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No. 71, December 2025

Carrying Capacity of the Virunga Massif for Mountain Gorillas

Intensive Bio-monitoring and Research in Maiko

The Relationship between Batwa and their Forests in Kahuzi-Biega

Usala Corridor Gains Formal Protection

BERGGORILLA & REGENWALD DIREKTHILFE

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Cover: The Musilikale group (up) interacting with the Susa group (down) on 26 June 2022 in Volcano National Park, Rwanda. Photo: Dian Fossey Gorilla Fund – Eric Ndayishimiye

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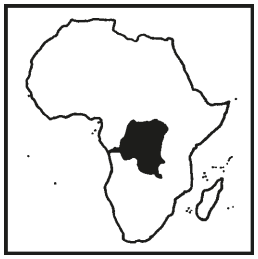


D. R. CONGO

Hope Grows on the Mountain: Rewilded Grauer's Gorillas Flourish

The project partners are thrilled to share encouraging news from Mt. Tshiaberimu in Virunga National Park, where four female Grauer's gorillas – Isangi, Lulingu, Mapendo, and Ndjingala – were rewilded from the Gorilla Rehabilitation and Conservation Education (GRACE) Center in late 2024. This effort marked the first time gorillas rehabilitated at GRACE were returned to the wild, and it represents the largest successful Grauer's gorilla translocation ever completed.

Integration and Behavior

The four females have successfully joined wild silverback Mwasa's group, which also includes juvenile gorilla Kavango. All four females are in excellent physical condition, with healthy coats, long hair, and strong appetites. They are feeding, foraging, nesting, and displaying natural social behaviours, including mating. The females have been observed grooming one another and Mwasa and showing maternal care toward young Kavango. Mwasa is a protective and attentive silverback, sharing his nest with Kavango.

Mwasa is the silverback – impressive in size and leadership abilities. Mwasa spends most of his time foraging and eating but stands ready to protect his family group.

All photos: GRACE Gorillas/Gorilla Doctors

Isangi is a curious and intelligent gorilla. She follows Mwasa's lead but is always looking for new foods to try, encouraging the other gorillas to taste-test them too.

Lulingu is the youngest of the four females and shares strong bonds with each of them. She is often seen grooming Mwasa and the other females.

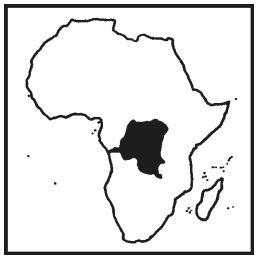
Mapendo has emerged as a natural leader at times, occasionally guiding the group in new directions before rejoining Mwasa. She is independent and confident.

Ndjingala is a calm gorilla who gets along well with everyone; she is sometimes seen caring for Kavango.

Kavango is curious, playful, and eager to interact with all the gorillas in the group; staying close to Mwasa, learning from his example.

Group Interactions

Mwasa's group is not alone on the mountain. A second family group, led by silverback Katsabara (or Katsavara), also inhabits Mt. Tshiaberimu. Encounters between the two groups have so far remained peaceful. Recently, the females from both groups mingled for about ten minutes before separating, while the two silverbacks kept their distance. Such intergroup



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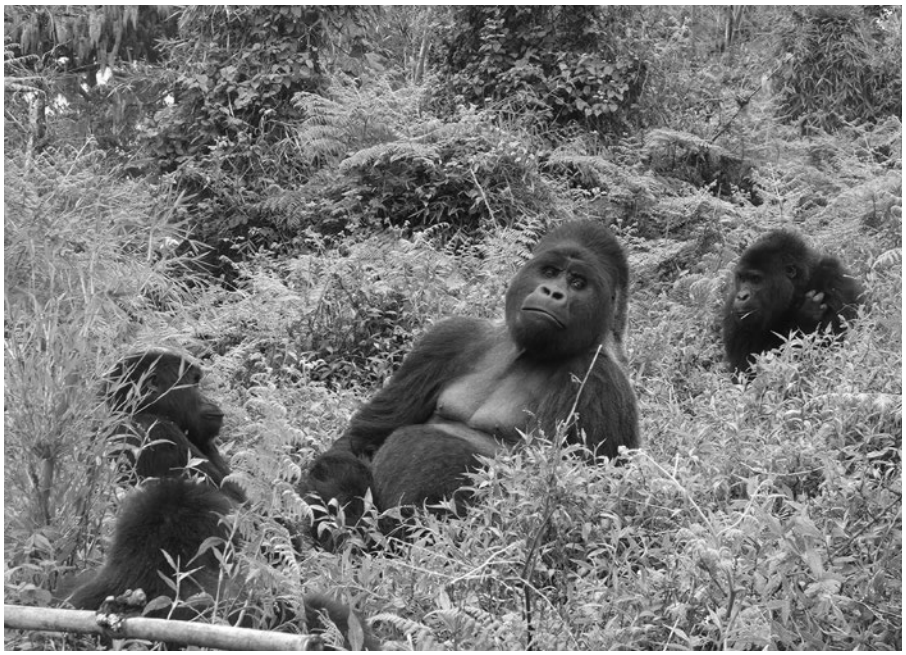


Members of the family group with silverback Mwasa in the middle
Photo: GRACE Gorillas/Gorilla Doctors

interactions provide opportunities for females to transfer between groups, a natural process that can shape gorilla social dynamics. The massive size of silverbacks is thought to play a role in protecting and defending females from transferring out of their groups. Although Mwasa occasionally approaches Katsabara, the latter appears to retreat to protect his family and infant. Both groups are feeding in overlapping areas, primarily on bamboo and Basella, without incident.

Conservation Significance
An analysis showed that the population of gorillas on Mt. Tshiaberimu needed a boost in genetic diversity, and unless new gorillas were moved there, the isolated gorillas living in that area would eventually go extinct. This rewilding effort increased the Mt. Tshiaberimu Grauer's gorilla population from 8 to 12 individuals, reducing the extinction risk to less than 1 %.

The project was the culmination of more than a decade of rehabilitation and over three years of detailed planning and coordination among local communities, GRACE, Re:wild, Gorilla Doctors, Virunga National Park, and the Congolese Institute for the Conservation of Nature (ICCN), supported by a Project Advisory Committee of more than 20 international experts. Every step aligned with IUCN Best Practice Guidelines for Great Ape Reintroduction.

Looking Ahead
The story of Isangi, Lulingu, Mapendo, and Ndjingala is one of resilience, collaboration, and hope. Their successful reintroduction offers not just a lifeline for the gorillas of Mt. Tshiaberimu, but also a model for how communities, conservationists, and partners worldwide can come together to secure a future for one of the planet's most endangered great apes.

GRACE Gorillas, Gorilla Doctors, Re:wild and Virunga National Park

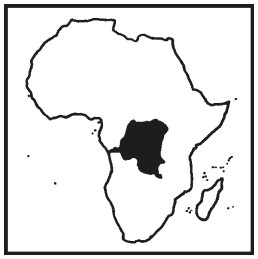
Credits
This historic rewilding is the result of a project partnership between the Gorilla Rehabilitation and Conservation Education Center (GRACE Gorillas), Gorilla Doctors, Re:wild, and Virunga National Park, supported by the European Union, Arcus Foundation, Disney Conservation Fund, Explore.org, a direct charitable activity of the Annenberg Foundation, Margot Marsh Biodiversity Fund, QATO Foundation, U.S. Fish and Wildlife Service, and Frankfurt Zoological Society.

Supervision of Trainees from Higher Education Institutions in Nature Conservation and Tourism

For a long time, very few courses in environmental sciences, nature conservation and tourism have been offered in eastern Democratic Republic of the Congo and very few resources have been available to support them. Only a few institutions are able to secure sufficient funding to support student internships or training abroad. This situation often leads to the recruitment of staff with low levels of qualification in national parks.

Furthermore, institutions that supervise students in these fields face numerous difficulties in gaining access to conservation sites or protected areas. These obstacles arise not only from a lack of authorisation, but more importantly from insufficient financial resources, as protected areas are often located far from their institutions.

On the occasion of the launch of scientific workshops at universities and higher education institutions in North Kivu dedicated to the sustainable survival of Virunga National Park, a gap was identified in terms of practical training for students. This finding highlighted the importance of introductory and



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Internship schedule

Period/ date	Activity carried out	Student supervisors	Theme
15 and 25/08	Public awareness campaign	Assistant Muhindo Ndivito	
18 and 19/08	Monitoring of the gorilla family Katsavara	Benoit Ishiba	How to find gorillas, gorilla observations
20 and 21/ 08	Monitoring of the gorilla family Mwasa/ Kipura	Benoit Ishiba	idem
22/08	Field trip		Training in the use of research equipment: GPS, compasses, maps, cameras
23/08	Anti-poaching patrol	Benoit Ishiba	Learning about different offences and how to respond to them
26 and 27/08	Trip from Mount Tshiaberimu to Mutsora, at headquarters		
28/08	Administrative and technical organisation of PNVi-Nord	Fidèle Zamwe	Ranks, office, tasks and organisational chart
29/08	ICCN partnership	Bienvenue Bwenge	Presentation of the Virunga Alliance-ICCN partnership
	Keeping patrol records and service reports	Assistant Curator, Grégoire Banyanito	
	Training on SMART software	Monitoring Officer, Kahambu Germaine	

professional training courses within national parks and nature reserves. Several institutions supervising students in conservation courses expressed their desire to see their students undertake internships in protected areas in the Democratic Republic of the Congo. To this end, they contacted the Berggorilla & Regenwald Direkthilfe, which had already secured funding for a few students, to negotiate support for their interns.

As part of this professional internship, the mission consists of providing on-the-job training to students from the Higher Institute for Nature Conservation, Environment and Tourism in Rumangabo (ISCNET-R), particularly those in the second cohort of the Environment Management and Nature Conservation programme, in anti-poaching, gorilla monitoring and community awareness activities. By the end of this year, the students will design a leaflet and a calendar aimed at raising awareness and promoting knowledge of Mount Tshiaberimu and its gorillas.

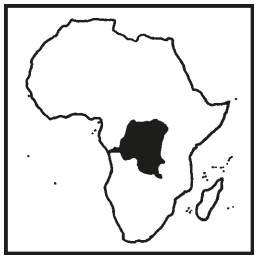
The specific objectives of the internship are:

– Carry out monitoring work with eco-guards and trackers: learning the methods and use of GPS instruments, mapping, location techniques, etc.
– Raise awareness among the population to strengthen collaboration between the park and local communities; analyse the constraints and complaints of the population regarding the park.
– Participate in anti-poaching patrols.
– Understand and learn about the overall functioning of the park and its departments: administrative and technical organisation and the main activities carried out in the field.

To achieve these objectives, the students visited the headquarters of the northern sector of Virunga National Park (PNVi) in Mutsora and conducted fieldwork on Mount Tshiaberimu from 10 August to 4 September 2025. It should be noted that Mount Tshiaberimu is a sub-sector of the northern sector of PNVi. Data were collected using analytical, comparative and

The students during a discussion in the field

Photo: Kasereka Gervais



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observational methods. For awareness-raising, they used participatory techniques. The choice of the northern sector was not random, as this subsector is where gorilla monitoring and anti-poaching patrols take place.

Internship schedule

The internship took place in two stages: The first stage involved fieldwork, during which activities consisted of monitoring gorillas, participating in anti-poaching patrols and raising awareness among the local population about conservation issues and peaceful coexistence. The second stage focused on the administrative and technical management structures of Virunga National Park in general, and more specifically on its structures in the northern sector of the park. The breakdown of time spent on the various activities during the internship is presented in the table below.

Two awareness-raising days were organised in six villages around Mount Tshiaberimu. These sessions reached 110 people and focused on peaceful coexistence between the park and the local population, crop damage caused by park animals, and the risk of zoonotic diseases. To date, there have been no confirmed cases of crop damage. When gorillas attempt to leave the park area, the local population immediately alerts the eco-guards, who come and drive them back to the park. Regarding the risk of zoonotic disease transmission, there has been no direct contact between the local population and the gorillas.

During a gorilla monitoring patrol
Photo: Kasereka Gervais

Participation in gorilla biomonitoring: the students took part in four biomonitoring patrols of the two gorilla groups on Mount Tshiaberimu, namely the Katsavara group, consisting of five individuals, and the Mwasa group, also known as Kipura, consisting of six individuals. They learned how to track gorillas, following their trail to the meeting point. At the meeting point, they observed the gorillas' activities, took notes, counted nests and observed droppings.

Participation in anti-poaching patrols: the students took part in a full day of anti-poaching patrols on 23/08/2025. From the Kalibina post, they set off towards the park boundary in the corridor known as Mulango ya Nyama. The team consisted of 17 people, including 6 soldiers, 3 eco-guards, 3 trackers and the students. At the entrance, they discovered and subsequently destroyed a cassava field measuring approximately 600 m^2. A few hundred metres further on, they destroyed another cassava field covering nearly 2,000 m^2. They continued to the other end of the boundary between the park and the village of Nguli. The patrol lasted from 6:30 a.m. to 5:15 p.m., covering approximately 14.62 km.

During the various activities mentioned above, the students handled different instruments: GPS devices, compasses, binoculars, cameras and walkie-talkies.

After the fieldwork, the students went to the Northern Sector headquarters for a briefing on how a national park generally operates and how a park sector is organised, using the Northern Sector as an example. They were informed about all the organisational structures of the administrative and technical staff.

In addition, they visited the various offices to learn about ICCN's partners, including the Virunga Foundation, Berggorilla & Regenwald Direkthilfe, GRACE, and relations with the surrounding community.

In conclusion, the trainees returned home with sufficient managerial skills in the scientific, technical and administrative management of a national park.

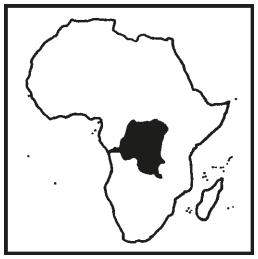
We would like to thank the donor who kindly supported this activity, namely GaiaZOO and Berggorilla & Regenwald Direkthilfe for their lobbying efforts.

Claude Sikubwabo Kiyengo

Intensive Biomonitoring and Research in Maiko National Park during the First Half of 2025

Maiko National Park (PNM), covering an area of 10,300 km^2, is the third largest park in the Democratic Republic of the Congo after Salonga National Park (36,000 km^2) and Upemba National Park (11,730 km^2). The PNM is a protected natural area that is home to a wide variety of flora and fauna. Its day-to-day management is based on the national biodiversity conservation strategy currently in force. Within the technical framework of the Anti-Poaching Fight, during the first half of 2025, field activities were made possible thanks to financial support from Berggorilla & Regenwald Direkthilfe, in order to ensure park surveillance, understand the ecological processes at play and assess the impact of human activities on the park's ecosystems. For the first half of 2025, the following objectives were targeted:

– Monitor changes in the park's biodiversity,
– Assess the impact of human activities on the park's ecosystems,



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– Identify potential threats to the park's conservation,
– Develop technical strategies to mitigate anthropogenic pressure.

Research activities

It should be noted that research activities were carried out in the southern sector of the PNM, focusing on three topics:

– Contribution of endogenous knowledge to understanding and managing wildlife; case study of local communities in the southern sector of the park, Maniema Province.
– Abundance, distribution, habitat characteristics, and threats to *Piliocolobus langi* (red colobus) in the southern sector.
– Risk of contamination in the bush meat consumption value chain around Maiko National Park.

Twenty-three researchers from five institutions participated in this work, including five from the University of Kisangani, four from the University of Kinshasa, one from the National Veterinary Laboratory, one from the National Institute for Biomedical Research, and nine from Maiko National Park.

For the first topic, this study adopted an ethno-biological approach, combining qualitative and quantitative methods to collect and analyze information gathered on endogenous knowledge in the southern sector of the park, with a sample size of at least 80 respondents selected using snowball sampling and sociocultural quotas.

The study targeted four main sampling groups:

– Elders and traditional leaders (knowledge holders);
– Traditional hunters and fishermen (direct interactions with wildlife);
– Healers and practitioners of traditional medicine (medicinal use of animals);
– Women and young people (knowledge transmission and evolution).

Monthly patrol efforts carried out from January to June 2025 in Maiko National Park

Month	# patrols	# days	# nights	Distance (km)	Men/day	# hours
02/2025	3	32	29	421.532	182	207.479
03/2025	4	38	34	460.415	183	280.263
04/2025	6	85	79	1,149.2	495	207.479
05/2025	6	88	82	959.1	491	886
Total	19	243	224	2,990.247	1,351	1,581.221

ICCN (Institut Congolais pour la Conservation de la Nature) agents at the site are actively involved in the implementation of this study, as they participated in data collection, discussion of the results obtained, and the formulation of recommendations.

For the second topic, this study used the indirect census method, "Recce" or "reconnaissance trip", with patrols in tents to collect direct biological data (animals seen, vocalisations) or indirect data (observations of droppings, footprints, food remains, etc.) on *Piliocolobus langi*, its habitat, and threats. For each direct or indirect observation, the following data were collected: habitat type, canopy, undergrowth, slope, proximity to waterways, time of observation, animal species, types of threat, and altitude. The results obtained relate to the structural parameters of a population (relative abundance and encounter rate), statistical analysis of the data (correspondence factor analysis and ANOVA) and strategic analysis (SWOT matrix).

For the third topic, the study was just a field survey with a view to planning a more extensive study covering all sectors of the park.

Patrol efforts

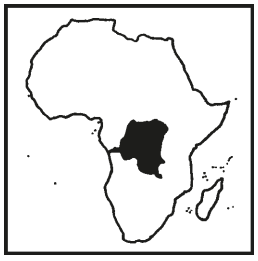
The table shows a significant difference for February and March, given the insecurity in the country, which meant that there were no patrols in the northern sector. Furthermore, hostilities around the town of Walikale in January prevented patrols, as all park staff were on alert.

Patrol coverage

The number of quadrants covered describes the efforts made by patrols in the field to ensure the effective implementation of biodiversity management objectives. In total, patrols covered 121 quadrants measuring 5 x 5 km, equivalent to 29.4 %, and 293 quadrants

Observations of flagship species

Sectors	Species		Observations		Total
	Scientific name	Common name	direct	indirect	
All parc sectors	*Okapia johnstoni*	okapi	1	209	210
	Gorilla beringei graueri	Grauer's gorilla	1	88	89
	Pan troglodytes schweinfurthii	eastern chimpanzee	30	55	85
	Loxodonta africana	elephant	–	47	47
	Afropavo congolensis	Congo peafowl	1	–	1



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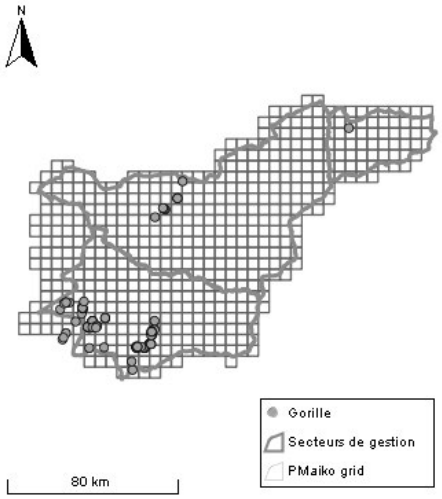


Gorilla distribution recording during the patrols

Map: ICCN

measuring 2.5 x 2.5 km, equivalent to 17.78 % of the park's surface area.

Almost the entire central sector has not been monitored due to its remoteness, limited material and financial resources, and the presence of several rebel groups. These rebels do whatever they want: gold prospecting and mining for minerals, poaching, military training, etc.

Wildlife observation

Flagship species: These species are most demanding in terms of maintaining a key characteristic of their habitat. For Maiko National Park, there are five flagship species. They were observed during the first six months of 2025, with the okapi being observed frequently and the Congo peacock being rare. Their encounter rates are low in relation to the distance covered by the patrols. Based on the distribution maps, we can see that signs of okapi, gorillas, chimpanzees, and elephants have been observed in all areas of the park, unlike the Congolese peacock, which has only been observed in the northern sector.

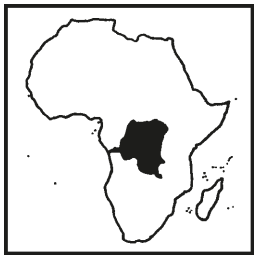
Observations of other wildlife species

Sectors	Species		Observations		Total
	Scientific name	Common name	dir.	indir.	
All parc sectors	*Potamochoerus porcus*	red river hog	3	398	401
	Cephalophus silvicultor	yellow-backed duiker	1	350	351
	Cephalophus dorsalis	bay duiker	0	170	170
	Cephalophus nigrifrons	black-fronted duiker	0	30	31
	Philantomba monticola	blue duiker	1	57	58
	Syncerus caffer	buffalo	0	52	52
	Tragelaphus spekii	sitatunga	0	27	27
	Tragelaphus eurycerus	bongo	0	2	2
	Hyemoschus aquaticus	water chevrotain	0	65	65
	Panthera pardus	leopard	1	72	73
	Smutsia gigantea	giant pangolin	2	69	71
	Cercopithecus mitis	blue monkey	196	1	198
	Cercopithecus ascanius	red-tailed monkey	111	1	112
	Cercopithecus mona	mona monkey	67	0	67
	Cercopithecus hamlyni	Hamlyn's monkey	30	2	32
	Allochrocebus lhoesti	L'Hoest's monkey	24	1	26
	Lophocebus albigena	grey-cheeked mangabey	31	0	31
	Piliocolobus sp.	red colobus	6	0	6
	Colobus guereza	black-and-white colobus	2	0	2
	Colobus angolensis	Angolan colobus	1	0	1
	Papio anubis	olive baboon	1	0	1
	Atherurus africanus	brush-tailed porcupine	0	1	1
	Hystrix cristata	crested porcupine	0	1	1
	Bitis gabonica	Gaboon viper	1	0	1
	Kinixys erosa	hinge-back tortoise	1	0	1
	Orycteropus afer	aardvark	0	59	59

Human activities

Human activities in the PNM include hunting with 12-caliber firearms, trapping, digging for minerals, fishing, travelling between different villages and camps, and collecting non-timber forest products (NTFPs).

There is a permanent human presence in the park, as evidenced by the number of active camps and related activities, particularly hunting and trapping. The presence of armed groups in the park is also a factor in the destruction of biodiversity and a constraint on



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Monitoring of human activities

Location (sector)	Period	Human activity	Number	Status	
				Active (number)	Inactive (number)
All sectors	January to June 2025	shell casing 00	72		
		camps	71	59	12
		trapping site	39	39	
		mining site	10	7	3
		collection of NTPFs	8		
		logging	3		
		fishing	3		

park management. As of August 18, 2025, the armed group known as the UPLD (Union of the People for Liberty and Democracy) had killed four elephants and, in October, three more elephants and five okapis, and wounded a gorilla, who charged his attackers after being injured (information from trackers at the Usala Gorilla Reserve). At this rate, there are fears that the flagship animals of Maiko will be wiped out, as the meat is sold but no one knows where the trophies are headed.

In early September 2023, eco-guards from Maiko South had clashes with Wazalendo living in the park. The latter disarmed the eco-guards. The weapons were recovered thanks to negotiations by government authorities.

Claude Sikubwabo Kiyengo

Armed Conflict and Gorilla Conservation, Maiko National Park Central Sector

Due to its size, Maiko National Park (MNP) located in Democratic Republic of the Congo (DRC) gives the impression of being a small country. It is one of seven national parks in DRC, and was gazetted under the presidential order n°70-318 of November 30th 1970 in order to protect the huge forest area and its fauna.

The national park is abounding with biodiversity including endemic species like the eastern lowland gorilla (*Gorilla beringei graueri*), the okapi (*Okapia johnstoni*) and the Congo peafowl (*Afropavo congoensis*). It has a large population of chimpanzees as well as forest elephants. This vast national park is well known for its great diversity of socio-economical, ecological, political and even cultural realities; however, the local population has a different view.

This complexity comes from the park's history, geographic location and reachability, but mainly from its 10,830 km^2 surface. This has caused socio-economic and cultural setbacks for the riverine population trapped between their imperial need of survival and the national park's strict conservation measures. The population is making demands and showing resistance to conservation activities because their socio-economic and cultural reality is rarely taken into consideration (Geisler 2003).

The armed conflict has had serious repercussions on gorilla conservation and more globally on the region's biodiversity. The eastern lowland gorillas living in DRC face increased threats due to human presence and hostilities in the central sector of Maiko National Park, widely known for hosting these gorillas.

Since 1989 the park has suffered from numerous armed conflicts, particularly in the central part. The different active armed groups include the Kachimuka group (Simba), Shiga-mpela, and Koni.

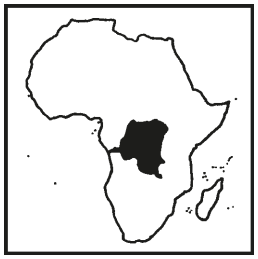
In 1995, the FDLR (Democratic Forces for the Liberation of Rwanda) from Tingitingi in the southern sector arrived in Maiko's central sector and settled temporarily at the Mandaye patrol post. Afterwards, young people from villages united to create local self-defence forces to fight them in the middle of the park. It was the beginning of the second conflict in Maiko following the one with the Ngilima group, an old group for self-defence that later became a Mai Mai group and ravaged the gorilla and elephant population in 1992.

Direct impact on gorillas

The occupation of forest zones by armed groups led to increased poaching for food and sometimes for military training activities (hunting and shooting). The direct consequences are a decline of the gorilla population as well as other emblematic species like okapi, elephant, chimpanzee, red colobus etc., thus weakening already vulnerable social groups.

Clashes in Maiko National Park between local armed groups and ADF-NALU (Allied Democratic Forces and National Army for the Liberation of Uganda) as well as human trespassing and the military presence in zones with a high gorilla density have fragmented the forest habitats, restricted the movement of gorilla groups and reduced their access to natural resources (nutrition, areas for reproduction), therefore increasing demographic and operational stress within these groups.

Conservation teams and local guides are targeted by poachers and armed groups whose interest is to ex-



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ploit the resources of Maiko; it compromises monitoring and the fight against poaching activities.

Indirect impact on conservation

Environmental and natural resource degradation are aggravated by armed conflicts in this zone; we can witness forest degradation and ecosystems disturbance with no regard for the presence of gorillas and other species who need it for survival.

Gorilla tracks have been seen in Mabombi, Sombo, Kandabilo, Magwada and Abakanla in 2022 by trackers from FLOWADE (Loya Wandi Community Reserve for Development); today these gorillas are endangered by poaching practices. Degradation of habitats is pushing gorillas to migrate from Magwada Hill to Tabili and elephants to migrate from Lumpenje to Bayule and Tatufi.

Between May and October 2025, there was a noticeable increase in the poaching of gorillas and other species in the central and northern areas of Maiko. This was particularly evident in the Loya and Angamapasa groupements (administrative areas led by traditional leaders), within the Bakumu and Angumo sectors. Some poaching cases have been identified: on 18th of July 2025 one solitary male gorilla was killed by poachers in uniform in Kandabilo; on 13th of July 2025 in Maroc (mining claim) three elephants were killed; on 3rd of September one male gorilla was savagely killed in Mamwanyu; on 27th of September one okapi was killed in Magwada and Maroc.

The river Angumo in the central sector of the Maiko National Park
Photo: Papy Mahamudi Kabaya Eustache

These practices are in violation of natural resource conservation laws, specifically Law n°14/003 of February 11, 2014, concerning nature conservation. The areas most severely affected by armed conflicts in Maiko are Angumo, Magwada, Lompenje, Amamwanyu, Ombeni, Silte, and Kandabilo.

Threats by hunting, trade of baby gorillas, elephant trophies, okapi skin trade, and mining are escalating, resulting in increased degradation of gorilla habitats. This activity endangers protected rare species and contributes to the destruction of natural heritage, which is essential to humanity. Furthermore, this situation puts the entire human population in danger that relies on the ecosystem services that are crucial for the development of the Kivu region and the whole world.

Local Communities United for Nature and Development (CLUND), as a committed community-based organisation, is refusing to keep quiet, braving fears, and determined to denounce and inform everyone; they are urgently demanding an immediate intervention to stop these illicit activities that are endangering the future of communities as well as the future of humanity.

The ecocide in the central and northern parts of Maiko must not go unpunished, it is a crime against humanity. ICCN and its partners should by all means take action to stop the destruction of biodiversity in Maiko, natural home of the eastern lowland gorillas.

Papy Mahamudi Kabaya Eustache

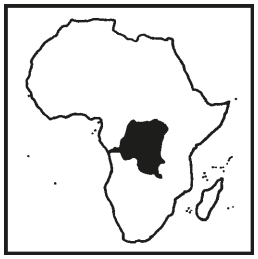
References

Bahati Lukoo, E. (2025): La conservation au prix de ma jeunesse. Environews RDC
Bobia, J. (2025): la REDD en RDC une arnaque à l'africaine. P. 6. Révue Bimanshainfo
Chardonnet, B. (2019): L'Afrique change: ses aires protégées doivent-elles être evaluées? Reconfigurer les aires protégées en Afrique. ResearchGate of UICN.
Christol Paluku, M. (2005): Effectivité de la protection de la biodiversité forestière en RDC. Etudes Juridiques de la Fao en Ligne. P. 28
FLOWADE (2022): Rapport de la descente sur terrain. Juin 2022, 4
Geisler, C. (2003): Les expulsés du jardin d'Eden: un nouveau problème. Revue internationale des sciences sociales 175, 73
Maindo, A. (2017): Le parc de Maiko face à l'activisme des groupes armés. Tropenbos RD Congo. P. 37
ONU (2013): Rapport des Nations Unies, cartographie des groupes armés dans l'est de la République Démocratique du Congo. Research Group
Pélissier, C. et al. (2018): Les réseaux des aires protégées de la République Démocratique du Congo: Evaluation pour sa consolidation et son extension. UICN et WWF Kinshasa
Vallière, P. & Mandé, I. (2025): L'Afrique subsaharienne au temps de l'anthropocène; collection sociétés africaines en mutation. P. 60, 61. Presse de l'université du Québec

The Relationship between an Indigenous Batwa Population and their Ancestral Forests in Kahuzi-Biega

What is the role of indigenous people in conservation? Are they 'forest destroyers' or 'forest protectors'? Both narratives argue that the fate of nature ultimately hinges upon indigenous peoples. This paper challenges this viewpoint, by showing that the narratives divert attention from the structural dynamics at the root of environmental change. Moreover, these narratives, representing indigenous people in simplified ways, feed into differing visions of conservation that ultimately fail people and nature.

When the Kahuzi-Biega National Park in eastern Democratic Republic of the Congo (DRC) was established, an indigenous group known as the Batwa were forcibly expelled from their ancestral lands inside the park during the 1970s. For them the impact of this expulsion was dramatic: they were left landless, pushed to live an impover-



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ished existence among other communities outside the park, without land titles or financial compensation. From October 2018 onwards, however, the descendants of these Batwa started to reoccupy parts of the park. The park authorities and the national army responded with heavy-handed militarized conservation approach, in their attempts to expel the Batwa from the park once more. Throughout and after these events, competing narratives emerged which depict the Batwa's relationships to nature.

For our study, we combined quantitative and qualitative data. We analysed satellite images and data on tree cover loss. The qualitative component of the research is based on fieldwork from 2019 to 2024. During multiple trips, we conducted focus groups, semi-structured interviews, transect walks, and detailed field observations with people living in and around the park's highland sector. We spoke to Batwa and the members of other social and ethnic groups living in the area, customary and state authorities, farmers, artisanal miners, charcoal and timber producers and traders, non-state armed groups, park guards, and soldiers from the government military, among others.

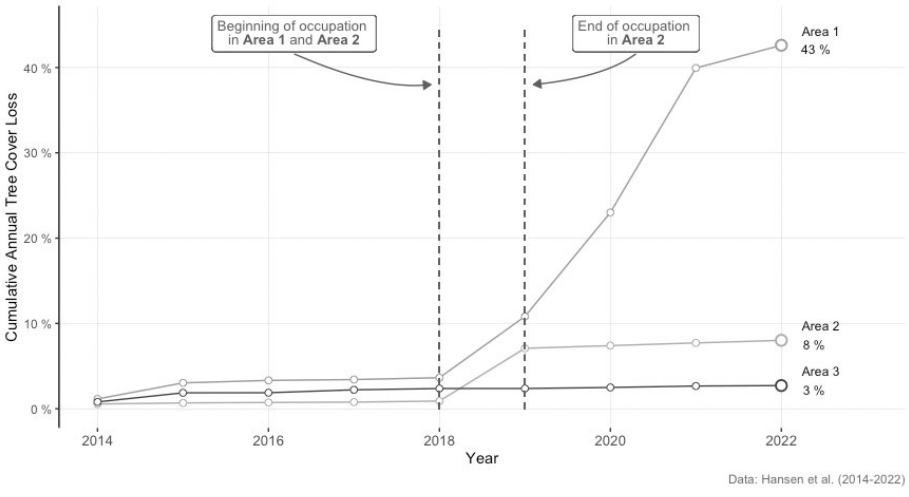
Stories of forest destroyers and forest guardians are deployed by actors with different views about the role of the state and indigenous peoples in conservation. On the one hand, the forest destroyers frame serves a hegemonic function, naturalizing state control of people, territory and nature as unquestionable common sense. On the other hand, the forest guardians narrative naturalizes indigenous peoples' rights to their ancestral lands, as part of a counter-hegemonic struggle against state governance of nature. The narratives promoted by the discourse coalitions place the Batwa at the epicenter of the events – either as unnecessarily victimized protectors of nature, or as victimizing perpetrators against whom nature needs to be protected. Our data challenge the narrative framings deployed by the two coalitions.

In October 2018, after multiple promises to provide them with land outside the park were broken, groups of Batwa started to return to the park's highland sector, to two main regions, respectively overlapping with the territories of Kalehe and Kabare. Once inside the park, they created new settlements with traditional houses, farms, churches, and schools. This event provoked diagonally opposed reactions from the different discourse coalitions. On the one hand, the park authorities accuse the Batwa of destroying the park; and on the other hand, indigenous rights NGOs either deny or downplay these claims.

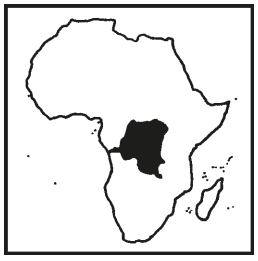
We assessed the impact of the Batwa's presence on tree cover inside the park with satellite data in three areas of the park. Areas 1 and 2 were those to which the Batwa returned, area 3 was a control area. The extent of tree cover loss in all three areas was relatively low between 2010 and 2017 as well as in 2018. However, the situation changed dramatically in 2019, just after groups of Batwa had started returning to the forest. Area 1 experienced 1602 ha tree cover loss and area 2 experienced 536 ha tree cover loss between 2019 and 2022. In area 2, 466 ha of this loss occurred in 2019. This was reduced from 2020 to 2022 when they left this region again. Area 3, which is not affected by the Batwa's return, experienced just 22 ha tree cover loss over the entire period 2019–2022. In sum, satellite data suggests the presence of the Batwa significantly accelerated rates of tree cover loss.

However, extensive field research reveals a much more complex reality. The Batwa surrounding Kahuzi-Biega National Park are among the most marginalized groups in the region. They suffer from nutritional deficiencies, poor hygiene, lack of medical care, inadequate housing, a high mortality rate. Where compensation has been provided, it has been limited, and mostly captured by Batwa elites. This marginalization has severely constrained the livelihood options available to most of the Batwa.

Since returning to the park, the Batwa have been able to take advantage



Cumulative tree cover loss in three areas of Kahuzi-Biega National Park between 2014 and 2022. Area 1: continual occupation by groups of Batwa from October 2018 to the present day. Area 2: temporary occupation between October 2018 and September 2019. Area 3: no Batwa occupation.



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of livelihood opportunities provided by wider structural conditions: in particular, massive demand for the park's charcoal and timber resources from the nearby cities of Goma and Bukavu.

In this respect, the Batwa employ two strategies. First, various Batwa chiefs have positioned themselves as the gatekeepers to a wider commodity chain leading to the park, which brings together a multitude of state and non-state actors. Second, to maintain control of this position within the commodity chain, and access to the park's resources, they resorted to violence; at times collaborating with, at other times contesting, different armed actors. Batwa chiefs were selling access to the park to neighbouring Bantu communities. During an interview with a Batwa chief, a steady stream of traders was coming out of the park, carrying planks of wood and sacks of charcoal. The goods were then collected by motorbikes and small pick-up trucks and transported to larger towns. However, the positionality of the Batwa in the commodity chain needs to be contextualized: they are but one, relatively minor, actor among a broader constellation of actors that is driving tree cover loss. Various actors profit from this commodity chain: local entrepreneurs organizing the transportation of goods via boat and trucks from the villages and markets at the edge of the park to Bukavu and Goma; and state agencies including the government military as well as customary authorities and nonstate armed groups extort taxes at different steps along the chain. There are also reports of more senior state officials profiting from the park's resources, in particular through gold mining. This sometimes happens in collaboration with armed groups – showing how state institutions can have ambivalent effects on dynamics of conservation and/or extraction.

As a second strategy, some Batwa chiefs and groups have resorted to violent means to maintain their economic interests and secure territory inside the park. For instance, a group of armed Batwa attacked the ICCN's Lemera patrol post Kalehe territory – park authorities claim this was done in collaboration with the Mai Mai Cisayura – on 2 August 2019. A park guard was killed during the attack. As a result, ICCN abandoned the patrol post entirely, which made it possible for the Batwa, in collaboration with other communities, to more easily access, extract and sell the park's resources.

Other than with park guards, the Batwa have ambiguous and contentious relations with a range of armed actors. Historically, various rebel groups have been also involved in illegal resource extraction within the park. The Batwa's return to the park's highland sector in 2018 coincided with the further (re)mobilization of armed groups that took advantage of the opportunity to enrich themselves. These groups were organizing and taxing the extraction and trade of the park's minerals; and, to a lesser degree, timber and charcoal. Several groups established bases in the park to profit from its resources, exacerbating insecurity in the surrounding area. The Batwa of Buhoyi village briefly worked alongside the Mai Mai Cisayura to secure territory inside the park in the latter half of 2019. On other occasions, Batwa have been victimized by non-state armed groups. One group killed a Batwa man and injured six others when its soldiers attacked a Batwa village inside the park in 2024.

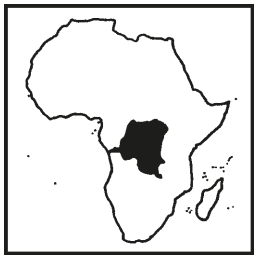
Based on our study, we challenge idealized depictions of indigenous peoples as either protectors or perpetrators, advocating instead for a context-dependent view of their role. Narratives portraying the Batwa as forest destroyers justified a heavy-handed approach to conservation law enforcement, involving joint-operations by the park guards and the military. Human rights abuses committed during these operations triggered international outrage, which was ultimately counter-productive for the park authorities. On the other hand, the forest guardians narrative renders invisible the Batwa's agency in deforestation and violence against park guards and government soldiers. Nuancing both narratives, we propose that the Batwa – much like the park guards – should be viewed simultaneously as victims and perpetrators, entangled in the broader dynamics of violence and extraction. This allows for cases where indigenous peoples are indeed exemplary environmental stewards – as much recent research and policy literature suggests – while also accounting for more complex situations where they play by rules of games that prioritize resource extraction, leading to ecological degradation.

Original publication

Simpson, F. O., Titeca, K., Pellegrini, L., Muller, T. & Dubois, M. M. (2024): Indigenous forest destroyers or guardians? The indigenous Batwa and their ancestral forests in Kahuzi-Biega National Park, DRC. World Development 186, 106818

A Milestone for People and Wildlife: Usala Corridor Gains Formal Protection

Local communities in the Usala conservation corridor were formally awarded land tenure of their traditionally owned forests by the Provincial Government of North Kivu on August 14, 2025. These four Local Community Forest Concessions (CFCLs – Concessions Forestières aux Communautés Locales) create a contiguous corridor that connects Maiko National Park with Tayna Nature Reserve. This designation is a critical milestone in the protection of essential Grauer's gorilla, okapi, and forest elephant habitat.



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Local leaders sign Free, Prior, Informed Consent (FPIC) declarations.
Photo: UGADEC/GRACE Gorillas

Local communities have stewarded these forests with traditional land management systems for decades; however, these systems have been eroded by war and deteriorating quality of life and are increasingly threatened by mineral extraction and in-migration.

Seeking a permanent way to protect their traditional land tenure and forests, local leaders asked the North Kivu based organization UGADEC (Union des Associations de Conservation des Gorilles pour le Développement Communautaire à l'Est de la R. D. Congo) for support in gaining formal protection. Local communities' most favourable way to do this in the DRC is to apply for a Local Community Forest Concession (CFCL) from the Provincial Government. Now approved, this designation allows communities to manage their own land for long-term conservation and sustainable livelihood objectives. Notably, during the formal allocation review, Provincial authorities commended the thoroughness of community engagement, particularly the fact that no formal or informal complaints were received during the public comment period.

This unprecedented acknowledgment from the Provincial government was made possible because, prior to advancing CFCL applications, UGADEC, GRACE, and local community leaders undertook an inclusive, extensive, transparent, and truly village-level free, prior, and informed consent (FPIC) process. This 18-month FPIC process established community-wide understanding and support for the newly created CFCLs. This foundation of transparency and ongoing engagement is vital to achieving meaningful and effective conservation in the Usala corridor.

This extensive village-to-village level engagement was no easy feat. One of the reasons Usala remains intact and is such critical habitat for threatened and endangered species is that it is extremely isolated. Rama, the key village of Usala is a seven-day walk from GRACE sanctuary headquarters in Kasugho. To successfully work in this area, long field work periods have been required, as well as a focus on hiring and training local staff as much as possible.

"This project is very important to me as part of UGADEC. We are committed to supporting communities and creating conservation zones, which reflects our vision of local people managing their own natural resources. For the communities, this project secures their forests and gives them the opportunity to manage them sustainably – for their well-being and for conservation." Omer Palaku, UGADEC Executive Director

For Usala, this formal community forest designation is just the beginning. Efforts are now focused on developing conservation management plans, providing management committee capacity building, and sustainable community development strategies.

At the same time, biodiversity surveys of important fauna species are underway, with some of the regions' very first monitoring data being returned via satellite connection in the last few months. This preliminary data shows evidence of gorilla, chimpanzee, okapi, pangolin and more.

Timber and non-timber forest product inventories and community focus groups on resource use have also been completed. This information will enable local communities to delineate different land-use zones allowing for some land to be set aside for artisanal land use to improve local economies. The area's first socio-economic surveys are nearing completion, highlighting key needs for communities in the area, as well as opportunities for sustainable livelihood initiatives.

These developments – supported by communities, local government, project managers, and donors who believe conservation in Usala can go hand in hand with stronger local economies – show that empowering communities to protect their forests and wildlife is possible.

Jennifer Holland, Jackson Kabuyaya Mbeke and Omer Paluku

Special thanks to Maneno Kakule Ndavugha and Mitondo Hamisi Alain for their close collaboration with communities in conducting the extensive Free, Prior, and Informed Consent (FPIC) process. We also acknowledge the important support of RGU Coordinator Papy Zephirin Mahamudi Kabaya and GRACE Usala Project Manager Dominique Trésor Valyananzi.

GORILLAS

Carrying Capacity of the Virunga Massif for Mountain Gorillas

The Virunga Massif, a chain of volcanoes in the heart of Africa, is home to one of two remaining populations of the endangered mountain gorilla. Six dormant volcanoes tower to elevations of up to 4,500 meters and span just 450 km^2 across three countries – the Democratic Republic of the Congo, Uganda, and Rwanda. Its complex geographical structure creates a diverse mosaic of habitat types, supporting a variety of fauna and flora. Here, mountain gorillas live in a protected habitat surrounded by the highest human population densities in sub-Saharan Africa.

How many mountain gorillas can the Virunga Massif truly sustain? It is a question we hear often – from conservation partners, researchers, and visitors who stand in awe of these forests. Scientists call this concept carrying capacity, the idea that every ecosystem has a limit to the number of individuals it can support over time, based on the availability of food, space, and other critical resources. Understanding this limit is not just theoretical; it plays a key role in how we measure the impact of conservation efforts and set realistic targets and expectations for long-term population management.

In the 1990s, researcher Alastair McNeilage (1995) was the first to tackle the challenging task of estimating how many gorillas the Virunga Massif could support. Using information about the types of habitats within the forest and how gorillas use these spaces, he estimated that the population would eventually reach carrying capacity once it passed a benchmark of around 600 individuals. That threshold has now been crossed.

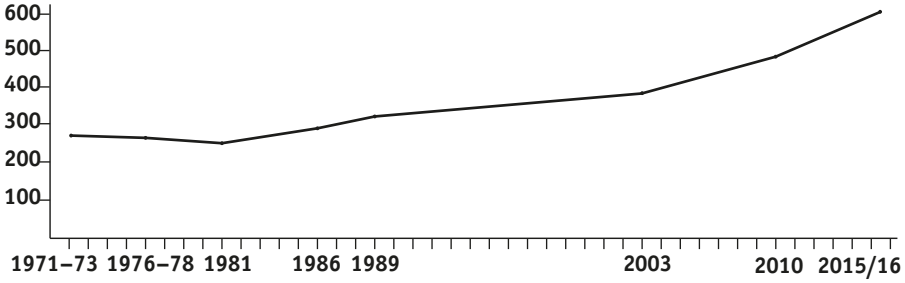
Thanks to decades of intensive, long-term collaborative conservation efforts, the Virunga gorilla population has steadily grown and recovered from a low of just ~250 individuals in the 1980s to more than 600 (639–669) gorillas in 2015/16 (Granjon et al. 2020). But now, new questions arise. Has the Virunga gorilla population already reached its limit, given the forest's small size and geographic isolation? Or could it still support more gorillas? And if they are nearing the limit, what ecological or behavioural factors will begin to slow, or eventually halt, this remarkable growth?

McNeilage (1995) highlighted key ecological and social mechanisms that could regulate the size of the Virunga gorilla population and emphasized the need for more research into how these factors play out in real time. For example, he proposed that human disturbance could affect gorilla movement and increase mortality; that limited food availability could spark intra-specific food competition, lowering birth rates and further raising mortality, unless gorillas can adapt to new resources; and that social pressures, such as more frequent interactions between groups and solitary males, could lead to increased infanticide and stress, both of which suppress population growth.

Since McNeilage's study (1995), long-term monitoring has significantly deepened our understanding of the forces that shape gorilla population dynamics in the Virungas. Thanks to continuous records dating back to 1967, when Dian Fossey established the Karisoke Research Center between Mount Karisimbi and Mount Bisoke in Volcanoes National Park, Rwanda, researchers have been able to track the changes in gorilla social behaviours, reproduction, and movement over decades. After her death in 1985, the Dian Fossey Gorilla Fund (i.e., the Fossey Fund), named in her honor, together with its conservation partners, carried forward this legacy.

A primary focus of the Fossey Fund's efforts has been to continue the long-term monitoring and scientific study of gorillas in the Karisoke research area, representing today's descendants of the gorilla social groups originally studied by Fossey. With data spanning nearly six decades, this represents one of the world's longest-running primate research projects, providing unparalleled insights into factors that influence population dynamics in a wild primate population living in restricted habitat.

From the 1980s until around 2010, gorillas in the Karisoke research area experienced the highest growth rates of any region in the Virungas (Gray et al. 2013). But more recently, this subset of the population has experienced slower growth rates, offering a rare chance to investigate the underlying biological and social mechanisms that might be regulating population size and structure (Caillaud et al. 2020, Morrison et al. 2022).



Development of the Virunga gorilla population (censuses)

Figure: Angela Meder

From the early 1990s to 2006, the Karisoke subpopulation consisted of three stable gorilla groups that grew steadily. These groups reached sizes up to 65 gorillas, containing up to 8 silverbacks – the largest groups ever recorded for gorillas. But stability did not last. Young males matured and began challenging the aging silverbacks for leadership, triggering a cascade of group splits and new group formations starting in 2006. Within just a few years, group density in the Karisoke research area tripled, while home range expansion into adjacent areas remained limited and slow. This sudden reorganization reshaped the social fabric of the Karisoke subpopulation, introducing new risks and pressures that continue to influence gorilla behaviour and survival today (Caillaud et al. 2020).

Since 2006, the presence of more gorilla groups inhabiting the same area has led to an 11-fold increase in home range overlap between neighbouring groups, triggering a 3-fold rise in inter-unit encounters (i.e., interactions between an established social group and either a solitary male or another social group) (Caillaud et al. 2020). These encounters can be highly aggressive and sometimes result in fatal injuries. As a result, the rate of infanticide rose 4.5-fold, and adult males, the primary defenders of their groups, faced an increased risk of dying from severe injuries (Caillaud et al. 2020). Notably, the rise in infanticide alone accounted for 57 % of the decline in population growth observed in the Karisoke subpopulation between 2000 and 2017 (Caillaud et al. 2020).

At the same time, more frequent encounters also created more opportunities for females to transfer to neighbouring groups or accompany solitary males. Female transfers increased 10-fold under these conditions (Caillaud et al. 2020). A recent study by Robin Morrison et al. (2023) showed that such transfers delay reproduction: females who transfer once between births experience interbirth intervals that are 7.5 months longer than those who remain in the same group, and this delay grows to 18 months for females who transfer twice. These delays have further contributed to the observed slowing of population growth.

In contrast to these pronounced social effects, long-term data from the Karisoke subpopulation lend little support for the idea that intra-specific food competition currently limits female reproductive success. While average interbirth intervals have lengthened in recent years, this trend appears to be primarily driven by delays among females who transfer between groups (Morrison et al. 2020). So far, there is no evidence that Virunga mountain gorillas are facing reduced food availability, even as gorilla densities have increased. However, rising food competition cannot be ruled out in the future, especially as the population continues to grow and as more attention is given to lesser-studied regions of the Virunga Massif beyond the historical Karisoke research area.

Since 2019, the Fossey Fund, in collaboration with the Rwanda Development Board, has expanded its research efforts to include eight gorilla groups outside the historical Karisoke research area. Six of these groups range in forest areas that experienced little to no population growth until 2010 but have recently begun to show encouraging upward trends. Data from this research expansion initiative revealed striking dietary differences between groups across Volcanoes National Park, a finding that aligns with the diverse habitat types where these groups range (Ihimbazwe et al. 2025). Researchers have now documented 57 additional food items in the Virunga mountain gorilla diet (Ihimbazwe et al. 2025), highlighting the need for updated assessments of food biomass and nutritional quality, which are critical components for estimating carrying capacity. These findings also reinforce earlier studies demonstrating the impressive dietary flexibility of mountain gorillas. Such flexibility may buffer the population from the effects of food competition by allowing gorillas to shift to alternative resources as availability changes. Still, we cannot rule out the possibility that food competition plays a critical role in regulating population growth in these newly studied areas. The timing and influence of each regulatory factor may differ by forest area and may depend on local habitat characteristics.

The question of carrying capacity becomes even more complicated when viewed in the broader context of the ecosystem. Mountain gorillas are not the only large herbivores inhabiting the Virunga Massif. They share the forest with elephants, buffalo, bushbucks, and duikers. For this reason, carrying capacity should not be assessed in isolation, and inter-specific competition must be considered. These sympatric herbivores also benefit from gorilla conservation measures, as highlighted in the most recent large mammal survey in Rwanda's Volcanoes National Park led by a young researcher from the Fossey Fund, Jean Claude Twahirwa and his team (2025). Andrew Plumptre's research (1991) in the 1990s found limited dietary overlap between mountain gorillas and other large mammals in the historical Karisoke research area. However, little is known about the diets of these species across other parts of the Virunga Massif.

It is likely that the feeding patterns of other herbivores, like those of the gorillas, vary substantially across space. To fully understand carrying capacity, we need a better understanding of how the diets of gorillas and sympatric herbivores overlap across time and the landscape, an essential piece of the carrying capacity puzzle.

Adding to the complexity of estimating carrying capacity is the simple fact that neither gorillas nor humans live in a static world. Human population growth and climate change are rapidly reshaping ecosystems, including those that mountain gorillas call home. The density of people living around gorilla habitats continues to rise, placing growing pressure on natural resources. One ongoing threat is the presence of snares set by poachers across the Virunga Massif which remains a significant conservation challenge. Though intended for other wildlife, these traps can injure or kill gorillas. Ongoing research is exploring how encounters with snares may influence gorilla ranging patterns, another important factor in estimating their carrying capacity.

Another key density-dependent factor that may limit future population growth has long been underrecognized: infectious disease. Compelling evidence stems from a recent, collaborative parasitological study conducted across the Virunga Massif (Petrželková et al. 2021, 2022, Mason et al. 2025). Conservationists have noted a rise in severe gastrointestinal illness within forest areas that experienced the highest population growth up to 2010, encompassing the Karisoke study area. Analyses of historical fecal samples show that over the past two decades, *Hyostrongylus*, a stomach parasite commonly found in pigs, has become dominant within the gorilla parasite community in this forest region (Mason et al. 2025). This shift coincides with a peak in gorilla group density and the social changes that followed.

Non-invasive endocrine studies have shown that encounters between gorilla social units can elevate stress levels up to eight times compared to baseline. Such spikes in stress may compromise immune function, increasing vulnerability to disease. However, stress is likely not the only contributing factor. For example, environmental characteristics exacerbated by climate fluctuations may create more favorable conditions for the development and survival of infectious larvae, leading to higher parasite exposure and infection rates. Additionally, denser gorilla populations may increase environmental contamination, heightening the likelihood of re-infection with parasites shed in gorilla feces. This study also revealed significant spatial variation in the load of strongylid eggs, a common proxy for infection intensity, across the Virunga Massif, with infection patterns closely tied to habitat types and differences in historical population growth patterns (Petrželková et al. 2021, 2022).

Thanks to decades of long-term monitoring, we now have a much clearer understanding of the factors and mechanisms that regulate the growth of the mountain gorilla population. This growing body of empirical data will be essential for refining future models that revisit and build on McNeilage's (1995) original estimates of carrying capacity. These models must account for the Virunga Massif's geographical complexity and how it shapes gorilla ecology, social dynamics, health, and demographic trends. Future projections would also benefit from the continued research efforts outlined throughout this article, such as updating biomass estimates based on the expanded list of gorilla food items, assessing nutritional quality, and investigating interspecific food competition.

Crucially, these research efforts must further extend beyond the historical Karisoke research area and Rwanda, which has been the foundation of much of our current knowledge of Virunga mountain gorillas. Expanding research into understudied forest areas in the Democratic Republic of the Congo and Uganda is vital for improving the accuracy and generalizability of carrying capacity estimates. As long as models rely primarily on data from Rwanda, they will remain limited. This underscores the importance of continued strong transboundary collaboration in future research and conservation planning.

Looking ahead, Rwanda's commitment to restoring parts of Volcanoes National Park, areas that were converted into agricultural land between the 1950s and 1970s, represents a major opportunity. Park restoration will not only increase available habitat for gorillas but may also help alleviate the social pressures and rising mortality rates associated with higher group density. Models of carrying capacity can no longer ignore the impact of forest regeneration along the park boundaries. Long-term ecological monitoring of these restoration areas will be critical for tracking the recolonization of fauna and flora, including gorillas and their key food plants.

So where does the Virunga mountain gorilla population stand today, a decade after the last survey? Due to disruption caused by the COVID-19 pandemic and regional unrest, the standard five-to-seven-year interval between population surveys has lapsed. Still, there is growing optimism that planning for the next transboundary survey can soon resume and will provide further insights into the population, now amassing over 600 individuals.

As forest restoration efforts take hold, growth rates may rise again in the coming decade. But the long-term trajectory is clear: growth cannot continue indefinitely. At some point, the Virunga mountain gorilla population will reach its ecological maximum. Future models for estimating carrying capacity will help conservationists set realistic targets for what that maximum might be, and, just as importantly, what it will take to sustain it.

When that time comes, the definition of conservation success will evolve. The goal will no longer be growth, but stability. And achieving that will require

the same commitment, collaboration, and vigilance that made the population's recovery possible in the first place, if not more, in this rapidly changing world.

The Dian Fossey Gorilla Fund

References

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

Twahirwa, J. C. et al. (2025): Positive population trends among meso- and mega-herbivores follow intensive conservation efforts in Volcanoes National Park, Rwanda. Wildlife Biology 2025 (1), 1–10. https://doi.org/10.1002/wlb3.01118

Granjon, A. C. et al. (2020): Estimating abundance and growth rates in a wild mountain gorilla population. Animal Conservation 23 (4), 455–465

Gray, M. et al. (2013): Genetic census reveals increased but uneven growth of a critically endangered mountain gorilla population. Biological Conservation 158, 230–238. https://doi.org/10.1016/j.biocon.2012.09.018

Ihimbazwe, H. et al. (2025): Dietary Variability Among Mountain Gorilla Groups Across Volcanoes National Park, Rwanda. Ecology and Evolution 15 (5), 1–20. https://doi.org/10.1002/ece3.71192

Mason, B. et al. (2025): Untangling parasite epidemiology of mountain gorillas through historical samples: Strongylid nematodes are friends or foe? Biological Conservation 310. https://doi.org/10.1016/j.biocon.2025.111319

McNeilage, A. (1995): Mountain gorillas in the Virunga volcanoes: ecology and carrying capacity. University of Bristol

Morrison, R. E. et al. (2023): Cascading effects of social dynamics on the reproduction, survival, and population growth of mountain gorillas. Animal Conservation 26 (3), 398–411. https://doi.org/10.1111/acv.12830

Petrželková, K. J. et al. (2022): Ecological drivers of helminth infection patterns in the Virunga Massif mountain gorilla population. International Journal for Parasitology: Parasites and Wildlife, 17 (November 2021), 174–184. https://doi.org/10.1016/j.ijppaw.2022.01.007

Petrželková, K. J. et al. (2021): Heterogeneity in patterns of helminth infections across populations of mountain gorillas (*Gorilla beringei beringei*). Scientific Reports 11 (1), 1–14. https://doi.org/10.1038/s41598-021-89283-4

Plumptre, A. J. (1991): Plant-herbivore dynamics in the Birungas. Bristol University, UK

Female Mountain Gorilla Have Some Power Over Males

Males have been long assumed to strictly overpower females in most mammals. Recent research questions this assumption suggesting that female-male power* relationships vary along a continuum from strictly male- to strictly female-biased. We wanted to investigate female-male power relationships in gorillas, because not only are males much bigger than females and have much larger canines, they are also typically considered to exhibit the strictest male-biased power over females among great apes and male gorillas are often depicted as a "male power archetype" across animals. At the same time, we knew that females have some control or power over males because females can transfer between groups, effectively deciding which male they want to reproduce with.

** Following what is becoming common scientific practice, we use the term 'power' rather than dominance (which is power based on force or the threat of force), as it is a more general concept including leverage (which is power based on the bargaining asymmetry of commodities that cannot be taken by force).*

We used behavioural data over 25 years from four groups of wild mountain gorillas living in Bwindi Impenetrable National Park, Uganda. Specifically, we used avoidance and displacement interactions to infer power/dominance relationships, a common process in studies of mammals including gorillas. We found that males generally have more power (rank higher) than females, and the highest-ranking male is never overpowered by females. However, we also observed that power is not strictly determined by sex and females can overpower other males. Almost all females had more power than at least one adult male (silverback) in multi-male groups.

Previous research on power relationships in gorillas and other mam-

A silverback in Bwindi National Park charging to show his power

Photo: Martha M. Robbins

mals mostly focused on contests among individuals of the same sex assuming that males overpower females "by default", but also assuming that males and females compete over different resources: males over females, and females over food. Our study suggests that females and males in fact often compete directly over access to resources. Specifically, power relationships between female and male gorillas determined priority of access to decaying wood, a rare resource and a critical source of sodium for gorillas. When a female overpowers a male, she always had priority over him in the context of feeding on wood.

Altogether, our findings suggest that even in species in which males are much larger and stronger, females sometimes can overpower males, and females and males compete directly over similar resources. These findings refine our interpretation of intersexual relationships across animals and caution against oversimplified views based solely on physical strength while neglecting the complexity of their social behaviour.

Nikolaos Smit and Martha M. Robbins

Original publication

Smit, N. & Robbins, M. M. (2025): Female mountain gorillas can outrank non-alpha males. Current Biology 35, 1–7

Group Traits Influence the Relationship between Individual Social Traits and Fitness in Gorillas

The social environment of an individual is strongly related to its fitness. In many social species, it has been shown that individual social traits, such as the strength of bonds, are linked to evolutionary fitness, reflected in birth rates, reproductive success or longevity. Many studies have investigated the impact of either individual social traits or group-level characteristics, such as group size, on fitness. However, it is largely unknown how the relationship of individual social traits and group-level traits affect fitness.

Using data from 21 years, researchers from the Dian Fossey Gorilla Fund and the universities of Exeter and Zurich examined how both individual social traits and group-level traits influenced the evolutionary fitness of 164 wild mountain gorillas in Volcanoes National Park, Rwanda. Amongst others, they investigated the impact of strength and stability of social bonds as well as group size and stability on fitness parameters, such as rates of illness and injury, birth rates and rates of illness and injury of dependant offspring.

The study showed clear sex differences in the costs and benefits of social bonds. Furthermore, the researchers showed that group-level traits modulated the effect of individual social traits on fitness. For female gorillas, having strong social bonds was related to lower rates of illness. However, for male gorillas, strong bonds were associated with higher rates of illness. This effect was strongest in unstable groups. At the same time, having strong social bonds was linked to lower injury rates in male mountain gorillas. Being in a large group was linked to lower rates of injury in male gorillas, whereas for female gorillas, it was linked to lower rates of illness. In small groups, females with strong bonds had lower rates of illness as well as lower birth rates. Infants of these females showed higher rates of illness. Whereas in large groups, females with strong bonds had higher rates of illness and higher birth rates. Infants of females in such groups had higher rates of injury.

Overall, the study shows how the social environment influences survival and reproduction of mountain gorillas. The social environment seems to affect survival rates in males more strongly than in females, which highlights the potential for sex-specific selection on social traits. Investigating multiple influencing factors, the study shows that several mechanisms seem to influence the relationship between social behaviour and fitness contributors, such as illness, injury, as well as reproduction. These mechanisms appear to be influenced by an individual's sex and age, and group characteristics seem to further modulate the impact of these mechanisms.

Taken together, the study demonstrates that social bonds come with both costs and benefits, resulting in potential fitness trade-offs in sociality. The researchers argue that the value of being social may depend a lot on an individual's sex, age, dependent offspring and traits of its social groups. Because of these varying costs and benefits, there is no one "best" way to be social, which may explain the wide range of social traits observed within species.

Original publication

Morrison, R. E., Ellis, S., Martignac, V., Stoinski, T. S. & Eckardt, W. (2025): Group traits moderate the relationship between individual social traits and fitness in gorillas. PNAS 122 (20), e2421539122

Navigational Strategies of Western Lowland Gorillas

Food resources in tropical forests often occur in dispersed and ephemeral patches. To navigate efficiently to such patches and hence to forage efficiently, animals need a spatiotemporal memory. However, the way mammals efficiently navigate their home ranges are poorly understood.

Using tracking data from over 596 days, researchers investigated how one group of wild western lowland gorillas in Nouabalé-Ndoki National Park navigated its home range, both in eve-

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ryday foraging and during long-distance foraging trips. Additionally, they examined whether the group used the sun to help them to do so.

The data showed that gorillas moved much longer distances to get to a swamp, containing important food resources. Furthermore, when gorillas made these long-distance foraging trips to the swamp, their movements were much straighter and faster than during everyday foraging on nearby patches. This implies that the group intentionally targeted the far away swamp using spatial memory and reflects a high motivational level to get to the swamp quickly. Taken together, these results suggest that western gorillas can efficiently navigate their home range. Additionally, the gorillas moved more directly when the sky was clear, even under the dense vegetation cover of the forest. However, the elevation of the sun, which can be used as a compass when being low, did not influence the path straightness. This implies that the gorillas did not use the sun's azimuth as a compass. Rather, they seem to rely on visual place recognition, using landmarks that are easier to detect under sunlight conditions.

According to the researchers, the study suggests that primates seem to use different kinds of navigational strategies, depending on the conditions they face. Thus, comparative studies of different primate species investigating the impact of various abiotic factors on movement patterns are needed to better understand navigational strategies in diurnal primates.

Original publication

Robira, B., Benhamou, S., Obeki Bayanga, E., Breuer, T. & Masi, S. (2024): Changes in movement patterns in relation to sun conditions and spatial scales in wild western gorillas. Animal Cognition 27, 37

Ambayeba Muimba-Kankolongo, Célestin Banza Lubaba Nkulu, Jacob Mwitwa, Florence Kampemba Mujinga and Misery Mulele Nabuyanda

Mining Impacts on the Environment in the Central African Copperbelt of Zambia and the Democratic Republic of Congo. Springer Cham 2026. XXI, 382 pages, 101 illustrations. Hardcover 181.89 euros, ISBN 978-3-031-96-785-6, Softcover ISBN 978-3-031-96-788-7, eBook ISBN 978-3-031-96-786-3

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United Nations Security Council

Letter dated 3 July 2025 from the Group of Experts on the Democratic Republic of the Congo addressed to the President of the Security Council. Final report of the Group of Experts on the Democratic Republic of the Congo. United Nations 2025, S/2025/446. 254 pages.

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BERGGORILLA & REGENWALD DIREKTHILFE

Since many years, our funding of patrols and of community activities have been supported by several zoos. This year, for example, the Stuttgart Zoo supported the renovation of a school (above) and the GaiaZOO the families of trackers (below), both at Mt. Tshiaberimu.

Right: During the species conservation day at Rostock Zoo, Nicky Schubert informs pupils about mining in D. R. Congo, mobile phones and gorilla conservation.
Photo: Annika Flanderka

Our Donors

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Many thanks to all donors, also to those we could not name here! We wish you all a wonderful New Year with plenty of success and happiness.