



Gorilla Journal

Journal of Berggorilla & Regenwald Direkthilfe

No. 66, June 2023



**First Photo of a
Silverback Gorilla
in Itombwe**

**Mining Menaces
Itombwe Nature
Reserve**

**Are Mountain
Gorillas still
“Wild”?**

**Mountain Gorilla
Population
Growth**



BERGGORILLA & REGENWALD DIREKTHILFE

CONTENTS

D. R. Congo

First Photo of a Silverback Gorilla in the Itombwe Nature Reserve
Mining Menaces Itombwe Nature Reserve

The Beekeeping Project in Sarambwe Nature Reserve
Support for Conservation and Community Development around Maiko

Support for Communities

GRACE Celebrates International Women's Day

Gorillas

Are Mountain Gorillas still "Wild"?
Mountain Gorilla Population

Growth Related to Group Density and Female Transfers

Behavioural Flexibility and

Foraging Strategies of Wild

Western Gorillas

Interspecific Interactions between Sympatric Apes

Reading

Berggorilla & Regenwald

Direkthilfe

Authors of this Issue

3 John Baliwa Ngoy worked as assistant conservator in Kahuzi-Biega from 2006 to 2008; from 2008 to 2013 he was Chef de Site at the Domaine de Chasse de la Luama. From 2013 to 2017 he worked in the Réserve de Faune à Okapi at Epulu. Since 2017 he is Chef de Site Adjoint at Itombwe.

9 Chakirwa Zirimwabagabo Pascal is a junior lecturer at the Catholic University of Bukavu. He received his MSc in Agronomy at Kwame Nkrumah University, Kumasi, Ghana. He has a particular interest in natural hazards and disaster, principally in eastern D. R. Congo.

17 Laurie Cummins is GRACE Education and Community Engagement Manager.

19 Josias Kambale Kamaliro is GRACE Communications Manager.

22 Honoré Kambale Masumbuko is GRACE Education Manager.

23 Rory Keating is GRACE U.S. Communications and Outreach Coordinator.

24 Dr. Jean Claude Kyungu Kasolene led an NGO from 1994 to 1999. He headed the Tayna Gorilla Reserve and the Walikale Community Gorilla Reserve and was Project Manager for the Tshiaberimu Gorilla Project for The

Gorilla Organization. In 2008 he became conservator for Mt. Tshiaberimu. From 2017 to 2019, he was the Director of the Itombwe Reserve and in 2020 became the Chief of the Maiko Park.

Dr. Shelly Masi started in 2000 to investigate in Bai Hokou how habitat and seasonal changes in food availability influence western gorilla feeding ecology. Currently she continues her research at the National Museum of Natural History in Paris to obtain a complete picture of western gorilla food choice.

Dr. Angela Meder studied the behaviour and development of captive lowland gorillas for 10 years. She is working as a book editor. Since 1992 she has been part of the Board of Directors of Berggorilla & Regenwald Direkthilfe.

Dr. Robin Morrison did her PhD on western lowland gorillas at University of Cambridge and worked for 4 years on mountain gorillas at the Dian Fossey Gorilla Fund. Now she started as a senior researcher in the Department of Evolutionary Anthropology at the University of Zurich.

Franck Muhindo-Malikewa is responsible for community conservation at the Maiko National Park.

Claude Sikubwabo Kiyengo conducted a gorilla survey in Maiko and worked for the ICCN in Goma, for the IUCN program PPP and for the regional office of IUCN in Central Africa. He was chief conservator of the Parc National des Virunga, central sector, the coordinator of the NGO VONA, the PACEBCo expert for conservation and biodiversity in the Virunga region, and since 2008 he has been our assistant.

Dr. Fergus O'Leary Simpson is a postdoctoral researcher at the University of Antwerp's Institute of Development Policy (IOB). His research focusses on the intricacies between environmental conservation, natural resource conflicts and armed mobilisation in eastern D. R. Congo.

Bank Account:

IBAN DE06 3625 0000 0353 3443 15
BIC SPMHDE3E

Switzerland:

IBAN CH90 0900 0000 4046 1685 7
BIC POFICHBEXXX

Organisation Address:

Berggorilla & Regenwald Direkthilfe
c/o Burkhard Broecker

Juedenweg 3

33161 Hoevelhof, Germany

E-mail broecker@berggorilla.org

Website:

<http://www.berggorilla.org>

Gorilla Journal 66, June 2023

Editor: Angela Meder

Augustenstr. 122, 70197 Stuttgart, Germany

E-mail meder@berggorilla.org

Translation, editing and proofreading:

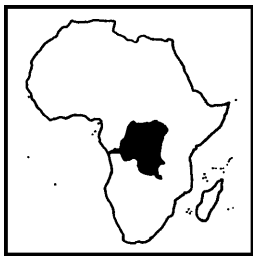
Ann DeVoy, Bettina and Andrew

Grieser Johns, Bronwen Hodges

Cover: First photo of a gorilla in the

Itombwe Reserve

Photo: ICCN



D. R. CONGO

First Photo of a Silver-back Gorilla in the Itombwe Nature Reserve

The Itombwe Nature Reserve (INR) is one of the protected areas of the Democratic Republic of the Congo. It is located in the Itombwe forest (GPS coordinates 670091/9633034) and is under the management of the Congolese Institute for Nature Conservation (ICCN). The INR was created with the aim of conserving flagship species, animals whose populations were in a state of severe decline due to habitat loss as a result of anthropogenic activities. Prominent species, whose populations are continuously monitored, are forest elephant (*Loxodonta africana cyclotis*), Grauer's (or eastern lowland) gorilla (*Gorilla beringei graueri*), chimpanzee (*Pan troglodytes schweinfurthii*) and buffalo (*Syncerus caffer*). The aim of the management of the INR is: Participatory protection of the physical integrity of the INR in order to conserve its biodiversity, its ecosystem services and its cultural and socio-economic values – while respecting gender dimensions and the rights of local residents and indigenous peoples – for the benefit of the local, national and international community.

In 1996, a systematic great ape inventory was conducted by ICCN and WCS. An ornithological study was also undertaken. The results of these surveys revealed that over the last 25 years the estimated number of eastern lowland gorillas had decreased from nearly 17,000 to 6,800 individuals. This was a consequence of the minimal effort made to protect these primates. The recommendations that came out of this work, in combination with recommendations made by IUCN in 1992 and 1993, resulted in the reserve being created in 2006. However, its boundaries were not clear. In 2016 the reserve's



The solitary silverback at the edge of the Itombwe Nature Reserve

Photo: ICCN

boundaries were properly defined following participatory demarcation work with all stakeholders (local population, civil society, ICCN and its partners).

It is fair to note that this participatory definition of the reserve's boundaries does not guarantee the conservation of the reserve's biodiversity – rather that conservation depends on the human and logistical resources allocated to the reserve. Unfortunately, the resources allocated to the reserve are far from what is required to ensure the conservation of the reserve's habitats and biodiversity or to reach conservation targets. For example, the number of gorillas in the Mwana Valley dropped from 211 to 73 between 1996 and 2020 (source: Small Initiatives Program, PPI, French Environment Fund, FFEM).

The number of conservation officers remained too low to protect an area of 5,737 km². The INR has a staff of 41, 23 of whom are charged with the protection of biodiversity. To help overcome the shortage in the number of eco-guards, Africapacity, in collaboration with ICCN, supported the training of 114 community guards during 2020 and 2021. This was undertaken through ICCN's partner community structures: the Community Conservation Management Board (CGCC) at the level of each chiefdom and the Community

Conservation Committee (CCC) at the community level, which provide civilian patrols in the reserve. Of the participants in the community patrols, 90 are at the disposal of their respective chiefdoms without supervision or backing. Those in the Itombwe sector, 24 in total, benefit from some supervision by a local structure called Itombwe Generation for Humanity, IGH. Even so, these community patrols are determined to support the ICCN eco-guards in their efforts to secure the INR.

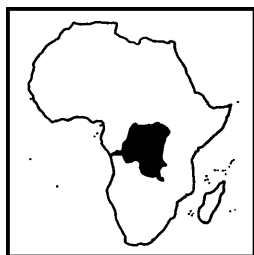
Results from major patrols between 2019 and 2022

The 2008 census of gorillas in Itombwe provided information on the zones where these primates occur, enabling the monitoring patrols to focus on these areas.

In 2019, four monitoring patrols were carried out by eco-guards and community guards, two in March and two in August. The patrols observed evidence of the presence of at least four gorilla families and a solitary individual in the Mulambozi sector, towards Mukunguzi, Walembe, Ishasho and in the Mwana Valley sector, in Kabelukwa, Makutano, Namasalakoma, in the Ulindi sector towards Kigogo to Muhuzi. Groups of 9, 10, 12, and 14 nests were observed in these areas plus one single nest. Between the 10th July and the 8th August, a community patrol noted 44 observa-

We Need Translators!

Would you like to translate texts from French to English for the Gorilla Journal? We need people who know French well and are speaking English fluently. If you are interested in becoming part of our volunteer translator team, please contact Angela Meder at meder@berggorilla.org



D. R. CONGO

tions of droppings, nests and food remains.

In 2020, seven patrols were conducted, of which three were in the Mulambozi sector, two in the Ulindi sector, and one each in the Mwana sector and Kiboyoka. In the Mulambozi sector, on the Byomoa-Kiwandawanda axis, signs of two gorilla families were observed, one of 12 individuals and one of two, plus one solitary gorilla. On the Ishasho-Akyekya-Nam'nywabui-Byelele axis, 7 gorilla nests and 21 tracks were noted. No details were given.

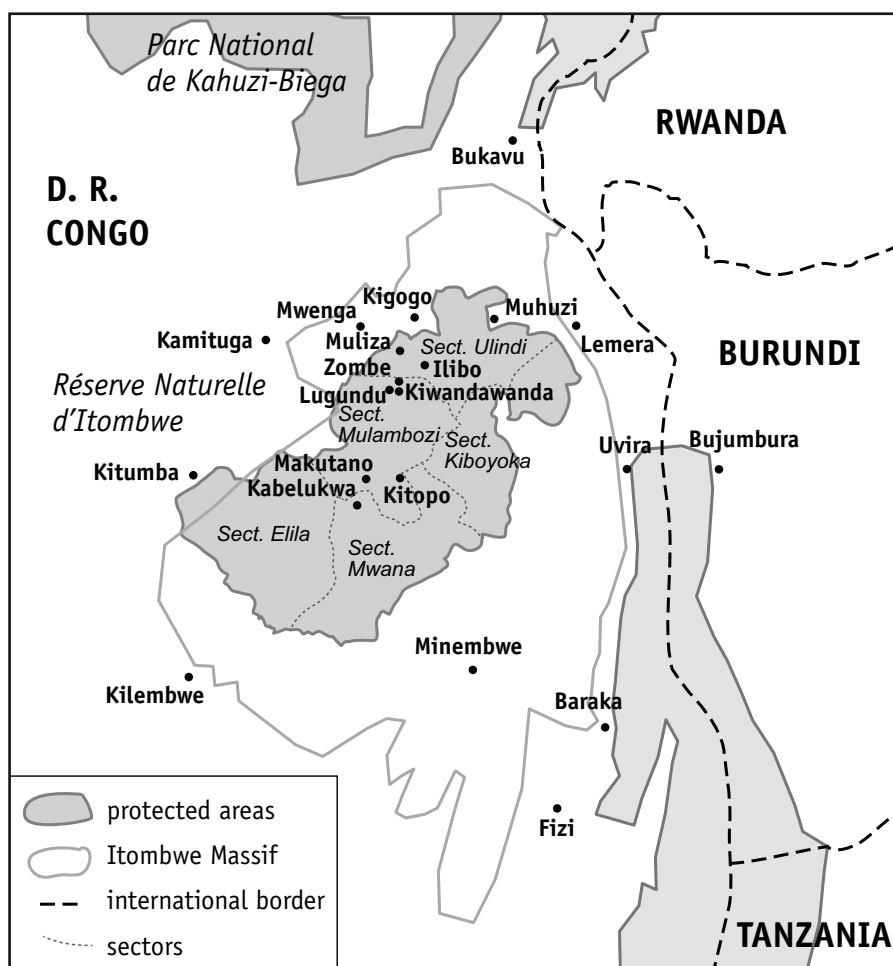
In the Chirere sub-sector of the Ulindi sector, tracks have been noted on the Nshoko and Kacheche Mountains and in the areas called Bisika, Manguba and Kaku. Groups of two, five, six and seven nests were observed in these areas. On the axis of Ilibo, Muliza and Kanyololo two gorilla tracks, one recent and the other old, were noted between the 22nd and 29th July 2020.

In 2021, three patrols were conducted in June and August, two in the Mulambozi sector and one in the Elila sector. Four signs (tracks), faeces and eight gorilla nests were observed in the Mulambozi sector. No trace of any great apes was observed in the Elila sector.

In 2022, three patrols carried out in the Ulindi, and Elila sectors in May, September and October did not find any signs of the presence of gorillas. Only the January patrol in the Mulambozi sector reported signs of gorillas, nests and the remnants of food.

Attempts at filming gorillas in Itombwe

Several attempts to film gorillas were made without results. The first was in September 2017 during a filming mission by the WWF in Kitopo in the Mulambozi sector. The gorillas fled when approached by the film crew and the only images captured were blurry. Another attempt was made in March 2019 during a joint patrol of



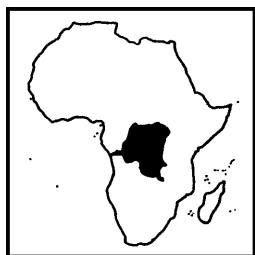
The Itombwe Reserve with its sectors and some of the places mentioned in the text

Map: Angela Meder

eco-guards and community members. A family who had slept in nine nests was approached, but as they were not habituated they fled before even a photo could be taken. In June 2020, an infrared camera trap was placed at the foot of a tree on Makyimingi hill in the Mulambozi sector. When it was checked, no images of gorillas had been obtained.

Photographing the gorillas remained a dream of the INR eco-guards until recently. Then, the population of villages near the Mulambozi sector rang-

of villages Lugundu-Kiwandawanda-Zombe reported the presence of an aggressive gorilla that often visited the forest edge and adjacent fields. During a patrol in June 2021, the eco-guards finally managed to take a photograph of the face of this lone silverback despite its grimaces and threats: the first time since the creation of the INR 15 years previously. It was an opportunity for the managers and eco-guards of the INR and their partners to congratulate each other. To monitor this gorilla regularly and to promote ecotourism in the INR, habituating this gorilla to the



D. R. CONGO

presence of humans is of the utmost importance. When foraging, the gorilla often finds itself face to face with passers-by.

We hope that monitoring efforts in the INR will not be reduced, despite insufficient support for patrol rations and equipment. WWF withdrew from the INR at the end of the CARPE project, meaning that no equipment has been provided since 2019, and the last donation of eco-guard uniforms dates back to 2016. The glaring shortages of uniforms, GPSs, medical supplies, vehicles, tents, tarpaulins, sleeping bags, backpacks, boots, bush rations and camp staff are constraints for tent patrols in particular and hinder the work to protect biodiversity in general.

*John Baliwa Ngoy and
Claude Sikubwabo Kiyengo*

Mining Menaces Itombwe Nature Reserve

In the remote Itombwe Nature Reserve in eastern Democratic Republic of the Congo (DRC), mining increasingly threatens nature conservation efforts. Mining activities are widespread in and around the reserve and often take place under the protection of armed actors. This has negative impacts on biodiversity conservation and has proved an intractable challenge for the Congolese conservation agency (ICCN) and its partners. In field research funded by a grant from the United States Institute of Peace (USIP), we set out to discover why.

The reserve is home to numerous rare and threatened species, including eastern lowland (Grauer's) gorillas, eastern chimpanzees, and a variety of bird and amphibian species. Its mountain forests represent one of the most biodiverse regions on the African continent. The reserve is located in a region long impacted by violent conflict. Up until today, various armed

groups use its secluded forests as a hideout and rear operating base. The Congolese government's military also has bases around the reserve. Both state and non-state armed actors are engaged in illicit resource extraction, including mining.

The reserve overlaps with deposits of various minerals, including gold, coltan and cassiterite. Based on our field research, we discovered three types of mining taking place in the region. Large-scale industrial mining is organized by international companies that use heavy machinery to extract mineral ores. Semi-industrial mining is based on intermediate technologies such as river dredges, pumps and small mechanical excavators. Artisanal mining is practised informally, by local communities, usually with basic hand-held tools.

Overlaps between mining and conservation

Itombwe Nature Reserve was est-

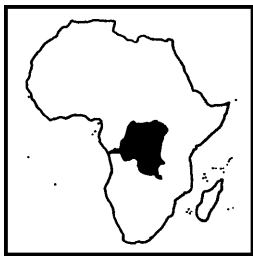
ablished in 2006. However, mining activities have taken place in South Kivu, where the reserve is located, since the colonial era. For instance, the Belgian mining company *Minière des Grands-Lacs* (MGL) began exploiting minerals in the 1930s, including in several sites that are now inside the reserve's boundaries.

Fourteen state-issued mining permits currently overlap with the reserve's limits. Three of these are exploitation permits, nine are research permits, and two are artisanal mining zones (ZEAs). The Canadian company Banro previously owned five of these permits. Looking to expand its business in 2018, Banro even prospected for gold in six sites inside the reserve. However, after significant international backlash, the company decided not to mine these sites. Following persistent insecurity around its mining concessions, Banro sold off all its assets in DRC to Strategos Group in November 2022. Depending on investment



Semi-industrialised gold dredging operation in the Elila River at the edge of Itombwe Nature Reserve

Photo: Fergus O'Leary Simpson



D. R. CONGO



Semi-industrialized open-pit gold mining operation at the edge of Itombwe Nature Reserve

Photo: Fergus O'Leary Simpson

conditions, industrial mining operations could therefore still menace the reserve in the future.

Recent years have witnessed a surge of semi-industrial mining in the region of South Kivu. Chinese companies established semi-industrial gold mining operations at the southeastern edge of the reserve in 2019. They established mining sites in the Elila River using boat dredges as well as open-pit mines with mechanized diggers. Artisanal gold and cassiterite mining are even more widespread in the region. Our research identified as many as 40 artisanal mining sites inside the reserve's boundaries, although the total figure is likely much higher. Some of these sites host significant numbers of miners. For instance, the large cassiterite mine of Zombe draws in up to 1,000 miners at a busy time of year.

Mining activities at all scales have significant negative environmental impacts on the reserve. Large areas of forest are cut down to prepare landscapes for mining. For instance, since operations started in 2019, the semi-industrial mining site at the edge of the reserve in Kitumba has generated

about 82 hectares of tree cover loss. This deforestation severely fragments habitats for the reserve's wildlife. In turn, the process of mineral extraction overturns soils, uproots plant life and despoils landscapes. These impacts are further compounded by the construction of new roads which generates yet more deforestation and encourages in-migration to remote areas. This fuels additional logging, hunting and agricultural expansion and human habitation in the vicinity of the reserve.

Mining not only affects the land. It also disrupts local water sources and river ecosystems. All forms of mining typically involve the use of chemicals such as mercury and cyanide that are toxic to the environment and human health. When mineral extraction takes place through river dredging, water quality is degraded and fish stocks diminish. This also undermines local people's access to clean water and other essential livelihood resources.

An intractable problem

Despite it being illegal and causing substantial damage to biodiversity and ecosystems, what makes mining inside

the reserve so pervasive? Here, we identify three factors.

First, there does not appear to be much political will to deal with the issue. The Ministry of Mines has issued several mining concessions that overlap with the reserve, which makes them appear legal. Given that mining permits have the potential to bring in significant revenues for different actors within the Ministry of Mines and other state agencies, it is unlikely they would suspend them and cede control over the territory to ICCN. Thus, competition between the Ministry of Mines and ICCN makes it difficult to invalidate the mining permits inside the reserve, or to find a compromise.

In conjunction with this, high-level state agents are themselves implicated in the illicit extraction and trade of minerals from within and around the reserve. This is apparent in the involvement of the national army in the protection of semi-industrial mining operations in the region since 2019. The units posted to protect mining sites organize illegal charcoal and timber production in the reserve, further impacting biodiversity conservation efforts.

Second, ICCN lacks the resources to end mining in the reserve. The Itombwe Reserve covers over 5,000 km² of mountainous forests isolated from regional road infrastructure. Yet, with around just 30 eco-guards, it is only present in a small western part of the reserve. At this point, ICCN is unable to increase the number and coverage of patrols due to increasing budgetary constraints. Law enforcement is further hampered by the fragmentation of government authority and control around the reserve.

Part of the reason artisanal mining activities have been so difficult to stop is that they take place under the protection of non-state armed actors. Several artisanal mining sites located inside the reserve are under the direct control of armed groups or occasionally pay tax-



D. R. CONGO

es to those groups. Conflict over mining sites further restricts ICCN's activities. For example, when a non-state armed group carried out a raid on a Chinese semi-industrial mining operation in Kitumba, the ICCN guards posted in the village were forced to flee the site and relocate to another area.

Third, artisanal mining can bring significant economic opportunities, certainly when compared to smallholder agriculture. It is an important livelihood activity for thousands of people living around the reserve and is therefore difficult to prevent or shut down without sparking conflict and resistance. This is particularly the case where artisanal sites are located in the zones of influence of non-state armed groups that operate inside the reserve. For instance, the large cassiterite mine of Zombe is frequently referred to as the economic 'lung' of Basile Chiefdom. An artisanal miner described how, "With-

out Zombe, there is no life!" Unless Zombe's miners are presented with alternative livelihood opportunities to mining, they are likely to be very reluctant to discontinue their activities. Although the mine is not located directly in armed group territory, the members of armed groups do occasionally impose informal taxes on the site, making its containment all the more challenging.

Reducing the threat of mining

How then to deal with mining in the reserve? We believe different types of mining require different responses. With regard to industrial and semi-industrial mining, there is an urgent need to bring together and harmonize the laws and state institutions that regulate the allocation of mining permits and protected areas. Mining permits that overlap with the reserve itself should be cancelled and any mining activities

taking place in the vicinity of the reserve should be monitored closely. In turn, the national army must stop enabling and providing protection to companies operating illegally in the vicinity of the reserve. This fundamentally undermines the legitimacy of the state in enforcing conservation regulations and can spark conflict with local people who are affected by these operations.

When it comes to artisanal mining, the situation is more complicated. This is due to its importance to local livelihoods and the threat of reprisals from non-state armed groups if mines are shut down. However, an innovative approach has been taken in Itombwe Nature Reserve, whereby artisanal mining activities have been allowed to continue in the reserve's multiple-use zone. This approach has limited conflict between the reserve authorities and the local populations, certainly when compared to other protected areas such as Kahuzi-Biega National Park where a more forceful approach has been taken. Still, there is a danger some of the reserve's mining sites could expand into the reserve's core conservation area, where mining is forbidden.

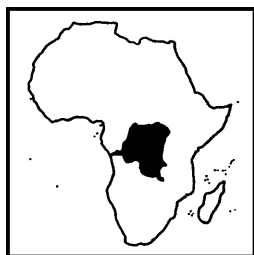
It will therefore be important to properly delimit and regulate existing sites to limit environmental impacts. To do so, increased patrols of park guards will be required to try to stop mining creeping from old sites into new areas. In conjunction with this, alternative livelihood strategies should be developed to encourage both miners and the members of non-state armed groups to incrementally start to leave the reserve.

To conclude, while silver bullets clearly do not exist, there are several options available to reduce the threat of mining in Itombwe Nature Reserve. But as long as the population living around the reserve remains poor and economic incentives favour extraction rather than conservation, it is unlikely the threat from mining will go away anytime soon. This requires not just a



The artisanal mining site 'Cigubi' inside the Itombwe Nature Reserve's multiple use zone

Photo: Fergus O'Leary Simpson



D. R. CONGO

commitment to conservation, but also a commitment to tackle endemic poverty, insecurity, and the involvement of state and non-state armed actors in mineral extraction. Ultimately, the success of all solutions depends on genuine commitment on the part of the Congolese government and sustainable funding from its international partners. Without this support, mining will continue to menace conservation long into the future.

*Fergus O'Leary Simpson and
Chakirwa Zirimwabagabo Pascal*

This work was supported by the United States Institute of Peace (USIP) [grant number G-2001-22755].

The Beekeeping Project in Sarambwe Nature Reserve

Support for this project was requested because of strong demand from the local population of Rutshuru and Nyiragongo and the city of Goma, due to a shortage in these areas, and also in view of the beneficial qualities of honey: taste, therapeutic, cosmetic, protective, digestive, calming and respiratory. The beekeepers extract honey and make a profit from the sale, thus acquiring the means to meet their household needs and those of their dependants.

The main therapeutic properties of honey are as follows:

- Anti-infection, antibiotic, scar healing: honey has a weak concentration of protein and a moderately elevated acidity (pH 3.2–4.5), which blocks bacterial development. It also contains glucose oxidase; this enzyme produces hydrogen peroxide, a natural antiseptic that has the same effect as oxygenated water. Applied to wounds, honey absorbs fluids, drawing lymph and plasma out of the body, draining



Traditional bee keeping near the Sarambwe Reserve

Photos: Getride Kambere Nzanu

the wound. This helps the body to eliminate waste products, clean and heal wounds.

- Taste: honey is used as an ingredient for cakes, in sauces and to sweeten tea and coffee.
- Cosmetic properties: honey is a hydrating product that softens and tones the skin. Its hydrating properties help to nourish and renew skin cells, maintaining a youthful skin. It is much used in cosmetic products such as skin oils, shower gels and hair gels.
- Digestive, respiratory and sedative qualities: honey affects the digestive system and, thanks to its antibiotic and healing properties, is effective in treating stomach and intestinal infections, reducing inflammations and alleviating stomach ulcers. It aids sleep, helps to improve coughs and sore throats, and calms the respiratory system.

Beekeeping: profitability, parasites and enemies

Due to the properties set out above, beekeeping is an income-generating activity. Honey makes money. A litre of good-quality honey sells for US\$ 6–7 in



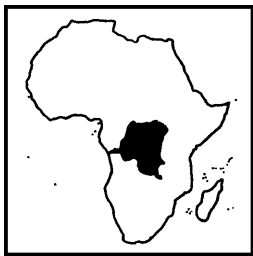
Goma. Around the Sarambwe Reserve, honey is produced during two seasons (see below). The average production is 4–7 l per modern hive and 2–3 l per traditional hive, although it can be as low as 2 l per modern and 1 l per traditional hive.

It should be noted that hard work is required to succeed as a beekeeper.



Hive for modern bee keeping near the Sarambwe Reserve

Photos: Getride Kambere Nzanu



D. R. CONGO

For example, the choice of terrain for positioning the hives is very important. Several factors can have a negative effect on honey production or lead to the beehives being abandoned. These include:

- Human factors: hives placed near a village are often faced with problems such as children throwing stones, conflict with villagers and farmers who claim that the bees will sting them or their livestock (goats, pigs, cows). Some people with bad intentions drive the bees from their hives, using simple methods such as putting down plants whose smell the bees dislike or putting harmful insects in the hives.
- Predation: the positioning of the hives must take into account bee predators, notably insectivorous birds like bee-eaters and reptiles such as agamas.

The Sarambwe bee project

The project was inspired by the benefits described above. Thirty modern and thirty traditional hives were produced and distributed to two groups of beekeepers and a local women's association in Sarambwe and Kisharu. Production is expected to reach 340 to 510 litres of honey per year, with two harvests – after the rainy season and at the beginning of the short dry season. The larger amount of honey will be produced in January-February, with a lesser production in July-August. Five litres of honey sell at US\$ 30 local wholesale price, which represents an injection of US\$ 2040–3060 per year in the area, if all the honey is sold.

How the reserve benefits

This project reinforces collaboration between the community and the reserve. It enables managers to retain the monitoring system already in place, whereby the population report illegal activity in the reserve, including

cultivation, sawing, poaching, wood-cutting and bushfires. A key area of negotiation is raising awareness among poachers of the advantages of abandoning their hunting and trapping. Since the beginning of the war between the Congolese armed forces and the rebel movement known as M23, all the police, soldiers and local authority workers have left the area and taken refuge in the city of Goma. With no-one capable of punishing the poachers, they consider themselves free to carry on their destructive activities in the reserve.

Thanks to the Dialogue Committee and the presence of the local elders, we are in the process of negotiating ways that poachers can benefit from the bee-keeping project in exchange for surrendering to the elders the 'tools of their trade' – spears, arrows and snares. These negotiations are going well. The poachers seem to agree, we are succeeding in convincing them. However, presently there are no hives left for distribution. Extra funding would enable us to help the poachers as well. If forthcoming, we will make great strides towards the safeguarding of the biodiversity of the Sarambwe Reserve.

Claude Sikubwabo Kiyengo

Support for Conservation and Community Development around Maiko

The population of villages and towns in the Maiko region faces many difficulties in accessing basic services such as drinking water, and so do the families of the eco-guards of Maiko National Park (MNP). In the absence of springs that are protected and managed, the inhabitants take water from rivers that they also use as toilets, for waste disposal and for washing their clothes and themselves. This situation explains the presence of many waterborne

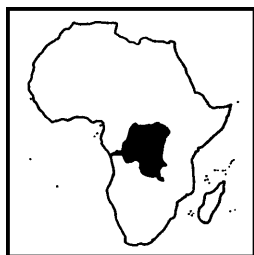
diseases such as cholera, typhoid fever, bilharzia and amebiasis.

The population lives mainly from agriculture and small-scale mining. Agricultural products are a source of food and income for many families. But the processing of these products is problematic due to a lack of adequate tools.

Other problems affecting the region are hunting and poaching. The population consumes a lot of bushmeat, which is also a source of income for them. With the voluntary surrender of 12-gauge shotguns, the rate of hunting has decreased sharply. Animals are reappearing, even along the road. However, those who surrendered their weapons saw their incomes fall and are asking for an alternative. The rivers in and around the MNP once contained a lot of fish, but due to water pollution resulting from mining activities, the fish have become scarce.

The population had expected to benefit from the creation of the park and the protection of its resources. Unfortunately, due to insecurity in the region, fewer partners have become involved in supporting the park than had been hoped. However, awareness-raising activities have resumed, albeit at a slower pace, since the process of withdrawal of armed groups, particularly in the southern sector, has been agreed.

The social distance between the MNP managers and the members of the riparian communities has resulted in a loss of public confidence in the ICCN and its representatives. In addition, people are uncertain of the managers' professionalism in regard to the management of natural resources. A project to assist mutual understanding has been started with a community conservation approach. This project consists of a series of actions designed to improve relations between the two parties and the socio-economic living conditions of the population.



D. R. CONGO

Berggorilla & Regenwald Direkthilfe supports community development

As part of this project, a series of actions have been launched to strengthen women's socio-economic resilience and their involvement in the sensitisation of their communities to hygiene practices to protect the communities from waterborne diseases. The other major objectives of the project are to promote the protection of the park's natural resources and to bring the riparian communities and the MNP managers closer together. The detailed objectives of this project are as follows:

1. Facilitate access to drinking water in villages and towns bordering the park to mitigate waterborne diseases.
2. Improve agricultural production with the semi-industrial processing of products within the community.
3. Reduce poaching with the development of fish farming to encourage people to eat less bushmeat.

The aim of the project is to support the 24,600 direct beneficiaries from ten villages, and other people living in this area, by helping them to generate income from local products such as fish, rice, palm oil and cassava flour.

Implementation of activities

The objective is to reconcile the imperative for conservation of biological diversity with the socio-economic development of local populations through a participatory approach. In accordance with this mission, the management of Maiko National Park and its partner Berggorilla & Regenwald Direkthilfe (B&RD) have implemented various actions to improve the living conditions of the communities bordering the park. Several activities were implemented during 2022 thanks to partnership funds: support for fishponds for a number of associations, the supply of spring water in Uyugu and Tingi-Tingi

villages and a supply of processing mills for a women's association in the northern sector.

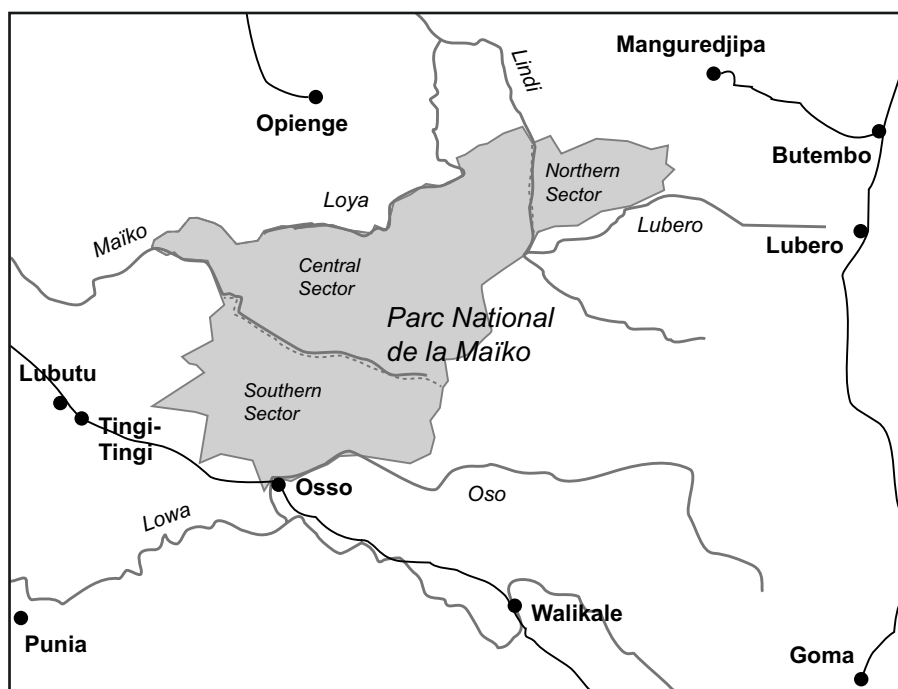
Fishponds. The beneficiaries are 800 members of the Catholic Church. Only the Catholic Church has been able to harvest fish from its fishpond. About 50,000 fish have been sold to meet the community's protein needs and to provide income for the Church. Three quarters of the population of Osso, Uyugu and Obasa villages (10,000 people) consume fish from their fishpond, even those with no money.

Processing of agricultural products. This is a mill for flour and corn, rice and oil. Until 31st January 2023, the project supported the community's efforts to process agricultural products through the association of women ecologists of Manguredjipa. Thanks to the mills, this association was able to produce 120 kg of rice from the rice mill and 200 kg of cassava flour generating 100 US-dollars (200,000 CDF). Thanks



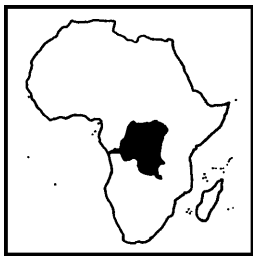
Rice mill of the women's association of Manguredjipa

Photo: ICCN



The Maiko National Park with some of the places mentioned in the text

Map: Angela Meder



D. R. CONGO

to the oil mill they produced 12 cans of palm oil, totalling 240 litres.

Spring water retention in Uyugu and Tingi-Tingi villages. The establishment of water retention units has proceeded as planned: one unit has been built in Tingi-Tingi and another in Osso. Work on a mini-feeding pipe also began, but the work had to be interrupted due to the rainy season. The work resumed in mid-January. The beneficiaries considered these projects to be positive developments.

Current results of the project

The people of Tingi-Tingi and Uyugu/Osso, who used to drink water from the river, now have drinking water thanks to B&RD's support for the development of the two springs. In addition, two processing mills now allow the community to produce oil and rice without using much energy, thus increasing the revenues of the Manguredjipa Ecologist Women Association. These provisions, including an oil mill, a rice mill, fish farming and the development of sources of drinking



The population harvests fish in one of the ponds

Photo: ICCN

water, represent an unforgettable charitable act for the community bordering the Maiko National Park.

However, the support does not yet benefit everybody in the community. A request has been made to extend these activities to other villages so that they

can also take care of themselves. The Maiko National Park and its partner organisation B&RD have been asked to help other associations. Although mill revenues are partially used to finance the continuation of the project, additional support is still needed. The cur-

Support for Communities

Unfortunately, only a few communities in the vicinity of the park were able to benefit from this donation. The remaining communities are asking for similar support, and they need it just as urgently:

- Clean drinking water is needed everywhere, in many places people still drink contaminated water from the river.
- The demand for fishponds is also very high. Fish farming can significantly reduce hunting pressure in the park.

Machines that allow the farmers to process their products, adding value

and thus selling at a higher price, are also important for farmers. Palm oil produced with these machines does not come from plantations but from local cultivation. In Africa, oil palms were used for the extraction of oil for many centuries, as was documented in the 15th century – planting oil palms is a tradition and the oil plays a major role in local cooking.

Bank Details:

IBAN: DE06 3625 0000 0353 3443 15
BIC SPMHDE3E
Switzerland: IBAN: CH90 0900 0000
4046 1685 7
BIC POFICHBEXXX

Maiko National Park is huge and many people live in its vicinity! We would like to support even more people, but we can only do it with your help.

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

Address:

*Berggorilla & Regenwald
Direkthilfe
c/o Burkhard Broecker
Juedenweg 3
33161 Hoevelhof, Germany*



D. R. CONGO



One of the water sources that was made available for the communities with our support near the Maiko National Park

Photo: ICCN

rent implementation percentages are as follows: oil and rice mill 50 %, water retention projects 50 %, fishponds 60 %.

Some more details about the fish farming project

Several difficulties were encountered during the implementation of the project:

- lack of means of transport,
- fish loss during rainy periods,
- fish being stolen from the ponds.

Future strategies and actions to address these issues include:

- the sale and rotation of fry,
- the multiplication of fishponds,
- the recruitment of a fish farming specialist,
- the reduction in the malnutrition rate,
- the end of the use of toxic products in rivers,

- good quality fish production.

Jean Claude Kyungu and Franck Muhindo-Malikewa

GRACE Celebrates International Women's Day

The Gorilla Rehabilitation and Conservation Education (GRACE) Center, located in eastern Democratic Republic of the Congo, is centered on community-led conservation. In addition to caring for rescued Grauer's gorillas and conducting ongoing biodiversity monitoring in the nearby Tayna Nature Reserve, GRACE provides conservation education and sustainable livelihood programs for community members. This includes celebrating important awareness days and hosting special events each year, such as International Women's Day and World Gorilla Day.

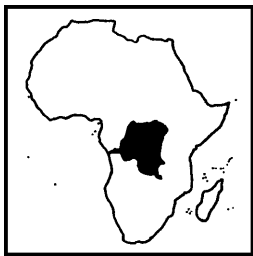
International Women's Day on March 8 is considered the most important event of the year at GRACE. In Congo, we partner with local women's groups to host events that celebrate the importance of women in conservation and society.

In 2022, GRACE Educators expanded events from one to two villages for the first time ever. This year, we went even further, with celebrations across three villages on the same day: Katoyo, Kasugho and Kagheri. These three villages are located within 15 km of the sanctuary and residents here are a key audience for GRACE. Their commitment to protecting gorillas and conserving forests, and their ongoing support for GRACE, makes our work possible.

International Women's Day was a huge success in all three villages this year. The celebrations and events spanned two days, March 7 and 8, and included processions, radio broadcasts, tree planting, presentations on conservation, pledge walls, and more. As a result, more than 23,000 people took part in GRACE's International Women's Day celebrations in D. R. Congo. That is more than three times the amount of people (6,700) who participated in last year's events. Here are a few of our favorite highlights from the day.

Children draw female heroes in their lives. On the eve of International Women's Day, GRACE Educators visited a local primary school. They talked with students about why women are essential in conservation and society. Students drew pictures of women heroes in their lives.

Community members plant trees. In Kagheri, men and women joined together on March 7 for one of GRACE's favorite activities ... tree planting! Together they planted 841 trees along the road towards Kasone village, seven miles (11.25 km) away. These trees help prevent erosion along the road.



D. R. CONGO

Communities celebrate International Women’s Day. In all three villages – Katoyo, Kasugho and Kagheri – community members celebrated on March 8 with:

- processions (parades) through the village
- speeches from community leaders and GRACE staff
- poems
- skits
- and more

In Kagheri, these activities were especially exciting because it was the first International Women’s Day co-hosted by the Kagheri Women’s Association and GRACE.

Pledge walls inspire conservation communities. “Pride walls,” or public pledge walls, are one way GRACE aims to promote community pride in the unique wildlife of eastern Congo – including Grauer’s gorillas. GRACE Educators pose questions to the community and individuals can choose to participate by answering one or more of the questions on the wall. The responses create a sense of collective commitment to conservation in each village. They also help give GRACE Educators insight into how people think and feel about conservation, gorillas, and more.



A community member posts her responses to the “Pride Wall” at GRACE’s International Women’s Day celebration in Katoyo.

Photo: GRACE

International Women’s Day on the Radio Tayna. GRACE Educators regularly produce informational reports, dramas, and even songs for the radio.

Led by GRACE Educator Gracianne, women shared their thoughts and spoke about the event during a special broadcast for International Women’s Day on Radio Tayna. The radio program is estimated to reach 15,000 people in the greater Tayna area.

Women build a fuel-efficient stove. In Katoyo, women who previously completed GRACE’s fuel-efficient stove training conducted their own mini-workshop. They showed other women how to press bricks from local materials and construct a fuel-efficient stove.

Designed in collaboration with local women’s groups, this stove uses less wood and produces less smoke than traditional three-stone stoves used in the region.

In early 2023, GRACE Educators will conduct a full-scale fuel-efficient workshop in Kagheri for the first time.

Celebrating with action: a village cleanup. In the Kasugho market space, men and women came together to con-

duct a village cleanup. They collected waste and buried it in a public dustbin. This helps prevent waste from entering the forest.

International Women’s Day inspires men and women alike

International Women’s Day is more than just a celebration. It helps to emphasize the importance of women in conservation and in communities in D. R. Congo. One powerful example of the impact of International Women’s Day occurred in Kasugho, where male government officials presented members of the women’s association with a symbolic cloth. This cloth represented a commitment to unity and a joint effort to support women and girls in the community.

As we work to build a more equitable and inclusive world, it is important that GRACE continues to recognize the important role for women in the community and conservation. We are proud to report that International Women’s Day celebrations were so successful that community members are already planning for next year’s activities!

Rory Keating, Laurie Cummins, Honoré Kambale Masumbuko, Josias Kambale Kamaliro and GRACE DR Congo Education Team



Members of the Kasugho Women’s Association form a procession through the streets.

Photo: GRACE



Women planting trees on International Women’s day

Photo: GRACE



GORILLAS

Are Mountain Gorillas still “Wild”?

Everywhere in Africa human influence on gorillas and their habitats has become common. Interventions are severe everywhere, not only by deforestation, hunting, mining etc., but more recently also, for example, by the effects of climate change. The human population pressure in the distribution area of eastern gorillas has been extremely high for decades and is still increasing (Plumptre et al. 2003). Mountain gorillas are an extreme case; they live in two forest islands – the Bwindi/Sarambwe forest and the Virunga Conservation Area – separated by about 30 km. As their forest islands are surrounded by agriculture, they have lived close to humans for a long time.

When mountain gorillas initially were studied by researchers, it soon became obvious that the conservation of both the species and their habitats was urgent, therefore strategies were developed and discussed. And as soon as cute mountain gorilla photos were published in the media, it was clear that the gorillas could be used to ensure the conservation of the forests they need for survival. These photos made the apes very popular and many people wanted to meet them. Nowadays, we may get the impression that the protected areas are no longer wilderness. Are the mountain gorillas still wild animals or are they living in a huge safari park?

Habituation and the Consequences
The most serious intervention of researchers is to contact the gorillas

closely. Dian Fossey became famous for her impressive photos with mountain gorillas. She started to habituate them in 1967 (Fossey 1983). Habituation means that animals are slowly accustomed to human presence. This practice became a standard procedure for gorilla researchers. However, it became obvious that the habituation process is not only very stressful for the gorillas (Klailova et al. 2020, Shutt et al. 2014) but after its completion it also bears risks for them: poachers can approach them more easily and the gorillas are less afraid of humans in general (which increases human-wildlife conflicts and the risk of disease transmission).

Having been habituated to humans, gorillas can not only be visited by researchers, but also by tourists. In Rwanda the Mountain Gorilla Project (now IGCP) started tourism in 1978, in the Virunga National Park a project of the Frankfurt Zoological Society and WWF started in 1984 and in Bwindi tourism started in 1993. The aim was to increase the income of the national parks and thereby to encourage the authorities to prevent further destruction of the forests in order to protect the gorillas. To keep disturbance as low as possible, the number of visitors, the time spent close to the gorillas etc. were regulated by strict rules. But this was not the first time that tourists could see gorillas; in Uganda, Walter Baumgärtel had already started mountain gorilla tourism in the late 1950s. The first one who habituated gorillas for tourists was Adrian Deschrijver in Kahuzi-Biega, where the first visitors saw the gorillas in 1972 (Butynski & Kalina 1998, Goldsmith 2014).

Among researchers and conservationists, the growing tourism caused many discussions. Like any contact, tourism may be dangerous for the gorillas (disease transmission, increased stress etc., especially if the rules are not observed – which unfortunately



A young gorilla is watching the tourists and exploring the clothes of a ranger in Bwindi.

Photo: Michael Schmitt



GORILLAS

happens very often, see Butynski & Kalina 1998, for example). But even critical experts agree that tourism can increase government and public support for gorilla conservation. Mountain gorilla tourism has become an important source of income for the range countries, and they have tried to earn as much profit as possible from it. In the Virunga Conservation Area, the number of habituated gorillas increased dramatically since the start of gorilla tourism; in 2010, more than 70 % of the Virunga gorilla population were habituated (Gray et al. 2013). This is not considered sustainable, for example because an epidemic disease transmitted to the gorillas by humans could put the whole population at risk.

This leads to another intervention that requires habituation: veterinary care. At the request of Dian Fossey, the Mountain Gorilla Veterinary Project (today: Gorilla Doctors) was launched in 1986. Since then, the veterinarians have been caring for the habituated mountain gorillas in the Virunga Conservation Area, later also in other protected areas for eastern gorillas. With their work, a new kind of gorilla management started. Their aim was to intervene mainly when the gorillas suffered from diseases or other medical problems that were caused by humans, for example to remove poachers' snares, treat epidemics, prevent diseases by educating the population, tourists and employees, and to reduce contact of gorillas to humans and domestic animals. Moreover, they conduct research (MGVP/WCS 2008).

Managing Gorilla Populations

Before researchers, conservationists and employees of companies that exploit the forest entered the gorillas' habitat, the local population was the gorillas' contact to humans and also the main threat for them. Occasionally people, especially hunters, were attacked by gorillas and sometimes

farmers killed gorillas when they destroyed crops. Thanks to intense conservation efforts, this has now become extremely rare in mountain gorillas.

Any intervention in the gorillas' habitat also has an effect on the gorilla population. Of course, humans originally did not have the intention to "manage" anything when they hunted gorillas or cut the forest for agriculture; this idea started when gorilla conservation became professionalised. Strategic planning meetings were held and action plans were published.

Gorillas usually do not leave their forest, but have done this increasingly since the forests have become more and more fragmented. Mountain gorillas sometimes leave the protected areas to forage in the fields surrounding their habitat. As they like some of the crops and are not afraid of humans when habituated, they do this again and again, which causes human-wildlife conflicts. Crop raiding gorillas are driven back to the protected areas, occasionally they are anaesthetised and carried back; unfortunately, the farmers usually receive no or not sufficient refunds for the crops. In the Virunga National Park, Democratic Republic of the Congo, an electric fence was erected in 2020/21 to prevent animals leaving the park to forage in fields (Nakayima 2002).

Despite their very restricted habitat, mountain gorillas are the only ape subspecies with an increasing population size. This is the result of decades of hard work and has been celebrated as a big success. It was the result of various management measures. Conventional measures were law enforcement (including regular patrols by rangers) and community development projects, but additional measures were taken like veterinary care and close monitoring of the habituated gorilla groups. In the Virunga Conservation area, these efforts resulted in a marked increase of

the number of habituated gorillas, while the unhabituated ones showed a slight decline (Robbins et al. 2011). Gorilla tourism is also an important factor that helped to save the mountain gorillas from extinction.

However, more recent data showed that the growth of the population in Rwanda has slowed down and stress and aggression have increased; it seems that the gorilla density is already too high there (Caillaud et al. 2020). The forest is becoming too small for the increasing Virunga gorilla population – as a consequence of the management by humans who want to save them from extinction. So further management strategies may be necessary if the population indeed is too large for the limited habitat. An extension of the Volcano National Park has been discussed (very controversially) for several years.

Translocation? As soon as it became clear that isolated small eastern gorilla populations may be threatened, the idea of translocation as a conservation tool came up. In 1975, John MacKinnon suggested transferring some males from Kahuzi-Biega to the Virunga National Park to prevent further inbreeding there – although he was aware that they lived in different habitats and might belong to different subspecies (MacKinnon 1976). Translocation was then discussed in two different scenarios: 1. for small threatened gorilla populations to transfer them completely to another place; 2. for the mountain gorillas to add gorilla groups from other areas to strengthen the population. This was only a theoretical discussion, although a translocation might possibly have saved the last Masisi gorillas (Yamagiwa 1996). There were also serious concerns: the translocated gorillas would have been in a strange environment with strange food plants that they were not adapted to; diseases could be transferred, etc. To transfer a population to a suit-



GORILLAS

able safe area within the Grauer's gorilla distribution area would have been almost impossible. Nobody knows whether translocations of wild gorilla populations are feasible at all; apart from the enormous logistic and financial efforts, the survival of individuals or the whole population could be at risk (for a general discussion see Cowlshaw & Dunbar 2000). At the moment, it is not being considered. Attempts to re-introduce confiscated or orphaned Virunga gorillas to the wild, at least, were have not been successful so far.

Population and Habitat Viability Assessment: After the genocide in Rwanda and the following turmoil in eastern Congo in the 1990s, monitoring of the Virunga population was difficult or even impossible, and experts were very concerned that the gorillas there could become extinct. In 1997, a population and habitat viability assessment workshop for the mountain gorillas was held (Werikhe et al. 1998). The working groups discussed the status of various gorilla conservation aspects and developed recommendations. One question that was discussed during the PHVA was: Should mountain gorillas be expected to “pay” for their conservation? This question is based on the point of view that conservation can only be successful if it generates revenue. For the mountain gorillas (but not for other gorilla populations) the answer is: gorillas are able to “pay” for their conservation because the economic return of tourism is higher than that of other land use like agriculture.

The management of natural resources usually involves many stakeholders who have their own interests. Western conservationists have been accused of wanting to preserve wilderness in Africa, especially attractive wildlife, for presenting them to tourists, but ignoring the needs of the local population. However, community participation has been an important factor in gorilla conservation from the start. Projects for

communities are supported to provide alternatives for entering and exploiting the protected areas. Moreover, they encourage the population to cooperate with the management of the protected area. There is a lot of space for improvement, however; each case has to be examined individually (opportunities and problems are discussed in Cowlshaw & Dunbar 2000).

Priority Populations

Among gorilla populations, the mountain gorillas are an exceptional case. Their successful conservation required the investment of enormous resources – and this cannot be simply copied to protect other gorilla populations. In other regions, especially in areas where the gorillas are not habituated, it is impossible to generate funds for the same conservation activities like in the Virungas and in Bwindi. Most protected areas for eastern gorillas are struggling to fund even the most urgent law enforcement measures. Moreover, many people have argued that the needs of wildlife should not be prioritised over that of humans; the growing human population should be given the right to use at least part of the protected areas for their purposes.

It is not easy to decide which gorilla population has the best chances to survive and to direct all available resources to their conservation. Apart from evolutionary uniqueness and extinction risk, the biodiversity of the area and the importance of the habitat are important factors in the discussion (Cowlshaw & Dunbar 2000). John Oates used these criteria to compile a priority list for conserving primate populations. The mountain gorilla populations are ranking very high on these lists (1985).

Mountain gorillas live in the Albertine Rift – a biodiversity hotspot and an extremely important region for several reasons. Within this area, the Virunga Conservation Area and Bwindi also are

two of the most important sites for conservation (Plumptre et al. 2003). Moreover, it has become very obvious during the past decades how important it is to save as much of the remaining forests in the Albertine Rift for the climate and for humans. The gorillas as a flagship species may help us to convince more people to support this.

“Wild” gorillas

If we want the gorillas to become “wilder” again, we could reduce the activity of conservationists and tourists in their habitats; but this would mean that the forest and as a result the gorillas could be destroyed. This would have severe consequences. Forests are an extremely important watershed for the surrounding population and their agriculture, and this especially becomes obvious during drought periods. On the other hand, during the rainy season more landslides would destroy villages and fields. The regional climate that already suffers from the global climate change would be affected in a way we are not able to predict exactly.

Mountain gorillas are – at the moment – better protected than other gorillas, and their population is faring well. But they depend on us for their survival. To protect them, it is important to reduce all risks as much as possible, and everybody who comes close to



For some gorilla populations, feces analysis is main opportunity for research (in this case: Itombwe).

Photo: ICCN



GORILLAS

them should be aware that she/he is responsible for their future. Gorillas who are in regular contact with humans, especially the mountain gorillas who are monitored during the whole day, tend to change their behaviour, so habituated gorillas are no longer truly wild gorillas (Butynski & Kalina 1998).

But what about the unhabituated mountain gorillas? Researchers only have indirect evidence of them such as genetic material and hormonal analyses. But they are happy that at least some wild mountain gorillas still range the forests. Tourists will never see them because they vanish as soon as humans approach – and it has to be like that because otherwise they would not stay wild.

Angela Meder

References

Butynski, T. M. & Kalina, J. (1998): Gorilla Tourism: A Critical Look. Pp. 294–313 in: Millner-Gulland, E. J. & Mace, R. (eds.) Conservation of Biological Resources. Oxford (Blackwell Science)

Caillaud, D. et al. (2020): Violent encounters between social units hinder the growth of a high-density mountain gorilla population. *Sci. Adv.* 6, eaba0724

Cowlishaw, G. & Dunbar, R. (2000): Primate Conservation Biology. Chicago (University of Chicago Press)

Fossey, D. (1983): Gorillas in the mist. London (Hodder and Stoughton)

Goldsmith, M. L. (2014): Mountain gorilla tourism as a conservation tool: have we tipped the balance? Pp. 177–198 in: Russon, A. E. & Wallis, J. (eds.) Primate Tourism: A Tool for Conservation? Cambridge (Cambridge University Press)

Gray, M. et al. (2013): Genetic census reveals increased but uneven growth of a critically endangered mountain gorilla population. *Biological Conservation* 158, 230–238

Klailova, M. et al. (2010): Behavioral responses of one western lowland gorilla (*Gorilla gorilla gorilla*) group at Bai Hokou, Central African Republic, to tourists, researchers and trackers. *American Journal of Primatology* 71, 1–10

MacKinnon, J. (1976): Mountain Gorillas and Bonobos. *Oryx* 13, 372–382

MGVP/WCS (2008): Conservation Medicine for Gorilla Conservation. Pp. 57–78 in: Stoinski, T. S. et al. (eds.) Conservation in the 21st Century. Gorillas as a Case Study. New York (Springer)

Nakayima, L. (2002): Electric Fence Reduces Human–Wildlife Conflict around Virunga Na-

tional Park. *Gorilla Journal* 64, 14–15

Oates, J. F. (1985): IUCN/SSC Primate Specialist Group Action Plan for African Primate Conservation: 1986–90

Plumptre, A. J. et al. (2003): The Biodiversity of the Albertine Rift. Albertine Rift Technical Reports No. 3

Robbins, M. M. et al. (2011): Extreme conservation leads to recovery of the Virunga mountain gorillas. *PLoS One* 6, e19788

Shutt, K. et al. (2014): Effects of habituation, research and ecotourism on faecal glucocorticoid metabolites in wild western lowland gorillas: Implications for conservation management. *Biological Conservation* 172, 72–79

Werikhe, S. et al. (1998): Can the Mountain Gorilla Survive? Population and Habitat Viability Assessment Workshop for *Gorilla gorilla beringei*. CBSG, Apple Valley, MN.

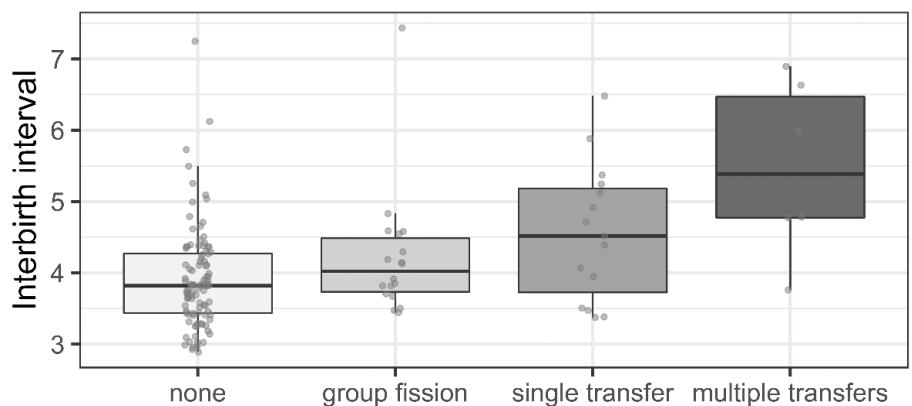
Yamagiwa, J. (1996): Should We Consider the Translocation of Gorillas? – Statement. *Gorilla Journal* 13, 21–22

Mountain Gorilla Population Growth Related to Group Density and Female Transfers

New research from the Dian Fossey Gorilla Fund analyses more than 50 years of demographic data to examine factors influencing variability in the growth rate of the mountain gorilla population and what this may mean for their future conservation.

Mountain gorillas are a rare conservation success story. The subspecies was on the verge of extinction in the early 1980s but through long-term investment by the governments of Rwanda, Uganda and the Democratic Republic of the Congo as well as conservation organisations like the Dian Fossey Gorilla Fund, they are currently the only great ape whose numbers are increasing. But with approximately 1,000 individuals left, they remain a highly conservation-dependent subspecies.

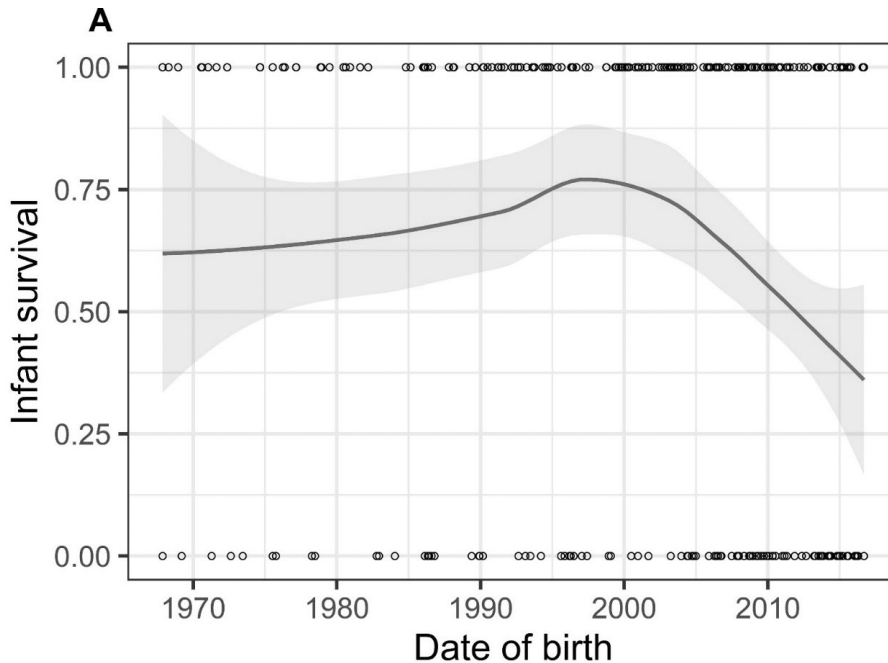
Historically, as a result of the heavy poaching in the 1970s and early 1980s, the mountain gorilla group density was low in the area of the Volcanoes National Park. From the mid-1980s, the mountain gorilla population in Rwanda began a slow recovery, demonstrating the benefits of strengthened conservation practices, which included anti-poaching patrols, daily monitoring, community engagement and veterinary care. This allowed the population to grow consistently each year throughout the 1980s and 1990s. During this time groups interacted infrequently, maybe every other month, and were very stable with few changes in leadership and group splits.



Female group changes between births across the study period and their effect on surviving interbirth interval (IBI). Boxplots of the length of IBI for females across the four group change categories: none ($n = 101$), group fission ($n = 18$), single transfer ($n = 15$) and multiple transfer ($n = 6$)



GORILLAS



Survival across the study through infancy (3.5 years) based on the individual's date of birth. The dark line indicates smoothed conditional means using the 'loess' function, the gray shading indicates 95% confidence intervals, and the circles indicate individual infants (0 = died, 1 = survived). Data excludes stillborn offspring. The coloured shading on the X axis indicates periods (A–D) of the study.

By the early 2000s many of the monitored groups had grown considerably, with one reaching 65 individuals, which is around six times larger than the average mountain gorilla group. Despite the growing population, the density of groups and frequency of inter-group encounters remained relatively stable.

In 2007, this stability began to change, as these now very large groups began to split from each other. The group density tripled in the space of only two years, as young males left to form their own groups. This increase led to more spatial overlap and group interactions. Such interactions range from tolerant to highly aggressive, and this aggression can even be lethal, particularly for adult males who are usually involved in this violence, and infants which can often be the targets of violence from out-group males.

An earlier study (Caillaud et al. 2020) had revealed that these increased interaction rates resulted in higher male and infant mortality, contributing to a significant slowing of the population growth rate. However, the authors reported that mortality alone did not explain this pattern.

In the new study, further analysis revealed that changes in female reproduction also played a role. The increase in intergroup encounters gave females more opportunities to move between groups. But these moves were associated with delays in reproduction, specifically the period between successful births. In mountain gorillas, infants are usually spaced about four years apart but changing groups one time extended this interval by nearly eight months, while changing groups multiple times led to an 18-month extension.

Females' choice of which group to live in is an important part of gorilla life history but is largely limited to when groups interact with each other. Historically, the low rates of group interactions meant that females had relatively few opportunities to move, as they generally only transfer when they are not pregnant or have a dependent offspring. The significant increase in group interactions provided us with the first opportunity to study the implications for females that change groups multiple times.

The study shows that female movement patterns and the reproductive consequences of these follow broader trends driven by social dynamics across the population. It adds to our growing understanding of how social dynamics can impact conservation, particularly when groups are living at a high density.

Fortunately, over the last several years, the groups have been able to spread out, suggesting this period of group instability, high mortality and slowed reproduction may be coming to an end. Infant mortality as well as female transfer rates are already beginning to return to what was more typical in the 1980s and 1990s. However, the results underscore the challenges facing the population as it continues to grow within a limited habitat.

Extrinsic factors, such as climate change or poaching, are often more commonly highlighted as conservation threats but these data highlight some of the intrinsic challenges species may face as habitat shrinks. This is critical information that can help inform longer-term conservation strategies to ensure the continued growth of the population.

*Robin Morrison, Dian Fossey
Gorilla Fund*

Original article:

Morrison, R. E., Hirwa, J. P., Ndagijimana, F., Vecellio, V., Eckardt, W., Stoinski, T. S. (2022): Cascading



GORILLAS

effects of social dynamics on the reproduction, survival, and population growth of mountain gorilla. *Journal of Animal Conservation*, early view. <https://doi.org/10.1111/acv.12830>

Reference

Caillaud, D. et al. (2020): Violent encounters between social units hinder the growth of a high-density mountain gorilla population. *Science Advances* 6, eaba0724

Behavioural Flexibility and Foraging Strategies of Wild Western Gorillas

Tropical rainforests are characterized by seasonal fluctuations in fruit availability with important inter-annual variations in tree productivity. These seasonal fluctuations can thus greatly challenge the foraging efficiency of frugivorous mammals, impacting their nutritional and energy balance across the year. Being rich in soluble sugars, fruit is a very high-quality resource providing animals with readily accessible energy. When compared to leaves and herbs, however, fruiting trees are challenging to find in the forest since they are spatially scattered and ephemeral in time (e.g. each species fruiting at a given time of the year).

Site-faithful animal species such as primates respond to the seasonal variation in food availability by flexibly changing their behaviour. To cope with the changes in fruit availability many frugivorous species seasonally adjust their behaviour in terms of activity budget, diet or ranging patterns. The temporal changes in fruit availability can be fairly predictable within a year, thus frugivorous mammals need to know *what* food they can find, *where* is located and *when* across the year. When compared to folivorous/herbivorous species, frugivorous species should thus have higher spatio-temporal knowledge of food resources distribution and availability, a concept

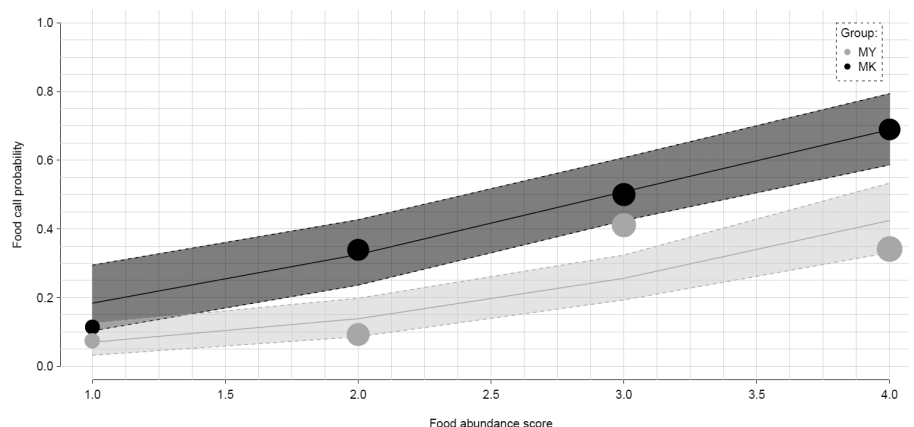
known as *Ecological Intelligence Hypothesis*. This would allow them to better cope with seasonal and fairly predictable environments having spatio-temporal patterns repeated over time (i.e. seasons).

Among frugivorous primates, western gorillas (*G. gorilla*) should be not exceptional on this. They inhabit the lowland rainy forest characterized by the seasonal changes in fruit availability. In contrast to the folivorous/herbivorous mountain gorillas (*Gorilla b. beringei*; subspecies of eastern gorillas) western gorillas are mainly frugivorous (70 % of the feeding time) during the season of high fruit availability. Then, they become mainly folivorous/herbivorous during the low fruit season. Western gorillas are thus seen as seasonal frugivores preferring high-sugar fruit when fruit is more available in the forest. The long gut and gut retention time provide gorillas with higher fermenting and detoxifying abilities which enable western gorillas to extract energy also from a more fibrous (herbivorous) diet. To cope with the seasonal changes, they can thus flexibly change

the diet and rely on a high-quality diet also when fruit is scarce.

The impact of ecology on western gorillas is evident also at the brain anatomical level. Western gorillas have larger volumes of the cerebellum and hippocampus than *G. beringei*. These two brain areas are involved in the movements, and in the processing and retention of spatio-temporal cues, respectively. The higher arboreal locomotion, the higher frugivory diet and the larger home ranges may consequently imply more spatial mapping functions of the hippocampus in western gorillas, thus likely shaping the brain differences between the gorilla species.

The alternating periods of fruit scarcity and richness greatly affects western gorilla biology not only in terms of diet. Western gorillas show also seasonal variation in the nutritional intake suggesting that they may face nutritional challenges in response to the seasonal environment. Quantity and diversity of macro- and micro-nutrient intake decrease when gorillas prioritize an energy-rich diet based on fruit. On the other hand, during the low frugivory



Differences between two habituated groups of western gorillas in the probability of emitting food calls in relation to the food abundance score at the visited tree. Plain line represents the output of the statistical model when the effect of other descriptive variables (density, DBH) is averaged. Background indicates the confidence interval of the model. Points depict the data with circle size being function of sample size.

Figure: Miglietta et al. 2021



GORILLAS

season, western gorillas consume food with lower metabolizable energy content, and alongside the lower frugivory they likely experienced lower intake of certain vitamins. Such seasonal nutritional stress seems to impact also their microbiome and health, with higher occurrence of parasites and urinary infections during the low frugivory season.

In addition, frugivory seems to increase also within-group feeding competition in western gorillas. When fruit is less available, larger groups show great behavioural flexibility in terms of diet, becoming less frugivorous and more insectivorous when compared to smaller group. Because of the spatial dispersion of fruiting trees, larger groups need to feed less on fruit in order to minimize group spread and reduce infanticide risks. If group size triggers high dietary flexibility both at the group and the population level, activity budget does not differ among the groups between the two seasons.

When being more frugivorous, western gorillas spent less time feeding and more time travelling independently to the group size, when compared to periods of low frugivory. This is also reflected in their space-use patterns. Their movements in the home range are highly dependent on the seasonal diet in addition to the group size and composition. Daily path length and weekly range are larger during the high frugivory season because of the higher frugivorous diet. The daily path length, on average 1.7 km, increases up to 9 km during the high frugivorous season.

When feeding on fruit, western gorillas travel longer distances to locate fruiting trees dispersed within their home ranges. During this season, they thus experience higher travel expenditure and lower diversity of nutrient intake, rising the questions whether this will affect the overall energy budget. Surprisingly, despite these fluctuations they manage to balance their energy

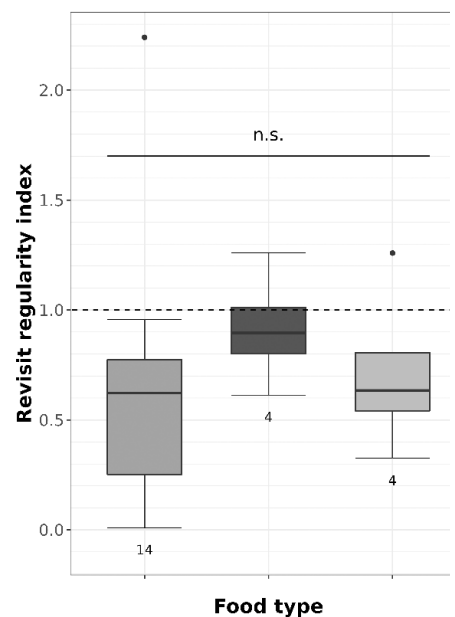
budget across the year. How do they achieve to forage efficiently in both seasons?

To meet their nutritional and energy needs across the year, western gorillas likely rely on efficient foraging strategies. Indeed, they do not randomly choose the trees to visit. Like other primates, they prioritize the closest trees (i.e. shorter travelling distance) with the highest probability to provide ripe fruits. In addition, they move linearly when moving between feeding sites. These highly linear movements seem to reflect an ahead planification of foraging movements towards specific feeding sites, rather than being the result of movements in a random direction (until a feeding site is found). Their linear movements are indeed linked to an overall advection (e.g., a forward tendency across the day), especially when they travelled long distances. The optimal foraging strategy of western gorillas is also associated to an effective communication system allowing to drive the whole group towards specific and valuable feeding trees. When discovering high quality and abundant fruit at a tree, western gorillas emit higher frequency of food calls to attract the other group members. Particularly, adult females stop calling when their offspring and the silverback arrived at the tree.

In addition to the high and low fruit abundance, some fruit species are more difficult to predict, since they synchronously produce fruits only once every few years. This is the case for the fruits of *Dialium* spp. and *Gilbertiodendron dewevreii*, both figuring importantly in the western gorilla diet. Particularly, when the fruiting season is ending *Dialium* fruits provide western gorillas with key nutritional elements both via direct ingestion and coprophagy. This species is thus crucial during a period of nutritional transition, thus with higher nutritional needs for the gorillas. Furthermore, some other fruit species are

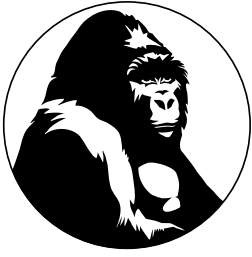
available only for a couple of weeks or just a month, with individual trees fruiting for just few days a year. Do western gorillas forage efficiently because they can track food availability over time?

Independently from the food type (i.e. fruit or young leaves), western gorillas revisit a given individual tree only few times a year. For ephemeral food such as fruit and young leaves from trees, tree visits by the gorillas occur in bursts and within the appropriate sea-



Recursion patterns as a function of high and low fruit seasons and of the food type in 3 habituated groups of western gorillas. Regularity index within the appropriate season for each food type for the 3 groups pooled. For each location with more than 4 revisits within the season of highest interest of the associated food type (high fruit season for fruit-associated locations, low fruit season for leaf-associated locations), we calculated a within season regularity index. Left: fruits; middle: (mature) leaves; right: young leaves

Figure: Robira et al. 2023



GORILLAS

son (i.e. when fruit are available), as opposed to the visits to the sites providing year-round available food (i.e. mature leaves from shrubs). Gorillas revisited the same tree every few days and then never did it again during the year.

This foraging pattern shows that gorillas consider the food renovation level of the individual trees till complete depletion of it (i.e. more fruit ripening or leaf shooting over time). Western gorillas seem thus to be able to predict or infer food availability. They likely remember depleted feeding sites at the individual trees by relying on the recent experience of what is available in the environment. They do so also for the fruit of the aquatic tree species of *Nauclea*. Since these trees are present only at clearings or swamps, it is almost impossible to infer their fruiting period by randomly encountering them in the forest. Like wild chimpanzees, overall western gorillas seem to possess an advanced botanical knowledge of tree phenology. Likely, they rely on multiple ecological variables to infer food availability.

Given that memory is energy demanding, western gorillas may be selective on what it is worth to remember (e.g. specific trees or feeding tree locations), as it was shown in chimpanzees. The position of some food resources may be worth to remember as opposed to other food that they may eat seasonally but more opportunistically, like insects. Since their ranging patterns and feeding ecology are highly affected by the seasonality in fruit availability, we would expect that western gorillas may have different spatial foraging strategies in each season. They may forage efficiently during the high frugivory season by memorising specific fruit-associated patterns. On the other hand, they may feed more opportunistically during the low frugivory season, when they rely mainly on herbs and leaves.

Even though the feeding sites repeatedly visited by western gorillas dif-

fer in each season, surprisingly, no seasonal differences are observed in their spatial movement patterns in terms of revisitation patterns, straightness and speed. Even though they increase travel straightness and speed when feeding on fruit and aquatic herbs, as opposed to leaves, they travel as straight and as fast in both seasons, showing also the same global forward tendency. Western gorillas seem indeed to use an efficient foraging strategy in both seasons in relation to the different seasonal food. This is likely the result of a certain degree of dispersion of the food they eat during the low frugivory seasons. During this period, western gorillas remain selective feeders, feeding on herbs and on specific species of young leaves from trees.

Even though terrestrial herbs are present year-round, they are also concentrated in high density in smaller and larger scattered patches of secondary vegetation. Like for finding fruiting trees, it is likely profitable for western gorillas to use spatial memory also to locate particularly large and herb-rich patches (these being also their preferred sites for night nests). In addition, production of young leaves may not be synchronous at the individual tree level, and trees offering highly proteinaceous young leaves may be as hard to find as fruiting trees. In terms of spatiotemporal availability, young leaves show more similar phenological features to fruit, being more scattered and ephemeral, when compared to widely abundant herbs and mature leaves from shrubs (also eaten by the western gorillas).

Finally, western gorillas feed on year-round aquatic herbs in both seasons. This is often associated to the longest daily journeys towards dispersed and, sometimes, distant clearings or swamps. By providing unique food such as the highly mineral-rich aquatic herbs (and the seasonal flashy fruits of the aquatic species of *Nau-*

clea) these areas are likely worth remembering for the gorillas. Overall, the scattered spatial distribution of all this “non-fruit” food may explain the lack of seasonal differences observed in the spatial foraging strategies of western gorillas. They seem to rely on spatio-temporal memory to forage efficiently and to balance their nutrient and energy intake across the year. Their spatial foraging movements are likely based on specific decision rules according to the most complex and nutritionally interesting food in each of the seasons.

In sum, despite western gorillas’ diet, activity budget and ranging are greatly affected by seasonality, they are able to balance the energy budget by relying on similar spatial foraging strategies between the seasons, in addition to an advanced communication capacity allowing high-level group coordination. Western gorillas seem to possess advanced spatiotemporal cognitive abilities to cope with seasonal changes in food distribution and availability. Overall, they show a high degree of behavioural flexibility in response to the environmental changes. In addition to high cognitive abilities, certainly the specific physiological adaptation of a long and enlarged gut allows gorillas to rely on a particular large dietary breadth and flexibility. Their behavioural flexibility highlights also the evolutionary potential that led our common ancestors to cope with environmental constraints.

Such behavioural flexibility is crucial for the survival of endangered species, providing high resilience towards unpredictable environmental changes. This is particularly relevant in the current context of alarming global climate changes, currently exacerbating the unpredictability and seasonal fruit shortage and abundance for forest animals. The higher ecological and behavioural flexibility of this critically endangered species provides us with some hopes for its long standing.

Shelly Masi



GORILLAS

Literature

- Fuh, T. N. et al. (2022): Group differences in feeding and diet composition of wild western gorillas. *Sci. Rep.* 12, 9569
- Masi, S. & Breuer, T. (2018): *Dialium* seed coprophagy in wild western gorillas: multiple nutritional benefits and toxicity reduction hypotheses. *American Journal of Primatology*, e22752
- Masi, S. et al. (2009): Western Lowland Gorillas (*Gorilla gorilla gorilla*) Change Their Activity Patterns in Response to Frugivory. *Am. J. Primatol.* 71, 91–100
- Masi, S. et al. (2015): The influence of seasonal frugivory on nutrient and energy intake in wild western gorillas. *PLoS ONE* 10 (7), e0129254
- Miglietta, S. et al. (2021): Absence of specific individuals and high food abundance elicit food calls in wild western gorillas. *Behav. Ecol. Sociobiol.* 75, 98
- Robira, B. et al. (2021): Foraging efficiency in temporally predictable environments: Is a long-term temporal memory really advantageous? *Royal Society Open Science* 9, 210809
- Robira, B. et al. (2023): Do seasonal frugivory and cognition shape foraging movements in wild western gorillas? In: Reyna-Hurtado, R. et al. (eds.): *Movement Ecology of Afrotropical Forest Mammals*. Springer
- Robira, B. et al. (under second review): Random walks in western gorillas: How do these great apes decide where to feed? *Animal Behaviour*
- Robira, B. et al. (2022): Passive segregation and multi-scale space-use adjustments to socio-ecological variables in western gorillas. DOI preprint in Research Square 10.21203/rs.3.rs-2394336/v1

Interspecific Interactions between Sympatric Apes

Gorillas live sympatrically with chimpanzees in most of their distribution area, but there are only a few sites where both species have been habituated to the presence of researchers and can be observed by them. Usually interactions between these ape species have been characterized as avoiding competition or as competition over food sources. Lowland gorillas in western Africa eat more fruits than eastern gorillas and therefore their diet shows a higher overlap with the one of chimpanzees than in their eastern counterparts.

In a new study, a total of 33 documented interspecific interactions (and two other unpublished interactions) at eight sites were found in published reports from studies conducted between 1966 and 2020. There is some evidence that foraging western lowland gorillas and chimpanzees spend more time in proximity during times of fruit abundance and less time during fruit scarcity. Sharing of tree crowns by both species was observed in Ndoki. In contrast, scientists reported two observations of lethal attacks of chimpanzees on immature gorillas in Gabon.

While the authors followed chimpanzees and gorillas during their own studies from 1999 to 2020 in the Goualougo Triangle, Ndoki Forest, they observed an additional 285 interspecific associations between the ape species. Research teams following chimpanzees in of a certain community observed 206 interspecific associations with gorillas.

Both species responded to alarm calls of the other species. No predation attempts between the species were observed, but aggressive threats and contact aggression between them. Instead of staying close to the silverback as protection, juvenile and subadult gorillas regularly travelled more than 300 m from their group to join a chimpanzee party.

Feeding together at the same food source represented one third of interspecific associations and despite the extreme rarity of figs in the region, these fruits were consumed during two thirds of the observed cofeeding events.

The authors concluded that there is a greater diversity of interactions than previously documented among sympatric apes, including social relationships between members of different species that persisted over years. In contrast to predictions of competition, nearly all interspecific associations were tolerant or affiliative. Members of the gorilla group were even integrated in a social

network with the chimpanzees that included repeated association and interactions.

On some occasions, part of the gorilla group would climb into the tree crown to feed with chimpanzees while others remained on the ground and ate fallen fruit. Occasionally young gorillas and chimpanzees sought out particular partners at food sources to engage in bouts of play. Subadults were observed to engage in interspecific play, but these social dynamics seemed to shift as they matured to adulthood.

Interactions between apes may differ depending on where they occur in the species' respective home ranges. Both species have core areas that are surrounded by peripheral zones which are visited less frequently and tend to have more aggressive interactions than core areas.

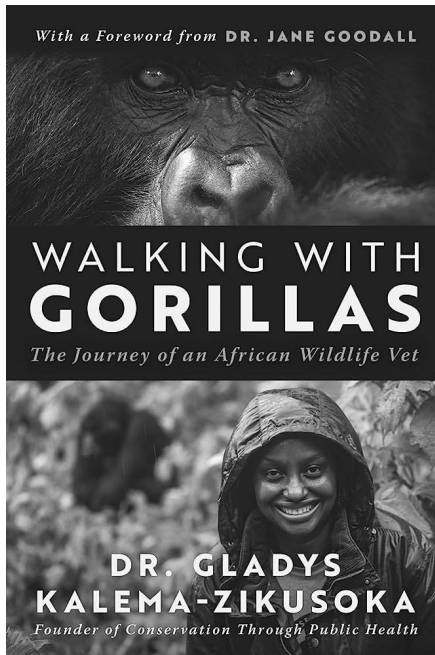
Such interspecific contacts may also have negative consequences. Disease transmission may result from association and affiliative behaviour – during direct physical contact between individuals during play, aggression, and sexual interactions. Moreover, gorillas were observed feeding on fruit that had been fed upon and discarded by chimpanzees and they foraged on fruits under areas where chimpanzees had foraged, urinated, and defecated.

Summary of

Sanz, C. M., Strait, D., Eyana Ayina, C., Massamba, J.-M., Ebombi, T. F., Ndassoba Kialiema, S., Ngoteni, D., Mbebouti, G., Rostand Koni Boue, D., Brogan, S., Funkhouser, J. A., Morgan, D. B. (2022): *Interspecific interactions between sympatric apes*. *iScience* 25, 105059



READING



Gladys Kalema-Zikusoka

Walking with Gorillas: The Journey of an African Wildlife Vet. New York (Arcade Publishing) 2023. 336 pages. Hardcover, US\$ 29.99. ISBN 978-1-950994-26-7

Gladys Kalema-Zikusoka is an exceptional, self-confident woman, who is not easily discouraged. She has succeeded in achieving her ambitions and forging a career, overcoming all obstacles. Her extraordinary story is told in a very personal way, reflecting the history of Uganda and providing fascinating insights on problems faced by a wildlife vet working in that country. She has accumulated a great deal of experience, talked to many people around her and developed her work jointly with local populations. Ultimately, this has led to her founding the organisation Conservation through Public Health.

With her personality and openness, Gladys has become the perfect ambassador for gorillas and the One Health idea. She has convinced a multitude of experts, sponsors and the international media to support her, and has been honoured with various awards. Travel-

ling around the world to attend conferences (and more recently to promote her book) she has met many more people and further refined her ideas. She has closely networked with conservationists, veterinarians and everybody who is interested in gorillas. Her success story should encourage and inspire everybody who wants to become active in wildlife conservation – especially African conservationists.

Angela Meder

IUCN

IUCN SSC guidelines on human-wildlife conflict and coexistence. Gland (IUCN) 2023. 261 pages. ISBN 978-2-8317-2234-4 (PDF), DOI: <https://doi.org/10.2305/YGIK2927>. Download PDF (17.4 MB): <https://portals.iucn.org/library/sites/library/files/documents/2023-009-En.pdf>

Judith Verweijen, Peer Schouten and Fergus O'Leary Simpson Armed Actors and Environmental Peacebuilding. Lessons from Eastern DRC. Washington (United States Institute of Peace). Peaceworks 186, November 2022. 32 pages. ISBN 978-1-60127-897-5. Download PDF (1 MB): <https://www.usip.org/sites/default/files/2022-11/pw-186-armed-actors-environmental-peacebuilding-lessons-eastern-drc.pdf>

New on the Internet

World Resources Institute

Global Forest Review. Forest Pulse: The Latest on the World's Forests. <https://research.wri.org/gfr/latest-analysis-deforestation-trends>

IUCN and EcoHealth Alliance

One Health principles for sustainable tourism in protected and conserved areas: Accompanying principles to the guidelines for prevention, detection, response and recovery from disease

risks in and around protected and conserved areas. Gland, Switzerland (IUCN) 2022. 36 pages. Download PDF (3.62 MB): <https://portals.iucn.org/library/sites/library/files/documents/2022-056-En.pdf>

IUCN and EcoHealth Alliance

Healthy people and wildlife through nature protection: Guidelines for prevention, detection, response, and recovery from disease risks in and around protected and conserved areas. Gland, Switzerland (IUCN) 2022. 44 pages. Download PDF (5 MB): <https://portals.iucn.org/library/sites/library/files/documents/2022-055-En.pdf>

Daniel Stiles

Empty Forests. How politics, economics and corruption fuel live great ape trafficking. BLACK MARKET BRIEF WILDLIFE TRAFFICKING 3. Global Initiative against Transnational Organized Crime, April 2023. Download PDF (12 MB): <https://globalinitiative.net/wp-content/uploads/2023/04/Daniel-Styles-Empty-Forests-live-great-ape-trafficking.April2023.pdf>

Letter dated 13 June 2023 from the Group of Experts on the Democratic Republic of the Congo addressed to the President of the Security Council (S/2023/431). 240 pages. Download PDF (15.2 MB): <https://documents-dds-ny.un.org/doc/UNDOC/GEN/N23/123/80/PDF/N2312380.pdf?OpenElement>

Ken Matthyssen and Erik Gobbers

Armed conflict, insecurity, and mining in eastern DRC: Reflections on the nexus between natural resources and armed conflict. Antwerp (IPIS) December 2022, 40 pages. Download PDF (4.8 MB): https://ipisresearch.be/wp-content/uploads/2022/12/20221208_ILRG_IPIS_Armed-conflict-insecurity-and-mining-in-eastern-DRC.pdf



BERGGORILLA & REGENWALD DIREKTHILFE

Finances

Income in 2022

Subscriptions	25,990.50 euro
Donations	131,564.00 euro
Sales, mobile phone recycling	1,242.20 euro
Total	158,796.70 euro

Expenses in 2022

Administration	3,349.85 euro
<i>Gorilla Journal</i>	1,960.60 euro
Website	462.00 euro
Refund meeting	159.60 euro
Postage	2,376.65 euro
Pay/top-ups	12,000.00 euro
Currency differences	918.04 euro
Material for sale	168.00 euro

Sarambwe

Support of trackers, kitchen personnel, supplies	31,936.00 euro
Medical supplies	1,700.00 euro
Equipment	1,634.00 euro
Repair water tank	1,066.00 euro
Bee keeping project	2,634.00 euro

Mt. Tshiaberimu

Tracker top-ups	14,700.00 euro
Equipment	1,336.00 euro
Mushroom growing	3,194.00 euro

Itombwe

Ranger top-ups	28,800.00 euro
Office rent	3,000.00 euro

Maiko

Ranger top-ups and medical care	29,100.00 euro
CoCoSi	2,500.00 euro
Community projects	18,600.00 euro

Bwindi

Water tanks	4,500.00 euro
Tree network	3,000.00 euro

Virunga Conservation Area

Gorilla Doctors	2,000.00 euro
Total	169,094.74 euro

Our Donors

From November 2022 until April 2023 we received major donations by: Alexandra Altmaier, atambo GmbH, Alexander Bahr, Fredrik Bakels, Wolfgang Balz, Anke Bartsch, Andreas Beck and Aida Hanjalic-Beck, Florin Bender, Rabea Besch, Michael Beutel, Michael Bojcic, Bonhoeffer-Gemeinde Heidelberg-Kirchheim, Karl-Heinz and Margot Buck, Sabine Bungart, Ulrich and Andrea Daniels, Rüdiger Dmoch, Morton Douglas, Drahtseilwerk Heinrich Tepe & Söhne, Jens Rottacker and Sibylle Eck, Elke Einatz, Michael Enders, Enercontrol GmbH, Heinrich Engert GmbH, Hermann Ferling, Ursula Fischer, Pascal Fliegner, Andreas Fretz, Jürgen and Irmgard Friedrich, Ursula Fritz, Gaia Nature Fund, Heidemarie Gauf, Sonja Geisendorf, Kerstin Genilke, Brigitte Gößling, Susan Goetsch, Isabel Golliez and Joshua Ebert, Gorilla Gym, Monika Greipl, Susanne Gressler, Arendt and Heide Gruben, Astrid Hammes, Hans Michael Henkst, Birgit Höfer, Friedrich Höpfe GmbH, Helga Hoppmann, Huesecken Wire, Hans Hermann Huth, Helga Innerhofer, Götz Kauschka, Markus Felix Klement, Christian Kleineidam, Peter Alexander Kleinschmidt, Hartmann Knorr, Gwendolin Koch, Sandra Kolberg, Angelika Krebber, Dirk and Manuela Kronwald, Martin and Claudia Kropfgans, Tanja Kupczyk, Elisabeth Labes, Daniela Lachmund, Renee Läßig, Ernst Lehmann, Stephan Lehmké, Thomas Lesemann, Ina Bojahr-Leukel, Reinhard Lindenhahn, Karin and Manfred Linke, Jochen and Andrea Lippbroß, Christian Lobert, LökPlan – Conze & Cordes GbR, Annette Lüttin, Dirk-Ulrich Mende, Hannelore Merker, Milwaukee County Zoo, Thomas Müller, Thorsten and Christiane Müller, Sylvia Nerlich-Griegel, Norddeutsche Draht, Nordthüringer Handel, Ryan Oliveira, Heidi Peter-Rocher, Phil Petri, Anne Pfisterer, Pieternella Pols

Fonds, Jan Herrmann and Ursula Plath, Christel Pohl, Alexander Pevka, Christian Pritscher, Randstad Dtl. GmbH, Anika Reez, Birgit Reime, Martin Reiner, Michael Reinholz, Geraldine and Gisela Reischl, Hans-Joachim Reuter, Wolfram Rietschel, Röttgers Kettenfabrik, Daniela Rogge, Alfred Roszyk, Erika Rüge, Petra Salvermoser, Monika Schiemann, Dieter Peter Schmitz, Schmuckzeit Europe – Save Brave Schmuck, Martin Schorken, Matthias Schüle, Erika Schulze, Schwabenpark, Eva Schweikart, Elke Seeger, Frank Seibicke, Andrea Sell, Stephanie Skolik, Hartmut Stade, Heinz Stelter, Angelina Steuerwald, Beatrice Renate Stock, Michael Jähde and Angelika Jähde-Stoeckle, Stefan Striebinger, Andreas Strohmaier, Andrea Stütz, Klaus-Peter Stulla, Achim Christen and Rita Christen-Stuttgen, Ulrike Thole, Filip Trottenberg, TSSB architekten, Vera Uhde, unsereHelden, Martina Vergne, Dorothee Vetter, Anita Maria Vörtl, Bernhard and Christine Voss, Hann-Jörg Walther, Antje Werner, Elisabeth Werner, Christof Wiedemair, Wigwam Naturreisen & Expeditionen, Wilhelma, the Zoological-Botanical Garden Stuttgart, Karlheinz Wittek, Klaudia Woede, Angelika Woels, Ingo Wolfeneck, Hagen Woywod, Brigitte Wullert, Sabine Wynands, Heinz and Elisabeth Zaruba, Ellen Zeh, Rebecca Zindler, Zoo Heidelberg, Zoo Krefeld, Zoologischer Garten Saarbrücken and Zoo Rostock.

We are especially happy that the internet agency igroup donated an update of our website to the latest TYPO3 version.

Many thanks to all donors, also to those we could not name here!