

# African Primate Diversity Threatened by “New Wave” of Industrial Oil Palm Expansion

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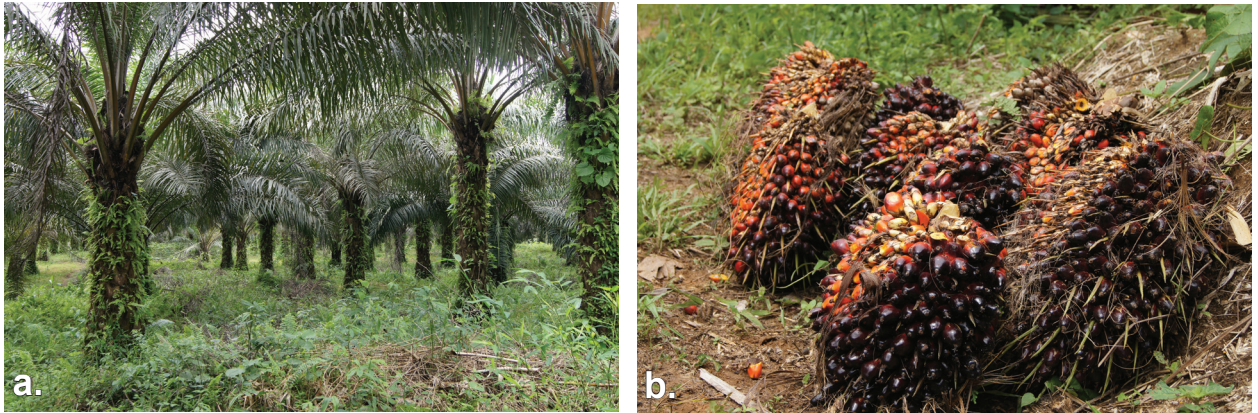
**Abstract:** Privately owned, foreign agribusinesses are increasingly acquiring and converting large tracts of arable land in the tropics to grow crops for food. Of particular concern is the rapid expansion of industrially produced palm oil, derived from the African oil palm (*Elaeis guineensis*) and the most widely produced vegetable oil in the world. Although most of the world's palm oil is produced in Southeast Asia, strong economic incentives are encouraging agribusinesses to lease land in the African tropical forest zone to develop oil palm plantations. Such large-scale clearance of forest to plantation agriculture may have wide-ranging implications for forest-dependent species, including and especially the primates. I review the known environmental impacts of industrially produced palm oil and its expected consequences for African primates and their habitat. I highlight the challenges primatologists and conservation practitioners will face in this new wave of industrial oil palm expansion by describing a development in Cameroon by the American agribusiness company Herakles Farms and non-profit organization All for Africa. Through the use of tactics commonplace in the oil palm industry, including the spread of misinformation, Herakles Farms has garnered the support of private donors and investors to build a 73,086 ha oil palm plantation in a forest area characterized by exceptional levels of species diversity and endemism. Agro-industrial developments will soon emerge as a top threat to biodiversity in the African tropical forest zone. If proactive strategies to mitigate the effects of large-scale habitat conversion are not soon implemented, we can expect a rapid decline in African primate diversity.

**Key words:** palm oil, industrial oil palm plantations, Cameroon, African primate conservation

## INTRODUCTION

Palm oil, derived from the African oil palm (*Elaeis guineensis*), has become the world's most produced vegetable oil (Sheil *et al.* 2009; Figure 1). Its uses are varied, ranging from cooking oil to ingredients in soaps, cosmetics, detergents, lubricants, and biodiesel. Driven by increasing consumption and the use of palm oil based products, the global production of this vegetable oil has increased exponentially over the past 50 years (Fitzherbert *et al.* 2008). Between 1961 and 2009, the average annual growth rate of the world's palm oil production was 7.3%, with production more than doubling every 10 years (FAO 2012). At the same time, the land converted to oil palm plantations quadrupled from 3.6 million ha in 1961 to 15.4 million ha in 2007, mostly in Southeast Asia where over 80% of the world's palm oil is produced (FAO 2012).

The relatively recent rise of palm oil as one of the world's most popular vegetable oils coincides with a global shift in the proximate drivers of tropical deforestation. Historically, smallholder farmers clearing land for agricultural production has been the primary cause of tropical forest loss (Rudel *et al.* 2009). However, increasing urbanization, global trade, and demand for food have led to an increase in the relative contribution of private agricultural enterprises to tropical deforestation (Butler & Laurance 2008; Rudel *et al.* 2009; DeFries *et al.* 2010). Consequently, the land area devoted to rice, maize, soybeans, and oil palm has dramatically increased over the last few decades, at the direct expense of intact tropical forest (Gibbs *et al.* 2010). This shift towards private-enterprise-driven tropical deforestation from



**Figure 1.** (a) African oil palms and (b) fresh fruit bunches, from which palm oil is derived. Photographs by J. Linder.

agriculture has been most evident and studied in the Amazon Basin and, especially, Southeast Asia.

Unlike the Neotropics and Southeast Asia, forest loss in the African forest zone is still primarily caused by the expansion of subsistence and smallholder farming (Fisher 2010; Rudel 2013). However, Africa has recently begun to experience a shift in drivers of deforestation, as indicated by recent and predicted expansion of large-scale, industrial oil palm plantations through land leases or purchases by multinational agribusiness corporations (Boyfield & Ali 2011; Hawkins & Chen 2011; Feintrenie 2012; Greenpeace International 2012). Human rights groups have labeled the rapid increase in acquisition of land in Africa by foreign investors as “land grabs” to highlight the potential negative consequences for local land owners and users (Friis & Reenberg 2010; Karsenty 2012). Environmental groups have similarly alleged that these land deals in Africa may result in widespread deforestation and an increased rate of local extinctions (World Rainforest Movement 2008; The Rainforest Foundation UK 2013). Certainly, if large tracts of African tropical forest are converted to monocultures, as they have elsewhere in the tropics, this will have a disproportionate impact on forest-dependent species, including and especially, the primates (Koh & Wilcove 2008a; Nantha & Tisdell 2009).

There are very few peer-reviewed articles that have focused on the development and potential environmental and socioeconomic impact of industrially produced palm oil in Africa (but see, Huddleston & Tonts 2007). Yet, primatologists and conservationists who work in African lowland, tropical forests either in protected areas or forests that are relatively accessible and have limited or undefined legal status are likely to be confronted with this oil palm boom in the very near future (e.g., Gonedélé Bi *et al.* 2008). As this appears to be a rapidly emerging threat to African forest biodiversity and local livelihoods, it is critical that biological and social scientists examine, discuss, and debate its advantages, disadvantages, impacts, challenges, and solutions.

The objective of this paper is to inform readers about this emerging ecological threat to African tropical biodiversity and inspire further research and engagement. I discuss the known environmental impacts of industrially produced palm oil and its expected consequences for African tropical forests. The conservation challenges created by this “new wave” of industrial oil palm expansion in Africa is understood through a case study of a highly publicized and contentious oil palm project led by American agribusiness corporation Herakles Farms, in collaboration with the non-profit organization All for Africa.

### IMPACTS OF INDUSTRIAL OIL PALM DEVELOPMENT ON PRIMATES AND THEIR HABITATS

Although oil palms require less land to produce the same amount of oil as other vegetable crops, and despite claims by some authors that the environmental damage from oil palm development has been exaggerated (e.g., Tan *et al.* 2009; Boyfield & Ali 2011), evidence shows that the impact of industrial oil palm expansion on primate habitats can be extensive. Results from longitudinal studies clearly indicate that oil palm expansion is a major driver of tropical deforestation in Malaysia and Indonesia, leading to substantial losses of primary and selectively logged forests and peatlands (Koh & Wilcove 2008a; Gaveau *et al.* 2009; Koh *et al.* 2011; Carlson *et al.* 2012). Similar impacts of industrial oil palm expansion have been reported for the Neotropics. In the Peruvian Amazon, for example, the development of industrial oil palm plantations is more likely to occur at the expense of forests, especially old-growth forest, than that of smallholder oil palm expansion (Gutiérrez-Vélez *et al.* 2011). In Columbia, the world’s fourth largest palm oil producing country, oil palm expansion has become one of the principle drivers of deforestation and forest fragmentation, especially of gallery forests (Oslender 2008; Carretero-Pinzón *et al.* 2009). Forest loss from oil

palm development in the Neotropics is likely to increase in the coming decades, with nearly half of the Amazon Basin potentially suitable for oil palm cultivation (Butler & Laurance 2009).

Compared with intact primary or selectively logged forest, industrial oil palm plantations are species-poor and/or exhibit substantially lower diversity in communities of plants (Foster *et al.* 2011), mammals (Danielsen & Heegaard 1995; Maddox *et al.* 2007; Bernard *et al.* 2009; Nantha & Tisdell 2009; Struebig *et al.* 2011), birds (Danielsen & Heegaard 1995; Waltert *et al.* 2005; Aratrakorn *et al.* 2006; Koh & Wilcove 2008a; Edwards *et al.* 2010; Azhar *et al.* 2011), lizards (Glor *et al.* 2001), amphibians (Iskandar & Erdelen 2006), ants (Room 1975; Brühl & Eltz 2010; Lucey & Hill 2012), beetles (Chung *et al.* 2000; Davis & Philips 2005), and butterflies (Koh & Wilcove 2008a; Lucey & Hill 2012). Meta-analyses of the impact of industrial oil palm plantations on animal species diversity and abundance suggest that total vertebrate species richness of oil palm plantations is 38% that of natural forest (Danielsen *et al.* 2008). Oil palm plantations are dominated by generalist, invasive, non-forest species and species lost due to forest conversion are typically specialists and/or of highest conservation concern (Fitzherbert *et al.* 2008; Foster *et al.* 2011).

In addition to causing forest loss, large-scale oil palm expansion also fragments a forested landscape, isolating forest patches, limiting dispersal of non-volant mammals, and increasing edge effects in adjacent forests (Fitzherbert *et al.* 2008; Bernard *et al.* 2009; Laurance *et al.* 2011). In some cases, relatively small forest fragments can remain within the larger oil palm matrix. Koh and Wilcove (2008a), Hill *et al.* (2011), and Struebig *et al.* (2011) suggest that for insects, bats, butterflies, and birds, such forest fragments may be of conservation value. However, a study of forest fragments within oil palm plantations in Borneo found that bird species richness and abundance were significantly lower and more similar to that of the oil palm matrix compared with contiguous forest (Edwards *et al.* 2010). Wilcove and Koh (2010) are careful to point out that protecting forests along waterways or preserving forest fragments within oil palm plantations lead to only minor improvements in biodiversity within the plantation and, in fact, do little to conserve regional biodiversity.

The forest zone of west and central Africa is significantly different from that of Southeast Asia and the Neotropics in its prevalence and intensity of bushmeat hunting (Abernathy *et al.* 2013). Bushmeat hunting can be expected to increase with the expansion of large-scale oil palm development in the African forest zone. Industrial oil palm developments lead to a local increase in human population density, primarily due to the migration of laborers into the project area (Butynski & McCullough 2007; Rist *et al.* 2010; Cramb

& Curry 2012). Just as the growth of urban centers in west and central Africa has spurred increased bushmeat trading, these migrant workers will bring with them a preference for bushmeat, thereby increasing demand and off-take. As forest is cleared to plant oil palms, hunters will increasingly harvest meat from the surrounding forests, including protected areas. Expanding industrial oil palm plantations and other forms of deforestation will further isolate intact forest blocks. Coupled with intense bushmeat hunting, local extinction rates of large-bodied mammals in isolated forest blocks can be expected to increase dramatically (Brashares *et al.* 2001; Benchimol & Peres 2013). As a result, perhaps predictive of what might occur with the expansion of industrial palm oil production in the African forest zone, a study of 23 forest protected area fragments in Côte d'Ivoire, varying in size and degree of isolation (due primarily to small- and large-scale farming), indicated that all surveyed forests except one lost between 25%-100% of the primate taxa expected to occur in those areas (Gonedelé Bi *et al.* 2012).

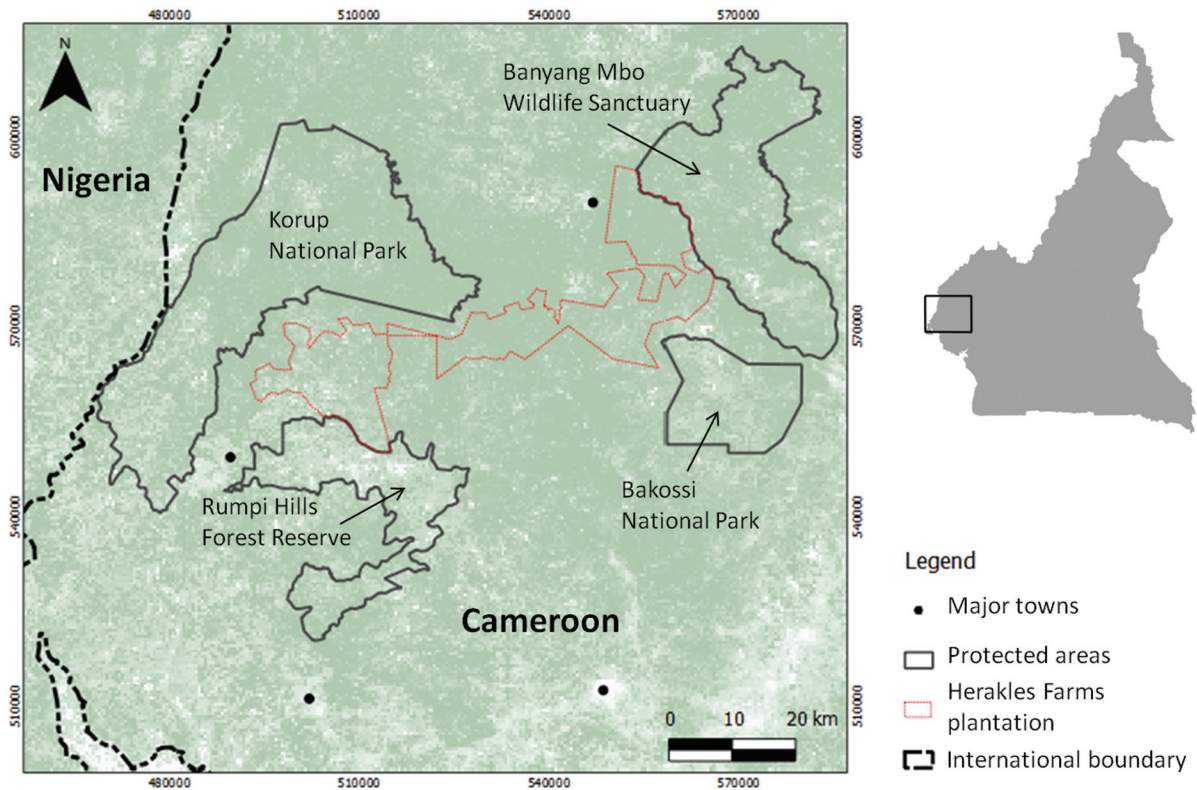
It follows that, not only will industrial oil palm development directly lead to the loss of large areas of primate habitat, but we can also expect that African primates found in protected areas will be at exceptionally high risk of extirpation if those forests are adjacent to industrial oil palm plantations. In a longitudinal study of 60 tropical protected areas, habitat loss and degradation surrounding protected areas were found to significantly threaten plant and animal community structure and erode ecological processes inside the protected area (Laurance *et al.* 2012). In the Pasoh Forest Reserve in Peninsular Malaysia, for example, densities of native wild pigs (*Sus scrofa*) have increased dramatically compared with historical levels due to the disappearance of natural predators and a year-round food supply in the oil palm plantations surrounding the reserve (Ickes *et al.* 2005). Increased levels of tree sapling mortality in the reserve, caused by higher pig densities, are expected to alter the reserve's tree community composition and have cascading effects throughout the ecosystem.

## THE ANATOMY OF AN INDUSTRIAL OIL PALM DEVELOPMENT IN AFRICA: THE CASE OF HERAKLES FARMS

### Background

With recent moratoriums on deforestation and land shortages in Malaysia and Indonesia, the African tropical forest zone has become a target of multinational agribusiness corporations looking to produce palm oil, fueling a "new wave" of African oil palm development (Hawkins & Chen 2011; Feintrenie 2012). Many African countries are offering attractive terms for agribusiness corporations. Oil palm plantations require high labor input and African nations can offer lower wage labor





**Figure 2.** Location of Herakles Farms/All for Africa oil palm plantation in South West Region, Cameroon relative to surrounding protected areas. Boundary of plantation based on the SG Sustainable Oils Summary Report of Planning and Management submitted to the RSPO. Forest cover based on analysis of the MODIS Vegetation Continuous Fields collection (<http://glcf.umd.edu/data/vcf/>).

than that found in Indonesia and Malaysia, thereby increasing competitiveness (Corley & Tinker 2003). African governments are also offering attractive land acquisition terms, including low rental fees, taxation and duties and rights to water, minerals, and/or timber in the oil palm concession area (Hawkins & Chen 2011; Nguiffo & Schwartz 2012). These factors are contributing to the industrial palm oil boom in the African tropical forest zone, with an estimated 2.6 million ha of land, the majority of which is forested, having already been allocated or suspected to be allocated in west and central Africa (Greenpeace International 2012).

Leading this new wave of industrial oil palm development is New York-based and Delaware-registered agribusiness corporation Herakles Farms (HF) and the non-profit organization All for Africa, which are planning a large-scale plantation in Cameroon's South West Region (Figure 2). Bruce Wrobel, the chairman and CEO of HF, reportedly had interest in producing palm oil in Africa for the biodiesel market and, through his energy company Sithe Global, considered developing plantations in Liberia, Tanzania, and Madagascar (Anonymous 2007; Görden *et al.* 2009; Carrere 2010; Friis & Reenberg 2010). However, by late 2008, as the price for crude oil sharply declined from its peak of nearly \$140/barrel, Wrobel decided that palm oil would have more

value as a food crop than as a component in biofuel. HF then acquired all of Sithe Global's assets in the palm oil industry, including the company Sithe Global Sustainable Oils (SGSO), which was incorporated in Ghana and Cameroon in 2008. In 2009, Sithe Global Sustainable Oils in Cameroon (SGSOC) signed an Establishment Convention with the government of Cameroon, which detailed the terms of a 99-year lease of 73,086 ha of land.

All for Africa, also based in New York and registered in Delaware, was co-founded by Wrobel (who also serves as the Chairman and Executive Director) in 2008, and aims to work with the private sector to support projects that generate socioeconomic benefits to communities throughout Africa. In 2008, All for Africa launched its "Palm Out Poverty" campaign, committed to reducing poverty, preventing illness, and promoting education across the African continent (see [www.allforafrica.org](http://www.allforafrica.org)). All for Africa will plant 1 million oil palm trees, primarily in Cameroon, and use the profits from the sales of palm oil to fund community-based projects in Africa. HF supports the Palm Out Poverty campaign by providing All for Africa with subsidized land and oil palm seeds and assistance with marketing and sales.

In Cameroon, "national land" (on which the HF plantation is situated) is leased through a process that requires the leasee to produce or obtain several

documents prior to developing the land. Of particular relevance here is an Environmental and Social Impact Assessment (ESIA), a Certificate of Environmental Conformity and, for leases of land more than 50 ha, a presidential decree (Cameroonian Decree No 76/166 of 24 April, 1976). HF submitted an ESIA to the Cameroon government in August 2011 and soon after was issued a Certificate of Environmental Conformity. Without a land lease signed by Cameroon's president (which HF has yet to receive as of this writing), HF has already cleared ~300 ha of forest for oil palm nurseries and roads and has been negotiating with villages for additional land outside the planned concession limit outlined in its ESIA (DuPuy & Bakia 2013).

SGSOC became a member of the Roundtable on Sustainable Palm Oil (RSPO) in March 2008 and extended its membership to HF in October 2011. The RSPO was formally established in 2004 with the primary objective of promoting and certifying "sustainable" palm oil (Schouten & Glasbergen 2011; RSPO 2012). The RSPO has defined "sustainability" as being comprised of, "legal, economically viable, environmentally appropriate and socially beneficial management and operations" and guided by a set of principles and criteria focused on issues related to transparency, compliance with local laws, use of appropriate best practices for growing oil palms, limiting environmental impacts and protecting biodiversity, and responsible consideration of affected communities (RSPO 2013). At the heart of the biodiversity components of RSPO sustainability is the protection of high conservation value (HCV), which is defined according to conditions related to ecosystem services and the presence of rare, endemic, flagship, or threatened ecosystems or species (Jennings *et al.* 2003). SGSOC submitted its HCV assessment of the planned plantation area to the RSPO in February 2012 (Asamoah 2011).

Problems with the development first arose in 2009 when the Cameroon Ministry of Forestry and Wildlife informed HF that their plantation area overlapped with existing forest titles (MINFOF 2009). The Program for the Sustainable Management of Natural Resources in South West Region, a sustainable development program of the Cameroon government co-financed by the German Development Bank, wrote to HF in 2010 raising similar issues, and suggested that a majority of the plantation area was covered with dense, HCV forest. The failure of HF to appropriately respond to the Cameroon government and the managers of the joint sustainable development program led to the emergence of an organized local and international campaign to stop the HF development. Critics have argued that the HF development has serious environmental, social, and legal problems and have called on the government of Cameroon to terminate the contract and prohibit

HF from clearing forest (Nguiffo & Schwartz 2012; The Oakland Institute 2012; Greenpeace USA 2013; Nelson & Lomax 2013; The Oakland Institute 2013). Here, I will focus on some of the environmental concerns that may be highly relevant to other African forest areas in which agribusinesses are planning plantations.

### **Environmental claims made by Herakles Farms and the counter evidence**

HF has claimed that the land targeted for its plantation, "...consists primarily of fragmented and degraded landscape devoid of any large tracts of the original moist evergreen lowland forest with its characteristic dense and continuous closed canopy" (Asamoah 2011: 3), "has been heavily exploited and now remains as secondary forest...and of low biodiversity value" (Herakles Farms 2012: 12), and is a "biodiversity cold spot" (Herakles Farms 2013). To support its claims, HF cites letters from Cameroon government ministries which state (without accompanied evidence) that the plantation area has been heavily logged and is covered by "secondary forest" (MINRESI 2009; MINFOF 2010). Additionally, HF cites its ESIA and HCV assessment as evidence that extensive human use and commercial logging have seriously degraded the habitat in the plantation area. A map provided by HF of their planned plantation area identified only small (mostly < 25 ha), isolated patches of HCV forest primarily restricted to hilltops and steep-sided ridges (Asamoah 2011).

Is the plantation area "degraded habitat"? This question is at the center of the environmental debate between HF and its detractors, as active members of the RSPO must seek to develop oil palm plantations on "previously cleared and/or degraded land" (RSPO Principles and Criteria 7.3). Despite the claims made by HF, satellite (Maschler 2012) and aerial (Greenpeace International 2012; Figure 3) surveys indicate that dense, intact, high canopy forest covers the majority of the plantation area. Furthermore, the HCV Resource Network, an organization composed of representatives from NGOs and the private sector that conducts peer reviews of HCV assessments, concluded that the survey effort and methods used by HF to assess HCV were inadequate and the HCV assessment would not comply with RSPO principles (HCV Resource Network 2012). Similarly, in letters written to the Cameroon government, Cameroonian and international organizations and scientists strongly criticized the HF environmental assessment for its poor survey design and implementation and misrepresentation of the quality of the forest. Despite these criticisms, the Cameroon government approved the HF environmental assessment. In September 2011, critics of the plantation filed a formal grievance with the RSPO, citing inadequate environmental assessments and unsupported claims made by HF. In August 2012,





**Figure 3.** Aerial views of two of the three Herakles Farms oil palm nurseries, surrounded by dense, high canopy forest. Photographs © Greenpeace International.



HF/SGSOC withdrew its membership from the RSPO, arguing that the grievance process was preventing the company from moving forward with its activities.

The descriptions provided by HF and the Cameroonian government of the forest's condition in the planned plantation area fail to differentiate between types of secondary forest, as forest recovery from selective logging differs substantially from forest regeneration on previously cleared land (Corlett 1994). Data provided by HF in its ESIA indicate that logging has occurred in large portions of the plantation area between 15 and 34 years ago. Although commercial logging has historically occurred in parts of the HF plantation area, HF fails to indicate that its intensity varied from light to heavy selective logging (Waltert *et al.* 2006; Lien 2007). In a study of forest regeneration after selective logging in south Cameroon, van Gemerden *et al.* (2003) reported that logged areas were floristically similar to the surrounding forest pool after 14 years and strongly resembled old growth forests after 27 years. Furthermore, more recent studies are revealing that the negative effects of selective logging on biodiversity may have been exaggerated and that selectively logged forests often retain relatively high levels of biodiversity (Berry *et al.* 2010; Didham 2011; Edwards *et al.* 2011; Gibson *et al.* 2011; Putz *et al.* 2012; Edwards & Laurance 2013; Ramage *et al.* 2013). In fact, studies of forests around the HF plantation area indicate that logged and unlogged forests do not significantly differ in tree abundance, species richness, or tree species composition and logged forests retain important populations of primate and hornbill species (Lien 2007).

Indeed, systematic line transect surveys of the HF plantation area conducted by Cameroonian and German university researchers in 2013 found evidence for the presence of all eight diurnal primate species that are also found in the adjacent Korup National Park (Waltert 2013). Of those, six are listed as threatened by the IUCN Red List of Threatened Species and include the Endangered chimpanzee (*Pan troglodytes ellioti*), drill (*Mandrillus leucophaeus*), and Critically Endangered Preuss's red colobus monkey (*Procolobus preussi*). A fish survey also conducted in 2013 in the plantation area's rivers found high levels of endemism and diversity and concluded that the rivers of the plantation area are of extreme aquatic conservation value both regionally and continentally (Schliewen & Arnold 2013). In other words, although relatively degraded compared with unlogged forest, selectively logged forest can have significant conservation and ecological value and may warrant protection from large-scale, agricultural development (Wilcove *et al.* 2013). This is not to argue that logging and its secondary effects do not have significant negative impacts on forest structure and species composition. Rather, automatically classifying selectively logged forest as degraded and suitable for conversion to a monoculture

risks losing a tremendous amount of biodiversity (Koh & Wilcove 2008a).

Despite the RSPO guidelines and claims made by both critics and supporters of the HF plantation, there is no consensus on what constitutes "degraded" land (Gingold 2010; Putz & Redford 2010; Wicke *et al.* 2011) and the RSPO does not provide an operational definition of the concept. Without an internationally accepted definition of and method to identify degraded habitat in tropical forest zones, the rapid expansion of large-scale, industrial oil palm plantations in Africa can be expected to destroy potentially critical primate habitat as the oil palm industry takes advantage of this ambiguity.

Both the World Conservation Union (IUCN)<sup>1</sup> and the World Resources Institute (WRI) have set out to develop methods, in accordance with the RSPO Principles and Criteria, to define and identify degraded areas that could be suitable for oil palm development. The WRI concluded that, due, in part, to high carbon stocks and the likely presence of high conservation values, both primary and secondary (logged) forests should not be included in definitions of "degraded forests" and were, therefore, unsuitable land for oil palm development (Gingold *et al.* 2012). Putz and Redford (2010), in their discussion of defining "forest", argue that secondary and degraded forests are distinct because of substantial differences in structure, composition, and dynamics.

An understanding of the current condition of the forest in the planned plantation area is critical because the plantation is located between four protected areas that serve to protect important populations of threatened primate and non-primate species. The habitat between these protected areas consists of a mosaic of farms, agroforestry, fallow land, regrowth from selectively logged forest, and primary forest. The fate of biodiversity inside these protected areas is, in large part, determined by their degree of isolation from and connectivity to each other and to other forests, the condition of the surrounding matrix, and the intensity of bushmeat hunting (Brashares *et al.* 2001; Laurance *et al.* 2002; Hanson & DeFries 2007; Newmark 2008; Struebig *et al.* 2011; Laurance *et al.* 2012; Benchimol & Peres 2013). In fact, declining forest cover and other environmental changes that occur immediately outside protected areas determine to a large extent the fate of biodiversity inside the protected area (Franklin & Lindenmayer 2009; Laurance *et al.* 2012). Therefore, the HF plantation will not only lead to the elimination of animal populations of conservation concern within the plantation, but will seriously degrade the integrity of

<sup>1</sup>As of this writing, the IUCN is in the process of examining the concept of "degradation" as it pertains to environmental policy and decision making. A brief description of this project can be found at: [http://www.iucn.org/about/work/programmes/business/bbp\\_work/by\\_sector/energy/biofuels/defining\\_degraded\\_lands\\_for\\_sustainable\\_biofuels\\_and\\_beyond/](http://www.iucn.org/about/work/programmes/business/bbp_work/by_sector/energy/biofuels/defining_degraded_lands_for_sustainable_biofuels_and_beyond/)

the four protected areas by dramatically reducing habitat connectivity and increasing edge effects and bushmeat hunting (Laurance *et al.* 2012).

## CONCLUSIONS AND A WAY FORWARD

The expansion of industrial oil palm plantations in Africa will lead to rapid losses of biodiversity through forest habitat loss and fragmentation and increased hunting off-take in the remaining forest areas (Abernathy *et al.* 2013). This is especially worrisome for African primates, most of which live in lowland forests and are among the most commonly hunted taxonomic groups (Linder *et al.* 2013). The synergistic effects of commercial bushmeat hunting with large-scale clearing of forest for palm oil production may overwhelm conservation efforts to forestall primate extinctions in the African forest zone in the coming decades. 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. This includes the largest remaining intact block of contiguous forest in West Africa, the Nigeria-Cameroon border region, where HF and other agribusiness corporations are prospecting for land.

Following the tactics of the broader oil palm industry, HF has misinformed the government of Cameroon, its investors, and the general public and this, in turn, will help to boost the global demand for “unsustainable” palm oil. The oil palm industry promotes public acceptance of its destructive activities in tropical forests and dismisses concerns of critics by engaging in aggressive public relations campaigns that spread “disinformation” (Koh & Wilcove 2008b). HF exemplifies this behavior by misrepresenting the condition of the forest (and the social impacts of its development) and targeting attacks against its most vocal critics (The Oakland Institute 2013). All for Africa’s “Palm Out Poverty” campaign is, perhaps, at the center of this HF public relations blitz. Enlisting the support of former U.S. President William J. Clinton and Hollywood actors, All for Africa attempted to fund its “Palm Out Poverty” campaign by raising \$20 million through annual sponsorships and public donations (All for Africa 2010a). In its media, All for Africa informed its supporters that its project would improve the livelihoods of local Africans and benefit the environment (All for Africa 2010b).

Concerned citizens and NGOs have reacted to this spread of disinformation by initiating their own investigations and campaigns, which have revealed the environmental, social, economic, and legal problems associated with the HF plantation. Pressure from other similar kinds of campaigns have led palm oil producers in Indonesia and Malaysia to join the RSPO, consumers to change buying habits and policies, and governments to

rein in rampant deforestation from the rapid expansion of oil palm plantations (Khor 2011). Similarly, an informed, evidence-based campaign spearheaded by Cameroonian and international NGOs and scientists, representing environmental, socioeconomic, legal and human rights concerns significantly slowed and altered the development of the HF plantation in Cameroon. By helping to give a voice to local opposition and revealing the environmental problems of the project, the campaign forced HF to withdraw from the RSPO and led the government of Cameroon to suspend HF activities in April 2013. However, by May 2013, the government of Cameroon reversed its decision and lifted the suspension without providing any reason. As of this writing, HF remains active in Cameroon, although reportedly in renegotiation with the government of Cameroon regarding the ultimate size and location of the concession.

The governments of Cameroon and other African countries can take proactive steps to limit the negative biological and social impacts of industrial oil palm expansion (Hoyle & Levang 2012). First, the allocation of new industrial oil palm concessions should be halted until environmentally and socially responsible policies are put in place. All new concessions should be required to follow or exceed the internationally accepted standards for sustainable palm oil development set by the RSPO. Although the RSPO has been widely criticized for various shortfalls (Laurance *et al.* 2010; McCarthy & Zen 2010; Edwards *et al.* 2012), it nonetheless represents minimum standards for producing palm oil. Second, degraded lands within each country should be identified using updated definitions and methods and with the participation of relevant stakeholders. Third, means of improving the productivity and yield of existing industrial and smallholder oil palm plantations should be investigated and implemented before new land leases are allocated. Fourth, governments should work with palm oil producers and conservation organizations to maintain connectivity between forest blocks, facilitating wildlife movement between suitable habitats.

There is also an urgent need to clarify the concept of “degraded land”, including its definition and accepted methods of identification. Importantly, any definition should consider different “degrees” and “types” of degradation, as simply describing land as either degraded or not degraded may fail to recognize its biological (and socioeconomic) importance (Gingold *et al.* 2012). Until this is accomplished, there can be no certainty that palm oil certified as sustainable by the RSPO, or any other organization that heavily relies on the concept, safeguards high conservation values.

Finally, field primatologists can and should play an important role in helping to forestall the loss of African biodiversity (especially primate diversity) in the face of habitat loss and increasing bushmeat hunting (Oates 2013). Specifically, with regard to the impending threat



of agro-industrial development, primatologists can help influence changes towards more environmentally and socially responsible palm oil production. Just as applied anthropologists have integrated scientific knowledge with advocacy and improving community welfare (Ryklo-Bauer *et al.* 2008) primatologists can link behavioral ecological research and effective engagement with biodiversity conservation. Located in often remote, poorly studied forests, primatologists can contribute to the understanding and identification of high conservation value habitats targeted for oil palm development. Additionally, the strong relationships primatologists often maintain with local communities can be used to initiate conversations about the advantages and disadvantages of, and alternatives to, industrial oil palm development. Primatologists should also consider being more active in matters of policy (advocacy) and in contributing to campaigns (activism) that aim to protect high-value ecosystems and promote transparency in land acquisition processes. Effective campaigns, such as the one targeting HF, are based on evidence collected by biological and social scientists, which is then shared with organizations that can strategically disseminate the information. Carefully researched, evidence-based campaigns avoid the pitfall of “blackwashing”, exaggerating claims and accusations against corporations (Koh *et al.* 2010). Primatologists can also help to initiate and support research on the biological and socioeconomic impacts of large-scale, agro-industrial (especially oil palm) development in tropical Africa, as there is a lack of such peer-reviewed studies (Turner *et al.* 2008).

Oil palm and other agro-industrial developments will soon emerge as a top threat to biodiversity in the African tropical forest zone. If produced correctly, palm oil can be a win-win for the environment and economic development (Koh & Wilcove 2007). However, if the Herakles Farms/All for Africa project is the model for the future of oil palm development, African biodiversity conservation will face serious and, possibly, insurmountable, challenges. If recent trends continue unchecked, the combined effects of commercial bushmeat hunting with large-scale and rapid habitat conversion could be catastrophic for Africa’s forest-dependent large mammal species, including and especially, the primates.

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