cultivated oil palm across Africa, the Americas and Asia, as well as globally, from the year 2000 to 2012 (data sourced from FAO, 2012).



POWERFUL ECONOMIC DRIVER

High net revenue from palm oil generates important economic benefits to developing and emerging economies in the tropics (Sayer et al. 2012). In Malaysia this industry is the fourth-largest contributor to Gross National Income (IDS 2007; MPOB 2012), while in Indonesia, oil palm contributes between 2% and 2.5% to the Gross National Product (BPS 2015).

At the local level, oil palm development can also help transition communities out of poverty. This is largely due to the crop's bi-monthly yields (i.e., 3 to 8 times higher than other oil seeds like soy, rapeseed and peanut) and the current ease to sell this crop resulting from continuously-growing global demand. In many cases the production of palm fruits provides a steady and reliable income for rural communities (Feintrenie et al. 2010) allowing communities to take longer-term investment choices (e.g. starting small businesses or encouraging schooling) (Dayang Norwana et al. 2011). If properly managed, oil palm can raise rural smallholders' income and assets by 60% or more (Susila 2004). As a result, many humanitarian organisations and local communities regard oil palm as the ultimate cash crop. Villagers can be eager for opportunities to plant oil palm and have been known to compete with other villages for development investors (Rist et al. 2010b).

However, the oil palm sector is grossly underpinned by poor land allocation procedures, lack of transparency, and corruption, which has heavily impacted species like the orangutan, as well as biodiversity at large, and local rural communities (Marti 1008). Too often, oil palm development results in social conflicts with local communities because of the loss of traditional land, corruption, and violence from unscrupulous companies. Large scale oil palm development also impacts the livelihood of the local communities with the destruction of the forest and its resources, water pollution, collapse of fisheries, increase in flooding. Last but not least, the influx of outside and foreign workers who are employed in large industrial plantations has often resulted in social conflicts with local communities.

THREATS TO BIODIVERSITY AND PERCEPTION

It is feared that the further expansion of the palm oil industry will place vital ecosystems at risk of untenable exploitation. Indeed, conventional production methods are highly unsustainable (Laurance et al. 2010; Wilcove & Koh 2010). Large-scale establishment of oil palm negatively impacts natural systems at several levels, such as populations, species, habitats and ecosystems. Oil palm development is a contributing factor to the global biodiversity 'crisis' (Laurance 2007; Sodhi et al. 2010). For example, clearance of peatlands and old-growth forests causes serious damage to the environment and releases large quantities of greenhouse gas into the atmosphere (van der Werf et al. 2009).

At a species level, oil palm expansion has significant impact on many threatened species and their habitat. One of the best-documented example is the orangutan (Pongo sp.), an arboreal forest-dwelling great ape that depends on the lowland rainforests growing on peat and mineral soils of Sumatra (Pongo abelii) and Borneo (Pongo pygmaeus) (Wich et al. 2012b; Wich et al. 2008). Such a threat to apes is by no means restricted to Southeast Asia and it is feared that African apes will undergo similar habitat loss through oil palm expansion since over 42.3% of the current African great ape distribution overlaps with land suitable for oil palm development (Wich et al. 2014).

In many developed countries, the palm oil industry has a largely negative public image. This is reflected by many recent campaigns organized worldwide against the industry. More and more concerns are also raised in producing countries because of the social and environmental damages resulting from the development of this industry. However, in a business developing as rapidly as the palm oil industry, it is difficult for scientists and those interested in sustainable practices to keep up with newly developing standards and procedures in certification bodies such as the Roundtable on Sustainable Palm Oil (RSPO), how these translate into on-the-ground reality, and what they mean for mitigating the industry's social and environmental impacts. The resulting lack of up-to-date information helps little to change the image of the industry formed by the public, which is not always well supported by facts. Table 1 shows some discrepancies in public information about the impacts of oil palm and information available from objective scientific studies. Such discrepancies are partly because of the emotive nature of the oil palm debate (Sheil & Meijaard 2010). Furthermore, it can be due to the inherent difficulty of studying industrial-scale processes across large landscapes with highly varying social, legal, political, and environmental characteristics.

The issue affects orangutans in Asia, but could also threaten other ape populations in Africa as the industry continues to expand. In some contexts, there is evidence that ape conservation and oil palm development can be reconciled to some extent by minimizing and mitigating negative impacts through improved management practices and better spatial allocation of plantations. The implementation of those measures could determine the future of ape species affected by oil palm development in Asia and Africa.

TABLE 1

Some examples of discrepancies between public statements and scientific facts about the impacts of oil palm.

PUBLIC STATEMENT	SOURCE	SCIENTIFIC STATEMENT	SOURCE
Over 90% (80% in the second reference) of orangutan habitat has been destroyed in the last 20 years.	(Orangutan Conservancy 2015; Say No to Oil Palm 2015)	About 25% of orangutan habitat has been lost between 1990 and 2004; no more recent estimates are available.	(Meijaard & Wich 2007; Wich et al. 2008)
The palm oil industry is one of the most important factors in the dramatic reduction of orangutan populations.	(WWF 2015)	In Borneo, 19% of the remaining orangutan range is in oil palm concessions. Bornean orangutan killing outside of oil palm concessions is responsible for more than 50% of orangutan deaths.	(Meijaard et al. 2011; Wich et al. 2012b)
Oil palm plantations are currently the leading cause of rainforest destruction in Malaysia and Indonesia	(Rainforest Rescue 2015)	This statement is correct for Malaysian Borneo, where the share of oil palm-driven deforestation since 1973 is about 55%; in Indonesian Borneo, it was less than 15% up to 2005; in Sumatra, the oil palm plantations were the second-largest industry behind deforestation from 2000-2010	(Abood et al. 2015)

IMAGE 1

Industrial-scale oil palm is grown in large plantations in which few natural forests and other ecosystems are retained.
With permission from Borneo Futures.

PART ONE

OIL PALM IN SOUTHEST ASIA & IMPLICATIONS FOR ORANGUTANS & PEOPLE

SUMMARY

Oil palm has significant development potential, but this potential is not always achieved. If poorly planned, poorly managed or planted in unsuitable areas, oil palm can create financial problems and losses for both single-family farms that mix cash crops with subsistence agriculture -- known as 'smallholders' -- and industrial-scale estates. The palm oil industry can also displace rural and indigenous peoples and negatively impact traditional cultures and livelihoods, such as the small-scale cultivation of rice and other dietary staples. If poorly planned, the impact of land-cover change from forest to oil palm can contribute to disasters such as flooding, which can result in high economic costs and the loss of lives. In many places, poor planning has also resulted in increased soil erosion, water pollution, and the collapse of fisheries.

Oil palm expansion also threatens the remaining habitat of orangutans, which has already suffered significant loss and fragmentation in recent decades. In Borneo, existing oil palm concession licenses cover one-fifth of the orangutan's distribution. However, with careful planning and informed spatial analysis, landscapes can be better designed with optimal allocation of lands for development and conservation, maximizing long-term societal welfare. To achieve this, significant improvements are needed at various government levels, as well as planning and management

improvements at the estate level. A change in mindset is also needed to better capture the long-term societal benefits and costs of any development plans, specifically those related to the rapidly expanding palm oil industry. The general public also needs to be better informed about sustainability and certification in order to make more responsible consumer choices..

The successive stages of forest conversion and oil palm establishment, development, and maturation have different impacts on orangutan populations. Forest conversion has by far the most negative impact on the short-term survival of the species through habitat loss and associated killing, and the long-term viability of the remaining populations is imperiled through factors such as genetic fragmentation, stress, and increased risk of disease transmission. Orangutans that survive forest conversion can feed on young palms, which can result in significant economic losses to the grower and subsequent retaliatory killing as a means of crop protection.

After three to five years, oil palms mature and the extent of conflict between orangutans and oil palm growers decreases significantly. At some stage, mature plantations may simply act as 'corridor' areas between fragmented forest patches, as long as dispersal of apes within these planted landscapes is not impeded and is tolerated by workers and plantation owners.

LAND-USE ALLOCATION FOR OIL PALM

In Indonesia, oil palm plantations cover over 8.4 million hectares, with 64.1% of those located in Sumatra and 32.0% in Kalimantan as of 2013. Over 5.2 million hectares are planted in Malaysia with 1.5 million hectares in Sabah and 1.2 in Sarawak. Both countries have lost significant forest cover due to oil palm expansion over the past 40 years, and it is estimated that 55% to 60% of forest clearance in Malaysia was done to make way for oil palm plantations (Gaveau et al. in press; Koh & Wilcove 2009), while from 2000-2010, the oil palm industry was the largest industrial sector contributing to forest loss in Sumatra and the second largest in Indonesian Borneo (Abood et al. 2015).

Forest loss is likely to continue as both Malaysia and Indonesia are planning to expand the palm oil industry to support development agendas. In this pursuit, Indonesia aims to increase its crop area to 18 million hectares of land suitable for oil palm (Jakarta Post 2009), while Malaysia is expected to increase its oil palm extent up to 6.6 million hectares, to follow national economic pathways—as outlined in Malaysia's Economic Transformation Programme—to help achieve a high-income status by 2020 (Permandu 2010).

Land-use allocation practices in both Indonesia and Malaysia are characterized by laws and procedures that ultimately promote the transformation of forest assets to agriculture and other types of extractive land uses (Brockhaus et al. 2012). Although specific practices differ between both countries, and between the two Malaysian states of Sabah and Sarawak, commonalities exist in their overriding wills for converting lowland forests to agriculture such as oil palm plantations (Cotula et al. 2015). For both countries, the legal political framework for land-use allocation is highly complex and involves overlapping policy and regulatory mandates with multiple stakeholders at multiple levels.

IMPLICATIONS OF POOR LAND-USE ALLOCATION FOR OIL PALM

In Indonesia, land-use allocation at a landscape level for oil palm is largely influenced through spatial planning and license granting: Basic Agrarian Law (Law No. 5/1960), Basic Forestry Law (Law No. 5/1967), and laws surrounding spatial planning (Law No. 24/1992). Spatial planning at the national level ascribes areas for permanent forest reserves (i.e. Forest Zones) in which normally no oil palm cultivation can take place. Outside of the Forest Zones, cultivation areas for non-forestry activities are allocated for agricultural purposes. Oil palm development licenses are then conditional on mandatory local impact assessments approved at the local government level. Impact assessments review social constraints that may impact oil palm development, such as opposition by local communities, or customary lands, and biophysical conditions of potential concessions to identify environmentally sensitive areas, such as the presence of deep peat, or the presence of High Conservation Value (HCV) and High Carbon Stock (HCS) areas.

In addition to the approval of the pre-licensing assessments is the requirement for consultation with local communities, typically governed at the district level. However, the quality of impact assessments and the adherence to community consultations vary widely, potentially having negative implications on people and biodiversity, including orangutan habitat. Although the introduction of the mandatory Indonesian Sustainable Palm Oil (ISPO) certification

In Sabah and Sarawak, land allocation is relatively straightforward compared to Indonesia, particularly Malaysia issues long-term land titles to promote investment in plantation development. In Sabah, the basis of 'development' has always been to secure property rights, and specific titles are issued for land areas designated for plantations. In Sabah, 'deforestation' is not seen as deforestation, but as the opportunity to own long-term land rights. In 1976, British Overseas Aid developed the Land Capability Classification Map for Sabah, which identified all land suitable for agricultural purposes. This map has been used as a yardstick for agricultural development ever since, and the crude zoning for industries has segmented Sabah into production sectors, with oil palm allocated to the eastern region (Institute for Development Studies 2007), due to its fertile floodplains and lowland areas (Abram et al. 2014b).

Land-title applications for large-scale commercial (Country Lease) or smallholder titles (Native Titles) for oil palm are assessed against the Land Capability Classification Map to infer the titles' suitability for palm oil production. In cases where the extent of the land title is small, the assessment of soil type might be by-passed. Another major issue for some regions is that once a title is granted for a particular land-use type, the title holder must abide by the predetermined land use. For example, in Sabah, titles allocated for oil palm must be converted to that land use as decreed under the State Land Ordinance. As in Indonesia, the issue of bribes, corruption, multiple and bogus applications for land are widespread, and local peoples' customary rights can be disregarded within the process of land alienation in the State (Siddiquee 2010).

Socio-political issues aside, there is a fundamental lack of transparent, adequate, and detailed spatial information in land-use allocation exercises for identifying key facts, such as the suitability of the area for oil palm development or other types of agriculture; the value of the forest for protected species such as the orangutan; and other forest values, carbon stock and other ecosystem services derived from forested landscapes. This lack of knowledge reduces opportunities to develop alternative and better land-use choices than than those adopted by successive governments following a business-as-usual approach (Runting et al. 2015).

Poor planning approaches and the use of overly-simplified biophysical methods for allocating oil palm can have major socio-economic, environmental and biodiversity conservation implications.

Palm oil is often marketed as 'liquid gold' and as a way to elevate the poor out of deprivation into financial security and abundance. However, smallholder yields and overall profits vary widely based on the knowledge of management for production of this crop – such as the appropriate use of fertilizer and other planting methods -- as well as the biophysical suitability of the area and the accessibility of processing mills and transport routes.

Smallholders can be impacted by poor land-use allocation for oil palm, which can have major financial implications (Abram et al. 2014b). Financial struggles have been particularly felt by independent growers and those not under management of a mill, or indigenous peoples who lack knowledge on best practices for this crop and as a result attain poor yields. Farmers in these cases may struggle to pay back loans for set-up costs, which can be high and problematic because palm fruits are only harvestable after several years (MPOB 2010). The palm oil industry also has a history of poor relations with local communities and high levels of conflict (Abram et al. in review).

The costs associated with social conflicts, the loss of ecosystem services and reduced food security remain largely unquantified and unaccounted for (Obidzinski et al. 2012), making it difficult to determine whether the benefits claimed by the industry and the governments outweigh costs. Varying support for oil palm among rural communities indicates that they are wary of net benefits (Abram et al. 2014a; Dayang Norwana et al. 2011; Meijaard et al. 2013). Several studies assessed the value of ecosystem services for forests where orangutans occur and compared those to alternative land-use options (van Beukering, 2003 #10015; Venter, 2009 #11026; Wich, 2011 #13616}. Although more work remains to be conducted, these studies indicate that the potential value of carbon stored in the forests and particularly the thick peat layers, in combination with the value of other ecosystem services, could compete over the medium term with the profits made from agriculture and in some instances even from oil palm plantations.

For oil palm to increase human welfare across the tropics, governments, oil palm companies, financial corporations, and certification bodies need to: 1) deliver integrated spatial assessments that identify lands where net-positive economic, social, and environmental outcomes can be delivered through oil palm development; and 2) account for all costs and benefits of oil palm. Net-positive impacts require at least a quid quo pro approach.

Such a loss will have a devastating impact on remaining populations of wildlife, such as orangutans, elephants (Elephas maximus), and proboscis monkeys (Nasalis larvatus) (Bruford et al. 2010; Estes et al. 2012). Indeed, further forest loss will aggravate the lack of connectivity between isolated populations and worsen the current fragmentation of the overall Kinabatangan populations. This will result in an increased compaction effect in the remaining protected patches of forest, and will put the already fragile tourism industry at risk. From a socio-economic and political perspective, the conversion of forest within a global biodiversity hotspot -- particularly one that supports great ape tourism ventures and other forms of ecotourism -- for no financial gain makes little sense. Improving planning and allocation for oil palm in the area is an urgent necessity.

Financially investing in agriculture in unsuitable areas may also have consequences for businesses. Although flood mitigation measures can be implemented in flood-prone areas, they are largely ineffective and very costly (Hoh & Ishak-Amin 2001). For example, in 2000, one company experienced palm mortalities due to high flood water in 5,000 hectares newly planted with immature palms, with estimated financial losses of US$3 million (equivalent to US$600/ha) (Hai et al. 2001). The impacts of flood-related financial losses are particularly pertinent for small-scale farmers who often establish plantations

TEXT BOX 5: CONSERVATION PLANNING FOR ORANGUTAN: AN INTEGRATED APPROACH

For orangutan conservation and the conservation of great ape species in African oil palm producing countries, spatial planning needs to incorporate various types of information and should try to align goals and outcomes to support Sabah's and Indonesia's orangutan Species Action Plans. Different types of spatial data can help to accommodate and synergize orangutan conservation and oil palm establishment at a macro-planning level, by taking a holistic view to achieving species-level conservation (see Runting et al. 2015 for an academic exercise in using such tools).

using formal credit, borrow money through informal arrangements, or invest a large proportion of their savings. Failed oil palm ventures therefore represent poor return on investment for small-scale producers (Vermeulen & Goad 2006). However, larger companies with processing mills are likely to have less associated financial risk in converting flood-prone land as larger plantations may have a mosaic of land suitability thereby offsetting financial risk.

Flooding is becoming an increasing social and economic problem throughout the major river basins in Borneo, as well as Peninsular Malaysia where it was similarly found that conversion of forest to oil palm plantations increases the duration and frequency of floods and associated economic damage (Tan-Soo et al. 2014). Although no formal analyses has been conducted on the impacts of conversion of forest for oil palm plantations there have been several floods in the north of Sumatra that have been linked to forest conversion and have led to losses in lives and economic losses, with more than half a million people affected during the last decade in Aceh alone (Wich et al. 2011).

The Indonesian and Malaysian governments recognize flooding as a significant economic, social, and environmental risk but do not incorporate flood impacts and their relationships to land use into land-use decision-making. A better understanding of the relationships between land cover, terrain, flooding events, and economic impacts could help land-use planners make better and informed decisions, especially in identifying where deforestation should be avoided to minimize flooding impacts, and enable spatial planning to optimize multiple social, economic, and conservation objectives. It is important to note that the costs of deforestation and ecosystem degradation, such as those associated with increased flood frequency, are generally borne by the society, and not by the industry or the financial developers that are responsible for them, making the internalization of those costs is a necessity.

Oil palm producers should consider the willingness of local people to shift their livelihoods to oil palm before opening up more land. Furthermore, the legal and traditional rights to land must be considered and included within development planning. Communities should not be displaced, marginalized, or negatively impacted by economic development. Indeed, a major argument by the palm oil industry and governments for forest conversion to oil palm is made on the premise that it will improve people's lives and the national economy. If, however, communities are unprepared or simply are opposed to oil palm, and want to retain forests which are also within orangutan habitat, then a merging of agendas arises between communities and conservationists. Converting such areas therefore may prove to be socially, economically, and environmentally unwise and the implications of going ahead with such development plans may not outweigh the benefits. Operational costs for oil palm development can be extremely high if a company is facing conflicts with local communities or non-governmental organizations (Levin et al. 2012) and targeting oil palm towards willing communities would help minimize these costs.

Land-use planning is complex, especially in multi-functional landscapes. However, advances in spatial modelling, geographic information systems (GIS) and spatial-planning tools have enabled integration of interdisciplinary datasets for understanding landscapes (Moilanen 2007; Watts et al. 2009). For example, it is now possible to quantify landscapes in terms of natural resources and potential value for commodities such as palm oil in terms of their monetary value (Abram et al. 2014b; de Groot et al. 2012). It is also possible to quantify landscapes in regards to their non-monetary benefits to society, such as people's perceptions of whether they want land-cover change to oil palm, or the value of forests in regards to their cultural and spiritual value or for the products they provide: (Abram et al. 2014a; Balvanera & Lopez-Hoffman 2012; Baral et al. 2013).

For species conservation, threats such as land-cover change and hunting can be mapped to generate information on distribution and relative abundance (Abram et al. 2015; Wich et al. 2012b). Such information is imperative to understanding complex landscapes and is necessary for strategically allocating land for specific and optimal purposes. This, in turn, can help inform spatial plans so that they translate national or sub-national policies to good practice on the ground (Knight et al. 2008).

TEXT BOX 5: VILLAGERS' PERCEPTIONS OF THE BENEFITS THEY RECEIVE FROM FORESTS

Studies based on interviews with rural villagers on Borneo aimed to ascertain their perception of the intrinsic value of the forests (Abram et al. 2014a; Meijaard et al. 2013). Certain communities showed a strong link and awareness of the value of forests for themselves, their families and the environment. The results showed that several forest products such as timber and wild meat were highly needed by forest-dependent communities, but also by communities within human-altered landscapes. In many communities, forests still play an important cultural and spiritual role, with communities in transition areas demonstrating most awareness of their links to the forest.

Health benefits from the forest for people or for the environment were also widely acknowledged. Direct health benefits were felt in more forest-reliant communities while environmental health was noted more in communities where transition in land cover was occurring. This suggests that people are experiencing the negative impacts of land cover change. Forest clearing for smallholder oil palm agriculture was widely supported in a range of regions. However, many communities were against large-scale forest conversion to agriculture with strong opposition in more intact forested areas but also in areas with oil palm.

Understanding people's perceptions of the values of forest and on land-use and land-cover change is important to incorporate into planning for conservation, development and social wellbeing.

EXAMPLE 1

Heterogeneous floodplain suitability for oil palm cultivation

A detailed land-cover study in the Kinabatangan region of eastern Sabah considered the suitability and profitability of the floodplain for oil palm (Abram et al. 2014b). The region is a biodiversity hotspot, being home to a priority orangutan population (Sabah Wildlife Department 2012), to one of the five major Bornean elephant ranges (Estes et al. 2012) and other protected species. Wildlife viewing tourism activities are rapidly developing in the floodplain despite the fact that most of the lowland forest has been converted to oil palm over the past 30 years.

Results from this study estimated that 54% to 68% of the non-protected forest remaining in the floodplain (about 30,100 hectares in 2010–2011) was unsuitable for oil palm production due to seasonal or tidal inundation (Abram et al. 2014b). In fact, if forest conversion to oil palm happens, establishment costs exceeds any potential revenues, estimated from USD 65 (in areas with around 25% of palms surviving) to USD 300 (with no palms surviving) per hectare, per year, across 25 years. This is because most palms will die and the overall net cost for converting forest to oil palm will significantly outweigh any revenue derived from these areas. In addition, costs across smallholdings (less than 40 hectares) can be significant for planters, causing potentially large financial implications.

Despite the lack of financial benefit of conversion to oil palm in these areas, at least 56% of these unprotected forests (16,209 hectares) in Kinabatangan have been allocated for oil palm under commercial and smallholder titles (Image 4). Adding already existing and future commercially redundant areas -- if they are developed as currently planned -- could amount to over 32,000 ha of redundant land in the floodplain.

IMAGE 2

2013/2014 unprotected forest cover on Country Lease and Native Titles, and on areas with unknown titles in the Kinabatangan region of Eastern Sabah (Malaysian Borneo).

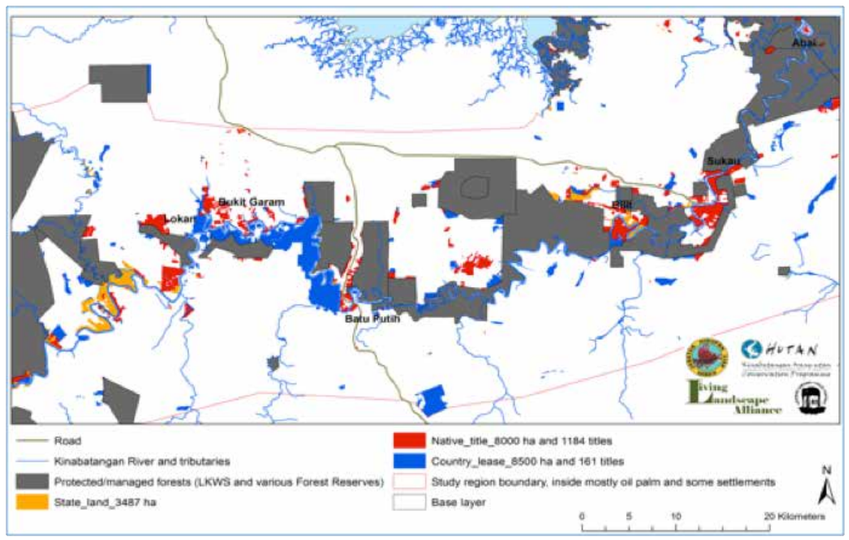
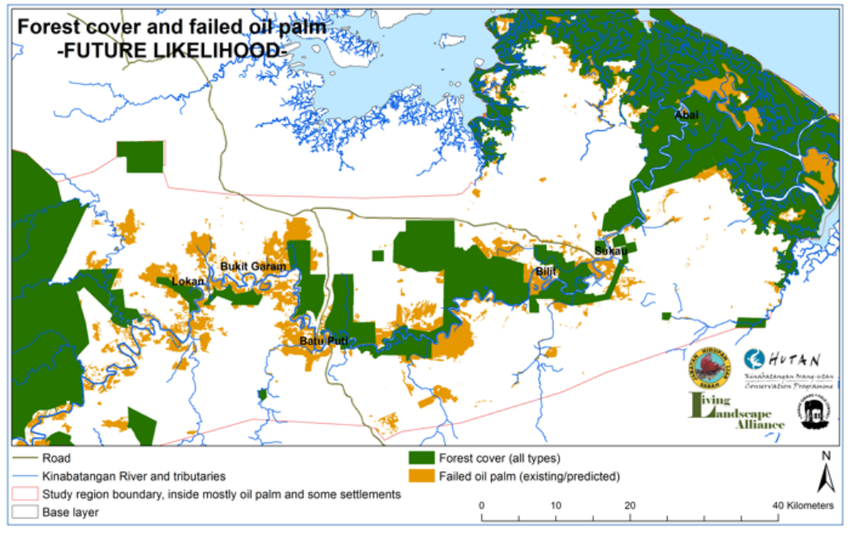


IMAGE 3

Estimated extent (32,000 ha) of failed oil palm (orange) if all unprotected forest is converted to oil palm cultivation in the Kinabatangan region of Eastern Sabah (Malaysian Borneo).



EXAMPLE 2

Heterogeneous floodplain suitability for oil palm cultivation

Major floods can be exacerbated by land-cover change. A Borneo-wide study conducted for the Great Apes Survival Partnership (GRASP) analyzed the relationship between flood events and land-cover change in Kalimantan in Indonesian Borneo. Information was compiled from three different sources: interview surveys from 548 villages; analysis of 413 newspaper articles between April 2010 and April 2013; and data from official sources.

The study identified significant discrepancies between government assessments of flood hazard and risk, and areas where floods occurred and were locally perceived to be most severe. The study found that flooding was widespread and significantly affected inland communities, as well as coastal towns and cities (Wells et al. 2013).

A follow up study (Wells et al. 2016) found that the probability of flooding trends over the past 30 years was higher for watersheds with more extensive oil palm plantations, but lower in watersheds with greater cover of logged or intact forests. Floods in recent years were more likely in watersheds with higher oil palm cover. In Borneo, flooding probabilities and reported trends in flooding were related to landscape features, especially the extents of impervious cover, mines, oil palm plantations, the extent and condition of forests and wetlands, and changes in soil water storage capacity. These findings were supported by the similarity of results from two independent data sets.

According to the perceptions of local villagers, wetlands and peatlands appeared to have a protective role in relation to flooding. Clearing these areas for oil palm may have contributed to increasing the frequency of floods over the past 30 years. Newspaper reports indicated that at least 146 distinct flood events happened during the three-year study period, flooding a minimum of 197,000 houses (and possibly as many as 360,000) and displacing a minimum of 776,000 people (and possibly as many as 1.5 million) (Wells et al. 2013) (Image 4).

IMAGE 4

Flooding in Ujoh Bilang Kutai Barat East Kalimantan in June 2006 as an example of the social impacts of floods. With permission from Godwin Limberg.

EXAMPLE 3

Conversion of peatlands creates large socio-economic and environmental problems

Peat soils on average comprise 90% water and 10% organic materials. In 2010, more than 20% of peat swamps in Southeast Asia had been converted into oil palm or pulp plantations, and only 34% remained under natural forest cover (Miettinen et al. 2012). The remainder were found in degraded and burned land or smallholder farm land. Draining and burning of peatlands is a major source of regional noxious haze and global greenhouse gas emissions (Turetsky et al. 2015). The fires of 2015-2016 and associated haze in Indonesia resulted in the loss of more than 2 million ha of forest -- a significant part of which was peat swamps – along with health issues that affected hundreds of thousands of people, and huge financial losses for the country, estimated by the World Bank at more than US$ 20 million (or 1.9% of Indonesia's Gross Domestic Product (GDP)).

When peat swamp forests are converted to other types of land uses they need to be drained. Their drainage results in rapid subsidence, literally the lowering and collapse of the soil and of the surface of the peat, which increases flooding events in the lower parts of the floodplains and in coastal areas, creating huge issues for coastal communities (Hooijer et al. 2012). Eventually, any crops planted in place of the natural peat swamp forests will die off after only a few decades (Deltares 2015a).

The case is clear for halting the drainage of peat swamp forests and enforcing strong moratoriums for their protection or rehabilitation in order to maintain the crucial ecosystem services they maintain and prevent devastating fires and haze. Companies with established plantations on peat soils should stop their activities and rehabilitate these peatlands to natural habitat or to alternative land uses, such as non-drained, low intensity crops.

EXAMPLE 4

Social conflicts due to inappropriate establishment of oil palm

In many countries, traditional livelihoods and local people's values are being challenged through power realignments over land and its resources in pursuit of economic development. Often, this leads to social tensions and conflicts (Barron et al. 2004). In Indonesia, 12.3 to 19.6 million people were associated with land-use conflicts from 1990 to 2000, representing 5 to 9% of the country's population (USAID 2006). Such numbers are not surprising in a country like Indonesia where nearly all forested land is under state rule and land tenure for local communities is tenuous. This is of particular importance in relation to Indonesia's rapidly-expanding 'forest-frontier' agriculture sector, which is dominated by the palm oil industry, with such development agendas often undermining customary rights to land and traditions of more forest-dependent communities (Abram et al. 2014a; Bartley 2010).

Conflicts between local communities and large-scale oil palm developments have been widely observed and documented due to land tenure issues as a result of illegal operations, large land leases overlapping with community areas, and displacement of people from land (Patel et al. 2013; Yasmi et al. 2010). Conflicts can also arise from environmental degradation that impacts the welfare or livelihoods of local communities (Abram et al. 2014a). Some local communities oppose oil palm, as they believe it will erode their traditional customs and identity, impact their livelihoods, and degrade their environment (Text Box 5) (Abram et al. 2014a; Achobang et al. 2013; Chong 2012). In some cases, local communities in collaboration with NGOs have taken oil palm companies to court for illegally operating in peat swamps in Sumatra (http://www.sumatranorangutan.org/tripa-campaign).

EXAMPLE 5

A need to include conservation and sustainable landscape development to improve land-use planning

Identifying synergies between development and the sustainability of species and ecosystems is paramount to mitigate adverse environmental and social impacts. This is especially important in light of increasing pressure on land and natural resources due to exponential global population increase and high economic growth targets set by many developing and emerging nations. Planning for sustainable landscapes can provide an effective approach to understanding complex social, economic, and biological aspects of landscapes

OIL PALM AND ORANGUTAN POPULATIONS

IMPACT OF OIL PALM DEVELOPMENT ON ORANGUTAN POPULATIONS

Indonesia and Malaysia are not only the two largest producers of palm oil, they are also the only two countries that comprise the present natural range of wild orangutans. Continued expansion of oil palm in these two nations has had a negative impact on orangutan distribution and on the species' short- and long-term viability (Ancrenaz et al. 2015b; Gaveau et al. 2009; Struebig et al. 2015). Habitat loss, degradation and fragmentation have had irreversible consequences for resident orangutan populations (see Chapter 2). These factors also lead to increased conflicts with people as orangutans are displaced into more human-dominated environments. This increases killings of orangutans, which in turn can also fuel domestic and non-domestic trade of these species (Abram et al. 2015; Davis et al. 2013; Nijman 2005).

It is inevitable that further expansion of oil palm in Sumatra and Borneo will exacerbate these threats, unless oil palm development can be steered away from remaining orangutan habitats. If not, the viability of most populations of critically endangered Sumatran and Bornean orangutans are at risk. A recent study (Wich et al. 2012b) showed that a minimum of 19% of the 2010 distribution of the Bornean orangutan was in land allocated for oil palm development. Another 24% occurred in areas for which land use has not been decided yet, but some of which are likely to be converted to either smallholder or industrial-scale oil palm or silviculture, which is the use forest land to develop crops.

In Sumatra, the extent of orangutan distribution under known oil palm concessions is around 3% (Meijaard & Wich 2014), but large areas with high orangutan densities, such as most of the Tripa peat swamps, have been lost to oil palm plantations (Wich et al. 2011). Considering that more concessions will be granted to support economic development, further orangutan habitat will be lost in both Borneo and Sumatra.

Orangutans are fully protected under Indonesian and Malaysian law. However, this level of protection refers only to acts of persecution, illegal keeping, or trade. There is currently no law preventing the destruction or degradation of orangutan habitat in either Malaysia or Indonesia, yet the removal of such habitat ultimately results in fatalities and localized extinction of the population (see chapter 2). As a result, the current protection of these species is inadequate in curbing population loss (Cotula et al. 2015). Both Indonesia and the state of Sabah in northern Borneo, which stands as one of Malaysia's orangutan strongholds, have Species Action Plans that aim to stabilize orangutan populations by 2016 (for Sabah) and 2017 (for Indonesia). Achieving these ambitious goals means that in addition to the need to halt the loss of orangutan habitat, it is essential to tackle human-orangutan conflicts and killings on Borneo (Meijaard et al. 2011) and Sumatra (Wich et al. 2012a).

A social survey undertaken in Borneo in just over 500 villages -- or about 8% of all villages on the island -- showed that between 750 and 1,800 orangutans were reported to be killed in the year prior to the survey in these villages alone (Abram et al. 2015). Meanwhile, enforcement of existing laws is woefully inadequate since conviction for orangutan killings or illegal acquisition/trade is nearly non-existent, although recently a few people have been prosecuted by the governments of Indonesia and Malaysia when they were found guilty of killing or trading orangutans. If forest conversion to oil palm and other non-forest land uses is not curbed, these action plans will fail and the fate of the orangutan will be jeopardized significantly.

However, changing legislation to protect orangutan habitat will potentially affect local, state and national economies, and could impede economic progress and potentially derail pursuit of current development targets. This is especially the case as orangutans and oil palm both require similar conditions and therefore compete for the same areas, namely lowlands with plenty of fresh water. It is clear that in Malaysia and Indonesia the economic incentive for oil palm development is greater than the desire to adequately protect orangutans. Unless the socio-ecological values of safeguarding these species and the tropical forests they reside in are recognized and taken into account to guide the development agenda, it is likely that the political will to develop new legislation to protect the habitat of these two species in Borneo and Sumatra will remain weak.

Nevertheless, there is often no need to change legislation to protect orangutan habitat because there are a number of regulations that prohibit the conversion of areas where orangutans occur, even though they were not specifically designed for orangutan protection (Wich et al. 2011). An analysis of orangutan habitat on Sumatra indicates that large areas should not be converted due to regulations prohibiting conversion on deep peatlands, steep slopes, and areas sensitive to landslides (Wich et al. 2011). It would be useful if such analyses would be conducted island wide for both Borneo and Sumatra so that it is clear which areas should remain unconverted.

OIL PALM PLANTATIONS ARE POOR LAND COVER FOR BIODIVERSITY

Oil palm is a threat to biodiversity within lowland tropical regions which have some of the highest levels of biodiversity and biologically unique ecosystems (Fitzherbert et al. 2008). Compared to intact forests, the structure and composition of oil palm plantations are much less complex, resulting in significantly reduced ecological variation. Palm density is relatively low (100–150 plants/ha), and overall plant diversity is extremely poor. The canopy layer is composed of only one species (Elaeis guineensis), presenting a uniform tree age structure with sparse undergrowth, as opposed to the multi-dimensional characteristics of tropical forests. In plantations, topsoil is stripped by erosion or damaged by compaction, and microclimate conditions become drier and hotter (Luskin & Potts 2011; Ramdani et al. 2014).

Consequently, these conditions bring changes to wildlife community structure and abundance, with endemic and specialized taxa being replaced by invasive and generalist taxa (Fitzherbert et al. 2008; Meijaard et al. 2005). A few abundant generalist non-forest or alien invasive species, often considered as pests by the industry, typically dominate plantation assemblages. Oil palm plantations are generally lower in species diversity compared to other types of industrial tree plantations, although it is higher than the most degraded and human-altered tropical vegetation types (Gibson et al. 2011). Therefore, traditional, large-scale oil palm monocultures are of limited importance for conserving local biodiversity. But well-managed plantations that retain some natural forest elements can provide some foraging resources and dispersal opportunities for various species (Maddox et al. 2007; Maddox 2007), including the orangutan (Ancrenaz et al. 2015b).

TEXT BOX 7: FOREST CONVERSION AND INDUSTRIAL OIL PALM DEVELOPMENT IN BORNEO

In 1973, Borneo's forest cover was 75.7% of the land area; in 2010 it was 52.8% (Gaveau et al. 2014). Between 1973 and 2013, Borneo lost 17.7 million ha of forest. Rather than slowing down, deforestation has accelerated and more than 8 million hectares were lost between 2000 and 2010 (Miettinen et al. 2011).

Recent analyses of satellite images show that 7.9 million ha of new industrial oil palm plantations were developed over the past 40 years, and are directly responsible for 21.4% to 25.4% of the deforestation on the island (Gaveau et al. in press). Between 1973 and 2010, the fastest rates of forest conversion occurred in Sabah (39.5%), followed by Kalimantan (30.7%) and Sarawak (23.1%). Recent analysis also shows that rapid forest conversion for oil palm development was extremely high in the Malaysian states of Sabah and Sarawak, with about 60% of forest being directly replaced by oil palm less than five years after their clearance. This rate is lower in the Indonesian part of the island, at about 11–15%.

IMPACT OF FOREST CONVERSION TO OIL PALM AGRICULTURE ON THE ECOLOGY AND SURVIVAL OF ORANGUTAN POPULATIONS

In most cases, industrial crops directly replace natural forests, either intact primary forests or already disturbed secondary or degraded forests (Gaveau et al. 2014; Laurance et al. 2010; Miettinen et al. 2011; Wilcove & Koh 2010).

When forests occupied by orangutans are converted to industrial oil palm plantations, adult females and flanged orangutans are displaced and often die, either directly through killing or indirectly as a result of starvation because they remain in the deforested areas (Wich et al. 2012b). However, unflanged adult male orangutans can potentially move away from disturbance areas and take refuge in undisturbed areas (Ancrenaz et al. 2010; MacKinnon 1972), resulting in a transitional 'excess' of males in remaining forest patches (Bruford et al. 2010).

Compaction of the habitat available to orangutans can create a compression or crowding effect of the remaining population, but the extent of this effect varies (van Schaik 2004). If the compressed population greatly exceeds the carrying capacity of the remaining natural habitat, or if too many individuals are compressed in a small forest patch, members of the resident population and displaced individuals will starve during periods of food scarcity in the forest (Rijksen & Meijaard 1999) and the social structure and behaviour of the animals will be impacted as residents may become more aggressive towards newcomers. They will rely on newly-established plantations to survive and feed on young palm seedlings and on people's crops, creating significant economic losses.

In the longer term, habitat fragmentation that follows agricultural development is a major threat to the viability of any remaining orangutan populations. Fragmentation results in the complete disconnection of remaining sub-populations. Fragmentation occurs when a physical barrier is created that is impassable to dispersing individuals, such as:

· When the forest is originally converted to other types of land use and only small blocks of natural forest are left isolated in the overall landscape and too far away from one another;

· When forest blocks are dissected by wide roads, human settlements, or other types of human-made structures that prevent orangutans from crossing;

· When drains dissect the landscape, as orangutans -- like all other ape species -- cannot swim. Therefore, a deep drain filled with water may become an impassable barrier to the animals;

· When large trees with adjacent crowns across small tributaries or drains—which may previously have been used as bridges—are removed, rendering these water bodies impassable to the animals.

Because of the landscape fragmentation, original orangutan populations become divided into smaller sub-populations isolated from one another. These smaller sub-populations become more vulnerable to genetic drift and inbreeding, to unpredictable events triggered by climate changes, and to human-related threats. The lack of gene flow between populations is a severe threat to the long-term survival of any given population in which dispersal is compromised. Anthropogenic changes to the landscapes are the ultimate cause of drastic orangutan decline today.

The best-documented example of landscape fragmentation is in the forests of the Lower Kinabatangan River in eastern Sabah. These forests have been exploited for the past few centuries and intensive commercial timber extraction started in the late 1960s. This wave of aggressive forest exploitation was soon followed by conversion to oil palm agriculture. Today only a few small, degraded, and isolated protected forests remain in a landscape of predominantly industrial oil palm plantations.

Orangutans have been documented as occurring in the Lower Kinabatangan floodplain since before the 1960s (Haile 1964; Horr 1972; MacKinnon 1974; Yoshiba 1964). However, genetic studies showed that 95% of the original Kinabatangan's orangutan population had been lost over the past two hundred years due to human activities, initially mostly due to hunting, and later due to forest clearance for oil palm development and other types of land use (Goossens et al. 2006). In the 1960's, about 4,000 individuals were estimated to occur in the forests of the Lower Kinabatangan. This Image was down to 1,100 in the early 2000s (Ancrenaz et al. 2004), and less than 800 animals today (M. Ancrenaz, unpublished data).

Current studies of this meta-population by the Hutan Kinabatangan Orangutan Conservation Programme (KOCP) show that forest conversion has resulted in a temporary influx of adult unflanged males into nearby patches of forest. This temporary male excess creates additional social and resource-exploitation stress in resident orangutans that have survived forest conversion. Over the years following initial fragmentation, these excess males disperse into nearby agricultural landscapes in search of new territories (Bruford et al. 2010). Today, although hunting is not a primary threat to their survival in the area (Ancrenaz et al. 2007), the population is still declining, mostly because of further forest fragmentation and conversion (Santika et al. in review). These studies show that the negative impacts of forest conversion on the orangutan's survival must be considered not only in the short-term, but also in the long-term in terms of landscape planning. The long-term impacts of any land-use change will primarily depend on how the overall landscape is planned and managed.

IMAGE 5

Forest loss between 1973 and 2010 (maps A and B) and current forest extent in Borneo (map D): from Gaveau et al. 2014.
Produced under Creative Commons Attribution (CC BY) license.

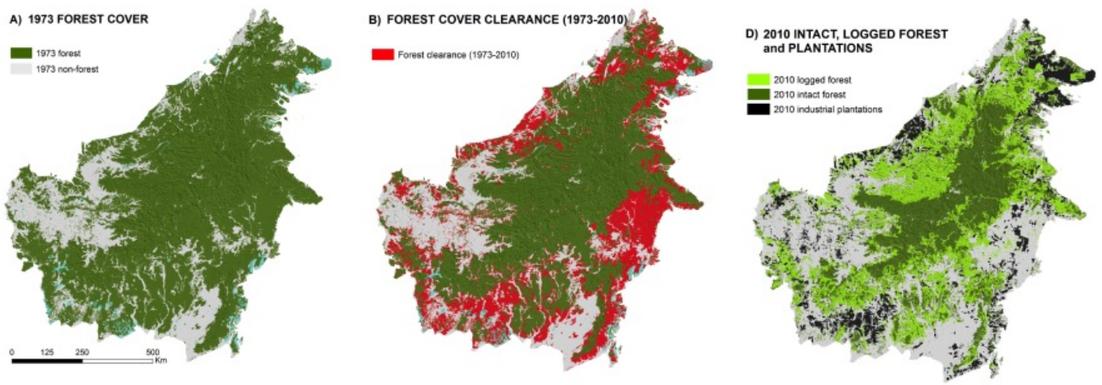


IMAGE 6

An orangutan nest in an oil palm plant and pith of a leaf after being consumed by an orangutan

ORANGUTANS RARELY CAUSE DAMAGE IN MATURE PLANTATIONS

Orangutans that survive forest conversion may start using agricultural landscapes. When a plantation is established within the range occupied by orangutans, the animals that survive forest conversion take refuge in any patch of forest that is not converted. When food becomes scarce in these forests, orangutans venture into the new plantations to forage. There they will pull out stems and destroy palms three years old and below to feed on palm hearts (Yuwono et al. 2007). Damage to the young palms can be significant with dozens of plants being destroyed at once during a feeding bout (Ancrenaz et al. 2007). Orangutans can also consume bark of acacias and other parts of species planted in industrial tree plantations (Chung et al. 2007; Meijaard et al. 2010) or destroy entire fruit crops in orchards belonging to local villagers (Campbell-Smith et al. 2011b). As a result, subsistence farmers and oil palm growers in some areas of Borneo consider orangutans the most damaging crop-raiders (Hockings & Humle 2009), and many orangutans are either killed or captured and translocated to other places (Hockings & Humle 2009) (Text Box 8).
Given the drastically different structure of oil palm plantations compared to natural forests, the behaviour and ecology of orangutans in these altered landscapes differ markedly from what is known in natural forests. In Sumatra, a small but stable sub-population of orangutans has survived in a mosaic of mixed agriculture and forest for over 20 years (Campbell-Smith et al. 2011a). Compared to wild conspecifics living in the forest, these animals spend more time resting and less time feeding, and less time eating fruits and more time consuming bark, and have a smaller home range (Campbell-Smith et al. 2011b). In Sabah, orangutans venture into mature oil palm landscapes to feed on young leaves directly taken from the crown of the adult palm and on ripe fruits picked from fruit bunches on the ground or directly on the palm (Ancrenaz et al. 2015b) (Image 9 and Image 10). Although orangutans prefer to nest in forest trees, they can bend and break large leaves of mature palms to build their nests in the central part of the plant (Ancrenaz et al. 2015b).

Often, orangutans in Borneo enter the mature plantations after workers have left the site and remain active later into the night before

returning to the forest (Spehar unpublished data; Ancrenaz et al. 2015b), although this was rarely found to occur in Sumatra (Campbell-Smith et al. 2011b). It is noted that these ranging patterns are similar to those that have been identified in crop-raiding chimpanzees in Africa (Krief et al. 2014).

In the Lower Kinabatangan, about 90% of the signs indicating orangutan presence such as nests or broken leaves, are found less than 50 m away from small forest patches or forest edges (Ancrenaz et al. 2015b). These findings suggest that the penetration into homogenous stands of oil palms is relatively limited unless non-palm trees are present. However, signs of orangutans (broken leaves) were also recorded more than 500 m from a forest, indicating that orangutans can sometimes venture further from a forest edge into an oil palm plantation (up to 5km or 6km, KOCP, unp. data). In this landscape, orangutans often walk on the ground to be faster and to avoid detection (Ancrenaz et al. 2015b; Ancrenaz et al. 2014).

Interview surveys in mature estates visited regularly by orangutans revealed that orangutan presence and activities had no negative impact on the fruit productivity of the mature palms, even when palm leaves are broken for nest building (Ancrenaz et al. 2015b). In plantations that are older than five years, orangutans should not be considered a major problem. The animals will mostly feed on ripe fruits collected directly from the fruit bunches either on the palm or on the ground.

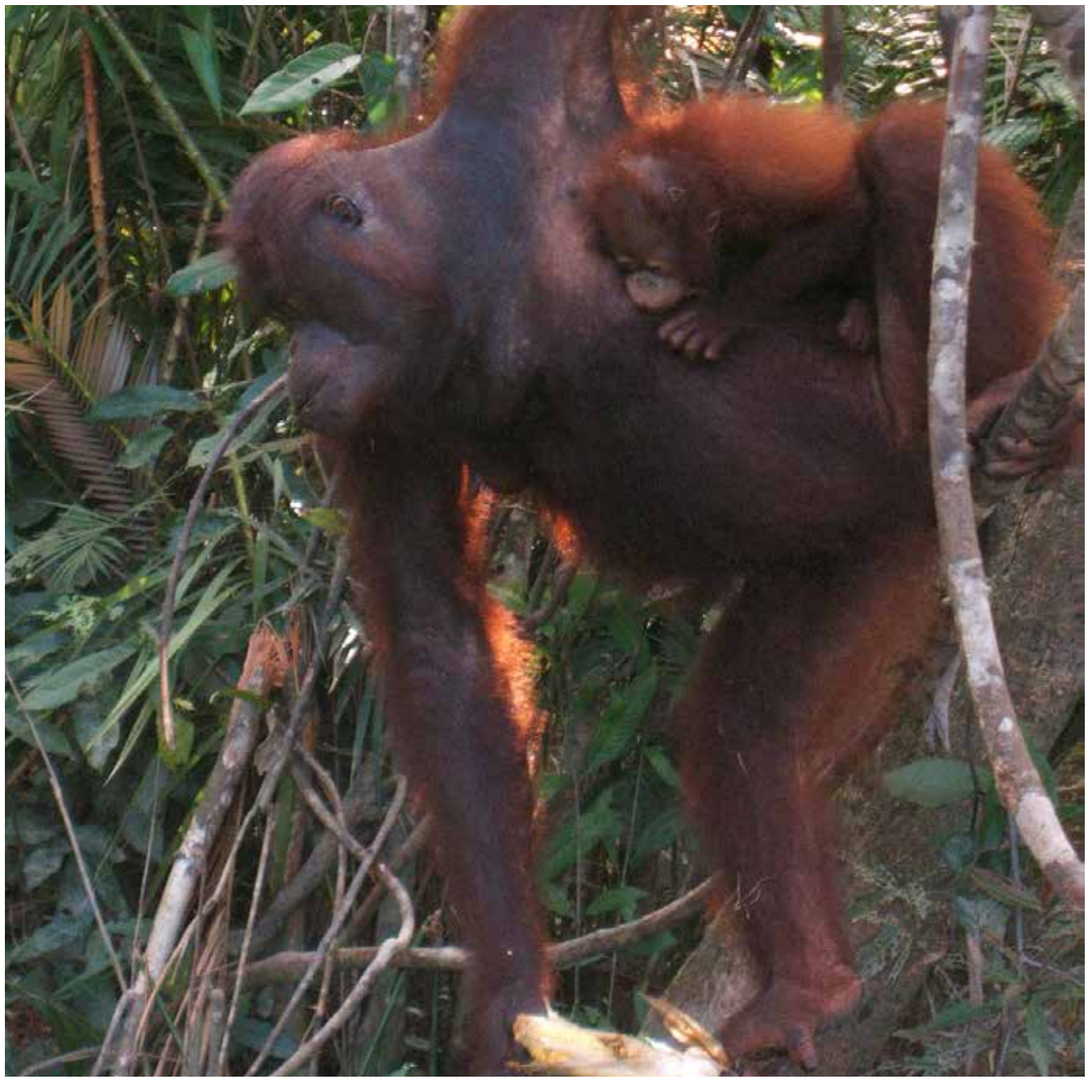
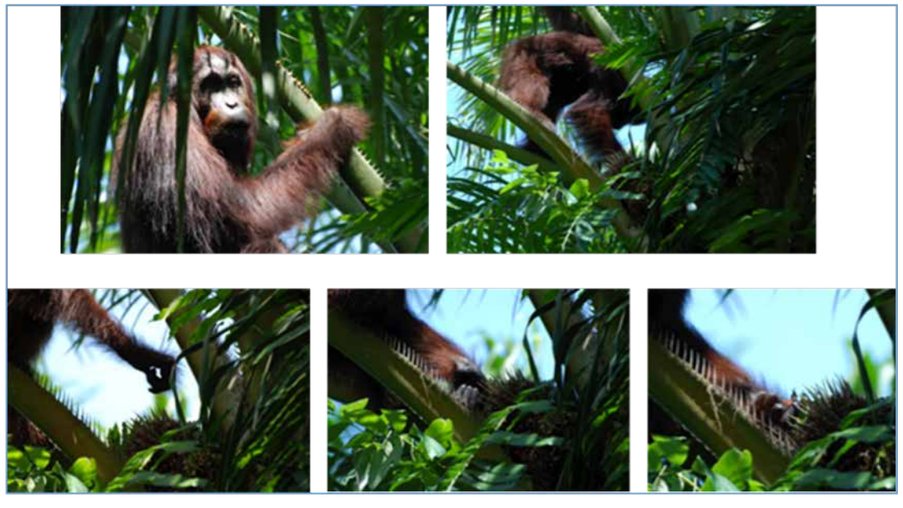


IMAGE 7

An adult unflanged orangutan male plucking mature fruits directly from a bunch of seeds in an oil palm tree.



KILLING ORANGUTANS AS A MITIGATION MEASURE IS ILLEGAL

Orangutans are fully protected species in both Indonesia and Malaysia, and therefore it is strictly forbidden by law to harass, injure, or kill orangutans, or to keep them in captivity (Cotula et al. 2015). In Sabah, such a crime is punished with a term of imprisonment of no less than six months but not exceeding five years. In Indonesia, large fines and prison sentences are legally possible but rarely implemented. In all plantations, a zero-tolerance policy on the killing of orangutan and other harmful acts needs to be enforced at all management levels.

Until recently very few companies were willing to reveal orangutan deaths associated with their plantation development, either because 1) they instigated the deaths themselves by paying hunters to kill orangutans and other wildlife, as has been reported from many parts of Sumatra and Borneo; or 2) they were concerned about any possible negative publicity for the company in case an orangutan death was reported. As a result, it is estimated that thousands of orangutans have been killed over the past few decades without any prosecution. However, better overall awareness and increased pressure from various civil society groups have recently resulted in more orangutan killers being arrested, prosecuted, and jailed in Sabah, Sumatra and Kalimantan. One way to encourage companies to report orangutan deaths would be for outside stakeholders and the media to recognize the difference between intentional killings and accidental deaths, and react accordingly. This requires transparent reporting procedures and trustworthy investigation by police or wildlife authorities.

PREVENTION OF CONFLICTS BETWEEN HUMAN AND ORANGUTANS

In areas where orangutans are responsible for economic losses and emotional distress to agricultural growers and workers, a negative perception towards their presence is likely and becomes a major impediment to building local support for their conservation (Aharikundira & Tweheyo 2011; Gore & Kahler 2012; Marchal & Hill 2009; Webber et al. 2007). Successfully addressing conflicts between orangutans and the palm oil industry requires the design and implementation of technical solutions that minimize the damage and related negative perceptions (Hockings & Humle 2009).

Many technical solutions have been tried to reduce impacts from orangutans in oil palm areas, with varying results. For example, trenches and strips of bare land seem to deter orangutans from entering oil palm plantations and could physically separate plantations from forests inhabited by orangutans. When palms become more mature these trenches could be bridged to allow orangutans to move across the mature oil palm landscape. Other deterrents include regular patrolling with dogs on oil palm plantations where orangutans are regularly encountered, or the use of fire crackers to scare orangutans away. More positive actions include planting a buffer of fruit trees at the periphery of newly planted areas to attract the orangutans and minimize the likelihood that they will venture in planted areas looking for food.

The most efficient ways to minimize orangutan conflict in oil palm areas are generally considered to be: 1) proper land-use planning before land conversion starts, so that large forest areas are maintained to contain viable orangutan populations, and 2) allowing safe dispersal of orangutans through plantations.

PROMOTING THE CREATION OF ORANGUTAN-FRIENDLY OIL PALM LANDSCAPES

It is unlikely that better management practices for oil palm production will be sufficient to significantly increase the biodiversity value of agro-industrial oil palm plantations (Yaap et al. 2009). Of much greater value would be the protection of forest fragments and corridors within the agricultural landscape (Image 11).

The research available from Kinabatangan emphasizes the value of patches of forest within an oil palm landscape for orangutan conservation, and even small and highly degraded patches are useful. This must be recognized and acknowledged by government planners and policymakers, the scientific community, the private sector and all land users.

Before oil palm development, HCV and HCS forests must be identified, demarcated, and set aside with a view to maintaining ecosystem functionality and meta-populations of wildlife (Koh & Wilcove 2008; McShea et al. 2009; Sabah Wildlife Department 2012). These patches should not be converted but rather incorporated into land-use plans as ecological set-asides, and appropriately managed to prevent illegal logging, poaching, and fire. However, the current legislation in place in Indonesia and Malaysia prevents the conservation of HCV areas of significant sizes within lands that have been allocated for agricultural development.

When the landscape has already been converted in an oil palm matrix, re-establishing greenways or corridors is a necessary step to recreate continuity between isolated orangutan populations. These greenways, either in the physical form of contiguous forest corridors or stepping stone fragments, will eventually be embedded in the landscape matrix and function to link larger blocks of forest. These forests have to be of sufficient ecological quality to allow the animals to stay and to survive in terms of food resources, nesting sites, and tree cover, and to favor animal movements. To maintain or to re-establish connectivity among forest fragments and to promote orangutan dispersal, it is important to consider not only the distance between the fragments and the length of the corridors, but also the quality of the area between locations and the level of human activity within them, by assessing the functional versus structural connectivity (Forman 2006; Gunderson et al. 2010; Lindermayer & Fischer 2006).

Orangutan dispersal can also be enhanced within an oil palm landscape by planting fast-growing non-palm fruit trees to increase food opportunities for wildlife and create possible nesting sites for orangutans. Habitat heterogeneity through the plantation lifecycle should be integrated into planning more biodiversity-friendly oil palm landscapes (Luskin & Potts 2011). Creating 'blocks' for rotation at different periods is a widespread approach that benefits biodiversity in the timber industry (Thang 1987) and oil palm growers could adopt a similar approach. Planting schedules could also increase permeability and connectivity between remaining forests by using progressive strips to maintain some continuous crop corridors (Luskin & Potts 2011). Variable retention, which leaves mature palms when new palms are planted at the end of a rotation cycle, would be another approach to increase the value of the landscape for orangutan and biodiversity conservation.

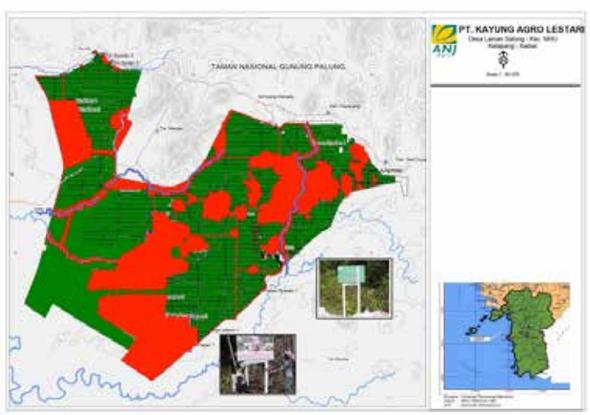
The proper spatial and temporal design of the plantation (Image 12) should be combined with best management practices and traditional conservation efforts to improve the quality of this landscape for orangutans and other biodiversity elements (Luskin & Potts 2011).

IMAGE 8

The Kinabatangan landscape is dominated by oil palm, with remaining forest patches tentatively connected through forest corridors.

IMAGE 9

Example of a conservation land-use plan (red areas) in an oil palm plantation (green areas), with conservation set-asides varying between a few hundred ha to nearly 2,500 ha, and riverine forest set-asides and forest corridors providing connectivity. Not all planned conservation area were realized but the concession has up to 150 orangutans (Meijaard et al. unpublished manuscript).



INCREASED RISKS OF DISEASE TRANSMISSION

The occurrence of emerging infectious diseases is a major threat to wildlife and to global public health, with high economic impacts. Although no major disease outbreak affecting orangutans in Asia has been documented, recent Ebola outbreaks in Africa have resulted in the death of thousands of humans and tens of thousands of great apes (Bermejo et al. 2006; Reed et al. 2014).

Reasons for increased risk of disease transmission between humans and orangutans -- and vice-versa -- living in anthropogenic landscapes include:

- A closer distance between humans and apes;
- Elevated levels of stress that could impair individual's immune system to combat disease and infection (Muehlenbein & Bribiescas 2005);
- Increased orangutan terrestrial locomotion exposing the animals to a greater risk of contamination with pathogens originating from people and domestic livestock (Ancrenaz et al. 2014);
- Changes in the epidemiology of the pathogens due to habitat fragmentation, human penetration into natural habitat, climate change, etc. In Borneo, the malaria caused by Plasmodium knowlesi was for a long-time restricted to monkeys. However, this type of malaria increasingly affects orangutans and people today (Lee et al. 2011).

There is still very little knowledge on the diseases of and pathogens present in wild orangutans in Borneo and Sumatra. Therefore, a precautionary approach requires that the epidemiology and dynamics of emerging diseases that could potentially affect these species of great apes in human-made landscapes are investigated thoroughly (Gillespie & Chapman 2006; Muehlenbein & Ancrenaz 2009; Travis et al. 2008).

The knowledge and experience gained regarding the impacts of oil palm development on orangutan survival are critical to inform the industry on how to best mitigate the negative repercussions of their development on African great apes.

PART TWO

EXPANSION OF OIL PALM IN AND AFRICA IMPACTS ON GREAT APES

EXPANSION OF OIL PALM IN AFRICA

As the palm oil industry develops and expands, companies look for ways to increase production. Malaysia and Indonesia have tried to achieve this is through increasing the yields produced per hectare, as a result of better management of the plantations, which can increase income by up to 60% (Potter 2015). This is especially the case for smallholders, who often sell their produce to large companies. Some have argued, however, that yield improvements will only make palm oil more competitive compared to other crops, thus attracting more production and potentially deforestation to the tropics, with other crops grown at higher latitudes such as rape seed possibly losing out to this competition (Carrasco et al. 2014).

In addition to yield increases, cultivars that have been genetically altered for increased production can be used. Oil palm breeding and selection is primarily focused on maximizing mesocarp and kernel oil yields (Rajanaidu et al. 2000). This aspect of oil palm cultivation could play a critical role, with the potential to produce up to 33% more palm oil per hectare (Singh et al. 2013).

With limited potential for further expansion of oil palm development in Malaysia and Indonesia, companies are now looking elsewhere in the tropics for extensive areas that can be converted to oil palm to meet the continued rise in demand. Much of this attention is falling directly on Africa (Image 13), and to a lesser extent South and Central America (Belenki & Wolosin 2015).

OIL PALM IN AFRICA

At present, oil palm is grown commercially in 11 countries in Africa: Angola, Benin, Cameroon, Cote d'Ivoire, DR Congo, Ghana, Guinea, Liberia, Nigeria, Sierra Leone, and Togo, but their global contribution to the palm oil industry is minor (Image 14). There are more African countries that are producing palm oil, but major export volumes are limited to a few (Image 15), with especially India, the European Union, and China being major importers (Image 16; Potter, 2015). A total area of 27,000 km2 in sub-Saharan Africa is estimated to have oil palm as an intended crop (Arcus Foundation 2015).

The largest producer of palm oil in Africa in terms of total production is Nigeria, but despite being the world's fifth-largest palm oil producer it only makes up 2% of global production. The other main producer is Ghana, with Cote d'Ivoire not far behind. These countries have increased production by a factor two to five between 1964 and 2014 (Image 14 and Image 17).

At present, continent-wide data on areas covered by oil palm do not exist for Africa. There is therefore no systematic procedure to determine the extent of recent increases in oil palm plantations. However, the recent increase of 'land grabs' in a number of countries shows the interest of industry to expand in Africa (Carrere 2013). Four international palm oil companies have plans to expand in Liberia: Sime Darby, Golden Veroleum, Equatorial Palm Oil Limited and Socfin/ Cavalla. All of these companies have signed concession agreements with the Liberian government estimated to cover 200,000 ha of land per operator (L. Walsh, pers. comm. 2015) although it's uncertain to what extent these areas will be developed or planted.

To date, most oil palm areas are smallholder plantations, or so called 'traditional' plantations. For some time, large-scale development has been accused of being a negative force for local communities with people losing autonomy and being under-compensated, and incidents of human rights violations and land grabbing in areas of oil palm development are at the forefront of this criticism. However, the reality on the ground shows an increase of smallholder development, suggesting that local communities see it as an appealing income opportunity as long as smallholders benefit directly from this development (Rist et al. 2010a).

The expansion into Africa could be potentially lucrative both for the country producing the palm oil and for foreign investors. The benefits from the palm oil industry could help to enhance national infrastructure by building hospitals, improving schools and creating road networks. For this reason, Africa has been identified as a primary target in a wave of land acquisition for oil palm development, with Asian- and European-based investors accounting for two-thirds of that activity. A recent report across all major commodities identified 754 land deals covering 56.2 million hectares that have taken place in sub-Saharan Africa since 2000, with the oil palm industry having an unknown share of this (Anseeuw et al. 2012).

IMAGE 10

All land in Africa that is suitable for oil palm plantations (based on Wich et al 2014).

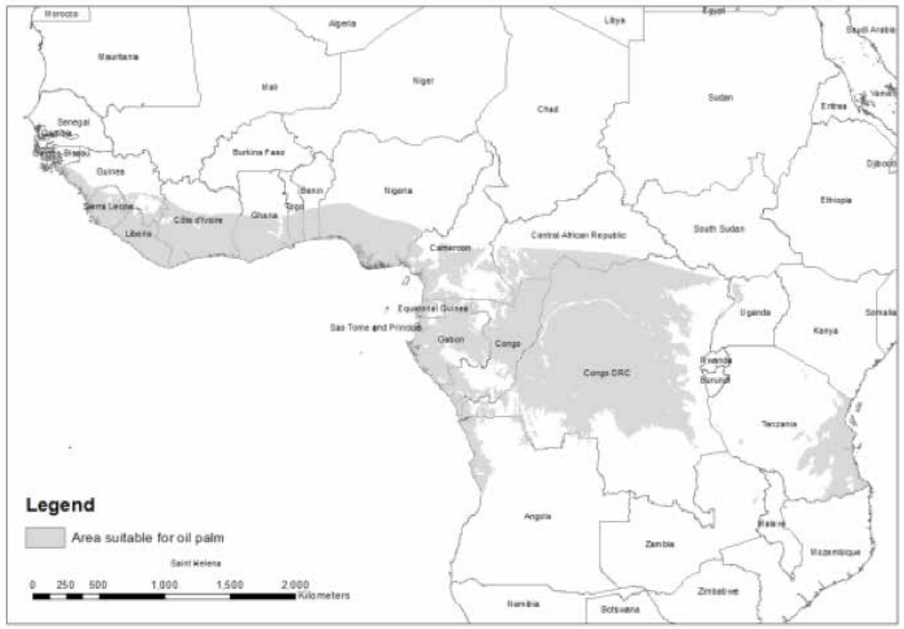


IMAGE 11

Five largest palm oil producers in Africa (USDA 2015)

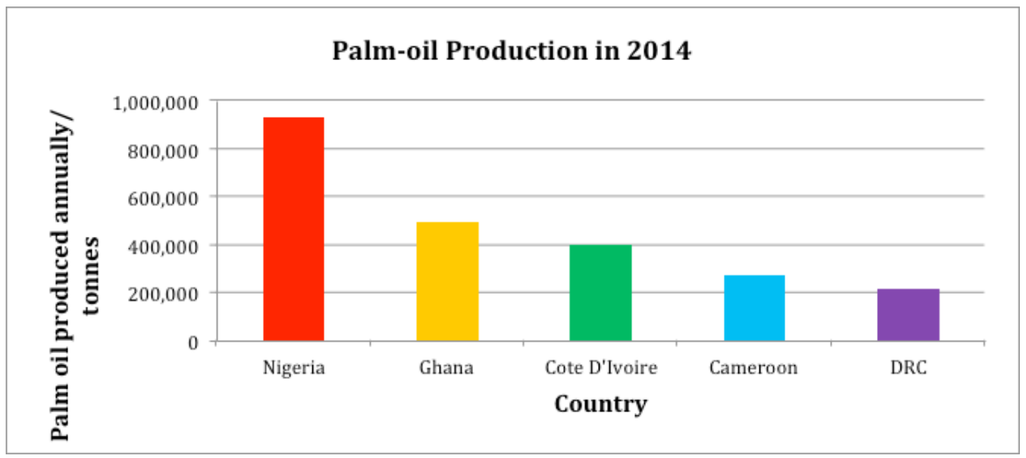


IMAGE 12

Five largest palm oil exporters in Africa in 2014 (USDA, 2015)

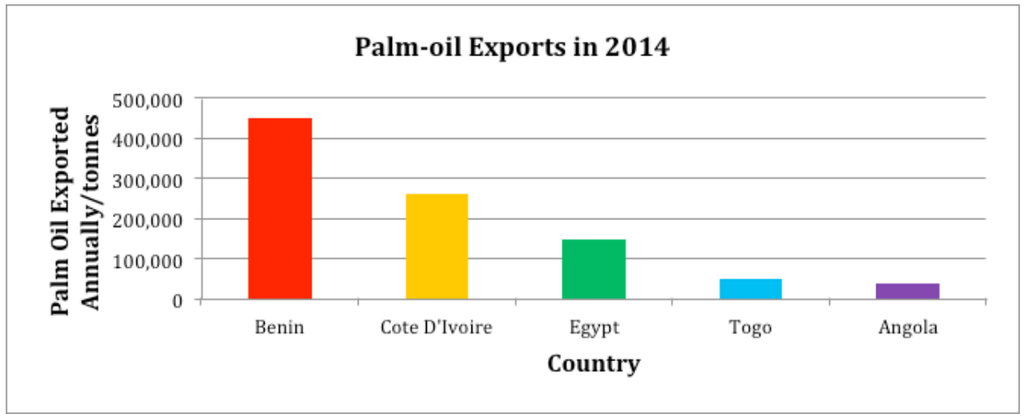


IMAGE 13

Five largest palm oil importers worldwide in 2014 (USDA, 2015)

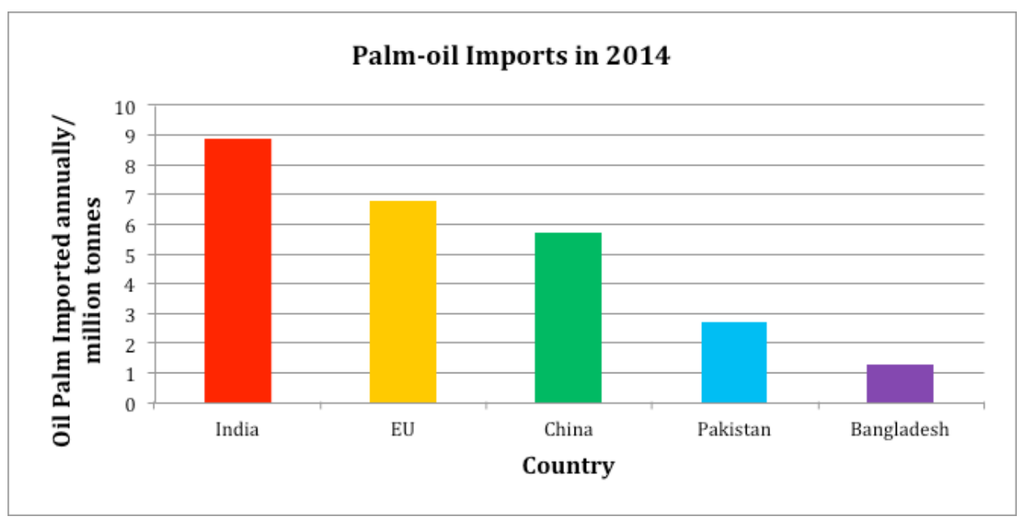
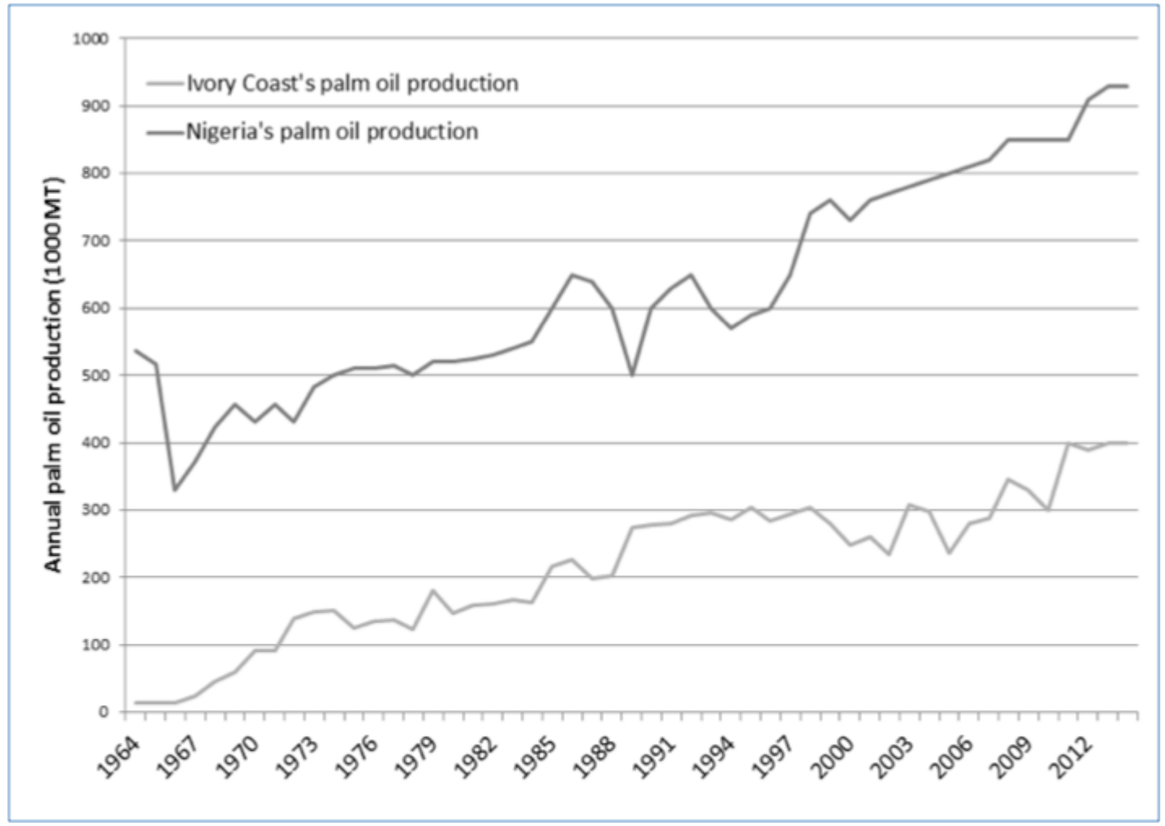


IMAGE 14

Annual palm oil production of Nigeria and Ivory Coast from 1964-2014 (USDA, 2015)



AFRICAN COUNTRIES WITH THE HIGHEST POTENTIAL FOR OIL PALM DEVELOPMENT

It is uncertain where the future expansion of oil palm in Africa will occur. It is likely that investment will focus on those countries that have historically been or currently are the most significant producers in the continent. In Nigeria, for example, palm oil is produced from a total area of three million hectares of land, of which some 370,000 hectares (12%) are industrial plantations while the rest is primarily smallholder plantations. In Ghana, the area planted with oil palm was 330,000 hectares in 2010 (Ofosu-Budu & Sarpong 2013) and 80% of the production originates from smallholders (see below). In Côte d'Ivoire in 2006, 160,000 hectares of plantations had been established (OWM 2005).

There are also significant areas of oil palm plantations in Guinea (310,000 hectares), DR Congo (210,000 hectares: 70,000 hectares as industrial plantations and the rest as village groves: Hoyle & Levang 2012), and Sierra Leone (29,000 hectares) along with smaller areas in Benin, Burundi, the Central African Republic, Equatorial Guinea, Gabon, Gambia, Guinea Bissau, Liberia, Senegal, Tanzania, Togo, and Uganda (Bwenda et al. 2008). Much of the palm oil currently produced in these countries is used domestically rather than exported, and there is an unmet demand of 360,000 tonnes of palm oil in West Africa annually (Garley 2011). Because of the proximity of Africa to the European market, the oil palm industry could use Africa as a major provider of palm oil to European countries in the future.

Top Five Palm Oil Producers in Africa

NIGERIA

Recent interview surveys show that in Kalimantan alone several thousand orangutans have Although Nigeria has already lost or degraded most of its tropical forest through unsustainable land-use practices, the remaining forests harbor a rich biodiversity, including chimpanzees (Pan troglodytes ellioti) and Cross River gorillas (Gorilla gorilla diehli). Nigeria used to be the largest palm oil producer in the world until the civil war in 1967. At present, 24 million hectares of land is estimated as suitable for oil palm development in the country but only 12.5% of this has actually been developed (Potter 2015). There is a shortage of palm oil in Nigeria meaning that around 150,000 tons is imported annually. Nigeria is therefore a country that could flourish by the further development of palm oil, provided that appropriate safeguards are developed in the country to minimize negative impacts of oil palm development (BusinessDay 2013).

GHANA

Ghana is home to the critically endangered Western chimpanzee (Pan troglodytes verus). Ghana is one of the largest oil palm producers in Africa with 305,758 hectares under oil palm cultivation. Approximately 244,000 tonnes are produced annually of which 80% is cultivated by smallholders or private small-scale farmers. However, like Nigeria, Ghana does not produce sufficient palm oil to meet domestic demand. In 2007, about 150,000 tonnes of oils and fats were imported, of which 94% was palm oil (Osei-Amponsah et al. 2012). The smallholders have little leverage when and where they sell their palm oil because there is often only one company that can buy it locally, which can therefore set the price, often leaving smallholders under-compensated for their crop. This is exacerbated by the fact that oil palm farmers in Ghana, as well as many other countries, are not well organized and have no formal representation at the community level (Danyo 2013). There is a lot of potential for oil palm expansion in Ghana but appropriate tenancy rules and arrangements need to be established to improve the profit margins of farmers and encourage them to increase productivity. Ghana has conducted a national interpretation of the RSPO Principles and Criteria to make it easier for producers to seek RSPO certification. In this regard, the country is a regional leader.

LIBERIA

Liberia is one of the last strongholds for Western chimpanzees (Pan troglodytes verus). Agriculture is dominated by traditional subsistence farming systems, and oil palm development started in the 1970s with a single 70,000 hectare plantation. However years of civil unrest stopped the development of this industry until a few years ago, explaining why the country has not yet reached the production scale of other African countries (Arcus Foundation 2015). Today, most of the expansion of the industry is through large private stakeholders with three oil palm companies controlling a total of 830,187 hectares of land for oil palm production -- or 7.5 % of the whole country's land area (Carrere 2013): Equatorial Palm Oil, Golden Veroleum, and Sime Darby, all RSPO members (Arcus Foundation 2015).

CAMEROON

With four taxa of great apes found in Cameroon, this country is a stronghold for African ape diversity: Central chimpanzees (Pan troglodytes troglodytes), Nigeria-Cameroon chimpanzees (Pan troglodytes ellioti), Cross River gorillas (Gorilla gorilla diehli) and Western Lowland gorillas (Gorilla gorilla gorilla). Palm oil is not new to Cameroon as the first commercial plantations were established there in 1907, but as demand continues to rise, producers are seeking to expand production in Cameroon with the aim of establishing new oil palm plantations during the next decade. There are extensive reviews of the situation in Cameroon (Arcus Foundation, 2015, and in Potter, 2015). The industrial production of palm oil is a national priority, initially to meet domestic demand and secondly for export (Hoyle & Levang 2012). The government aims to increase palm oil production from 265,000 metric tons in 2013 to 450,000 metric tons by 2020 (Hoyle and Levang 2012).

However, recent oil palm expansion in the country has caused concern for biodiversity through forest loss and fragmentation and resulting hunting pressure in the remaining forest areas (Abernethy et al. 2013). All concessions in the country overlap with great ape ranges. However, the cultivation of oil palm could also generate substantial economic returns and contribute to much-needed development for the country. The government appears to currently favor smallholder schemes for oil palm development to meet domestic demand first. But agro-industrial expansion also leads to a significant rate of deforestation throughout the country (Arcus Foundation 2015). The impact of non-subsistence crop development on local and national food supplies needs to be monitored to ensure that oil palm cultivation does not lead to a decrease in subsistence farming upon which so many communities rely upon.

Democratic Republic of Congo (DRC)

DR Congo is the only country to host all three African great apes, and also contains the entire natural range of the bonobo (Pan paniscus). Other great ape taxa found in this country include Central chimpanzees (Pan troglodytes troglodytes), Eastern chimpanzees (Pan troglodytes schweinfurthii), Grauer's gorillas (Gorilla beringei graueri), and Mountain gorilla (Gorilla gorilla beringei). DR Congo was the world's second largest palm oil producer in the 1960s, but years of civil war, unrest and economic decline have left it as a minor producer. Today its production of palm oil does not even rank in the top ten worldwide. Production continued to decline until recently when processing plants were established in the country.

The forests of the Congo Basin -- of which DR Congo is part -- cover approximately 200 million hectares, store an estimated 25-30 gigatonnes of carbon and provide direct livelihood benefits for over 40 million people, including an estimated 500,000 indigenous forest people (Rainforest Foundation 2015). However, a significant proportion of these forests is also suitable for oil palm cultivation. In 2005, total palm oil production in DR Congo was estimated at 225,000 tonnes with only 25,000 tonnes from industrial plantations (Carrere 2013), but this situation subsequently changed with 70,000 hectares allocated for planting in 2009 by external investors. This is largely due to the reclamation of abandoned plantations for oil palm development, which is becoming more prevalent (Carrere 2013).

AFRICAN GREAT APES AND OIL PALM PLANTATIONS

RANGE AND STATUS OF AFRICAN GREAT APES

There is concern that the expansion of industrial-scale oil palm plantations in Africa will have similar negative impacts on biodiversity, climate change, and local communities as identified in Southeast Asia (see Chapter 2). However there is still a dearth of information about potential negative impacts of oil palm development on natural resources and biodiversity in general, and great apes in particular (Linder 2013; Wich et al. 2014).

African great apes include the bonobo, the chimpanzee, the Western gorilla, and the Eastern gorilla. Chimpanzees are relatively widespread and found in 21 countries across equatorial Africa (Image 18). Conversely, bonobos are only found in DR Congo, making this species particularly vulnerable. Western gorillas are not as widely distributed as chimpanzees but still occur in five countries, while the Cross River gorilla subspecies occurs only on the border area between Nigeria and Cameroon. The Eastern gorilla only occurs in DR Congo, Uganda, and Rwanda, with the Grauer's subspecies only found in DR Congo (Arcus Foundation 2015).

All ape species in Africa and in Asia have been negatively affected by direct or indirect interaction with people, leading the IUCN to list all of them as either 'endangered" or 'critically endangered."

The distribution of great apes in Africa is restricted to the equatorial zone, which also coincides with the area that is suitable for oil palm development (Image 13). There is a 42.3% overlap between the distribution of great apes and areas suitable for oil palm cultivation (Image 19), but the potential impact of oil palm development differs between the four ape species: the percentage overlap between ape distribution and suitable land for oil palm is highest for the bonobo (98%), followed by the Eastern gorilla, the chimpanzee, and the Western gorilla (Image 20).

Similarly, the potential impact of oil palm expansion on apes in Africa is not distributed equally across countries (Image 21). For Ghana, Liberia, and Angola the proportion of ape habitat that is suitable for oil palm plantations is above 90%, while for Uganda, Burundi, and Tanzania this Image is below 10%.

Although there is no comprehensive database that contains all oil palm concessions in Africa, a subset of known oil palm plantations for which spatially explicit data on the boundaries of the concession are known showed a 58.7% overlap with ape distribution, with extensive variation between countries (Wich et al. 2014) (Image 22). The high overlap of ape species' distribution and oil palm suitability, and the fact that concessions have already been allocated or established within ape ranges, shows a high potential for direct and indirect negative impact of the oil palm industry on ape survival (Ancrenaz et al. 2015a). The obvious direct impacts occur when natural forests with great apes are cleared.

While all African ape species are legally protected across their range, similar to the situation in Indonesia and Malaysia their habitat is not, meaning that while it is illegal to kill gorillas, chimpanzees or bonobos it is not necessarily illegal to destroy their habitat. African apes can persist in many different types of forest, from mature old-growth forest with a rich food resource that is able to sustain a high density of chimpanzees, to previously logged forests which, depending on how and when it was harvested, may be able to support apes at varying densities. The Cross River gorilla survives in a fragmented forest landscape, although habitat and dispersal corridors exist (Bergl et al. 2012). Chimpanzees, like those in Sierra Leone or in Guinea, can persist in human-modified habitats such as forest-farm mosaics in close vicinity to human communities, feeding in regenerating farm bush and secondary forest (Brncic et al. 2010). Degraded land can provide apes with important services such as cover and habitat corridors between food sources, even if the environment supports the population at lower density. In some cases areas classed as 'degraded' may even support higher densities of apes than primary forest (Arcus Foundation 2015). In southwest Nigeria, the chimpanzee is one of just a few large mammal species that withstands severe anthropogenic pressure, albeit at a much reduced density, although current trends, if left unabated, imply that their populations will be extirpated eventually (Greengrass 2009).

In addition to habitat loss, there are other impacts of oil palm development to consider. Depending on quality of plantation design and management, such impacts can include: habitat fragmentation, degradation, and reduced connectivity; introduction of infectious pathogens and increased risk of disease transmission, often exacerbated by increased stress levels and immunosuppression; increased human access to remote areas used by great apes; and increased hunting, persecution, and illegal trade. These impacts can affect wildlife and its habitat beyond the boundaries of a plantation and may be widespread and can persist beyond the lifetime of a project.

The impacts of oil palm development on African great apes has not been extensively studied, but some impacts on great ape ecology are reviewed by Ancrenaz et al. (2015a). These impacts fluctuate with the type and the scale of the development, the phase of development (habitat clearance; young plantations; mature plantations), the species that is being affected, and local human-ape interactions (Ancrenaz et al. 2015a). Great apes have large brains, are intelligent, and have the capacity to adapt their behavior to changes in their environment. To a certain extent, they are resilient to anthropogenic pressure (Dunbar & Shultz 2007). Undoubtedly, the responses of Africa's great apes to drastic changes in their environment are complex and adaptations to these changes – such as increased ranging patterns, changes in diet, avoidance of people -- may not necessarily provide adaptive benefits in the longer term.

Lessons from Southeast Asia suggest that the cumulative impacts on apes and biodiversity from oil palm expansion at the landscape scale, in addition to activities by other industries sharing the same landscape, will be severe. Data from 2012 suggest that more than 2.6 million hectares of land in West and Central Africa has been or is in the process of being developed into large-scale oil palm projects, much of which is forested and home to great ape populations (Greenpeace International 2012). More recent analyses indicate that in 2014 some 4.2 million hectares in sub-Saharan Africa had been allocated to large-scale oil palm projects (Schoneveld 2014).

Several of the key oil palm development threats facing great apes in Africa are reviewed here.

IMAGE 15

The distribution of apes across Western and Central Africa versus contracted or intended land deals, including oil palm (Arcus Foundation 2015).

With permission from the Arcus Foundation.

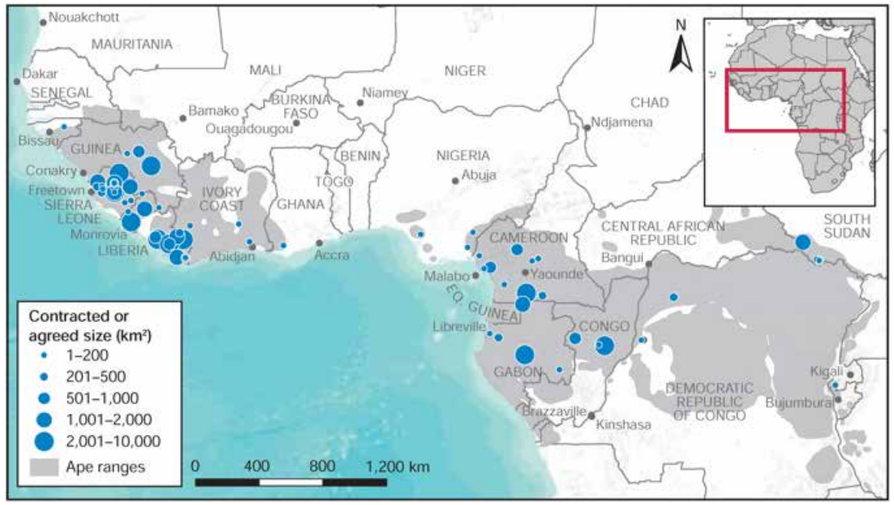


IMAGE 16

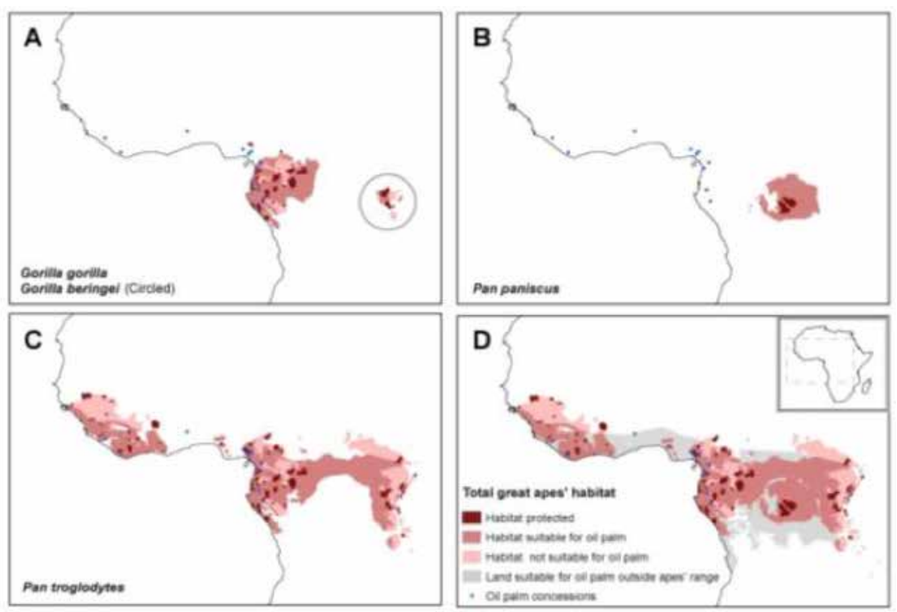
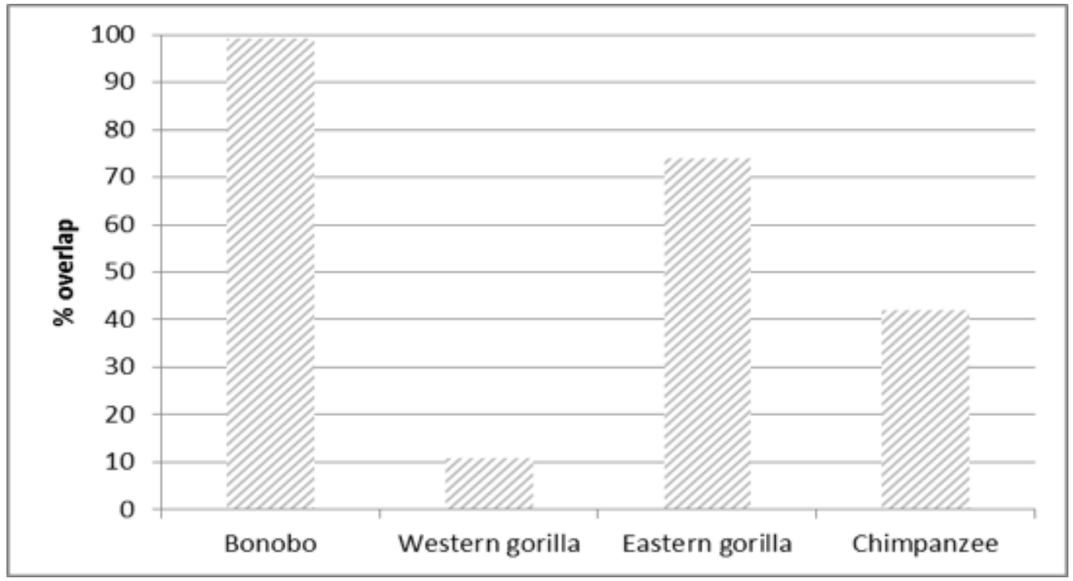


IMAGE 17

Percentage of overlap between ape species distribution and oil palm suitability (based on Wich et al. 2014).



Areas within the ranges of the four great ape species that are suitable for oil palm development from a climatological point of view (Wich et al. 2014).

Reprinted by permission from Macmillan Publishers Ltd: Current Biology 24:1659-1663 (2014).

IMAGE 18

The percentage overlap between ape distribution and land suitable for oil palm (based on Wich et al. 2014).

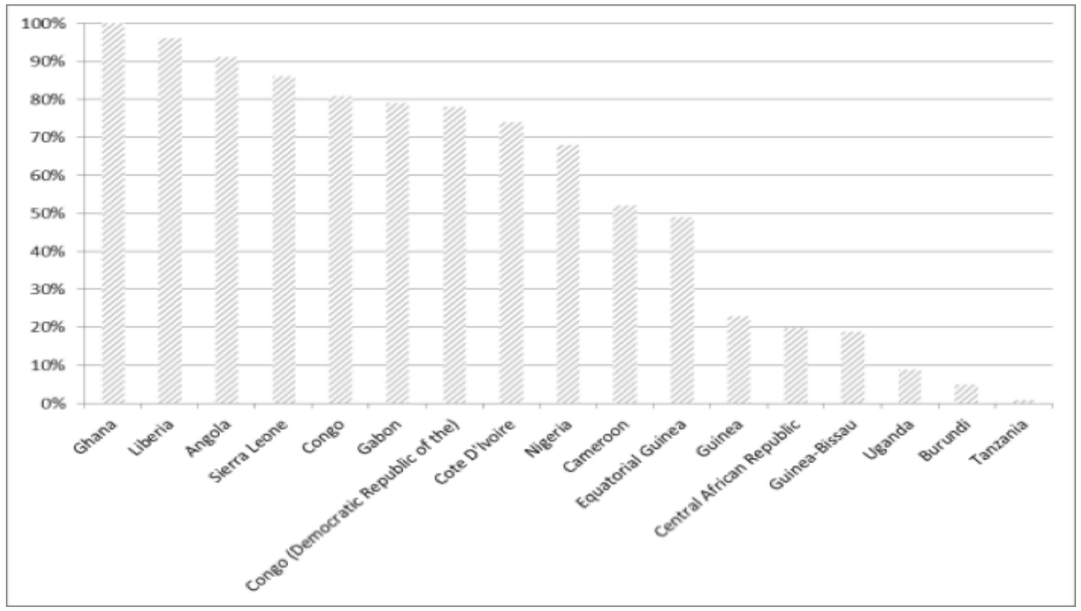
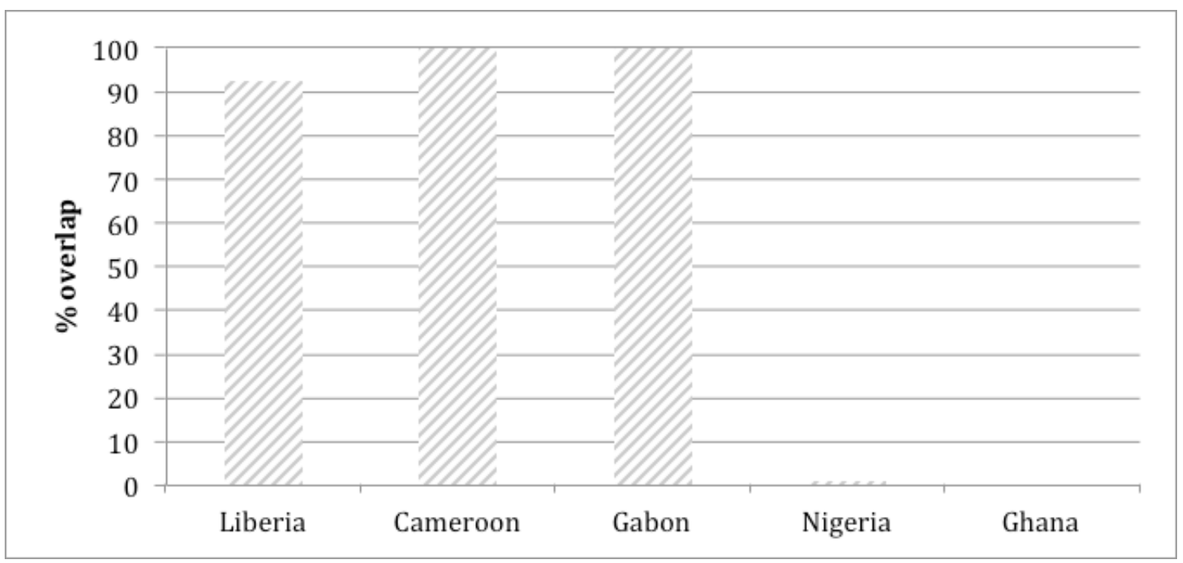


IMAGE 19

Percentage overlap of oil palm concessions with ape distribution for five countries (based on Wich et al. 2014).



DIRECT HABITAT LOSS FROM PLANTATION DEVELOPMENT

Plantation development involves the clearing of land, which might be forested, for the preparation of new plantings. Because the optimum size of an oil palm plantation in economic terms is between 5,000 and 10,000 hectares, plantation development can involve large-scale loss of natural forest and great ape habitat (Greenpeace International 2012). Clear felling results in the total loss or displacement of resident ape populations and is incompatible with ape persistence (Arcus Foundation 2013). Extensive forest clearing will thus result in local extinction of part of ape populations and possible shifts in their home range, creating social conflicts with neighboring great ape communities.

Changes in habitat quality are known to have negative impacts on chimpanzee reproduction (Thompson et al. 2007). Because female chimpanzees establish relatively small core areas as young adults and maintain them throughout their lifetime, habitat loss can directly affect a female's reproductive success through the removal of important food sources and displacement into ecologically less rich areas. Socio-spatial organization may also be affected. In chimpanzee societies, females are the dispersing sex and may leave their natal community and move into another community if the pressure on their territory is significant. These transfers have long-term consequences for the viability of chimpanzee communities. Males are territorial and xenophobic, and thus are unlikely to move outside of their territory. However, if they are forced to do so because their original habitat is destroyed, this will significantly increase the risk of inter-community aggression (Wilson et al. 2014b). Socialising is the 'glue' of ape society, and the associated noise from industrial development and operations is known to disrupt sociability (Morgan & Sanz 2007).

Clear felling of forest can permanently remove critical nest sites and cover. The disruption might also displace apes into areas subject to higher hunting pressure, where they might be targeted more frequently. Ultimately, reducing the overall habitat available to a species reduces the carrying capacity of that area, which in the long-term will result in a reduction in population size. Forest conversion has the worst negative impact on the short-term survival of the animals and the long-term viability of the remaining populations of apes (Ancrenaz et al. 2015b).

HABITAT FRAGMENTATION, DEGRADATION, AND REDUCED CONNECTIVITY

As ape populations become separated into smaller, distinct groups following habitat fragmentation, reduced dispersal and impaired gene flow will result in genetic inbreeding and drift. Isolated populations are also more prone to stochastic events, such as forest fires and other man-made or natural catastrophes.

Because apes may have to range more widely in degraded habitats to find food and fulfil their energy requirements, a reduction in connectivity between resources -- such as food and mates -- will severely impact their capacity to range efficiently. As an alternative they may turn to other available food sources such as nearby food crops, causing conflict with local people (Arcus Foundation 2015).

In the wild, chimpanzees exploit the fruit and flower of the oil palm and the pith of young plants (Humle & Matsuzawa 2004). With the exception of Mahale in Tanzania, all studied chimpanzee communities in proximity to oil palm consume its fruits. However, the extent of oil palm use and the number of parts consumed vary remarkably (Hockings et al. 2009; Humle & Matsuzawa 2004; Wrangham 1975). In areas where they are well tolerated by plantation workers and local communities, it is possible that a mosaic landscape that includes oil palm plantations could sustain a chimpanzee population if they could move safely within it. Given the context of bushmeat hunting and trade, however, and the intolerance that farmers often show towards primates, achieving such local tolerance would require significant awareness campaigns and other conservation strategies to achieve community support (Schoneveld-de Lange et al. 2016).

Road networks can also severely reduce connectivity and impede efficient ranging. Where the human population is low and the integrity of the forest preserved, chimpanzees have been observed to nest within sight of roads, suggesting a degree of tolerance. However, the perceived danger of a road may change considerably if apes need to cross one. Research has shown that chimpanzees assess road crossing risk in terms of road width and the amount and type of traffic (Hockings et al. 2006). When roads are used intensely, it is likely they become barriers to movement.

INCREASED DISEASE TRANSFER FROM HUMANS

Disease transfer from humans to great apes represents a major threat to their survival (Schaumburg et al. 2012). Apes are susceptible to a range of infections common to humans including viruses (Ebola, polioviruses, measles), bacteria (Shigella, coliforms), and parasites. Due to a lack of resistance to human pathogens a common cold in a human that passes to an ape can quickly develop into pneumonia. Highly infectious, pneumonia can quickly develop into an epidemic and cause significant mortality within a great ape group or a population. It is believed that stress caused by human pressure and genetic isolation can exacerbate the risk of disease transmission (Brack 1987; Leendertz et al. 2006).

As rural Africa is rapidly being converted into a mosaic of different land-use types, ape populations are living in increasing proximity to humans, which in the long-term may have health implications for both species. Great apes cannot recover quickly from losses caused by disease because of their slow maturation and reproductive rates. The inter-birth interval for African apes averages 4–7 years (Wich et al. 2004). Infant mortality can be high under natural situations and females do not become sexually mature until around twelve years of age (although this varies between ape species). Chronic disease has led to the extirpation of whole communities of apes (e.g., Rudicell et al. 2010).

Wherever concentrated numbers of humans work and live adjacent to ape habitat there is a risk of disease transfer. Although wild apes are usually wary of people they may come into close contact, especially when human waste and housekeeping adjacent to areas supporting apes are not properly managed, or if there is inadequate sanitation and sewage disposal. In West and Central Africa, villagers or workers often do not use pit latrines and defecate in open areas, which creates a direct sanitary risk of exposure to possible contaminants from human origin. Faeces and used toilet paper (where toilet paper is provided) can accumulate in areas of forest lying adjacent to the work areas, along roads, and at road blocks. Although human faeces decompose relatively rapidly and are unlikely to be investigated by apes, it does pose a risk.

OIL PALM AND EBOLA

In addition to the increased risk of infectious disease -- particularly respiratory pathogens -- naturally occurring pathogens such as Ebola and Simian Immunodeficiency Virus (SIV) have been confirmed as important sources of mortality in wild gorillas and chimpanzees (Ryan & Walsh 2011). Since 1990, scientists estimate that one third of the world's chimpanzee and gorilla populations have been wiped out by the Ebola virus (Nellemann et al. 2010). Although the true extent of the impact remains uncertain, in 2002 and 2003 Ebola killed an estimated 5,000 gorillas in Gabon and Congo (Bermejo et al. 2006), while in 2004 it wiped out 95% of a 400-strong gorilla population in Congo within a year (Caillaud et al. 2006).

Researchers have hypothesized that oil palm expansion in Guinea is linked to the recent outbreak of human Ebola virus in Guinea, Liberia and Sierra Leone (Wallace et al. 2014), which since December 2013 has claimed over 11,000 human lives. Forest is rapidly deteriorating in the region and since 2007 there has been a push to increase palm oil production and expand small-scale farms and industrial-scale plantations. At the source of the Ebola outbreak in Guinea, land use is a mosaic of forest, farms, and oil palm plots, an environment that supports a key Ebola reservoir, the frugivorous bats of the Pteropodidae family. It is believed that the first human to become infected in this epidemic—a two-year old boy referred to as 'patient zero'—may have become infected after playing with a colony of bats in a hollow tree (Wallace et al. 2014). The expansion of oil palm in Africa could therefore potentially run the risk of Ebola in great apes, as well as in humans.

INCREASED HUNTING PRESSURE AND EXPLOITATION

In West and Central Africa, the bushmeat trade has grown substantially in recent decades, and hunting pressure has increased with human population growth and urbanization. Increased exploitation of natural resources has resulted in easier access to previously undisturbed forested areas. Hunting technology has also improved and firearms have become prevalent.

Bushmeat represents the main source of animal protein in many rural areas in Africa, and the subsistence trade can generate a substantial household income. Commercial hunters who supply the urban markets are more likely to target larger species of primates and ungulates, because the return for the money and effort invested is greater. Therefore great apes are most at risk from commercial hunting (Kuehl et al. 2009). Great apes in many parts of the region are killed for their meat or for their body parts for use in local medicine (Greengrass 2015).

As a result of increased poaching for bushmeat, the conservation status of many large mammal populations, including great apes, has been severely compromised. A study of commercial hunting in Liberia revealed an astonishingly high rate of chimpanzee killing in and around Sapo National Park (Greengrass 2015) and a study in Cote d'Ivoire concluded that a combination of hunting and habitat conversion had reduced the chimpanzee population by more than 90% within 20 years (Junker et al. 2012). Because bushmeat is considered an open access resource, hunting and trade are difficult to regulate and laws are rarely enforced (Fa & Brown 2009; Fa et al. 2002).

Large-scale industrial oil palm development may pose the biggest threat to primate diversity in areas of exceptionally high species endemism and where bushmeat hunting is already pervasive and intense (Linder 2013). The development of any new project drives in-migration to the area from job-seekers. This rapid rise in the local human population around commercial developments can have a profound impact on hunting pressure, not just in the project area but in adjacent areas of forest, seriously degrading the integrity of the ecosystem at a much larger scale. In-migration results in agricultural expansion, an increase in livestock and competing land uses, as well as an increase in hunting. In Africa, areas around commercial-scale projects, whether active or abandoned, are often devoid of large mammal fauna.

Road construction, which is synonymous with agro-industrial projects (Laurance et al. 2014), exacerbates the situation because roads reduce travel costs and increase accessibility to market trade by local communities. Company traffic can also be used to transport carcasses unless prohibited and rigorously monitored. Companies are often under pressure to upgrade roads or even build new access roads as part of community projects. If these communities occur in particularly isolated areas, it is likely that road construction will access previously undisturbed regions where the biodiversity is the richest.

In some areas, taboos against hunting and consuming great apes exist, and this is a major reason explaining the survival of these animals in human-transformed landscapes. However, these taboos are being eroded by migrants looking for job opportunities in large plantations who do not share these beliefs. The hunting of great apes and other species is directly linked to small- and large-scale forest conversion projects. Manual land clearing increases the susceptibility of wildlife to hunting by company employees since local workers may see it as a 'right' or 'perk' of the job to flush out wildlife and kill it as land is cleared. Contractors and even foreign workers also hunt with managers, the latter often turning a blind eye to such illegal activities.

Solutions do exist, however they have been slow and difficult to carry out in the overall African context (Wilkie & Carpenter 1999). Having a 'no hunting' company policy is hard to strictly enforce, since bushmeat consumption is part of some cultures, and in many cases even supervisors eat bushmeat. Controlling the access to their concessions from members of local communities is also challenging because infrastructure developments such as roads provide hunters with numerous easy entry points. In some cases, companies have established their own security force, but active policing might negatively affect the quality of the relationships with neighboring communities, particularly if law enforcement in the country as a whole is weak.
Permitting controlled hunting or other forms of resource exploitation -- such as the collection of non-timber forest products -- in the plantation can serve to strengthen relations with local communities. If, however, a rise in the local human population results in an increased demand for limited natural resources found within the landscape, the impact of such permitted practices on great apes and other wildlife can rapidly increase.

ILLEGAL TRADE

Any commercial project which employs 'rich' foreign workers often attracts individuals trying to sell and trade young primate species, including great apes. Live young might be the by-products of the bushmeat trade but because foreign workers are likely to pay significantly more than the local market value, the buying of these infants exacerbates the trade by encouraging further hunting and trade in live infants. Given that an estimated ten adult chimpanzees are killed per infant captured, the impact of this is potentially significant (Stiles et al. 2013).

DELIBERATE PERSECUTION

The ability of apes to survive in human-modified landscapes is largely dependent on people's tolerance towards them. Like the oil palm related killings in Southeast Asia (Davis et al. 2013), there is a real risk that persecution of chimpanzees will also occur in oil palm concessions in Africa, given that this species is known to exploit oil palms. Where there is large-scale loss of prime ape habitat, starving apes could be forced to seek food in plantations, thereby increasing the risk of encounters with humans. However, research demonstrating a marked difference in behavior and ecology of orangutans living in an oil palm landscape as compared to those living in natural forest (Ancrenaz et al. 2015b; Ancrenaz et al. 2014) suggests that for chimpanzees, at least, an ability to adapt their behavior will reduce the risk of persecution. For example, in areas under high anthropogenic pressure, chimpanzees reduce their risk of human encounters by crop raiding during the night (Krief et al. 2014). However, more serious problems can arise when chimpanzees are deliberately hunted and killed or caught for raiding in oil palm landscapes.

CASE STUDIES : AFRICA

The wave of increased investment in industrial-scale oil palm in Africa is still in its early stages, but has already begun to impact great ape habitats. Early pioneers of the industry are still trying to work out how to operate in Africa. In areas where good planning and management have been lacking, the potential for negative impacts on apes is large. Unlike in Southeast Asia, however, the industry can still be guided into a direction that satisfies local government and community demand for development, but avoids large negative conservation impacts, or even generates positive conservation outcomes. Brief case studies from Cameroon, Nigeria, Liberia and Gabon illustrate the social and environmental conflicts that can arise when companies try to cut bilateral deals with governments without engaging in broader strategies seeking net-positive impacts across large landscapes. All four case studies are situated close to protected areas containing apes.

CAMEROON

The Nigeria-Cameroon chimpanzee is an important subspecies with a large proportion of its remaining populations occurring in Cameroon (Image 18). Allocating significant parts of its range to agricultural development will have a major impact on the survival of this subspecies and could lead to a large loss of diversity for chimpanzees in general (Prado-Martinez et al. 2013).

Herakles Farms is an American company active in the palm oil and timber industries. The company established oil palm plantations in the Southwest of Cameroon in 2009, between Korup National Park, Banyang Mbo Wildlife Sanctuary, Bakossi Mountains National Park, and Rumpi Hills Forest Reserve (Image 24). The total area of the concession was 73,000 hectares on a 99-year lease (Kupsch et al. 2014). The location of the concession areas presented a high risk of detrimental impacts on populations of both Nigeria-Cameroon chimpanzees and Western lowland gorillas.

A major issue with identifying suitable oil palm development areas is that there is no universally agreed definition of 'degraded' forest. Previously logged or damaged forest can rejuvenate quickly if not disturbed further. Data suggests that logging in and around the Herakles Farms concession area occurred 15-34 years ago (Pauli et al. 2014). This would give sufficient time for the forest to recover, so that clearance for oil palm could have displaced a significant chimpanzee population. Across the total concession area of Mundemba and Toko, the estimated total chimpanzee population within the concession was around 17 individuals, but this could be a significant underestimate.

This shows that automatically classifying previously logged forest as non-HCV risks losing potentially important biodiversity, and the lack of an operational definition of 'degraded forest' leaves it open to a wide range of interpretations, many of which do not reflect the environmental importance of some previously disturbed areas. The recently developed HCSF concept tries to achieve a working definition for this concept (HCS 2015) but this approach has not yet been officially accepted as standard yet.

Since its inception, the Herakles Farm project faced many accusations of inappropriate activities. In 2009, the Ministry of Forestry and Wildlife found that Herakles Farms had overlapped its plantation area with mature intact forest believed to be of High Conservation Value (HCV), despite this being prohibited by the Roundtable on Sustainable Palm Oil (RSPO), of which it was a member. The area was said to be degraded land but satellite image analyses indicated dense, intact, high canopy forest, and the development later encountered more environmental, social, and legal issues. When Herakles Farms ultimately cleared land without the President of Cameroon having signed the lease, the government terminated its contract, and finally abandoned all operations in Mundemba and Toko concession areas in 2015 (www.forestpeoples.org, 2015).

A recent analysis of satellite images in southern Cameroon shows that in three years (2011-2014) more than 3,000 ha of dense forests were destroyed by Chinese and Singapore-based companies close to the Dja Faunal Reserve, a UNESCO World Heritage site. If the two concessions (Hevea Sud and Hevea Nord) allocated by the government are entirely developed, more than 40,000 ha of forest (90% of it being dense forest) will be destroyed (Komarova & Zhurevleva 2014). This area is a prime habitat for chimpanzees and other protected species. It is feared that the presence of these large-scale plantations will have disastrous consequences for the long-term survival of wildlife populations found within the Dja Faunal reserve.

In Cameroon, the allocation of agricultural concession does not necessarily comply with the environmental laws, HCV areas can be converted to other types of land use, Environmental and Social Impact Assessments are given little consideration in the decision-making process, and local community rights are often not acknowledged (Rainer & Lanjouw 2015).

NIGERIA

The largest producer of palm oil in Africa is Nigeria, where palm oil giant Wilmar has begun establishing industrial plantations. Wilmar is one of the largest oil palm plantation owners in Indonesia and Malaysia. Only 6% of its palm oil is produced in Africa, but it will have close to 30,000 ha in Nigeria when plantation development is completed, including the Northern and Western triad of plantations: Biase (8,688 ha), Ibiae (5,561 ha), and Calaro (5,483 ha). These concessions are all held by Wilmar and the plantations border protected areas, reserves and national parks including Oban Group Forest Reserve, Ekinta River Forest Reserve and Cross River National Park. The concessions were established in 1963 but Wilmar did not acquire them for oil palm plantations until 2012. Wilmar reports that only 14,300 ha are being cultivated as of 2014, however the acquisition of larger areas for further cultivation is a major goal of the company.

Some areas allocated to agricultural development in Nigeria contain the Cross River gorilla, which is found in the highland forests on the border of Cameroon and Nigeria. The Cross River gorilla is the most endangered ape in Africa with an estimate of 250-300 individuals left in the wild. It is under threat from habitat loss, deforestation, bush fires, and subsistence agriculture, which are often exacerbated by logging and commercial agriculture, making these industries major drivers of population decline in the region. The remaining gorilla population is restricted to an 800,000 ha area divided into 10 groups (Teaby 2015). In addition, the close proximity of the Oban Group to the Korup National Park means that it is highly likely that developments

in this area could also harm the Nigeria-Cameroon chimpanzee population.

The problems that have arisen in Nigeria appear to be similar to those in Cameroon: unclear legislation, disputed land-use boundaries, conversion of sensitive natural habitat and social issues. The result has been increased threats to vulnerable gorilla populations which may compromise the survival of the subspecies. Strengthened conservation efforts and multi-stakeholder guidance of plantation expansion that takes economic as well as social and environmental concerns into consideration will be indispensable.

LIBERIA

Liberia has never been a large producer of palm oil and is ranked 24th worldwide. However, the country is in the process of expanding its oil palm industry by inviting large companies, such as Equatorial Palm Oil, Sime Darby and Golden Veroleum, to develop plantations (Rainer & Lanjouw 2015).

Golden Veroleum Liberia (GVL) started its operations in 2008 with a total concession area of 220,000 hectares in the southeast of the country. The Kpayan district concession (area 8,000 ha) is close to Sapo National Park and has plans for expansion right up to its borders and the borders of Krahn Bassa National Forest (Image 25). The country has an estimated population of 7,000 chimpanzees, the second largest national population of Western chimpanzees. The Kpayan area is approximately 14km from Sapo National Park, known to be home to West Africa's largest remaining forest bloc and containing a priority population of these apes (Tweh et al. 2015).

Soon after the onset of the operations by GVL, local stakeholders started to file complaints to the RSPO about the lack of proper Free and Prior Informed Consent (FPIC) processes before land transformation. In particular, these complaints exposed the lack of an integrated development strategy, poor transparency, lack of involvement of local community representatives in land-use decisions, and lack of respect for local rights (Rainer & Lanjouw 2015). Since then, Golden Veroleum has been under critical scrutiny, particularly by Global Witness and other NGOs, and the company has taken steps to improve its practices on the ground (L. Walsh, pers. comm., 2015).

Recently, an agreement was signed between the governments of Liberia and Norway. One of the pillars of this agreement is a deforestation-free agriculture sector for the country. The government of Liberia has thus decided to issue very strict guidelines of no-deforestation with which any company that intends to develop palm oil and other crops in the country must adhere. Liberia provides a clear example of a developing nation that has taken a jurisdictional decision to mitigate the negative social and environmental impacts of agro-industrial development.

Governments can play a critical role in deciding the development path that a nation can take. A way to tackle deforestation due to oil palm development would be to embrace a 'jurisdictional approach', i.e. to develop a development plan at the level of a nation or a state throughout the entire landscape, and not through individual, isolated initiatives. Liberia is paving the way for such an approach to be adopted in Africa. More and more governmental and non-governmental organizations recognize that positive, lasting solutions could reconcile agricultural expansion, sustainable development, and use of natural resources. Required multi-stakeholder processes for this planning need to be driven by governments, operationalized at the jurisdictional level, and supported by private industry, NGOs, and the general public.

GABON

In November 2010, the Gabonese government signed an agreement with Olam International, a Singapore-listed company, to develop 100,000 ha of industrial oil palm plantations and 50,000 ha of rubber plantations in the country (Arcus Foundation 2015). Being an RSPO member, Olam included great ape surveys in the spatial zoning study they undertook before land conversion. The initial field assessment included extensive wild-life surveys with a particular emphasis on great ape distribution and abundance. Apes are protected by law in Gabon and are classified as HCV1 under RSPO, and Olam wanted to 1) avoid major ape concentrations, 2) maintain the status of viable ape populations wherever they range and 3) develop the concession in ways that would avoid jeopardizing the safety of the animals. Working with ape specialists, key areas for great apes were identified as well as corridors that needed to be maintained to ensure population connectivity.

The assessment of three initial concessions (about 50,000 ha) showed that large blocks of HCV forests were covering the majority of the land; they could not be developed according to the RSPO criteria and to Olam policies. Out of these concessions, the company selected an area of 20,000 ha from which only 7,000 ha was finally allocated for oil palm development. Today the plantation covers less than 13% of the initial 50,000 ha. Similar land-use planning exercises including EIAs, HCV assessment, and FPIC with local communities were conducted for the entire land bank allocated by the government to Olam. Eventually, the company expects to develop not more than 45% of the total area originally acquired.

Assisted by expert NGOs and scientists, the company developed a great ape management plan which is currently implemented to ensure the long-term survival of the ape population. This plan has six major objectives:

- Allocate areas of intact habitat (HCV areas) for preservation;
- Ensure robust baseline and ongoing monitoring protocols;
- Require phased land preparation to enable wildlife to move into HCV areas;
- Implement protocols that mitigate the potential for disease transmission between humans and apes;
- Impose hunting controls and raise awareness among local communities;
- Support the development of subsistence programs to promote alternatives to hunting.

TEXT BOX 9: WILMAR IN AFRICA

Singapore-based Wilmar International Limited is one of the world's largest agribusiness groups and the largest supplier of edible oils in Africa (Wilmar 2014). In Africa, the group directly or through joint-ventures owns plantations in Uganda, Cote d'Ivoire, Nigeria, and Ghana totaling 59,000 ha of planted oil palm areas. In addition, the joint ventures also manage over 150,000 ha of smallholder and outgrower schemes (Wilmar 2014). In accordance with Wilmar's 'No Deforestation, No Peat, No Exploitation" policy announced in December 2013, the group commits to ensuring that all its operations in Africa adhere to this standard. Many hoped that Wilmar's landmark 'No Deforestation' policy would transform the palm oil industry. Instead, deforestation in Indonesia is accelerating and Wilmar is unable to prove that its suppliers are not responsible. Nor has it made significant progress towards eliminating social conflict within its supply chain" (Greenpeace 2016). The company faces constraints in Indonesia and Malaysia, where governments have pushed back against no-deforestation commitments. Whether more positive environmental and social outcomes can be achieved by Wilmar in Africa will depend significantly on the extent to which new approaches to industrial scale oil palm can be developed that take into account sustainability concepts from the start and at all levels of the supply chain, and are supported by government.

IMAGE 20

Herakles Farms planned oil palm concessions in Cameroon [Red = Present Development] (Greenpeace International, 2012)

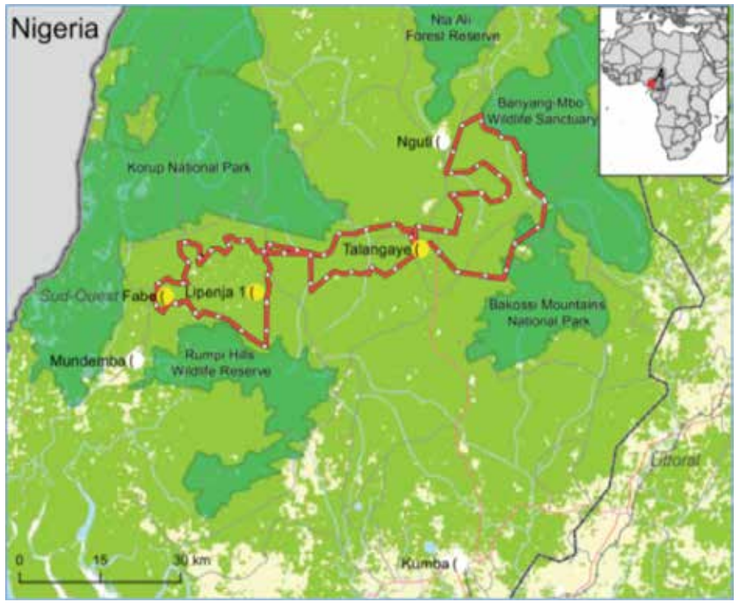
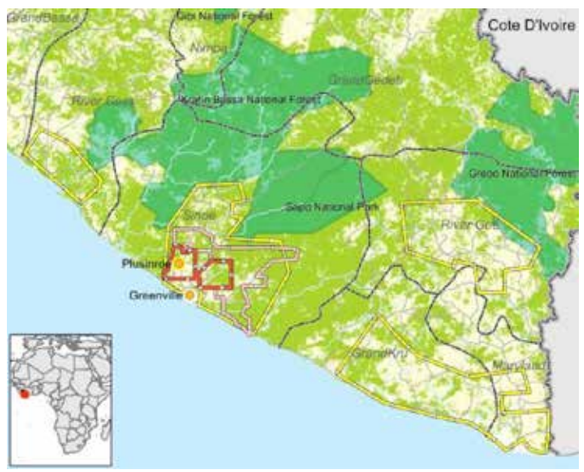
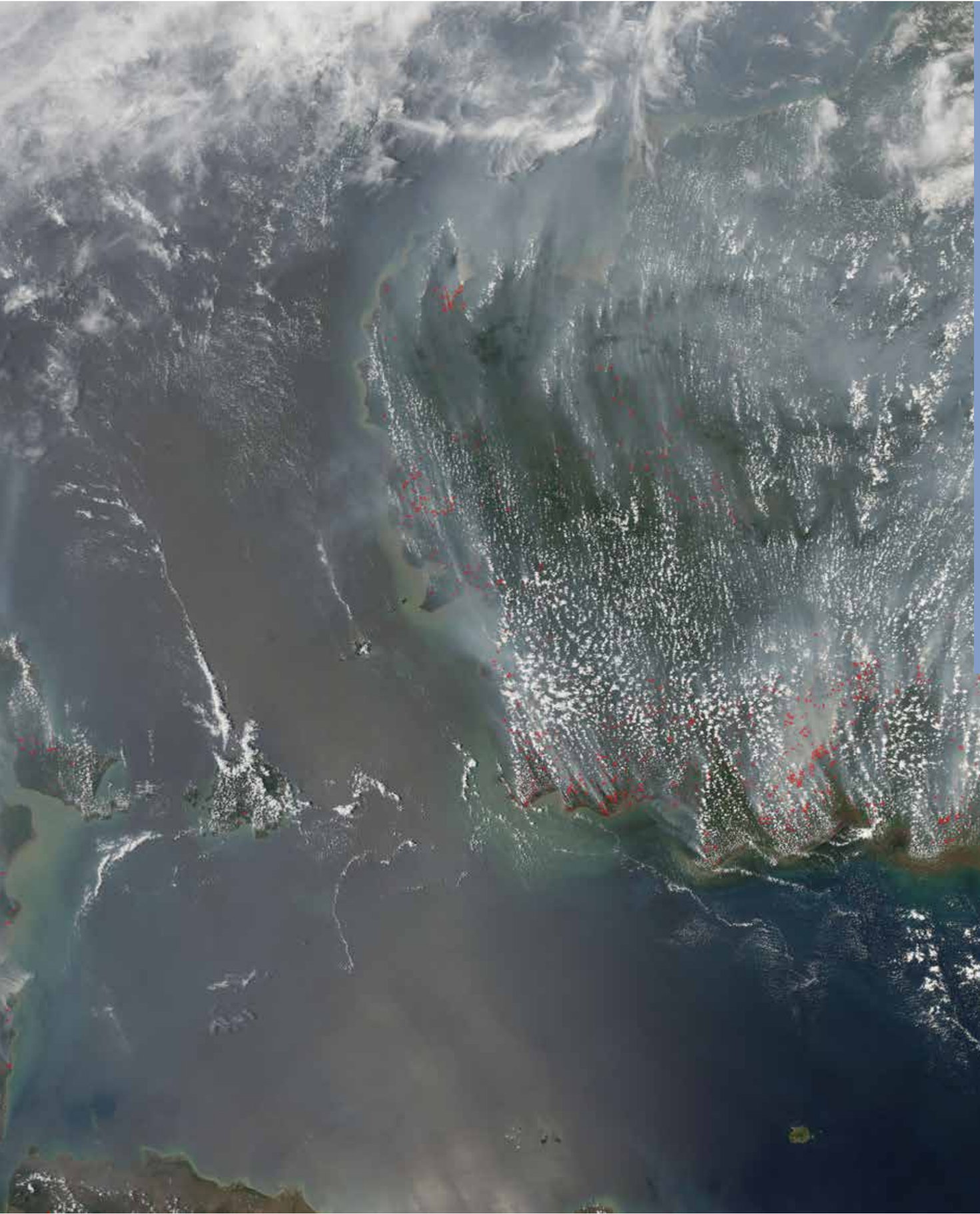


IMAGE 21

Golden Veroleum oil palm concession area in the southeast of Liberia [Red = Present Development, Yellow = Areas of Potential Expansion] (Greenpeace International, 2012)





PART THREE

ENSURING GREAT APE CONSERVATION THROUGH RESPONSIBLE PALM OIL

SUMMARY

Several certification systems for sustainable practices have emerged within the palm oil industry, the most prominent being the Roundtable on Sustainable Palm Oil (RSPO), which was created in 2004. As of today, 20% of the crude palm oil produced in the world is RSPO-certified. The two production leaders (Indonesia and Malaysia) have recently developed their own standards to ensure that all producers follow their respective laws: Indonesian Sustainable Palm Oil (ISPO), and Malaysian Sustainable Palm Oil (MSPO).

Unfortunately, the Principles & Criteria (P&Cs) developed in these three certification schemes are too generic to efficiently address the needs of great ape management and conservation. Best Management Practices (BMPs) specific to orangutans -- and African great apes -- need to be developed and endorsed by growers, and designed in clear, simple terms that ensure effective implementation. The oil palm industry needs to develop BMPs in collaboration with great ape conservation experts, and implemented by a team of ecologists that would be properly trained and employed by the company, rather than relying on external consultants to manage great apes and other protected species.

Translating great ape guidelines from BMP and Standard

TEXT BOX 2
THE MARKET VALUE OF CERTIFICATION

IOI Corporation's (IOI:MK) shares railed 5% to 4.45 ringgit from 4.23 ringgit on 6 August 2016 on the news that the RSPO would lift its suspension of IOI two days later. Volume of shares traded was three times higher than the 12-month average of 5.26 million shares traded daily after the news was announced, as investors saw a potential upside to IOI returning to selling its palm oil into the higher-margin RSPO market.

RSPO lifted its suspension of IOI because IOI has agreed to submit periodic updates over the next 12 months describing its progress towards stopping illegal deforestation by subsidiary companies and resolving specific cases of illegal deforestation. The RSPO Complaints Panel also commissioned an independent team of experts to verify IOI's mitigation efforts.

RSPO had suspended IOI following six years of complaints by NGO groups, which charged that IOI failed to prevent subsidiaries from illegal deforestation in Indonesia, contrary RSPO regulations. As a result, 27 large corporate buyers suspended or terminated business relationships with IOI.

Following the RSPO suspension, IOI's share price fell 17% from 4.96 ringgit to 4.14 ringgit.

Operation Procedures (SOPs) into actual on-the-ground management is challenging for most companies because they lack the capacity to understand and interpret BMPs across all management levels. For any BMP to become used and useful, a necessary first step is for companies to create, establish, and develop their own in-house capacity to identify, monitor, and manage biodiversity elements that occur within their estates. Companies need to employ their own teams of ecologists to monitor and manage all HCV forests in their plantations. These teams need to have sufficient authority to influence estate planning that is in line with company commitments towards biodiversity conservation, and ensure that this planning is changed, if required. If and when great ape presence is reported in an HCV assessment report, the company should collaborate with a local group with great apes expertise to develop an ape monitoring strategy and SOP, and to train their own HCV team in ape-monitoring techniques.

The presence of protected species within an estate should ideally be seen as a business opportunity and not a problem; instead of considering species such as elephants, great apes and other wildlife as a 'liability', these animals should be perceived as an 'asset' to the companies in terms of public relations opportunities or the development of new activities such as tourism, which might also provide economic benefit to local communities.

THE ROLE OF POLICY AND CERTIFICATION

To mitigate public concerns about poor practices, various industries have adopted sustainable 'certification' schemes such as the Forest Stewardship Council or the Marine Stewardship Council. The palm oil industry also adopted stricter standards for production and for export. Within this industry alone, several certification systems have emerged that provide a framework for sustainable production, the most prominent of which is the Roundtable on Sustainable Palm Oil (RSPO).

As the RSPO grows in strength, the idea of certification has become almost a norm within the palm oil industry, largely due to pressure from the end buyers of their product. It has not, however, been universally accepted by the industry as a whole. Indonesia and Malaysia produce two-thirds of the world's palm oil. In these two countries, with the support of their respective Governments, the palm oil industry has produced its own certification schemes, with Indonesia launching Indonesian Sustainable Palm Oil (ISPO) in 2011 and Malaysia introducing Malaysian Sustainable Palm Oil (MSPO) in 2013.

This review addresses some of the strengths, gaps and weaknesses of these certification schemes regarding orangutan conservation, and offers generic recommendations.

TEXT BOX 11:
CRITICISM OF THE RSPO

The RSPO was established in 2004 with the aim of making sustainable palm oil the norm. The organization launched a certification scheme to promote sustainable palm oil products adhering to agreed global standards. The objective of the RSPO is a positive one, but many have criticized the organization and alleged that it is too conciliatory and unable to guarantee the compliance of its members. Key criticisms have included:

- Palm oil supplies are not fully traceable from source to end user for most members and this lack of supply chain transparency makes it impossible to ascertain whether all the palm oil used in a particular product comes from sustainable sources.
- The GreenPalm trading platform, allowing producers and users to trade certificates for production of sustainable palm oil (thus allowing production of both Certified Sustainable Palm Oil (CSPO) and conventional oil), may have been significant in promoting initial uptake of RSPO standards. However, it now stands as a barrier to the increased uptake of more sophisticated and robust 'physically separated' supply chain models, and should be phased out.
- There has been a failure to enforce compliance with regards to RSPO Principles & Criteria, so that even member companies shown to have been contravening these regulations are not excluded from membership. More emphasis should be placed on ensuring that members are committed to following the P&Cs, with closer monitoring and investigation of member practices and prompt retraction of membership for persistent offenders.
- The certification system for oil palm supplies is not publicly understood nor trusted and companies using RSPO-certified palm oil are not able to achieve the premium price required to justify using a more expensive product.

RSPO does have some positive attributes, however. It is by far the largest and most widely recognized international regulatory and certification system currently in place for palm oil production, with extensive membership from a range of palm oil producers, traders, and users. Certification also has financial benefits. Recent initiatives such as the Palm Oil Innovation Group (POIG) and RSPO NEXT have shown the potential for new developments within the RSPO framework to build on the basic standards and provide enhanced targets and monitoring systems.

ROUNDTABLE ON SUSTAINABLE PALM OIL (RSPO)

The RSPO is a not-for-profit association that was founded in 2004 to unite stakeholders from seven sectors of the palm oil industry – palm oil producers, palm oil processors or traders, consumer goods manufacturers, retailers, banks and investors, environmental or nature conservation organizations, and social or developmental organizations -- to make sustainable palm oil the norm. The RSPO currently has over 2,500 members and certifies 20% of the global palm oil production in 13 countries, representing 12.1 MT of certified sustainable palm oil and 2.66 million ha of certified plantations (RSPO 2014).

A number of countries have committed to importing only 100% RSPO-certified palm oil. These include Denmark, Germany, the United Kingdom, the Netherlands, and France, but many more have shown an interest to follow this initiative. Several global companies have also committed to the intake of 100% RSPO-certified palm oil, including Nestlé, Unilever, Carrefour, and Johnson & Johnson, while other companies are advocating for more stringent principles. Despite this growing interest in RSPO certification there has been criticism (Text Box 13), especially from the NGO sector (Ruysschaert & Rainer 2015).

In 2005, the RSPO adopted the HCV approach for its sustainability strategy. All RSPO members developing plantations after November 2005 must conduct an HCV assessment prior to forest clearance (Text Box 11). Those areas that have been recognized as HCV cannot be converted. In 2007, following a two-year trial period, the RSPO launched the Principles & Criteria (P&Cs) which must be followed and implemented by members to become certified. In 2013, the P&Cs were revised following a first implementation phase of five years. It was then agreed that the RSPO would revise these P&Cs every five years.

As of 2013, the updated RSPO standards contain eight general principles, 43 criteria and 166 'indicators and specific guidance" specifications. These principles and criteria are generic and apply to all countries. However, each country can further adapt them under their 'National Interpretation of the P&Cs" to accommodate for national policy differences. As a result, the number of 'indicators and guidance" specifications vary between implementing countries.

Indicators are specific pieces of objective evidence that must be in place to demonstrate or verify that a Criterion is met. Guidance consists of useful information to help the grower or miller and the auditor understand what a Criterion or Indicator means in practice, to indicate good practice, and practices that should be followed. Specific Guidance has also been included on certain Indicators for added clarity, as well as specific points to be addressed in National Interpretations. In most cases, guidance for smallholder production is found in several documents that specify standards for that sector (RSPO P&Cs 2013). Third-party independent auditors use these P&Cs to assess and to determine whether or not a plantation or a mill can be certified. Five of these principles contain a number of criteria and indicators that are directly relevant to great ape management and conservation, especially criteria 5.2 and 7.3 (Text Box 15).

As an organization with voluntary membership, the RSPO does not have an enforcement mandate. The organization relies mostly on auditors and on civil society to monitor the compliance of its members with the P&Cs. RSPO has developed a Complaints System to address non-compliance. This system provides a platform to anyone (including members or non-member affected stakeholders) that has a grievance with RSPO members with regard to breaches to the P&Cs or to the RSPO Code of Conduct.

The RSPO has moved to address some of its weaknesses and to answer concerns of some of its members recently by reinforcing its mandate towards the conservation of natural resources (Ruysschaert & Rainer 2015). RSPO NEXT was officially endorsed during the 2015 RSPO Conference held in Kuala Lumpur (Malaysia), and this initiative is designed to strengthen standards on peat, deforestation, and social requirements (Text Box 16).

TEXT BOX 4: RSPO NEXT

In February 2016, RSPO responded to calls from its members to make supply chains greener and more ethical through the launch of RSPO NEXT. This new voluntary standard requires each company to have a public and open policy of no deforestation, no planting on peatland of any depth, and no planting on HCV and HCS areas -- these areas must be set aside as protected forests and be managed effectively by the company.

RSPO NEXT embraces a no-fire policy and stipulates that GHG emissions across the whole organization must be monitored, reduced and publicly reported every year. Social criteria stipulate that decent living wages are paid to the workers and that outreach programmes on sustainability are conducted with smallholders. All mills must also be able to identify where all of their palm fruits come from, including percentages of their own production and those of their associated smallholders. Only companies that are already buying 100% CSPO are allowed to purchase the RSPO NEXT credits.

INDONESIAN SUSTAINABLE PALM OIL (ISPO)

Indonesia Sustainable Palm Oil (ISPO) was initiated by Indonesia's Ministry of Agriculture as a national non-profit organization aiming to increase the competitiveness of the Indonesian oil palm product in the global market by addressing environmental issues. The mission of ISPO is to ensure that oil palm plantations are in compliance with Indonesian laws and regulations. ISPO is compulsory for all oil palm plantations in Indonesia. Since May 2012, ISPO has conducted audits by independent certification bodies. However, information on ISPO progress, members, certification assessment results and sanctions for non-compliance or complaints is difficult to find. In 2015, ISPO, supported by the United Nations Development Programme (UNDP), initiated a nationwide certification process for smallholders, estimated to be responsible for 40% of national production. This initiative aims to ensure that smallholders also meet Indonesian legal requirements and respect basic laws towards environment and social issues.

TEXT BOX 3. RSPO P&CS AND GREAT APE CONSERVATION

RSPO P&Cs include a number of principles and criteria that are directly or indirectly relevant to great ape management and conservation. They include:

Principle 1: Commitment to transparency

- Criteria 1.1: Growers and millers provide adequate information to relevant stakeholders on environmental, social and legal issues relevant to RSPO Criteria, in appropriate languages and forms to allow for effective participation in decision making.
- Criteria 1.2: Management documents are publicly available, except where this is prevented by commercial confidentiality or where disclosure of information would result in negative environmental or social outcomes.

Principle 4: Use of appropriate best practices by growers and millers

- Criteria 4.6: Pesticides are used in ways that do not endanger health or the environment

Principle 5: Environmental responsibility and conservation of natural resources and biodiversity

- Criteria 5.1: Aspects of plantation and mill management, including replanting, that have environmental impacts are identified, and plans to mitigate the negative impacts and promote the positive ones are made, implemented and monitored, to demonstrate continual improvement.
- Criteria 5.2: The status of rare, threatened or endangered species and other High Conservation Value habitats, if any, that exist in the plantation or mill management, shall be identified and operations managed to best ensure that they are maintained and/or enhanced.
- Criteria 5.5: Use of fire for preparing land or replanting is avoided, except in specific situations as identified in the ASEAN guidelines or other regional best practice.

Principle 7: Responsible development of new plantings

- Criteria 7.1: A comprehensive and participatory independent social and environmental impact assessment is undertaken prior to establishing new plantings or operations, or expanding existing ones, and the results incorporated into planning, management and operations.
- Criteria 7.3: New plantings since November 2005 have not replaced primary forest or any area required to maintain or enhance one or more High Conservation Values.
- Criteria 7.4: Extensive planting on steep terrain, and/or marginal and fragile soils, including peat, is avoided.
- Criteria 7.7: No use of fire in the preparation of new plantings other than in specific situations, as identified in the ASEAN guidelines or other regional best practice.

Principle 8: Commitment to continual improvement in key areas of activity

- Criteria 8.1: Growers and millers regularly monitor and review their activities, and develop and implement action plans that allow demonstrable continual improvement in key operations.

IMAGE 22

13 countries now have RSPO certified producers (RSPO 2015)

TEXT BOX 5: CERTIFICATION AND BEYOND

In recent years, some non-governmental organizations and corporations have argued for the development of stronger guidelines and management practices that would break the link between oil palm development and deforestation. The 'Palm Oil Innovation Group" established by Wilmar, Asia Pulp and Paper, and Golden Agri-Resources pledged to adhere to 'zero-deforestation' or 'deforestation-free' policies for the commodities they produce, source, or trade. These companies decided to apply these standards to all joint ventures, small investments, and holdings – not just the 50% of their holdings as currently requested under RSPO. Such strategies call for transparency, traceability, and due diligence in fresh fruit bunches sourcing into mills.

'The Palm Oil Manifesto", a high-level initiative initially signed by Apical, Asian Agri, Cargill, IOI, KLKB, Musim Mas, Sime Darby and Unilever, was set up to enhance the RSPO P&Cs with three major objectives: 1) to build traceable and transparent supply chains; 2) to accelerate the 'no deforestation' agenda through the conservation of High Carbon Stock (HCS) forests and the protection of all peat areas, regardless of depth; and 3) to increase the focus on driving beneficial economic change, and to ensure a positive social impact. The Manifesto commanded a High Carbon Stock study to provide guidance as to what type of forest could or could not be used for oil palm conversion. The results of this study were made available in December 2015.

The HCS+ approach provides a process to integrate the concepts of HCS, HCV, and FPIC together into the development of any new plantation, including land conversion for oil palm plantations must maintain critical ecosystem services; oil palm development must ensure socio-economic benefits for local communities; and oil palm development must be economically viable.

These no-deforestation pledges have attracted an increasing number of leading consumer brands in response to pressure originating from green NGOs and the public. The Forest Trust introduced a 'VT TV" ('Values, Transparency, Transformation, and Verification") scheme that is posited as a more efficient way to protect forest, environmental resources, and human rights than certification (Poynton 2015).

A growing number of analysts find that certification is too weak and hampers innovation, resulting in an inefficient system. When standards are too low, there is no additional incentive for companies to be better at what they do. Certification targets could be reinforced with goals based on company values in order to make people, companies, and society at large more aware and more responsible in their practices. This is possible only if companies, local communities, and local NGOs work together.

MALAYSIAN SUSTAINABLE PALM OIL (MSPO)

Malaysian Sustainable Palm Oil (MSPO) aims for all oil palm producers within the country to voluntarily comply with the federal and state laws. The MSPO was introduced under the Malaysian Standards Department (MSD), a federal government agency. MSPO is following the P&Cs approach of the RSPO, but the MSPO's approach appears a much reduced version compared to RSPO, offering little guidance on how to achieve these P&Cs.

The MSPO standards consist of four parts: 1) General principles; 2) General principles for independent smallholders; 3) General principles for organized smallholders; 4) General principles for oil palm mills. The requirements to obtain the certificate vary under different sections. For example, Part 3 states that an environmental plan needs to be developed, but without specifying what this plan should be. Under 'Principle 5-Criterion 1-Indicator 1", it is said that smallholders are expected to be aware of the environmental impact of their practices, but they are not expected to carry out formal impact assessment or mitigation measures unless there is a legal requirement.

OTHER CERTIFICATION SCHEMES

Additional certification schemes have been developed and can be relevant for the palm oil industry. Some of these schemes and groups are informal, but they all pursue a goal for more responsible and sustainable practices, including the Roundtable on Sustainable Biofuels, the Sustainable Agriculture Network, and the International Sustainability and Carbon Certification. Some groups are going even further and are advocating for more radical transformation of the traditional practices (Text Box 17).

International banks and large financial organizations, such as the World Bank and the International Finance Corporation, are also developing their own guidelines to limit funding to the best-performing companies, and not lend any support to companies that have a detrimental impact on the environment.

Recently, the World Bank commissioned a report for mainstreaming ape conservation into their policies and actions, Taking Ape Conservation to Heart: A Strategy for Mainstreaming Ape Conservation into World Bank Policies and Actions (Kormos et al 2014). The report advocates more responsible land-use decision making and comprehensive planning across policy makers and industries.

BEST MANAGEMENT PRACTICES FOR OIL PALM WITH REGARDS TO GREAT APE CONSERVATION

BEST MANAGEMENT PRACTICES: ARE THEY AVAILABLE, USEFUL, AND USED BY THE INDUSTRY?

Numerous guidelines for best management practices (BMPs) in regard to great apes and other wildlife within an oil palm landscape have been developed over the past 20 years and are readily available. The focus is generally on orangutans rather than the other apes, given the long history of oil palm development in Southeast Asia. Although some guidelines are generic, many include recommendations that can still be applied in the context of managing all great apes and their habitats. Among those are:

- The High Conservation Value Forest Tool Kit (HCV Network)
- A practical handbook for conserving high conservation value species and habitats within oil palm landscapes (ZSL / HCV Network)
- Environmental management guidelines for the palm oil industry
- Unilever good agricultural practice guidelines

The following guidelines are more specific to great apes:

- Best Practice Guidelines for the prevention and mitigation of conflicts between humans and great apes, IUCN/SSC Primate Specialist Group
- Best practices for orangutan conservation – oil palm concessions (Orangutan Conservation Services Program, USAID)
- Guidelines for the Better Management Practices on Avoidance, Mitigation and Management of Human-Orangutan Conflict in and around Oil palm Plantations (WWF-Indonesia)
- Konservasi Orangutan dan Habitatnya di Wilayah Perkebunan Kelapa Sawit (Wilmar and BOSF)
- Conservation Management Plan (CMP) and BMP (Teladan Prima Group / Ecositrop)
- Guidelines for orangutan management developed (United Plantation / Copenhagen Zoo_

These BMPs focus mostly on broad great ape management practices. They cover topics such as conflict mitigation techniques, compliance with existing laws and regulations, guidelines for preparing monitoring and management plans, awareness campaigns and information.

Although the need for BMPs is increasingly understood and accepted at senior and mid-management levels, the uptake of these BMPs and their field implementation has generally been limited. Translating BMPs into new and progressive practices on the ground is difficult because most companies have insufficient capacity to turn BMP guidance into effective on-the-ground implementation. The implementation of BMPs requires experienced field personnel equipped with a set of skills that covers ecology, spatial analysis, biodiversity, ecosystem services, and monitoring. It also requires a genuine interest in and concern for conservation issues, and sufficient authority to translate these concerns into changed management practices on the ground, such as estate planning. In many countries, experts who both have the necessary technical knowledge and a strong commitment to conservation are limited in number, and often the best candidates are former conservation workers who have acquired this skill-set and end up working for the extractives (mining, forestry) and agricultural (oil palm, pulp and paper) industries.

WHY DEVELOP AND IMPLEMENT BMPS?

Companies often hire outside consultants to conduct HCV assessments and to monitor them. Some companies will take the relatively easy step to set aside -- sometimes only on paper -- areas identified for biodiversity conservation. Active management of these set-aside areas is usually weak to non-existent, illegal logging and hunting are often rampant, and transparent monitoring is not implemented even though this is feasible with high-resolution satellites.

Relying solely on the often short-term involvement of external consultants from private companies, NGOs or academic institutions to manage environmental resources and HCV forests is unlikely to result in different on-the-ground practices. For any BMPs to become used and useful, it is necessary for companies to create, establish and develop their own in-house capacity to identify, monitor, and manage biodiversity elements that occur within their estates. This also means that biodiversity management should be considered a core task for each company, just like other aspects of plantation management including land clearing, planting, fertilizing, pest control, harvesting, workers training, and corporate social responsibility (CSR).

Another way to increase the uptake of BMP is to produce simple guidelines that are easy to understand and implement in the field. Most effective is to adhere to a 'dos and don'ts' approach, and to identify clear and simple outputs which can be easily quantified and monitored.

The core business of the palm oil industry is not conservation but oil production. Times are changing, however, and properly managing the environment and great apes in concessions is not only a legal requirement but also an opportunity to contribute towards long-term survival of these species and their habitats. This will benefit companies in return, by improving their public image and offering easier access to financing. There are many ways to quantify benefits, but there is an obvious need for more research to better understand the co-benefits of good environmental management so that these can be used to promote the uptake of best management practices. The development of great ape BMPs has been largely driven by NGOs to date, however, primarily for animal welfare reasons, without a real understanding of the needs and demands from the industry.

One key aspect of developing BMPs more in line with business needs would be to quantify how managing environmental resources sustainably could benefit companies directly and indirectly. One example is to reduce plantation development and management costs and increase yields by optimizing the use of ecosystems services (HCS 2015). Good hydrological management that maintains peat swamp and riparian forests will ensure good water flow during drier periods and reduced flooding events during periods of high rainfall. It will also supply sufficient water of proper quality and contribute to maintaining yields, whilst also maintaining the integrity of great ape habitat around plantation areas.

Other services provided by forests that benefit both oil

TEXT BOX 10.: OIL PALM PRODUCTION AND ORANGUTAN CONSERVATION: A POLARIZED DEBATE

The debate between orangutan conservation and oil palm development is extremely polarized, and it is difficult for both parties to engage in a constructive dialogue (Meijaard & Sheil 2011).

Negative campaigns initiated by some advocacy groups have resulted in the decision by many consumers, retailers, and companies to boycott palm oil or to source palm oil-free products. In turn, some sectors of the palm oil industry have spent significant sums to defend the allegations against them, and some have gone further to develop so-called 'greenwashing' strategies to improve their image. In this heated forum, the public is often misinformed. For example, in a 2014 poll conducted in Australia, 5% of the respondents believed that oil palm was derived from orangutan body parts. Public misinformation has the potential to harm the business, but also great ape conservation.

palm and biodiversity include improved pest control from forest species, by maintaining natural habitat for predators of rodents such as snakes or leopard cats (Koh 2008), and the reduction of temperature extremes because of temperature buffering forest remnants (Ramdani et al. 2014), which could positively influence palm fruit ripening, setting (Cao et al. 2011), and yields.

Perhaps even more important than the direct financial benefits of implementing BMPs would be the reduction in criticism and negative allegations made by some NGOs and consumer groups. This would help improve the overall public perception of the palm oil industry (Text Box 10). A more positive perception by the public will not only contribute to maintaining existing markets but will also generate a demand from new markets for the industry as a whole, including markets that are presently closed to oil palm imports, thereby expanding the reach of this industry. Benefits of BMPs go beyond the industry itself. Additional beneficiaries include local communities, which rely on the use of natural resources such as fisheries, and society at large, as healthy ecosystem services will ensure water quality. This will minimize flood and landslide risks, and minimize pollution and associated costs.

Often, companies are not necessarily aware of the species that occur in the areas they wish to develop. It is therefore important for scientists to produce accurate distribution maps showing the range of protected species and to share them with those companies planning to operate within these ranges. Such data are available at the Ape Populations, Environments and Surveys (A.P.E.S.) Portal website (http://apesportal.eva.mpg.de/), which provides an online tool to visualize great ape distribution in combination with other contextual layers such as protected areas. This information can then be used to 1) minimize the negative impacts that conversion and / or poor management will have on the population; and 2) mitigate any negative publicity and business repercussions that may result from poor environmental practices.

Inherent inaccuracies are common in regional-scale distribution maps (Di Marco et al. 2016), and emphasis must be placed on the importance of providing species distribution across the geographic scales at which they are most relevant. Accurate distribution maps at the concession, landscape, province, or even country level are most likely to be taken up by managers, land-use planners and policy makers.

WHAT ARE THE MINIMUM REQUIREMENTS FOR GREAT APE BMPS?

The minimum environmental management requirements are already defined by RSPO and encompass the following activities:

- Clearly demarcating the areas to be set aside for conservation following an HCV assessment
- Efficiently protecting and monitoring the HCV areas (Text Box 11)
- Addressing diligently any impending threat to great apes following clear and precise Standard Operation Procedures (SOP) that need to be developed by the company in collaboration with experts;
- Sufficiently informing and engaging communities to gain their support

Monitoring programs could be developed in collaboration with external experts but need to be implemented by the company itself. Proper mechanisms to ensure that the results of the monitoring activities inform the management practices must be clearly established.

The overall assumption is that great apes will be safe if the habitat is well managed and threats such as hunting are abated. When great apes occur within or close to a plantation, three key elements must be considered:

- Great apes are safe. Great apes must be safe from killing, and a 'no-kill policy' needs to be developed and strictly enforced. Monitoring and enforcement activities also need to be developed within the plantation. The entrance to the estate must be closely guarded and monitored to prevent hunters from gaining access to the area. Oil palm plantations can have high densities of game -- including pigs, deer, and other wild meat sources -- but uncontrolled hunting of these species also endangers apes. Every act of wildlife killing -- irrespective of the target species -- must be reported to the estate management. In accordance with the laws in effect, authorities must be informed and laws must be enforced. Anyone killing an ape must be arrested and prosecuted. When apes are reported to have caused damage to plantations, local authorities should be contacted to consider possible steps to ensure the animal's safety.
- Field staff awareness is raised. Oil palm plantation workers are often foreign immigrants and are not familiar with local wildlife and local legislation. The use of sign boards, meetings, briefings, posters and any other means further helps enforce the message that apes are fully protected and must not be harmed. Seeking collaboration and support of local organizations that are familiar with environmental education is highly encouraged if the plantation is lacking in-house skills and expertise.
- Great ape presence is monitored. The thorough and regular monitoring of great ape presence and damages, as well as of the condition of forest patches, needs to be implemented in all oil palm estates within the ape's natural range. All sightings of great apes and other protected wildlife should be reported by oil palm workers to their team leaders and a proper flow of information needs to be established between field operation management and the relevant wildlife authorities.
- Great ape translocation / relocation is the last option. Operations in which experts anesthetize a great ape to capture it and then release it elsewhere are not the best option and should be the exception, not the norm. This practice should be used only when all other attempts have failed, and when the safety of the animals or the people is at risk (Text Box 12).
- Conflicts are minimized. Adequate mitigation measures are identified and implemented.
- The landscape is designed to sustain a resident great ape population or to allow for safe passage of transient animals. Proper forest corridors and stepping stones are identified and set aside or re-established if and where needed, and the habitat is enriched through tree planting and informed spatio-temporal plantation management.

Official and standardized requirements specific to great ape management are mostly lacking. However, skilled and experienced staff are best suited to implement BMPs and SOPs and apply them to a local context, and the need for companies to employ and train their own team of ecologists to manage and monitor all HCVs in the plantation is essential. Each team should collaborate with external groups for capacity building and when specific external skills are required. A clear and transparent process needs to be developed for these teams to report on the progress of the company toward a better management of biodiversity elements that fall under their management, and to have their activities audited.

IMAGE 23

Great ape rescues are a frequently-used tool to save individual animals stranded in forest patches in plantations, often without prosecuting companies for illegally destroying great ape habitat. They can save a few animals but allow the industry and government to be less concerned about other wild populations. © International Animal Rescue.

TEXT BOX 11: GREAT APE MONITORING

Under the HCV classification, great ape habitats and those of any other protected or endangered species are classified as HCV 1, which is defined as forest areas containing globally, regionally, or nationally significant concentrations of biodiversity values, which must be monitored if occurring within the estate.

Proper great ape monitoring is difficult. It requires regular nest or animal counts along line transects or aerial surveys, and the amount of time and effort needed to collect sufficient data is significant. Often, a company will have to rely on university students, scientists, NGOs, or paid experts to conduct these activities. However, simplified techniques could also be developed to document the great ape status within a plantation, such as regular collection of presence / absence data, direct and indirect animal sightings, records of dead animals, use of camera trapping, and the deployment of drones (van Andel et al. 2015; Wich et al) .

Companies should also engage all their staff and workers in reporting and recording all great ape sightings to build up a data bank. An indirect approach to assess the great ape status would include threat monitoring of fire damage, illegal logging signs, water level for peat and rivers, and the presence of poachers.

TEXT BOX 12: GREAT APE TRANSLOCATIONS A LAST RESORT

Companies and governments often consider translocation of great apes as the ultimate mitigation option. However, translocation comes with a long list of potential complications (Beck et al. 2007). It is a very costly exercise that requires highly trained personnel, and the effectiveness of translocation is still doubtful as great ape capture is very stressful for the animal concerned and in some cases can be fatal. The survival rate of translocated animals is still unknown as is the probability of establishing a new territory after relocation. Finally, identifying forests that could be used as potential release sites remains difficult, as few sites offer forest that is fully protected, the land tenure secured, no resident great ape populations, and suitable protection against hunters (Wilson et al. 2014a). In addition, the resources needed for proper post-release monitoring often limit its implementation.

In addition, the net impact of great ape rescues and translocations remains unknown. When the rescue of a few individuals gives the impression to government and the industry that sufficient conservation action has been taken, how many more animals are not protected or more likely to be killed?

Great ape translocation cannot be seen as a stand-alone solution. It needs to serve as a last resort, when all other approaches have failed. The best approach is to manage apes at the population level and not at the individual level. Under an ideal scenario which considers a landscape approach and sets a target that ‘no great ape needs to be rescued”, landowners (industry, local communities, and government) will manage their respective lands to allow safe passage to the animals throughout the entire landscape.

HCV ASSESSMENTS AND GREAT APES

High Conservation Values (HCVs) are biological, ecological, social or cultural values that are considered outstandingly significant or critically important at the national, regional, or global level. HCV identification, management, and monitoring are some of the most important steps towards achieving forestry or agricultural commodity certification. In practice, the quality of HCV assessments varies according to the skills and expertise of the assessors, the time spent in the field and the budget allocated to field activities. The HCV Resource Network has developed an HCV Assessor Licensing Scheme (ALS) to improve the quality of these assessments. Since October 2014, all RSPO members with plantations developed after 2005 must conduct HCV assessments by ALS accredited assessors before land conversion and planting.

Great ape habitat is listed as HCV 1 and should be included in any HCV assessment that takes place within the range of the species. However, the species are quite adaptable and therefore are not necessarily a good indicator for other more forest-dependent HCVs. In addition, detecting great apes and their distribution is difficult and time consuming, and there is still no agreed methodology to identify and to assess great ape habitat and population status at the HCV level.

Any HCV assessment conducted within the range of great ape species should use specific and accepted methods for identifying populations, such as nest transects, camera trap surveillance, or aerial surveys (Kühl et al. 2008). The team of assessors should include at least one person highly capable of detecting great ape presence through indicators such as nests, vocalizations, or feeding signs. The final HCV report needs to be peer-reviewed by great ape experts who will be able to check the reliability of the assessment.
Monitoring is part the HCV approach; the assessment report should clearly explain what the monitoring techniques are that need to be undertaken by the company. For example, transects should be set up in the field during the assessment and a proper reporting system of sightings should be included in the report.
If and when great ape presence is reported in the HCV assessment, the company should collaborate with local NGOs or groups with great ape expertise to develop the final ape monitoring strategy and SOP, and to train their own HCV team in ape monitoring techniques.

PART FOUR

DEVELOPMENT OF GREAT APE GUIDELINES ON LESSONS LEARNED FROM RSPO

SETTING ASIDE PRIORITY AREAS FOR GREAT APE HABITAT

Several land management strategies can be proposed to reduce the environmental impacts of the palm oil industry (Yaap et al. 2009). However, avoiding forested areas to develop oil palm plantations remains the best way to minimize the industry's footprint on biodiversity, and avoiding forests that are home to viable populations of great apes in Asia and Africa will achieve the best result in terms of ape conservation.

At the macro-scale level, plantations should be developed on suitable degraded lands that are devoid of trees, and all areas with a significant conservation value should be set aside and not converted (Smit et al. 2013). To be successful, this land-sparing strategy needs precise spatial information and maps showing the distribution and status of forests, degraded lands, great apes, and other species of interest. An analysis of the availability of low-value land in Sumatra indicates that there is sufficient area available to accommodate considerable expansion of oil palm plantations. However, suitable areas often have land tenure issues that need to be resolved, introducing an unattractive level of complexity for companies wishing to use these areas for oil palm plantation expansion (Wicke et al. 2011).

Satellite imagery and remote sensing technology can produce

layers of information and can efficiently support the land-use decision-making process. Precise maps of great ape distribution are generally lacking, but for some species such as the Sumatran orangutan their distribution is quite well known (Wich et al. 2016). A conservation priority for the different species is therefore to map their precise distribution, and to disseminate this information widely among oil palm producers and land-use decision makers. "No-go" areas and the rationale for their status should be clearly identified on these maps.

A PRAGMATIC APPROACH FOR CREATING MOSAIC LANDSCAPES COMPATIBLE WITH GREAT APE CONSERVATION

It seems unrealistic to propose that all forested areas that are home to viable great ape populations and other fully protected species should be kept aside from development plans for conservation reasons. However, all areas acknowledged as 'priority populations' should be strictly avoided, while more wildlife-friendly ways are identified and implemented in those areas that are assigned for development projects. To some extent, agroforestry practices would support a more wildlife-friendly way to produce oil palm, and could result in a mosaic landscape that suits smallholders and members of local communities who can still harvest non-timber forest products such as honey, fish, and plants used for traditional medicine. However, the way the agro-industry develops oil palm over huge tracts of land is not compatible with agroforestry practices.

Many experts see a mixed combination between land sparing and land sharing as a way to develop a mosaic landscape that would serve the needs of local people, companies, and conservation (Koh et al. 2009; Law et al. 2015). In such landscapes, viable great ape populations would be maintained in large, strictly-protected "no-go" areas, which could be identified through a combination of assessments of HCV and also High Carbon Stocks. These protected forests would be connected with commercial forests exploited for timber and buffered with industrial tree plantations and agro-industrial plantations (Meijaard et al. 2012). This would then border the high-intensity use areas where most people and infrastructure are concentrated.

Ecological networks would be developed throughout these landscapes to allow connectivity and to retain some functional ecosystem services such as the prevention of erosion and the regulation of hydrology. Responsible oil palm companies could play a role in the management of such landscapes by strategically locating their plantations at the forest frontier, but assisting in the protective management of forest habitats and great ape populations around their plantations (Image 28).

To achieve this objective, landscape transformations need to be envisioned over large areas, preferably at the scale of a state or a nation. This jurisdictional approach is currently being pursued by Liberia in Africa, and envisaged to be followed in Sabah, Central Kalimantan and South Sumatra in Asia. However, ecologically connected networks are far from the standard forest management policies currently implemented in Borneo and Sumatra. To affect this shift, many questions need further exploration, such as:

- What would be the optimal size and shape of set-aside to maintain the viability of great ape and other target species (Text Box 18)?
- What are the different types of land tenure that will benefit all stakeholders sharing the same area, local communities in particular?
- What is the socio-economic value of various configurations of oil palm landscapes?
- What could different biodiversity offsets constitute in an oil palm context?

Achieving sustainable landscapes and viable ape populations must encompass the needs and aspirations of people who are sharing and utilizing the same landscape. This requires the collaboration and involvement of a wide range of stakeholders: local communities who are living within these landscapes; industries that are leading the intense transformation of the landscape; policy makers and governments that provide the legislative framework for land-use changes; consumers that will influence the market by their day-to-day choices; and civil society at large.

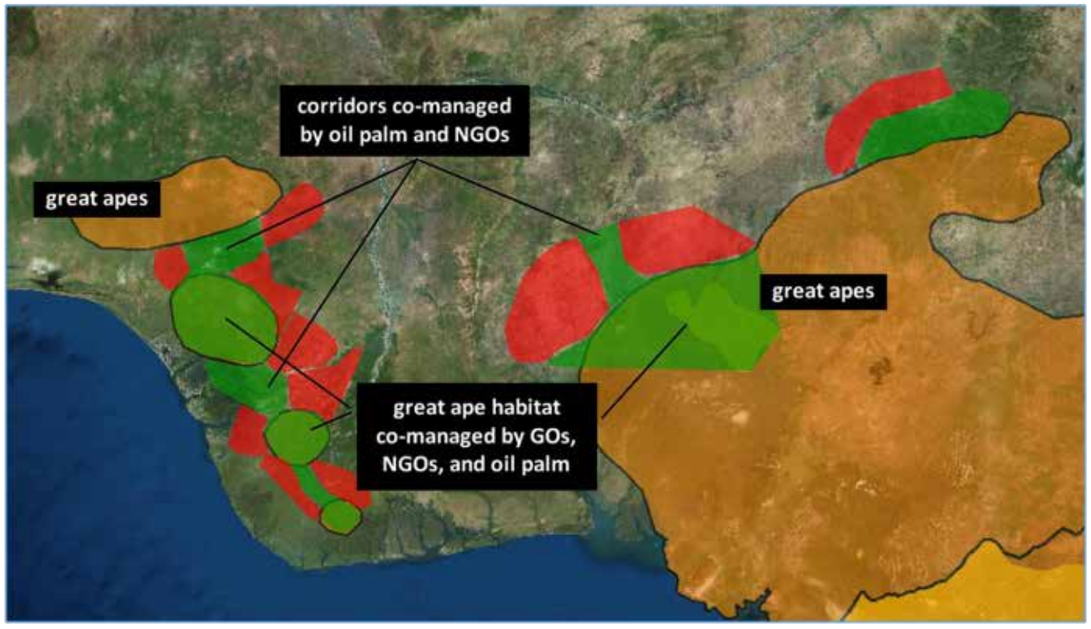
TEXT BOX 19: COLLABORATION TO REDUCE GREAT APE KILLING

1)The Wildlife Conservation Agreement that was signed between the Malua Biodiversity Bank Project, the Sabah Forestry Department and nearby plantations details the various activities that are undertaken to implement a wildlife monitoring plan developed and agreed upon by all signatories. The result has been a significant reduction of poaching events in the area.

2) A tripartite agreement was signed between Wilmar, the Borneo Orangutan Survival Foundation (BOSF) and the Governor of Central Kalimantan to develop Best Management Practices for orangutan conservation in oil palm plantations. One of the goals of this on-going partnership is to develop these management practices into a formal policy for the palm oil industry in Central Kalimantan.

IMAGE 24

Fictional example of how responsible oil palm companies could play a role stabilizing the forest frontier and reducing other wildlife threats by providing a buffer of well-managed zones adjacent to and overlapping with areas of high conservation importance. Orange areas are great ape populations, red areas are fictionally positioned oil palm plantations, and green areas are co-managed corridors and great ape habitats. Obviously, actual spatial planning would be informed by existing land-use plans, current land use, socio-economic importance of local land uses, and others. Local communities should be seen as beneficiaries as well, and be pro-actively engaged and involved in the management of the corridors and other forest areas.



TEXT BOX 18: HOW SMALL IS TOO SMALL?

High Conservation Value (HCV) forests are designed to retain biodiversity, but are still poorly understood in terms of what characteristics (size, composition, structure) are needed to maintain a given level of biodiversity over the long term. Given that plant and animal species decline in parallel with decreasing forest size, biodiversity loss is better avoided by retaining large tracts of continuous tropical forests. Recent research in Sabah (Edwards et al. 2014; Lucey et al. 2014) shows that:

1) Patches of 10,000 ha or larger retain the same level of biodiversity as found in continuous forests, although large and long-ranging species such as great apes may need larger forest areas to maintain viable populations;
2) Patches of a few hundred hectares retain 70% or less of what was originally found in continuous forest, but significantly more than the biodiversity found in an oil palm plantation. Natural regeneration can take place in these patches;
3) Small patches of 20 ha or less are less resilient and more prone to degradation and species loss than larger blocks. They need active management to maintain their value for biodiversity, including enrichment planting and buffer zones. Dipterocarp trees, for example, cannot regenerate naturally in small patches, and artificial enhancement is needed to prevent biodiversity erosion (Yeong et al. in review). Edge effects, such as increased vulnerability to wind, desiccation, and fire, result in increased degradation of the forest fragments and the species they could support.

Nevertheless, even the smallest and most degraded forest patches can still retain value allowing for and facilitating the dispersal of various species throughout the landscape. To achieve viable conservation results, it is important to consider meta-populations and not individuals, and it is necessary to embrace a landscape-scale conservation approach. This means HCV assessments must be designed and ecological processes must be managed not only within but also outside the boundaries of the oil palm estate.

PROMOTING STRONGER AND MORE EFFECTIVE REGULATIONS AND POLICIES FOR GREAT APE CONSERVATION IN OIL PALM DEVELOPMENT

Most range States need stronger regulations and enforcement to enhance the chances of ape survival within and around oil palm plantations. Indeed, many governments lack strong land policies that would allow for private land-owners to set aside HCV and land for conservation, and national laws need to be revisited and amended to optimize land-use allocation, and to allow for innovative types of land-uses that will integrate conservation needs. Land-use decisions should be transparent and based on the latest available scientific information. Basic moral principles should guide land-use allocation and money-lending processes at the local, regional, national, and international levels (Kormos et al. 2014). Land-use and development plans need to be adjusted to accommodate for biodiversity conservation and economic development (Runting et al. 2015).

The palm oil industry has the potential to control most of its biodiversity footprint, primarily by selecting areas for development that do not harbor any significant great ape populations or which are not already forested. Establishing strong company regulations that guide production practices with regard to environmental processes would help minimize these negative impacts on biodiversity. The development and implementation of BMPs and SOPs to monitor and manage great apes and other HCV species need to be internalized at the estate and company level. Creating partnerships with outside organizations that possess some of the skills that are lacking within the companies would help secure the future of many animals whose survival is threatened by agricultural practices (Text Box 19). However, the industry needs to be supported by a legal framework, which is eventually decided by the governments of countries where the companies are operating.

Conserving HCVs and set-aside forests is the responsibility of the oil palm estates, and 'corporate social responsibilities' may help companies achieve these objectives. One of the current challenges

of certification is that it operates mostly within the boundaries of a concession. Averting biodiversity losses, however, needs to consider the wider landscape and ecological processes that stretch beyond the boundaries of the estate.

Many believe that civil society at large is the ultimate enabler and driver for positive changes. Activism plays a big role to shape palm-oil industry practices as well as some policies in several consumer countries. Consumers can shape the international market and have already shown that the palm oil industry needs to consider the demands of their buyers to be more sustainable.

TEXT BOX 20: INDONESIA AND THE OIL PALM INDUSTRY DISAGREE ON THE "NO-DEFORESTATION PLEDGE"

In October 2015, the Indonesian government asked major palm oil companies to renounce the historic 'no deforestation' pledges they made one year earlier at the United Nations climate change summit in New York. Several large palm oil firms had signed the Indonesian Palm Oil Pledge (IPOP) to go beyond requirements from common certification schemes (RSPO, MSPO, ISPO) and avoid all deforestation resulting from oil-palm development. The Indonesian government justified its request by pointing out that it unfairly affected smallholder producers, who did not have the financial or technical means to avoid deforestation in their oil-palm development.

The pressure from the national government came after local governments in Indonesia began taking away parts of oil palm concessions that companies had tried to convert into conservation forests, which is an RSPO certification requirement if such forests are considered of high social or environmental value. An example is Golden Agri Resources, one of the IPOP companies, which tried to set aside an area designated for plantations in Indonesian Borneo into a conservation forest. Following this, the local government threatened to revoke the concession.

This development indicates growing tension between government objectives and market demands. Companies that are trying to improve their environmental performance are caught in the middle. Wilmar, the world's largest palm oil trader, unveiled an online platform this year which provides transparency and 'traceability' into its supply chain, including the names and locations of refineries and palm oil mills. Wilmar now needs to reassess how it can align its international commitments with demands from the Indonesian government.

PART FIVE

RECOMMENDATIONS

KEY RECOMMENDATIONS FOR GOVERNMENT

Governments need to coordinate and communicate effectively at an inter-ministerial level and strongly engage with scientists to identify areas where development will have the least impact on the environment and rural society, while maintaining a balance with their economic interests. The landscape should be considered at the scale of the nation to decide about various land uses and management practices.

Governments should work with industry, scientific, NGO, and civil society stakeholders to identify areas that cannot be converted to oil-palm plantations because the environmental, social, and economic costs outweigh the benefits (net-positive benefits). This requires an understanding of potential net revenues of agriculture and the economic, environmental, and social value of ecosystems prior to their development, including flood-buffering functions, control of soil erosion, climatic regulation, supply of fish, bushmeat and other non-timber forest products. Any area recognized as harboring 'priority' populations of apes cannot be developed. Undertaking informed spatial planning is complex but tools are now available to conduct proper analyses and to inform land-use decision-making.

All concession boundaries should be made available to the public and any interested party in a clear and transparent manner.

Governments need to revise policies and laws that are preventing landowners from retaining areas in their plantations under natural forest cover.

Governments should adopt the so-called "jurisdictional approach" and consider the largest possible landscape when designing their future land-use development plans; depending on the legal system in place, the scale of the landscape should be the province, the state or the nation.

KEY RECOMMENDATIONS FOR THE OIL PALM INDUSTRY

Oil palm companies need to seek certification before investing in Africa and need to ensure that their subsidiaries established in the continent are also certified or are in the process of being certified in a defined time frame.

In areas where great apes occur but are not identified as priority populations, oil palm plantation owners and managers should develop plans to maintain critical forest areas and maintain ecological connections between them. HCV and HCS tools provide clear guidance as to how to do this. The minimum size of natural forest to be retained should be at least 20% of the size of the plantation. This requires collaboration with great ape specialists for drafting biodiversity management plans. Priority should be given for these forests to connect together other forests bordering the plantations to decrease habitat and population fragmentation.

Oil palm plantation owners and managers that have great apes on their land should employ technically competent environmental management teams on a full-time basis, with the skills and mandate to protect biodiversity.

Oil palm plantation owners and managers that have great apes on their land should enforce a no-kill / no-harm policy and establish clear standard operational procedures (SOP) to ensure that workers or community members in the plantations do not harm great apes.

KEY RECOMMENDATIONS FOR CONSERVATION ORGANIZATIONS

Conservation organizations should collaborate and identify risks of oil-palm development in great ape habitats and other HCV and HCS areas. Current and accurate great ape distribution range maps should be overlaid with existing and planned oil-palm developments.

Conservation organizations should collaborate with governments, industry and other partners to build a consensus about "no-go" areas for development based on the presence of priority great ape populations and viable great ape populations, the presence of other high-risk factors such as floodplains and coastal peat swamps, and the importance of areas for food security.

Concession holders should be identified on the basis of 1) co-occurrence of oil-palm development and great ape presence and 2) the sustainability commitments made by individual companies, such RSPO certification or membership.

Concession holders with existing or planned operations should be engaged and informed as to best-management practices.

"No-go" areas for oil palm should be identified on the basis of great ape presence, or subsequent development should be monitored to ensure that "no-go" areas remain off-limits.

NGOs and consultant groups with appropriate expertise should collaborate with plantations to provide training for increasing in-house capacities to monitor and manage HCVs and other natural resources.

KEY RECOMMENDATIONS FOR RESEARCHERS

Develop accurate and detailed maps of great ape species ranges, focusing on geographies that are most relevant for policy or management – such as the landscape or province level -- of planned and existing plantations, and of lands potentially available for plantation development, in order to drive the land-use decision-making process.

Collaborate on determining the social, environmental and economic costs of oil palm in different land-use and land-cover types so that informed decisions can be made as to the net benefit or relevant costs of oil-palm development.

KEY RECOMMENDATIONS FOR FINANCIAL INSTITUTIONS

Compliance with environmental standards -- such as RSPO for the oil palm industry, FSC for the timber industry, IFC for the mining industry -- should become compulsory for any company to be listed on the international stock exchange. Strong environmental standards should be added to the existing financial and social standards that are already a prerequisite to listing.

GLOSSARY

Agroforestry: practices that integrate trees and other perennial plants into a mosaic farming system.

Anthropogenic: relating to or resulting from the influence of human beings on nature.

Carrying capacity: the maximum, equilibrium number of organisms of a particular species that can be supported indefinitely in a given environment.

Genetic drift: random fluctuations in a gene pool over time. The smaller the animal population the more susceptible it is to adverse impacts of genetic drift.

Greenways: networks of land containing linear elements that are planned, designed and managed for multiple purposes including ecological, recreational, cultural, aesthetic, and other purposes compatible with the concept of sustainable land use.

HCS: High Carbon Stock.

High Conservation Value: biological, ecological, social or cultural values which are considered outstandingly significant or critically important at the national, regional, or global level.

Meta-population: (or metapopulation): a group of populations that are separated by space, but consisting of the same species. These spatially separated populations interact, as individual members move from one population to another.

NTFP: Non Timber Forest Products

Set-asides: the policy of taking land out of production for biodiversity conservation purposes.

Stepping stones: series of small patches of forest that will allow for animal dispersal in a mosaic landscape

ABBREVIATIONS

ASEAN: Association of Southeast Asian Nations

BMPs: Best Management Practices

CPO: Crude Palm Oil

CSPO: Certified Sustainable Palm Oil

ES: Ecosystem Services

EIA: Environmental Impact Assessment

ESIA: Environmental and Social Impact Assessment

FPIC: Free and Prior Informed Consent

GHG: Greenhouse Gas

GRASP: Great Apes Survival Partnership

HCS: High Carbon Stock

HCV: High Conservation Value

ISPO: Indonesian Sustainable Palm Oil

IUCN: International Union for the Conservation of Nature

MSPO: Malaysian Sustainable Palm Oil

NTFP: Non Timber Forest Products

P&Cs: Principles & Criteria

PKO: Palm Kernel Oil

RSPO: Roundtable on Sustainable Palm Oil

SOPs: Standard Operation Procedures

UNDP: United Nations Development Programme

UNEP: United Nations Environment Programme

UNESCO: United Nations Educational, Scientific and Cultural Organization

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Great apes occur in 23 countries across Africa and Asia, many of which are plagued by strife and civil unrest. GRASP focuses on cross-cutting issues such as illegal trade, habitat loss, disease monitoring, sustainable development, eco-tourism and transboundary collaborations, employing the latest technology, tools and resources to meet these challenges.

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