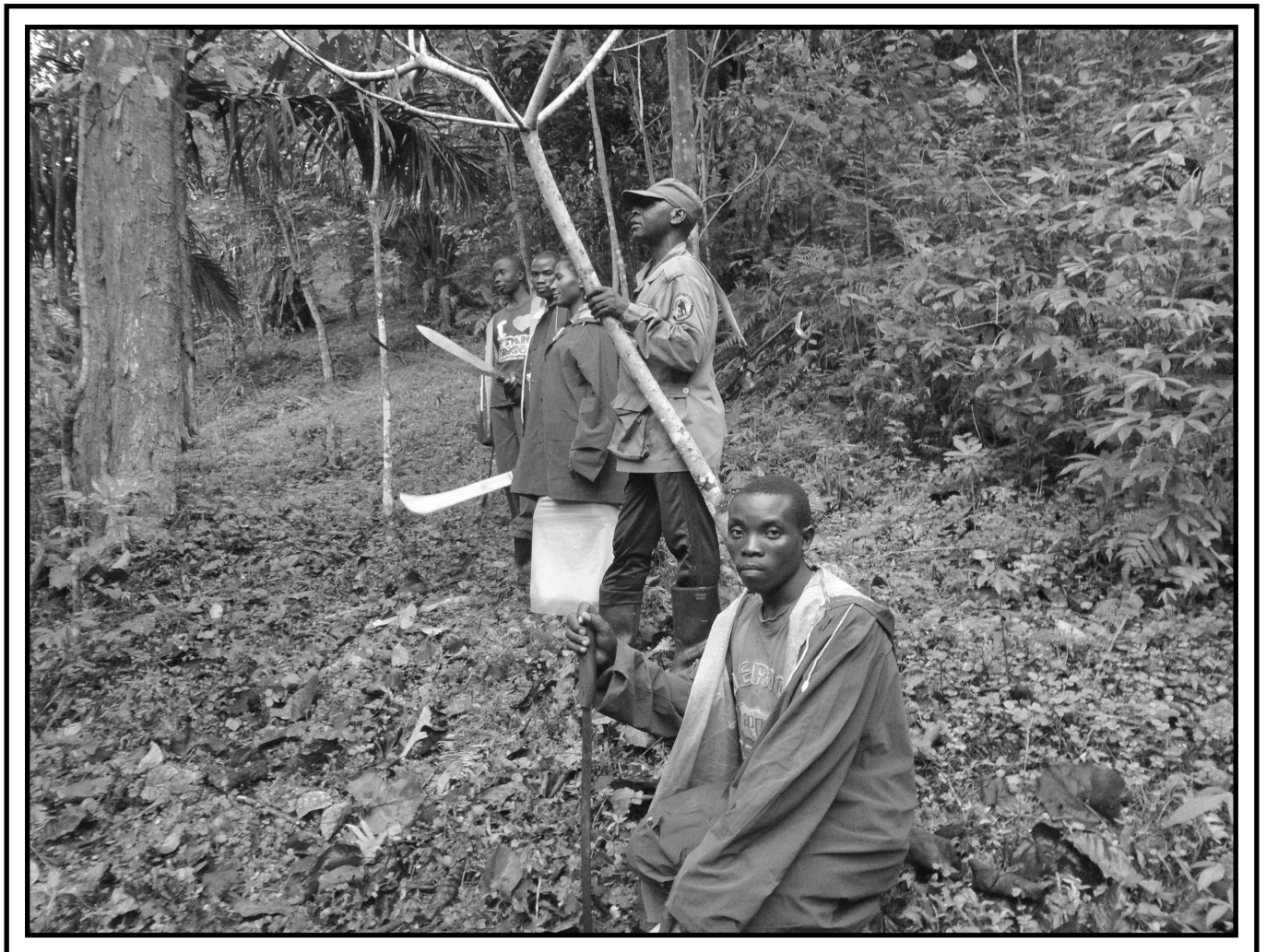




Gorilla Journal

Journal of Berggorilla & Regenwald Direkthilfe

No. 51, December 2015



**The Conservation
of Itombwe Nature
Reserve**

**Sarambwe
Reserve: Current
Developments
and Threats**

**Gorilla Folk
Filmmaking**

**African Tropical
Forests under
Stress**



BERGGORILLA & REGENWALD DIREKTHILFE

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Gorilla Journal 51, December 2015

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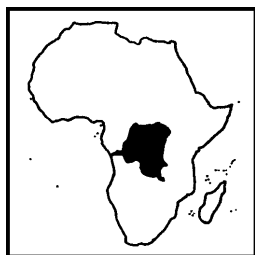
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The Conservation of Itombwe Nature Reserve: Actions and Challenges

Itombwe Nature Reserve (INR) is a key site for biodiversity in Africa in general and the region of the Albertine Rift in particular (Doumenge & Schilter 1997; Hart et al. 1999; Plumptre et al. 2007; Greenbaum & Chifundera 2012). The reserve is part of the exceptional high-altitude forests extending from 1,500 m to over 3,000 m altitude (Mubalama et al. 2008). According to different biological expeditions into the massif, the site remains important for biodiversity both due to the number of endemic species (endemism) and for the number of species in general (species richness), especially due to recent re-discoveries of certain amphibian species (Plumptre et al. 2010; Greenbaum & Chifundera 2012). However, in spite of its biological richness and habitat diversity, the biodiversity of the massif is threatened by various human activities. These in-

clude hunting using traditional means or firearms, small-scale and industrial mining, lighting of bush fires to facilitate grazing by domestic animals, human settlements and the weak governance of natural resources (Plumptre et al. 2010, 2013; Weinberg et al. 2013).

In order to find solutions for the challenges facing conservation of the massif, conservation stakeholders involved in the INR have put into place an integrated intervention plan which covers a range of activities from consultations with the local population to activities to protect the reserve's biodiversity (Mubalama et al. 2013). This paper will present the planning process, the different threats to biodiversity in the Itombwe Nature Reserve, the conservation efforts made by various stakeholders and the challenges that need to be overcome.

Location of the Itombwe Nature Reserve

The INR is situated in the east of the Democratic Republic of the Congo (DRC) in South Kivu Province, west of Lake Tanganyika. It extends between 2° 51.286' and 4° 0.690' south, and between 28° 09.889' and 28° 58.511' east. The Itombwe Mountains are part of the Mitumba Range in the east of the DRC in the Albertine Rift. The Mitumba Range borders the western branch of the Great Rift Valley, with several large lakes covering the valley floor (Doumenge & Schilter 1997).

The range is part of what is known as the Itombwe Massif and it is covered by a vast mountain forest. In fact, it is part of a mountain range that extends along the entire eastern border of the DRC, from Katanga to North Kivu (Doumenge & Schilter 1997; Mubalama et al. 2008). The Itombwe Massif has the largest high-altitude forest in the whole of Africa. Of the massif's 15,000 km², over 7,500 km² are covered by forest. Almost all of this (over 6,700 km²) is high-altitude forest, in-

cluding transition and bamboo forest. Itombwe's vegetation is very varied, ranging from low altitude to the highest summits (Doumenge & Schilter 1997; Mubalama et al. 2008).

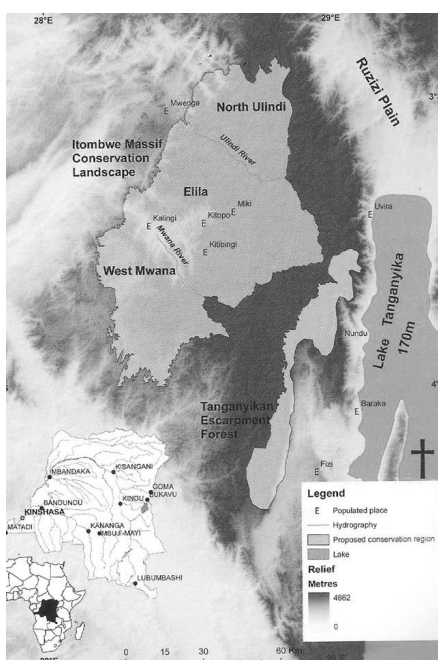
The current attempt to demarcate the reserve boundaries is the result of field work conducted within a joint framework developed through a participatory process that has focused on the identification and the validation of current maps (Mubalama et al. 2013; Plumptre et al. 2013). The current reserve boundaries give the reserve a surface area of 5,732 km², with a perimeter of 568 km (Mubalama et al. 2013). It extends into the territories of Mwenza, Uvira and Shabunda.

Currently, the reserve is managed by the Congolese Institute for Nature Conservation (ICCN). Conservation activities here are supported by Wildlife Conservation Society (WCS), the Worldwide Fund for Nature (WWF) and Africapacity/Rainforest Foundation Norway (Plumptre et al. 2010, 2013; Mubalama et al. 2013).

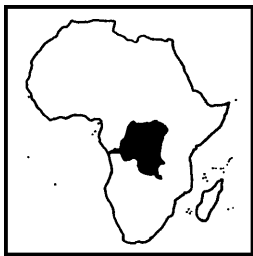
Participatory Process for the Validation of the Reserve Boundaries

The process of creating protected areas in the DRC has paralleled the evolution of conservation in the rest of the world (Hockings et al. 2000; Palomo et al. 2014). Protected areas were originally created by governments with little or no consultation of local communities or other stakeholders (Stevens & Stevens s. d.; Wells & McShane 2004). This top-down approach can be seen as being the root cause for the weak support by stakeholders at different levels (Kideghesho 2002; Fisher et al. 2012).

In the case of Itombwe, the reserve was created by ministerial decree no. 038/CAB/MIN/ECN-EF/2006 of 11 October 2006. This decree did not include an identification of boundaries and had little community buy-in (Plumptre et al. 2009, 2013; Greenbaum & Chifundera 2012; Mubalama et al. 2013). This was



Map of the Itombwe Massif



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at the bottom of a certain resistance by local communities and other groups to the implementation of conservation activities (de Faily & Bandu 2010).

In order to minimise conflicts between different actors and to ensure ownership of different stakeholders of the process of boundary demarcation, the ICCN and its partners, in collaboration with Africapacity/Rainforest Foundation Norway and the South Kivu civil society, developed a joint intervention approach with the aim to coordinate the different activities to be implemented and to ensure the involvement of the stakeholders at different levels (Plumptre et al. 2009, 2013; Mubalama et al. 2013).

The preliminary steps taken prior to 2006 (Prigogine 1977; Doumenge & Schilter 1997; Hart et al. 1999; Keyo & Yma 2000) included biological surveys, socio-economic studies, and meetings with local communities and tribal chiefs. Additional measures initiated to ensure participation are summarized below (for details, please refer to the paper by Mubalama et al. 2013 on the joint framework):

At the conclusion of this meeting, the different stakeholders pledged to support the process of demarcation of the Itombwe Nature Reserve. A joint framework for the coordination of activities was identified to ensure the involvement of the various stakeholders as below (Kujirakwinja et al. 2010; Damman & Hofsvang 2012; Mubalama et al. 2013):

- ICCN, being the state authority charged with the conservation of the reserve,
- the international conservation NGOs: WCS and WWF,
- a national NGO with the support of an international institution concerned with the rights of indigenous peoples, Rainforest (Africapacity),
- civil society organisations representing the various social groups.

A Joint Framework Is Established for the Itombwe Nature Reserve

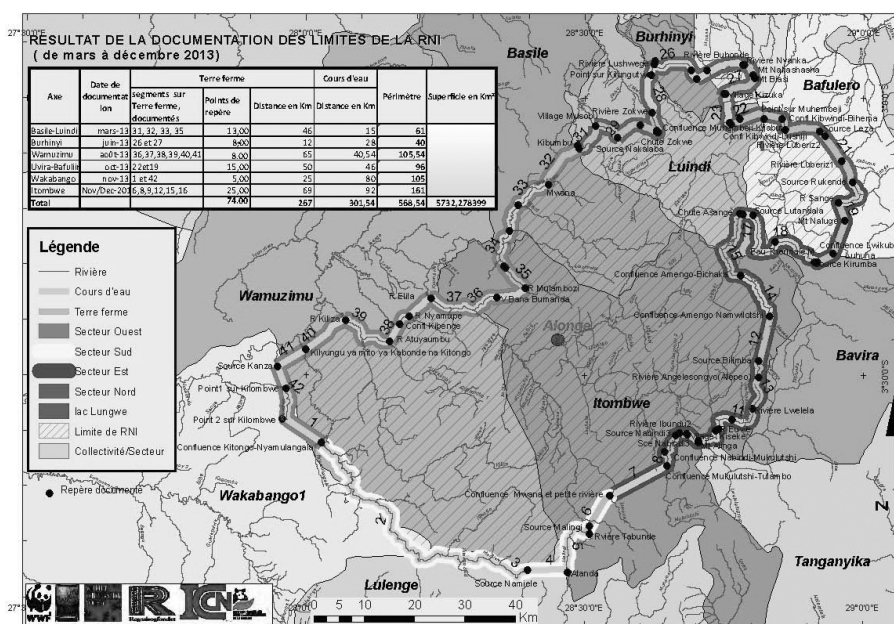
A joint framework (as presented above) was established with the role of

designing, coordinating and ensuring the implementation of activities (Damman & Hofsvang 2012; Mubalama et al. 2013). In order to ensure that the various stakeholders remain involved in the process, the joint team produced a plan of activities to be carried out before the boundary validation. This plan has been presented to and been modified by local interest groups. Planning meetings were held in different places and adjustments were made. This approach resulted in the involvement of the different stakeholders and in the re-establishment of trust between participants (Damman & Hofsvang 2012).

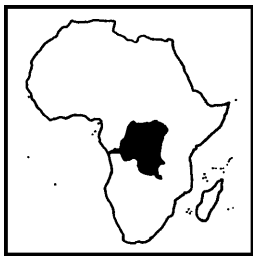
Development of a Reference Map for the Validation of Reserve Boundaries
Based on biological and socio-economic data collected in the field, a baseline map was developed to initiate the discussions (Damman & Hofsvang 2012; Mubalama et al. 2013; Plumptre et al. 2013). As the community has opted for a biosphere reserve, where

Meeting of Stakeholders Interested in the Conservation of the Itombwe Massif

The process of creating protected areas in the DRC has been adapted and modified by Law no. 011/2002 of 29 August 2002 (Article 15 contains the DRC 2002 Forestry Code), and Decree no. 08/08 of 8 April 2008. In Article 8, Line 1, this Decree outlines the procedure for forest categorization and re-categorization including the recommendation that consultations are held before the forest is categorized. In order to pre-empt any misunderstandings accompanying the signature of the decree, a harmonisation meeting was held with different groups and civil society organisations (de Faily & Bandu 2010; Kujirakwinja et al. 2010; Mubalama et al. 2013).



Map of the INR, representing Scenario 5 with some sections of the boundary



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biodiversity should be conserved at the same time as the livelihoods of the local communities are improved, a map showing different zones has been produced (Bisidi et al. 2008; Plumtre et al. 2009, 2010). In the course of its development, the map underwent various modifications. The maps resulting from this process were considered as different scenarios. The final and current map is known as “Scenario 5”.

Validation of Reserve Boundaries at the Community Level

The maps were presented to the communities that live in and around the reserve and to the local authorities. Sessions were held at the level of different village groupings with the objective to validate the proposed boundaries on the maps, taking into account biological and socio-economic needs (Bisidi et al. 2008; de Faily & Bandu 2010; Mubalama et al. 2013). These boundaries were accepted at the various localities, in some cases without amendments and in some cases with significant modifications in line with the cultural needs and the biological values identified by the communities. This was the case of Lac Lungwe. Situated at 2,700 m above sea level, it includes some forests on the western border of the reserve. In contrast, in two other village groupings, the communities reserved judgement on the reserve boundaries depicted in Scenario 4 as they were not yet sufficiently sensitized. This has taken the map into Scenario 5 which excludes the forests of Lulenge and Kasanza in order to ensure that the principle of free, prior and informed consent (CLIP) is respected (Kujirakwinja et al. 2010; Mubalama et al. 2013; Plumtre et al. 2013).

The process of participatory demarcation of the INR was adopted as a new conservation paradigm. It was put forward during the conservation work-

shop that the Natural Resources Network (RRN) organised in collaboration with DGPA in Kinshasa on 25 March 2015 (on the fringe of the International Festival of Indigenous Peoples) as the future model for the ICCN – in view of the national Government’s target to set up a network of protected areas covering 17% of the country’s national territory (Réseau des Ressources Naturelles 2015).

Documentation of Reserve Boundaries at the Local Level

The documentation of reserve boundaries is an important stage in the process of participatory demarcation. It has included the identification of reference points for the boundary, but also the collection of geographical coordinates in order to avoid the problems documented elsewhere (Virunga National Park) resulting from change of toponyms by local communities, leading to confusion in the identification of landmarks in the field. This exercise was carried out in those sections where the boundaries do not coincide with natural reference points such as rivers.

Documentation is carried out through three different stages, consisting of the identification of data gatherers and observers in the community, their training in the methodology of data collection (field notes and GPS) and the data collection in the field, feedback meetings on the field activities with the communities and, finally, the validation of results.

Information Meetings with Stakeholders at the Provincial Level

The map validations carried out with the stakeholders in the field ensures that the stakeholders will accept the reserve boundaries in the zones where they live. This will reassure them and minimise boundary conflicts. In order to ensure that the leaders and political actors at the provincial level are informed about progress and about

problems in the field, regular meetings are held with the different socio-political groups including the traditional chiefs, permitting transparency (Kujirakwinja et al. 2010; Damman & Hofsvang 2012; Mubalama et al. 2013). During these meetings, orientation is provided by the different actors with the aim of facilitating the discussion and the results. This helps the stakeholders develop trust and support for field activities by avoiding the development of rumours.

This exercise has been important for the finalisation of the reserve boundaries and also for the completion of the amendment proposal for the 2006 Decree.

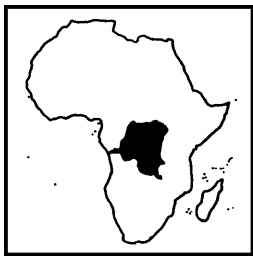
Meeting to Present Results to the Provincial Advisory Forest Council (CCPF)

Within the framework for completing the definition of the reserve boundaries, the CCPF is a legal imperative for any forest categorization or re-categorization (Mubalama et al. 2013). To accord with this, the presentation of results to the CCPF was one of the last stages of the process, aimed at making sure that the file will be passed to the appropriate political authority at the provincial and national levels.

The meetings held within this framework involved the different members of the CCPF nominated by the Governor of South Kivu Province in 2013. In addition to these formal meetings, technical meetings involving civil society organisations were held to ensure transparency and to avoid any future disputes. All these consultations led to the validation of the documented INR boundaries during the CCPF workshop held on 24 June 2014.

Participatory Mapping of Zones under Consideration

The boundaries of the Itombwe Nature Reserve were proposed within the context of a biosphere reserve with different conservation zones. These



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Meeting to discuss the boundary validation with the residents of Obekulu village
Photo: Deo Kujirakwinja

zones can permit the coexistence of biodiversity and human activities to ensure the sustainability of resource use and socio-economic activities (Battiste 1990; de Faily & Bandu 2010). However, the discussion of some zones is at a deadlock, as these zones contain exceptional biodiversity but encompass areas that are important for the local communities, including settlements, fields, cultural sites, etc. (Doumenge & Schilter 1997; Plumptre et al. 2009; de Faily & Bandu 2010; Hartter et al. 2011; Greenbaum & Chifundera 2012; Mubalama et al. 2013)

In order to ensure that the different zones are established in a way that will protect the various endemic species under threat, a zonation proposal has been developed. This is based on the distribution of the reserve's threatened endemic species and also integrates climate change considerations (Plumptre et al. 2013). To this end, participatory mapping is being piloted in the Mwana valley in the Basimunyaka village grouping. The approach consists mainly of field work: holding discus-

sions with the communities on the different land use schemes and management mechanisms, and the production of local maps.

Biodiversity Conservation Activities

In addition to the activities leading to the legitimization and legalisation of the reserve boundaries, the actors within the joint framework are also carrying out various conservation activities in order to minimise the impact of human activities. These activities consist mainly of supporting the deployment of monitoring patrols in distribution areas of great apes (Grauer's gorilla and chimpanzee) and in the subsequent analysis of protection coverage using SMART (Spatial Monitoring and Reporting Tool).

Patrols Following Key Species

Hunting by traditional means and with firearms remains the greatest threat to the fauna of the INR. All species are affected regardless of which protection category they have been assigned to either by Congolese or international

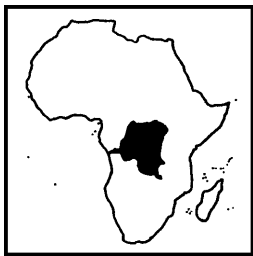
laws (Hart & Hall 1996; Inogwabini 2014; Tranquilli et al. 2014). Small-scale and semi-industrial mining poses another important threat to the habitats of various species, but also to the species themselves (Weinberg et al. 2013). According to a 2015 study by WCS (Kirkby et al. 2015), hunting of different species is prevalent at mining sites involving both hunters and miners. The affected species include great apes, elephants and antelopes (Nellemann et al. 2010; Weinberg et al. 2013; Kirkby et al. 2015).

Although the participatory approach is recommended by current practices of natural resource conservation, the "protection approach" where the law is forcefully applied retains its usefulness in discouraging miscreants (Terborgh 1999; Hutton et al. 2005; Siurua 2006).

Thus, although the boundaries have not yet been physically marked, the ICCN eco-guards carry out patrols in zones that are important for biodiversity not only in order to contribute to the continued efforts of these populations, but also to discourage various people who might be tempted to hunt. The patrols are supported by training events and equipment for data collection and storage. Data collected during patrols are stored and analysed by the guards with support from WCS and WWF using the SMART tool which was developed for this purpose (Plumptre et al. 2014).

Sensitization

In addition to the ongoing demarcation activities, ICCN teams in collaboration with NGO partners are carrying out sensitization campaigns among the communities to ensure their participation in the conservation of the reserve. These sensitization sessions go beyond this, however, by supporting the communities in the local structuring in order to prepare them for the transparent implementation of alternative activities.



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In this context, grassroots committees have been established and the members are trained to ensure the connection between the conservation actors and the population. This is in line with the national community conservation strategy, which has been in place in the DRC since 2006.

Involvement of Local and Provincial Authorities in the Reserve's Protection
As a result of the permanent presence of certain armed groups in some areas, the eastern region of the DRC has long been recognized as a conflict or post-conflict zone. In order to ensure that the local authorities are aware of ongoing conservation activities in their zone and benefit from them, regular meetings are held either at the local or the provincial level. These meetings are useful for collaboration as challenges are addressed and proposals are made that require the intervention and the involvement of said authorities.

Challenges and Opportunities

The Itombwe Nature Reserve is one of a new generation of protected areas: their establishment follows a participatory process which requires negotiations and compromise between different stakeholders. This in itself is a challenge, as the process takes a long time (followed as it is by frequent questioning and donors worried about the timeline of the process), while the biodiversity deteriorates further due to people's migration into the zone in search of natural resources such as minerals and agriculture (Vlassenroot 2013). One of the major challenges remains the management of small-scale mining and the management of immigration from other sectors. Another challenge is material and financial. The Itombwe Reserve has known operational difficulties in the support of interventions in those zones that form a part of the reserve boundaries. These difficulties do not

only reflect the reduced number of field staff and equipment required for reaching the various sites but also the security conditions on the ground and the different land uses (Vlassenroot 2008; Brabant & Nzweve 2013). It also concerns the viability of conservation activities in a zone that is so poor that the population is primarily concerned with support for their social structures.

In order to ensure that the reserve's status is monitored regularly, the ICCN general directorate has entered the reserve on the list of pilot sites for the application of the Management Efficiency Tracking Tool (METT). In addition, the participatory process followed for the reserve demarcation and mapping forms a solid basis for the prevention of conflicts and for adaptive management (Armitage et al. 2009).

Conclusions

All over the world, biodiversity is threatened by human activity and industrial

Help for Itombwe

The Itombwe Reserve needs our support to ensure the survival of its gorillas and chimpanzees. One of the necessary projects is reinforcement of the patrol based monitoring system to maintain the populations of great apes in the Mwana area. The following activities are urgent – and we agreed to fund them:

- provision of ranger rations to ICCN rangers for great apes monitoring patrols;
- provide technical support and training to rangers for patrol data management.

Another important aspect of conservation in Itombwe is the sup-

port and the participation of the local population. Since 2012 people have been prepared for self-governance and law enforcement. At the moment the following activities are planned:

- support community meetings and trainings;
- conduct a livelihood feasibility study in two main regions of Itombwe.

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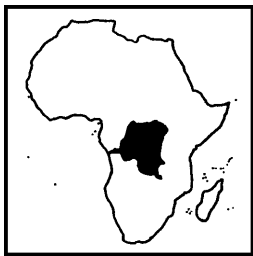
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If the forests and the wildlife of the Itombwe Massif are to be preserved, they have to be protected effectively. Please support the conservation of this invaluable area!

You are also welcome to donate via PayPal if you prefer this:
<http://www.berggorilla.org/en/help/donate/>

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extraction (Siurua 2006; Laurance et al. 2012). For this reason, experts in conservation and environmental protection prescribe the establishment of protected areas in sites that are important for conservation: the aim is to preserve rare and endemic species in those regions (Hockings et al. 2000; Hutton et al. 2005). This is also true for the DRC, where different regions critical for biodiversity are proposed as protected areas. In order to redress the mistakes of earlier protected areas, which were created through a top-down approach, the current process requires the participation and the free consent of local communities and other stakeholders interested in natural resources (Brandon & Wells 1992; Naughton-Treves et al. 2005; Palomo et al. 2014).

The Itombwe Nature Reserve, which is one of the key sites for biodiversity protection in the DRC, is the focus of this paper as far as it concerns the participatory process. Having attracted researchers since the 1930s, the reserve remains important with many recent biodiversity discoveries (Prigogine 1977; Hart & Hall 1996; Doumenge & Schilter 1997; Hart et al. 1999; Plumptre et al. 2007; Greenbaum & Chifundera 2012). For this reason, the DRC decided to protect the reserve and signed a Decree in 2006 (Mubalama et al. 2013; Inogwabini 2014). To improve the process and to respond to the wishes of various stakeholders, a participatory process, coordinated by a joint framework, was initiated and carried out in a participatory manner. Starting with consultations at the local and the provincial level, the process should result in an amendment of the reserve boundaries at the national level (Kujirakwinja et al. 2010; Mubalama et al. 2013).

Through these ongoing efforts, the Itombwe process may be considered a model for the partnership between conservation actors, human rights actors and political actors for the benefit

of biodiversity conservation and the improvement of the livelihoods of the local communities (Damman & Hofsvang 2012; Plumptre et al. 2013). However, the acquisition of equipment and funds that can support community interventions for the poor population remains a major challenge.

Deo Kujirakwinja, Alain Twendilonge, Leonard Mubalama, Onesiphore Bitomwa, Guillain Mitamba, Jean de Dieu Wasso and Andrew Plumptre

The implementation of these various activities has been financially supported by USAID, US-FWS, Rainforest Trust, CEPF and SIDA. Activities could not have been successful without the involvement of the local community of the Itombwe Nature Reserve, the ICCN guards and the provincial government. In particular, we would like to thank Madame Jennifer Birali, Madame Adélaïde Muhigirwa, Olivier Kanefu, Shabani Kilindo, Faustin Batechi and Anselme Matabaro. We also thank the various people who participated in the implementation of activities in the field and in meetings.

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conservation of the reserve. It is based on the 11 most recent monthly activity reports, communications by the local authorities, and some older but important reports on the threats facing the reserve. Knowledge of activities underway in the protected area and threats it faces is necessary before solutions can be found. The report will commence with a short summary of activities undertaken and observations on the fauna of the Sarambwe Reserve during the period October 2014 to September 2015.

Activities and Results

Maintenance of the Camp and Paths, Border Demarcation, Patrols and Monitoring

The Sarambwe trackers do not only track, as their name suggests, but they also support the reserve with a range of other activities such as the maintenance of the camp and of paths within the reserve, the demarcation of borders between the reserve and the agricultural fields on the Congo side, and

foot patrols inside the reserve together with rangers and sometimes soldiers of the Democratic Republic of the Congo who are based at the Sarambwe post.

The trackers participated in a total of 119 patrols, covering the entire reserve. In general, patrols cover the entire length of the reserve each week, and observations are made of the fauna, sometimes also the flora, and illegal activities. Protection activities are carried out where infractions have been noted, but sometimes the rangers and trackers find it difficult to react as they are prevented from doing so by forces that are more powerful than they are: in such cases they can only observe.

Boundary demarcation has been carried out along a length of 2,850 m by planting and maintaining 571 *Erythrina abyssinica* trees.

Fauna

An analysis of observations made by rangers and trackers during the reporting period has shown that mountain gorillas were present during 7 months:



Clearing in the Sarambwe Reserve

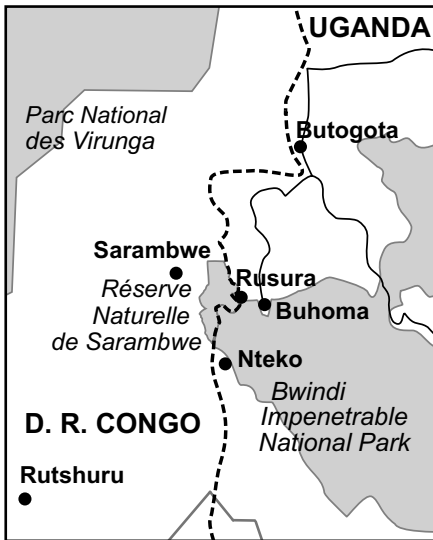
Photo: Aimé Bararuha

The Sarambwe Reserve: Current Developments and Threats

This article documents activities implemented in the Sarambwe Reserve and the almost continuous threats to the



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in December 2014 and in January, March, April, June, July and September 2015. There are 3 family groups and one solitary gorilla that spent more time in the reserve than the other gorillas. The smallest group consists of 4 individuals that are not habituated to the presence of humans, and stays longer in the reserve than the other families. The habituated Mukali group consists of 8 gorillas and comes to the reserve only for short periods of time. The Gahanga group is made up of over 11 individuals (this is based on a count of 11 nests at a site where they slept for one night). The solitary male seems to be more permanent than the two larger groups. Unfortunately, the trackers do not know whether any of the groups is visited by tourists in Bwindi; they gave them names without knowing if they have Ugandan names too. Given the limited training that the trackers have undergone, it is difficult, if not impossible, for them to establish the ages of the gorillas. Therefore, they only record the number of individuals, without specifying their age or gender.

The most frequently observed animal species is the red-tailed monkey (*Cercopithecus ascanius*), with groups from 4 to 44 animals. From where they

are found and from the recorded numbers we can estimate that there are at least 15 groups of red-tailed monkeys; most of these groups number between 12 and 17 individuals. The second most frequently observed species is the baboon. Baboons are everywhere in the reserve, usually moving around in groups from 6 to 38 individuals. Black-and-white colobus (*Colobus guereza*), also called Guereza colobus, occur in the reserve, usually travelling in groups of between 3 and 24 individuals. Chimpanzees (*Pan troglodytes*) are also present: the trackers' surveys have yielded groups of 2, 3, 4, 10, 13 and 17 animals. Among other indicator species are bush pigs (*Potamochoerus porcus*), often encountered as lone individuals or in groups of two and, very rarely, more than two animals – a group of six was reported four times during one year. Squirrels are regularly observed, and so are Gambian pouched rats (*Cricetomys gambianus*). Duikers are rare and the trackers cannot

identify individual species. Some species reported by trackers are doubtful, such as pangolin, jackal and Diademed monkey (*Cercopithecus mitis*).

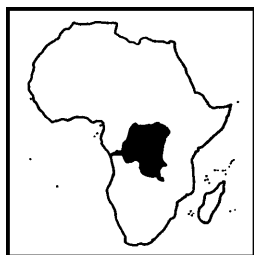
Illegal Activities (Threats)

The extent of illegal activities in the Sarambwe Reserve is very alarming. Over 95% of illegal activities are carried out by Ugandan villagers backed up by their soldiers, who are positioned along the border. Bwindi Impenetrable National Park is strictly protected. The benefits generated from the conservation of that park are shared with the adjacent populations, but benefit sharing favours the population living close to the transport routes over those people living further from these routes, although they are still close to the protected area. And it is that part of the population which goes poaching in Bwindi (Baker 2014). Benefiting from the proximity of the Sarambwe Reserve, where protection is less than perfect, and from the confusion that



Snare set by poachers in the Sarambwe Reserve

Photo: Aimé Bararuha



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is generated by the State's limitations, the population goes after what the Sarambwe Reserve has to offer. The situation is made worse because the poachers have the army to help and protect them. In the Sarambwe Reserve, four types of illegal activities are practised:

1. agriculture and related activities such as clearing, bush fires and cultivation;
2. deforestation and related activities such as pit-sawing, charcoal production and harvesting of log wood;
3. poaching and related activities such as hunting and trapping, with or without dogs;
4. other activities such as illicit travel to identify areas for poaching, pit-sawing, charcoal making, starting fields, or for fishing in the various rivers and streams. Illicit travel occurs through the entire reserve and year-round, regardless of season.

Agriculture and its preparatory activities: In the Sarambwe Reserve the greatest threats to the forest and its biodiversity are activities related to agriculture, such as starting bush fires, clearing and cultivation. 'Clearing' means the cutting of vegetation underneath large trees or the cutting of vegetation on fallow land with the objective of preparing a field for cultivation. During the reporting period (between October 2014 and September 2015), the destruction of the forest or recovering fallow land continued as follows:

- Bush fires destroyed 20 ha of fallow land in February and March 2015 and 0.5 ha of intact forest in September 2015. The affected areas were Kasarabandwa (3 ha), Kakangagai (6 ha), Mwiganywa (5 ha), Kanyangiri (4 ha), Kalimante (2 ha) and Kanyabusinini (0.5 ha). The bush fires were started in order to prepare the ground for cultivation during April to September 2015.

- In August 2015, 4 ha were cleared in Kasarabandwa.
- The planted crops are either perennial or seasonal. The sole perennial crop is banana: it has been planted on a total of 4 ha. The seasonal crops are beans, manioc and wheat: they have been planted on 38 ha in those areas affected by bush fires and clearing.

Due to the involvement of the army in these illicit activities, the rangers and trackers have only been able to destroy 4 ha of fields (2 ha each of manioc and banana trees) – which is only 10.5% of the planted 38 ha.

Deforestation: Deforestation in this context involves the cutting of large forest trees for various uses, notably pit-sawing, harvesting of log wood, or charcoal production. Recently, charcoal production has no longer been observed in the Sarambwe Reserve, although it used to be practised by the local population. We believe that the reforestation that was initiated through the development of tree nurseries in schools between 2011 and 2013 has yielded enough firewood and charcoal to meet the needs of the local population.

Pit-sawing is practised by Ugandans. This activity is quickly discovered by the Sarambwe trackers and rangers, frequently leading to confrontations between the reserve rangers and the Ugandan soldiers who protect this illicit activity. A wave of arrests of pit-sawyers, some of whom were sent to the office of the public prosecutor in the secondary seat in Rutshuru, resulted in negotiations between the local Ugandan and Congolese authorities at Ishasha in January 2014, during which this activity was halted.

In the course of 2014, however, pit-sawing was observed on three more occasions. In March, the attempt to arrest the pit-sawyers and to arrest the Ugandan planters led to a confronta-

tion – involving an exchange of fire – between the Ugandan troops and the Sarambwe Reserve's rangers in Congo. In May, 4 Ugandan soldiers crossed the border into the reserve near the fields cultivated by the Ugandans in Congo. At the end of August 2015, 5 Ugandans entered the reserve in order to conduct pit-sawing. On being encountered by the rangers and trackers, they fled, abandoning three saws. They alerted their soldiers who crossed into the DRC to recover what they had left behind from their "abductors", whom they "identified" as Rwandan FDLR rebels. The Ugandans led the heavily armed soldiers all the way to the Sarambwe ranger post. A multitude of soldiers overpowered the rangers and took them by force to make them stand trial there. In spite of the intervention of several persons, these ICCN staff members were taken to the army barracks in Mbarara for interrogation, before being taken to Bwindi, where they were released at the border the day after their arrest.

Poaching also goes on in Sarambwe. Wire snares are usually used for large animals (pigs, baboons, gorillas and chimpanzees). Nets made from nylon or lianas are used for small mammals (Gambian pouched rat, squirrels and possibly large terrestrial birds such as partridges). Jaw traps target any animal regardless of size. The trappers may be accompanied by dogs; sometimes a lost dog is found in the reserve.

In the course of this year, 54 traps have been destroyed in the reserve. Of these, 33 were for small mammals, 20 for large mammals, and one was a jaw trap. One dog has been killed. Traps are found all over the reserve and all year round.

Support for Infrastructure and Community Development within and around Sarambwe

Six months after the Sarambwe Reserve became accessible again, Berg-



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gorilla & Regenwald Direkthilfe recommenced its support for infrastructure and community development in the vicinity of Sarambwe. These activities mainly target the infrastructure relating to Sarambwe post, particularly provision of field gear, lighting and mini solar panels to charge telephones, a digital camera, a GPS and motorcycles. The rehabilitation of the ranger post has not yet started due to problems relating to the security of construction materials and to the state of the road that leads to the post. The development of community and private reforestation from plants produced in school tree nurseries, and nurseries maintained by the wives of the trackers, has started. These activities had been conducted in 2011 and 2012, but were suspended due to security problems in the area.

A training session in the use of GPS was organised for trackers and mapping data on the reserve are currently being collected.

Recommendations

- The animals in the reserve should be (re-)surveyed.
- The trackers should be trained in animal identification.
- High-level lobbying is required to draw attention to the repeated invasion of the reserve by Ugandans.
- Support for the neighbouring communities needs to be increased.
- The Sarambwe post needs to be equipped with furniture and kitchen utensils and a kitchen needs to be constructed for the post.

Claude Sikubwabo Kiyengo

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Mother and infant in the Kwitonda group, Volcanoes National Park, Rwanda

Photo: Michael Klaas

Mountain Gorilla Females Avoid Inbreeding

Especially in multi-male groups, mountain gorilla females may stay in the group in which they were born; in the Karisoke study groups on the Virunga Volcanoes, about half of them do so. As the tenure of the dominant male in a group often exceeds the time it takes for his daughters to become sexually mature, they remain in the company of their father, who is in general the leading silverback. Does this mean that they also breed with their father?

To establish the paternity of 97 mountain gorillas, the team of Linda Vigilant analyzed fecal samples collected since 1999. These included 79 gorillas born into 4 of the mountain gorilla groups monitored since 1967. They found that in groups with more than one male on average 72% of the offspring are sired by the dominant male; but he was never the father of his daughters' offspring.

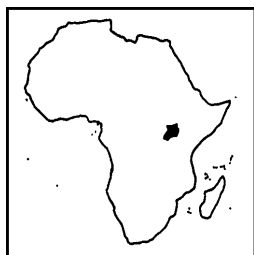
Female gorillas actively make mate choices and initiate a large proportion of copulations. The finding that more than one subordinate male can father offspring in a given group may suggest that different females have different preferences. They appear to tactically avoid mating with their fathers. This strategy works so well that the chances of alpha gorilla males siring the offspring of their own daughters are effectively zero. Nonetheless, the study shows that the parents of 9 of the 79 offspring were related as at least half-brothers and half-sisters of one another.

The question is how the fathers and daughters know whom to give the cold shoulder. Daughters of dominant males reproduce with subordinate males that are substantially younger than their fathers. They might therefore be using relative age as a cue to avoid mating with their fathers. The long periods immature offspring spend in the company of the dominant male might help them recognize their fathers, and dominant males appear to prefer mating with older females who are experienced mothers.

From a press release of the Max Planck Inst. for Evolutionary Anthropol.

Vigilant, L. et al. (2015): Reproductive competition and inbreeding avoidance in a primate species with habitual female dispersal. Behavioral Ecology and Sociobiology 69, 1163–1172





UGANDA

Feeding Competition in Female Bwindi Mountain Gorillas

All animals – including humans – must eat to survive. The energy derived from food is necessary to sustain basic metabolic and muscle functions, growth, repair and reproduction. However, food, at least in the wild, is a limited resource – there is not always enough to go around. Competition for food can be a major cost for animals living in groups, which must often compete directly with each other for the same limited resources.

Socioecological models propose that there is a strong link between certain food resource characteristics (e.g. distribution, size and quality), the manner in which females compete for food, and the resulting pattern of social relationships in animal societies. These models seek to link ecology to social behaviour and the very structure of animal societies, and have been relatively successful at explaining the rich diversity of primate societies in particular (Schülke & Ostner 2012). Specifically, the models aim to predict how ecological conditions influence the size of social groups, the sex ratio, and social interactions including dominance, aggression, and affiliation.

Briefly, when preferred food resources are distributed in such a way that one or a few individuals in a group are able to monopolize or control access to them, more powerful individuals gain a greater share of these limited resources at the expense of weaker individuals. More dominant individuals (individuals with a higher ranking in the social hierarchy) often use aggression to gain greater access to resources over weaker lower-ranking ones. This leads to higher-ranking individuals having a more favourable energy balance (defined as energy intake or the energy derived from food minus energy ex-

penditure) than lower-ranking individuals, typically with a positive impact on their reproductive success (number of surviving offspring).

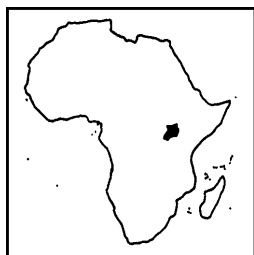
However, this theoretical body of work is not without its problems: the models in question have recently attracted criticism, and their usefulness is currently disputed (Koenig & Borries 2009; Clutton-Brock & Janson 2012). One of the main difficulties in evaluating these models is that very few studies have actually measured the energetic consequences of feeding competition. Moreover, the precise factors that determine whether a food can be monopolized or controlled remain elusive (Koenig & Borries 2006; Schülke & Ostner 2012). Recent reviews have suggested that in order to fully understand feeding competition in a species, studies need to examine the extent to which the access to foods can be controlled and the nature of the resulting competition, and relate these aspects to energetic or reproductive consequences.

Gorillas are an interesting species in which to study feeding competition, as they live in a wide range of ecologically distinct habitats, providing ideal conditions to examine how variations in ecology give rise to variations in behaviour. The two populations of mountain gorillas (Virunga Massif and Bwindi) predominantly feed on herbaceous vegetation (fibrous foods), which is abundantly available. Accordingly, individuals are not expected to be able to control access to these food resources. However, in contrast to the Virunga mountain gorillas, Bwindi mountain gorillas also incorporate a considerable amount of fruit into their diet, which may be easier to control access to than herbaceous vegetation. Studies have shown dominance relationships to be weak in both populations. However, in the Virunga population dominance relationships were found to be stable over the long term, suggest-

ing that they may be more important than previously thought (Robbins et al. 2005) and there is some evidence that higher-ranking females have higher reproductive success than lower-ranking ones, although whether this is the result of a more favourable energy balance is unknown (Robbins et al. 2007; 2011).

In order to better understand feeding competition in this species, we set out to measure its energetic consequences in a group of Bwindi mountain gorillas and explore the manner in which females compete for food. Over a one-year period, we collected detailed feeding observations on 6 adult females from the Kyagurilo group of mountain gorillas in Bwindi Impenetrable National Park, Uganda. We conducted nutritional analysis of the major food items for protein, lipids, carbohydrates and fiber, the macronutrients which are broken down into energy during digestion. Using human digestion coefficients (i.e., the number of calories humans are able to obtain for each gram of macronutrient) we calculated energy intake rates (the amount of energy gained by the gorillas during feeding) and estimated energy expenditure (the amount of energy used by the gorillas during three main activities: resting, feeding and travelling). We also collected data on aggressive events and recorded the number of adult females in close proximity to the target female (neighbours), to examine whether lower-ranking females avoided spending time near higher-ranking ones.

Our results revealed that higher-ranking females had higher energy intake rates than lower-ranking females, meaning that they obtained more energy per time spent feeding than lower-ranking ones. To better understand these results, we further examined whether higher-ranking females were feeding faster or feeding on higher energy foods than lower-ranking females, or both. We found only the former to be



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the case, with higher-ranking females feeding at a faster rate than lower-ranking ones, but not on foods with higher energy levels. We subsequently found that when the gorillas incorporated a large amount of fruit into their diet, this caused them to gain energy faster than when feeding on other foods, which is explained by the fact that fruit contains higher energy levels than other foods. Interestingly, higher-ranking females did not spend more time feeding on fruit than lower-ranking ones, indicating that higher-ranking females did not control access to fruit. Additionally, we found that higher-ranking females spent less time moving, causing them to expend less energy per hour than lower-ranking females.

In summary, the first part of the study revealed that higher-ranking females gained energy at faster rates and expended less energy in moving than lower-ranking females. This in turn led to them having a more favourable energy balance. Our aim for the second part of the study was to understand how higher-ranking females were able to achieve these energetic advantages.

We did not find that higher-ranking females were more aggressive than lower-ranking ones. However, when aggression occurred, it was mainly directed down the dominance hierarchy (from higher-ranking to lower-ranking females). As predicted, aggression

occurred more often when the gorillas were feeding on fruit (as fruit tends to be more clumped than herbaceous vegetation). Finally, higher-ranking females had fewer neighbours (other adults close by) than lower-ranking females. These results suggest that lower-ranking females avoid spending time close to higher-ranking females, rather than higher-ranking females taking a more active role by using aggression to obtain the abovementioned energetic advantages.

In conclusion, the study shows that in Bwindi mountain gorillas, higher-ranking females enjoyed greater access to resources resulting in a more favourable energy balance. This relationship was not the result of controlling access to fruit resources by higher-ranking females. However, feeding on fruit did provide more energy for the group as a whole than other foods, a finding which has been replicated in a number of other primate species. The results of the study indicate that the energy cost of feeding competition in this population is greater for lower-ranking females than for higher-ranking ones. This is an interesting finding for mountain gorillas, as at first glance these gorillas appear to feed on food resources which are difficult to control access to.

The results highlight how even in species in which dominance relationships appear to be weak, some individuals do better at the expense of others, suggesting that the strength of dominance relationships may not always predict energetic inequalities. The differential costs of group living may help explain variation in reproductive success in Bwindi gorillas and other species. Moreover, aggression is not a prerequisite for unequal costs of group living as avoidance alone can also produce the same results. This subtle form of competition has received much less attention in the literature, despite producing similar results to more direct forms of aggression. Accordingly, fu-

ture studies should place greater emphasis on this competitive strategy.

Edward Wright, Andrew M. Robbins and Martha M. Robbins

We would like to thank the Uganda Wildlife Authority, the Uganda National Council for Science and Technology, the Institute for Tropical Forest Conservation and the Max Planck Society. A special thank you to all the field assistants who participated in this project.

Original articles

Wright, E. et al. (2014): Dominance rank differences in the energy intake and expenditure of female Bwindi mountain gorillas. Behavioral Ecology and Sociobiology 68, 957–970

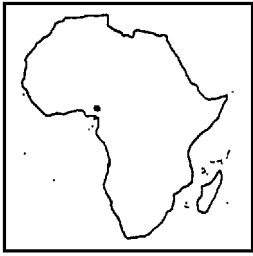
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Photo: Edward Wright



CROSS RIVER

Improving Law Enforcement: Going the “SMART” Way in Nigeria and Cameroon

The Spatial Monitoring and Reporting Tool (SMART) is new and improved software for measuring, evaluating and improving the effectiveness of wildlife law enforcement patrols and site-based conservation activities. SMART software runs on PDAs equipped with GPS devices and is designed for collecting data on illegal activities in protected areas. It helps protected area managers to plan, implement and evaluate their activities.

Other advantages of SMART over the existing CyberTracker data collecting system is that it provides timely and accurate information on poaching, illegal logging and other direct threats to biodiversity through the collection of field and intelligence data which enables quick feedback between protected area managers and frontline enforcement staff. SMART also helps to measure the impact of anti-poaching efforts in order to judge which tactics yield the best results; and provides information to government agencies to assess cost-effectiveness of law enforcement efforts. Most importantly SMART helps generate automatic and accurate patrol reports.



Afi WCS Project Manager, Emmanuel Bassey carrying out a field assessment of SMART

Photo: WCS

With technical support from North Carolina Zoo, SMART was recently introduced to the Cross River gorilla landscape with the first training workshop for project managers and other key stakeholders in Calabar, Nigeria in July 2014. Additional technical training was organized in July 2015 for all field-based managers of the Wildlife Conservation Society (WCS) in Nigeria and Cameroon. The training was facilitated by Richard Bergl of the North Carolina Zoo and lasted for five days.

Afi Mountain Wildlife Sanctuary in Nigeria was selected as the pilot site to test SMART in the field. Over the past three months the pilot project has noticed a number of improvements: patrol planning has become easier, intelligence gathered from previous patrols and the public is now associated with patrol plans. Numerical and spatial targets are developed and linked to patrol plans, this helps to calculate the suc-

cess or failure of completed patrols, making evaluation simple. Reporting has also been quicker and easier, as site based reporting template and maps are generated automatically.

We plan to use SMART to map illegal activities and poaching hotspots to enable us channel law enforcement



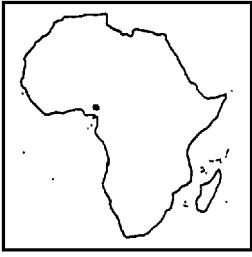
SMART training by Richard Bergl (left)

Photo: WCS



Anti-poaching patrol with CyberTracker

Photo: WCS



CROSS RIVER

efforts and resources to areas of high result. By the end of 2015 SMART will be rolled out to three additional sites in Nigeria as well as sites in Cameroon, in collaboration with government partners.

Emmanuel Bassey

Gorilla Folk Filmmaking in the Cross River Headwaters

In the Lebialem highlands of Southwest Cameroon, people say that if a hunter kills a gorilla, a person (often a village notable) dies. Connected by a totem, the person and the gorilla share a spirit (Etiendem et al. 2011). In the spring of 2013, a local Fon (chief) died not long after nearby villagers killed a Cross River gorilla (Nkempi & Leke 2013). Folks told us the events were connected. We often hear beliefs and stories like this while working around the habitat of the Cross River gorilla. We rarely encounter them elsewhere.

Most accounts of animals in our collective canon come from a particular

perspective. Consider gorillas. They were “discovered” by white explorers, named in Greek, popularized by Western hunters, biologists, and conservationists. Few non-Africans have ever heard an African story about a gorilla (unless they are a close reader of this journal, which has included a few [Meder 1999; Etiendem 2008]).

During colonialism, control over knowledge production and authentication tended to prevent the inclusion of local accounts (Goldman 2007). To be fair, Africans often told colonialists fanciful tales about gorillas, for example how gorillas liked to sit around dying campfires or how silverbacks would steal guns and break them with their teeth or over their knees (Newman 2013). Locals also kept much of their knowledge about gorillas and their relationship with the apes secret, due to its sacred nature (Meder 1999).

Knowledge is not only scientific facts. Local Africans provided colonists and later researchers with information that was important to their own communities: knowledge relevant to relating to gorillas. Local knowledge explained

gorilla behaviours and guided interactions between community members and the gorillas. It differs from the objective, impartial knowledge sought by Western science.

Motivation

When African accounts of gorillas included stories about how to interact with gorillas, they confused Westerners looking just for gorilla facts. Western scientists wanted to study wild gorillas in their natural habitat. They wanted to know how gorillas act when unaffected by people. This position came from a long Western tradition of separating humans from Nature, and of understanding Nature as defined by that outside of human influence. This affected their study. They would not research gorillas as they interacted with the local communities, only as they acted alone out in the forest (Fuentes 2012).

They did not want local anecdotes of encounters but evidence from hard science and careful study. The hierarchy of knowledge meant that many African accounts were lost. When more colourful and un-scientific accounts of gorillas did come, Westerners (hunters, journalists, scientists writing for popular press) presented them. Africans were ignored.

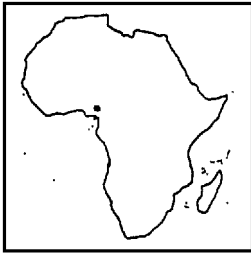
The history of hierarchy among knowledges has repercussions today. As conservationists seek to engage local communities in conservation efforts, to sensitize them to the conservation message, and to justify conservation and its impacts, they explain gorillas and gorilla conservation from a Western perspective (Hill 2002; Lee 2010). This has had limited effect. Conservation feels like yet another Western initiative imposed upon the local community.

Last year, we sought to address this. We, At Films, collaborated with the Environment and Rural Development Foundation (ERuDeF) in Came-



Ndimuh Bertrand Shanchu filming Nzhu Jimangemi surrounded by students of the Government Secondary School Bechati. The students are watching their classmates from the drama club perform.

Photo: Adam Pérou Hermans Amir



CROSS RIVER

roon and the Wildlife Conservation Society in Nigeria, to co-produce a series of films telling local stories about the critically endangered Cross River gorilla (*Gorilla gorilla diehli*). Each film features a different local community. Our project was about listening. It was about collaborative knowledge production, and the emergent blend of ideas, cultures, and aesthetics created by participatory filmmaking. We worked only as midwives, merely catching local narratives, ideas, and imagery and helping to express and celebrate it as cinema. We made the films with and for local communities to show their accounts of Cross River gorillas, bringing both natural and cultural heritage into conservation efforts.

Fewer than 300 Cross River gorillas remain (Dunn et al. 2014). The gorillas have full legal protection, but their habitat does not. About half remains unprotected. Conservation of the Cross River gorilla depends on the support of local communities. Cultivating an indigenous conservation ethic is as important as establishing conservation protection. We hope our films, ranging from traditional conservation methods (totems and taboos) to contemporary stories, can generate local debates and interest in conservation. Locals can identify with the stories. To them the stories make sense, express their beliefs and values, and teach lessons.

Methodology

Rather than teach a predetermined morality lesson (e.g. do not cut down trees), we sought to work with each community to determine their own moral concerns. Our local collaborators dictated how moral issues were raised and framed, and how they were addressed. All we introduced was an initial prompt: Cross River gorillas are going away. We invited any sort of thinking: what should we do about this? Is this a problem? How did you deal with this challenge before?

Participatory filmmaking is an increasingly common practice of co-producing knowledge. The practice takes various forms but the idea is collaborative video production between a facilitator/filmmaker and the video's subjects. The subjects determine the content and narrative of the video. They set, choose, and perform the stories. They are often involved in shooting the video as well. The facilitator usually comes in the most at the level of editing but this can be collaborative too.

We call our method *folk filmmaking*. The participatory aspects were different for each film but followed a general sequence. First, based on informal interviews and local conservation issues, we would mock up a script and present it to a group of community members and collaborators. They would adjust the script. Then, with their help via chain-referral and other networking, we would collect a cast. Once we had our cast, we all gathered together, read through the script, and again made changes as the cast saw fit. Now we were ready to perform and film the story. We would shoot for as long as our

group was available, sometimes just for one day, other times for almost a week. Last we would edit the film, subtitled the local dialect, tweaking montages, checking the scenes.

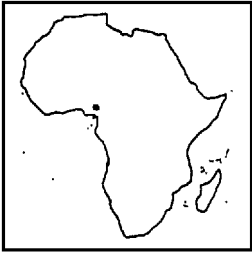
Each script was little more than a skeleton. Every member of the cast, with remarkable creativity and charisma, ad-libbed and improvised each line and scene. We were overwhelmed and relieved. We worried about having too much of a hand in the process but soon came to see our scripts as merely sparks from which a story – local, unique, and surprising – would grow.

With this project we sought not just to produce films sharing local stories, but also to create a local film team to continue making films after we left. Supported by a Flagship Species Fund Grant from Fauna & Flora International (FFI), we trained and equipped two local conservationist-journalists from ERuDeF, Ndimuh Bertrand Shanchon and Immaculate Mkong. They continued to make films after we left and will lead the distribution campaign to screen the series across Western Cameroon.

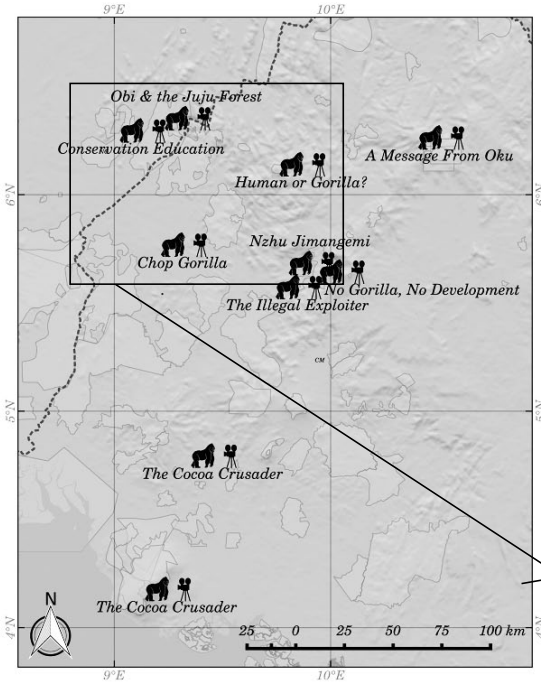


Ndimuh Bertrand Shanchon on the set of *Human or Gorilla?*, a film he wrote, directed, and starred in. Bertrand stars as Desmond, the park ranger in three films.

Photo: Adam Pérou Hermans Amir



CROSS RIVER

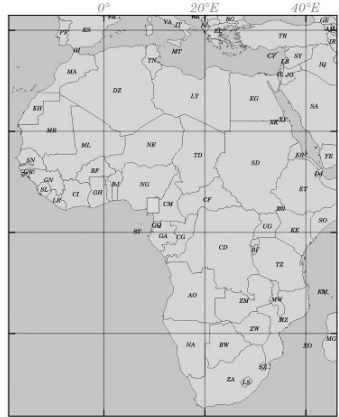


Locations where the various films were produced

Map: Adam Pérou Hermans Amir

The Film Series

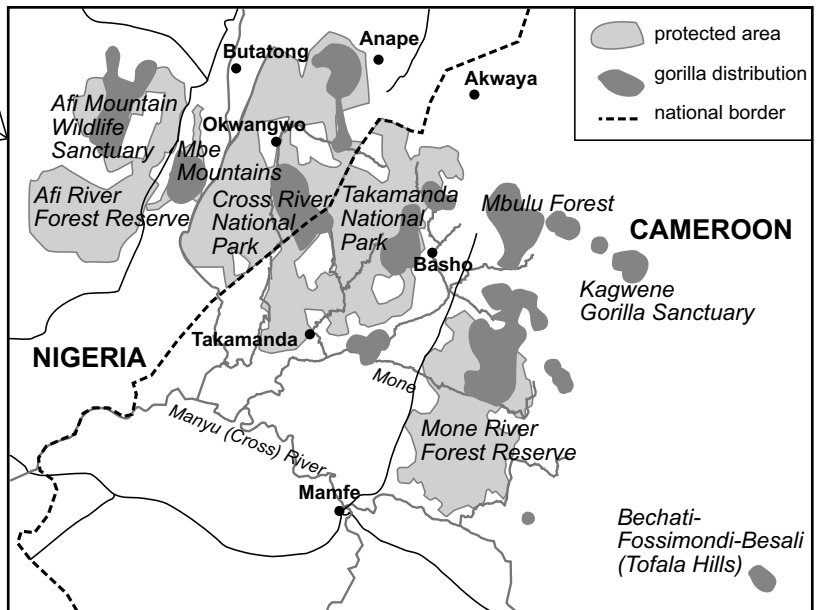
Each of our nine films addresses a different moral issue related to the loss of Cross River gorillas. *Obi and the Juju Forest* (Okwa II, Nigeria) tells a tale of traditional conservation, before the whiteman. *Conservation Education* (Bamba and Wula, Nigeria) presents a modern story of conservation education classes and conflict between a schoolgirl and a hunter. *A Message from Oku* (Oku, Cameroon) shares what it's like to lose gorillas for good. *Chop Gorilla* (Mamfé, Cameroon) is a comedy about a gorilla hunter who won't stop hunting, despite arrests by forest guards and protests from his family as Ebola begins to erupt in the news. *Nzhu Jimangemi* (Bechati, Cameroon) builds on the totem belief to tell a love story. *Human or Gorilla?* (Njikwa, Cameroon) explores the many threats to Cross River gorilla habitat, including deforestation, trapping, fire,



ties and differences across the communities affected by Cross River gorilla conservation.

Conclusion

Just as local knowledge can teach primatologists much about gorillas, such as where the gorillas occur or what they eat, local knowledge can also help guide human-gorilla relationships. In local beliefs and stories rests an indigenous conservation ethic. Cinema offers a powerful tool for community education and engagement, increasing-



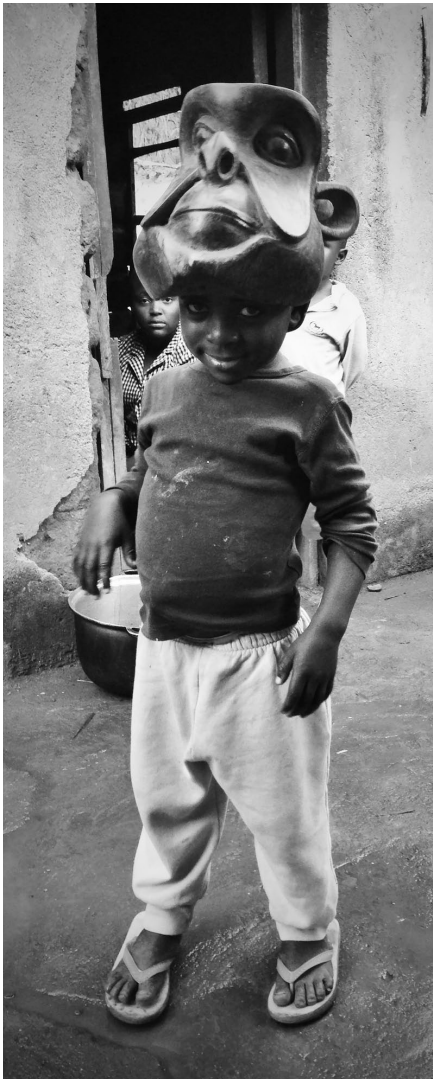
and corruption, through the mishaps of a park ranger. *The Cocoa Crusader* (Kumba, Cameroon) addresses the threat of cocoa production by following a reporter trying to figure out whom to blame for the explosion of the cash crop and concomitant loss of forest. *The Illegal Exploiter* (Besali, Cameroon) highlights the temptation and risk of bribery and corruption for the small, rural communities. *No Gorilla, No Development* (Mmockmbie, Cameroon) struggles with the challenge of balancing community and conservation needs. The films comprise a series, showing both similari-

ly utilized by primate conservationists (Wright 2010). Producing the cinema with and for local communities diversifies the knowledge the movies express. The world's wildlife may be our global heritage but we have overwhelmingly Western accounts of wild animals. Local stories not only foster local conservation ethics, they also diversify and enrich our global culture and connection to wildlife as well.

Our project is in its final stage. Our totem film, *Nzhu Jimangemi*, won the Jean Rouch Award from the Society of Visual Anthropologists. This November we will present it at their annual film



CROSS RIVER



Junior Caleb Laisin joking around with a gorilla mask from Oku, North West, Cameroon. The carvers make the gorilla masks so that their community will remember what they have lost. The carver Ban La Nying features in the short film A Message From Oku.

Photo: Adam Pérou Hermans Amir

festival. Around the same time, our colleague Louis Nkonyu, an integral part of our first two films, will begin screening the series at schools and community meetings in Cross River, Nigeria,

supported with a projector from Idea Wild. We hope to launch our Cameroon distribution campaign around the same time but we are still seeking support.

*Adam Pérou Hermans Amir,
Ndimuh Bertrand Shanchó and
Noal Zainab Amir*

The Gorilla Folk Films from the Cross River Headwaters can be viewed at www.folkfilmmaking.org

Special thanks to the traditional authorities and people of Bamba, Bechati, Besali, Kumba, Mamfé, Mmockmbie, Njikwa, Oku, Okwa I & II, and Wula for their hospitality, warmth, and support throughout the production process. We also extend profound gratitude to all actors and filming production assistants across the entire series. A tremendous thank you, as well, to the staff of the Environment and Rural Development Foundation (ERuDeF), Wildlife Conservation Society (WCS) and officials from the Ministry of Forestry and Wildlife for all their help and hard work. Finally, a deep thank you to Fauna & Flora International for their faith, encouragement, and assistance; without their support this project would not have been possible.

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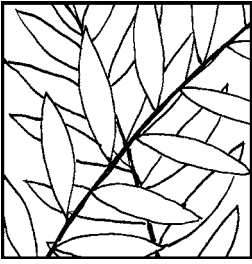
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The cover for Nzhu Jimangemi (*The Gorilla's Wife*), a film about gorilla totems set in the Lebialem Highlands of Southwest Cameroon



RAIN FOREST

African Tropical Forests Are under Stress

Tropical deforestation is well known to have serious negative consequences for biodiversity, terrestrial carbon sinks and the balance of atmospheric greenhouse gases. By contrast, selective logging of tropical forests is often regarded as having a lesser impact on the ecosystem particularly in the long term, even though there have been few critical evaluations of the practice, particularly in Africa.

Recently, we published new research which shows how significant the impact of selective logging on African tropical forests can be. As this practice is the most widespread form of land use in world tropical forests, our results, together with a growing body of evidence, indicate that selective logging is not as benign as companies and researchers in commercial forestry usually suggest.

Our paper (Cazzolla Gatti et al. 2015) summarizes more than 3 years of field research in tropical Africa (funded by European Union through an ERC project) conducted in Ghana, Sierra Leone, Cameroon and Gabon by our team at the University of Tuscia, in Italy and with the support of international renowned researchers such as D. Coomes and J. Lindsay.

We compared field data collected in 511 plots in the tropical forest of the four countries. These plots were subject to different forest management practices: no recent logging (primary forests), selective logging (up to 30 years old) and re-grown secondary forests post clear-cutting (at least 20 years ago). Our findings suggest that the vertical structure, stem density, the prevalence of vine and weed species and plant richness of the selectively logged and secondary forests differ greatly from those of primary forests.

We compared several variables across different management forests to

evaluate the impacts of selective timber harvesting on forest ecology and we found that even low-intensity selective logging causes significant changes to ecosystems. This is one of the first studies which approaches the effects of “sustainable” selective logging not only on wildlife but directly on tree diversity and biomass.

In other words, we demonstrate that the negative effects, even at small logging volumes, is evident on selectively logged forests and it worsens with time (even after 50 years). We estimated a loss of 50 % of tree diversity (even where the removed trees are 1–2 per hectare!) and of 60 % of biomass (which means that it is only 40 % less than clearcutting!).

Moreover, we show that the effects of selective logging are greater than those expected simply from the removal of commercial species, and can persist for decades. Selective logging, unless it is practiced at very low harvest intensities, can significantly reduce the biomass of a tropical forest for many

decades, seriously diminishing above-ground carbon storage capacity, and create opportunities for weeds and vines to spread and slow down the ecological succession.

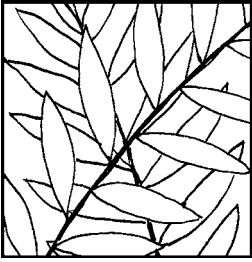
This practice is causing long-term changes to tropical forest ecology in Africa by altering tree communities and, in this way, indirectly affecting animal diversity (most of the forest analysed are the habitats of great apes, rare birds, monkeys and cats, forest elephants, endangered reptiles and amphibians, unclassified insects, etc.). Our paper published in the journal *Ecological Research* clearly demonstrates that the effects of logging (even if selective), and carried out under “responsible forest management” schemes, are considerable and common in all the countries where this practice is allowed.

Given our results and other recent findings, we suggest that certification schemes – like the Forest Stewardship Council (FSC) and the Pan-European Forest Certification Council (PEFC) –



Cutting a tree that was just felled

Photo: Roberto Cazzolla Gatti



RAIN FOREST

may be completely unsustainable from an ecological point of view.

There appears to be a consensus that selective logging causes relatively minor disturbance and is thus acceptable within the requirements of some certification schemes such as the FSC. However, evidence of long-term effects of selective logging on carbon sequestration and biodiversity is poor and sometimes overlooked, particularly in Africa, despite the increasingly wide adoption of this practice.

We conclude our paper arguing that policymakers and conservationists should not consider selective logging a sustainable practice because our paper suggests exactly the opposite and it seems true for different countries and forest types. This practice has several important negative effects on forest structure, dynamics, biodiversity and ecosystem services and these effects can be truly evaluated only in the long term by analysing the evolving dynamics of repeated logging and, not the mean structural values, but the indices linked to the arboreal density.

The objective of this research is to alert not only the scientific community but also NGOs and governments to the necessity of reviewing licence and forest management. This is reinforced by another paper (Battipaglia et al. 2015) – led by G. Battipaglia of University of Caserta – we published recently on *PlosONE*, of whom I am one of the authors. Here we tried to evaluate to what extent African tree growth is influenced by global anthropogenic disturbances, such as rising concentrations of CO₂ and climate change. Long-term tree-ring chronologies of three widespread African species were measured in Central Africa to analyze the growth of trees over the last two centuries. Growth trends were correlated to changes in global atmospheric CO₂ concentration and local variations in the main climatic drivers, temperature and rainfall. Our results provided no evidence for a fertilization effect of CO₂ on tree growth. On the contrary, an overall growth decline was observed for all three species in the last century, which seems to be significantly correlated to the in-

crease in local temperature. Our work advances our current understanding of the growth responses of trees to atmospheric CO₂ concentration, clarifying possible interaction with temperature. This is a key requirement for assessing the long-term responses and feedback between forest ecosystems and future climate.

Other evidence on the reduction of the growth of tropical forests, contrary to what was previously suggested, together with the fact that these ecosystems are being damaged by selective logging, underline that our attention should be paid not just to totally destructive practices such as deforestation (clear-cutting) for alternative land uses (crops or grazing, commonly in the Amazon, or the palm oil plantations that are typical of Southeast Asia), but also to the selective logging of the last virgin forests of Africa and of the regrown secondary forests that are already stressed by climatic changes. This may be a more serious cause of forest degradation than what has been thought to date. These first results suggest that it will be crucial to increase research about the key question for forest management and conservation: is selective logging really sustainable for tropical forests? Our answer is: no!

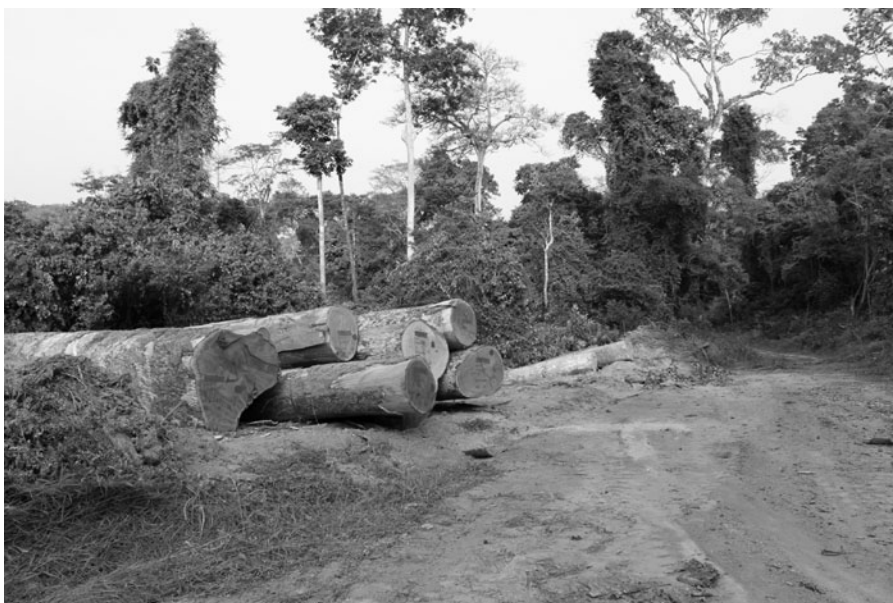
Roberto Cazzolla Gatti

Original publication

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Felled rain forest trees ready for transportation

Photo: Roberto Cazzolla Gatti



READING

Arcus Foundation

State of the Apes – Industrial Agriculture and Ape Conservation. Cambridge (Cambridge University Press) 2015. 360 pages, 1 b/w illustration, 116 colour illustrations, 19 tables. Hardcover: ISBN 978-1-107-13968-8, £ 69.99. Paperback: ISBN 978-1-316-50523-6, £ 24.99. Available on the Arcus Foundation website for download at: <http://www.stateoftheapes.com/volume-2-industrial-agriculture/>

Principal authors are Helga Rainer, Alison White and Annette Lanjouw, but each chapter has its own author(s). The book has two separate sections: a larger one on industrial agriculture and ape conservation, the second one on the status and welfare of apes.

Chapter 1 discusses the devastating impact of plantations to climate change and ape populations as well as approaches for mitigation. Palm oil accounts for 40 % of the global production of vegetable oil.

Chapter 2 describes deforestation and industrial agriculture in 3 countries in detail. In Cameroon, where gorilla habitat is threatened, the government wants to increase palm oil production from 300,000 metric tons in 2015 to 450,000 in 2020. Oil palm concessions cover 1 % of the total gorilla range, and the further expansion of oil palm and rubber plantations will be the primary cause of agro-industrial deforestation (also within gorilla habitat).

Chapter 3 deals with the conversion of forest to plantations in Sub-Saharan Africa. It introduces the products of industrial agriculture and discusses their importance. Africa imports more palm oil than it produces. 60 % of the land currently allocated to oil palm concessions overlaps with great ape habitat. Examples for agricultural operations' impact on ape populations are given and attempts for more responsible practices are discussed.

Chapter 4 explains the legal frameworks in 8 countries. It shows how

attractive international agribusiness investments are for government – concessions are readily provided, even if the land is used by local communities. Good environmental laws are usually in place, but often they are not enforced.

Chapter 5 introduces the RSPO (Roundtable on Sustainable Palm Oil) and discusses its effectiveness.

Chapter 6 deals with the impacts of industrial agriculture on ape ecology. It describes how the different ape taxa react to the new habitats, how they can use them and which human–ape conflicts may arise.

The impact of industrial agriculture has already become dramatic in South-east Asia, especially of oil palm; as the demand is still growing, more areas will be transferred to plantations during the next decades, especially in Africa – so this problem will increase for African apes. This book provides a very useful basis for discussions and activities to deal with this threat.

Angela Meder

New on the Internet

The Kahuzi-Biega National Park has a new website: <http://www.kahuzi-biega.org/>

Another site with information and news: <https://parcnationalkahuzibiega.wordpress.com/>

OFAC-COMIFAC & RAPAC

Aires protégées d'Afrique centrale. Etat 2015. 260 pages. PDF download (25 MB): <http://www.observatoire-comifac.net/edAP2015.php>

International Trade Centre (ITC)

The Trade in Wildlife: A Framework to Improve Biodiversity and Livelihood Outcomes. Geneva 2015. XII, 29 pages (Technical paper), Doc. No.: SC-15-311.E.

PDF download (2 MB): [\[in-Wildlife---A-framework-to-improve-biodiversity-and-livelihood-outcomes/\]\(#\)](http://www.intracen.org/publication/The-Trade-</p></div><div data-bbox=)

FAO

Global Forest Resources Assessment 2015. How are the world's forests changing? Rome 2015. 56 pages. PDF download (2.9 MB): <http://www.fao.org/3/a-i4793e.pdf>

FAO

Global Forest Resources Assessment 2015. Desk reference. Rome 2015. 253 pages. PDF download (4.5 MB): <http://www.fao.org/3/a-i4808e.pdf>

Greenpeace

Opportunity Knocks. How and why Chinese importers need to help fight illegal logging in the Congo Basin. November 2015. 20 pages.

PDF download (2.2 MB): http://www.greenpeace.org/africa/Global/africa/publications/forests/Opportunity_Knocks.pdf

Global Witness

Blood Timber. How Europe helped fund war in the Central African Republic. July 2015. 32 pages. ISBN 978-0-9574857-9-2. PDF download (3.6 MB): <https://www.globalwitness.org/reports/bloodtimber/>

Jason K. Stearns and Christoph Vogel

The Landscape of Armed Groups in Eastern Congo. Congo Research Group, December 2015. 10 pages. PDF download (3.5 MB): <http://congoreserchgroup.org/wp-content/uploads/2015/11/The-Landscape-of-Armed-Groups-in-Eastern-Congo1.pdf>

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Our Donors

From May to October 2015 we received major donations by Angela Dickmann, Dorothee Eckes, Horst Egger, Marianne Famula, Fellbacher Weingärtner, Jürgen and Irmgard Friedrich, Ayten Gülec – Wu Sheng Schule für traditionelles Kung Fu, Marco Grunewald, Ingrid and Karl-Georg Gutjahr, Helga Innerhofer, Dagmar Kallup, Isabella Löber, Anne Pfisterer, Pieternella Pols Fonds, Birgit Reime, Wolfram Rietschel, Alfred Roszyk, Karl Sailer, Christoph Speier, Familie Uhl/Schmitt, Jacques Welter, Christof Wiedemair, Andrea Würz and Zoo Milwaukee.

Some donors supported us with very special activities: The Fellbacher Weingärtnergenossenschaft for the second time transferred the funds they collected from the sale of the gorilla wine. Ingrid Jäger-Gutjahr donated the proceeds of her childrens' book *Jeder kann was!* for a project that supports Bwindi gorilla conservation through education in schools. Andrea Würz collected donations at her birthday party. WIGWAM Tours supported us with their excellent infrastructure to and in Uganda to transport T-shirts for the trackers of the Sarambwe Reserve.



Many thanks to everybody, including all the donors that could not be listed by name here. We are grateful for any support, and we hope that you will continue to support our work in 2016!



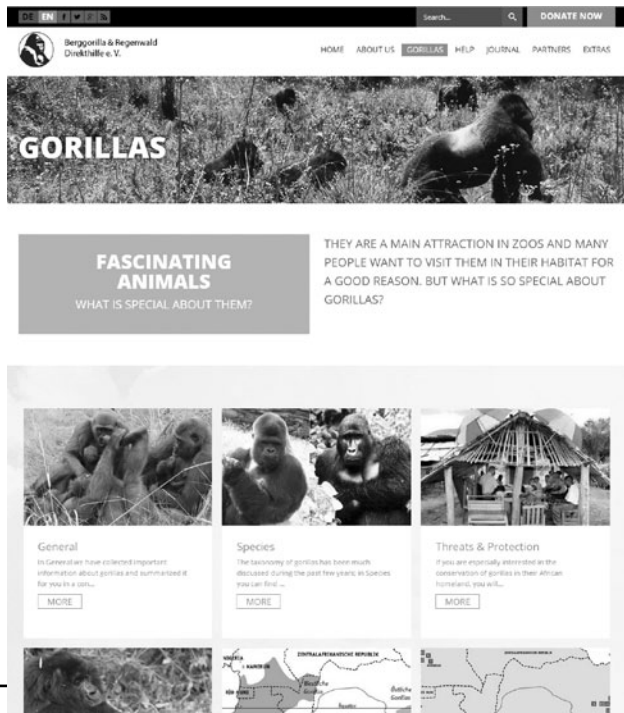
Great Ape Photo Exhibition in Vienna

On 5 June 2015, Johannes Refisch who works at UNEP/GRASP opened his great ape photo exhibition in the Rotunda of the Vienna International Centre (UN). This exhibition has been shown in different places in Africa and Europe already. The opening was enriched by a Cameroonian group that performed music and dance.

Photos: Angela Meder



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