

2020 was the year primatologists postponed fieldwork due to COVID-19: what happened to wildlife and the landscape for African primates' conservation?

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Since the appearance of SARS-CoV-2 in late 2019 in China, to date, the disease COVID-19 (for the definition of the terms related to the virus, see Gilardi (2020)) has killed more than 3 million humans worldwide, around 2% of the 150 million people infected (<http://corona.tuply.co.za/>). Despite vaccinations becoming available in 2021, the disease continues to rage around the world, due limited and unequal access and vaccine escape among new variants. The result has been a global crisis, impacting economies and health, and leading to lockdowns that limit activities and trade. In addition to concerns about human populations, there are serious concerns about the transmission risk of COVID-19 to already threatened non-human primates (NHPs), due to their physiologic and genetic similarities close to humans (Melin et al., 2020) with extinctions of some species a real possibility. Experts recommended a range of measures, including halting research or tourism activities to reduce the risk of the virus spreading (Gillespie & Leendertz, 2020). In addition, NHPs serve as an umbrella species for the thousands of animals, insects, and plants in their habitats. In January 2021, the first positive cases for COVID-19 in African primates were reported in captive gorillas in the San Diego Safari Zoo Park (California, USA), which with health care did not lead to lethal consequences (<https://www.sciencemag.org/news/2021/01/captive-gorillas-test-positive-coronavirus>).

COVID-19 has made low-income households even more vulnerable (i.e., through increasing unemployment), leading to an increase in wildlife poaching, among which many flagship species such as great apes, elephants, rhinoceros, and pangolins are taken for consumption, to generate revenue (i.e., through the sale of ivory, bones, skins, scales, and other trophies), or for traditional medicinal practices. With COVID-19, both government monitoring and the presence of people such as researchers or fieldworkers in remote areas – both buffers for poaching and other activities (Campbell et al., 2011) – have declined.

Both local people and wildlife are increasingly vulnerable. International travel and visitors – once considered a means to safeguard wildlife – was almost eliminated by COVID-19, and the loss of wildlife can contribute to the loss of spiritual taboos or traditional beliefs. Other factors also contributed to a decline in tourism. On 24 April 2020, twelve rangers, a driver and four civilians were killed in a rebel attack in the Democratic Republic of the Congo (DRC)'s Virunga National Park (VNP), home to the endangered mountain gorilla (more on this subject matter can be found [here](#)). It was not an isolated case, the number of VNP employees who have died during their work because of civil wars (rebel groups, militias) and poachers in the last three decades is now over 200 – about 10% of rangers within the protected areas of the DRC. Tourism activity was halted over concerns for security, and as a result poaching again could increase. In one example, on the 11th of September 2020, arrests were made following the seizure of more than 25 apes trafficked from DRC to Zimbabwe (more on this subject matter can be found [here](#)).

Another alarming case was the attempted classification of the Ebo forest (Cameroon) into forest management units for logging in July 2020, which, fortunately, was halted (<https://earth.org/cameroon-suspends-logging-concessions-in-ebo-forest/>). Similar government declassifications of protected and reserved areas to concede them to timber or mining companies are common in Central Africa, motivated by financial gain (often with corruption due to a lack of law enforcement), without any prior environmental impact study of biodiversity.

On the other hand, the lack of social protection policies, and the high cost of living (including food insecurity and limits on other basic survival needs) resulting from the low human development index of people living in the home countries of the greatest biodiversity hot-spots, including NHPs, promote the overexploitation of the wildlife and the circulation of pathogens in the ecosystem.

Wildlife products (i.e., bushmeat, game, and fisheries) constitute the primary protein sources for local people living near rainforests. However, demand for non-timber forest products is also driven by urban centres; including: i) culinary and dietary preferences, ii) traditional medicine, iii) art and jewellery. Capture, transport, storage, and handling of these wildlife products – whether live or processed – introduces risks, disrupting the naturally stable

chains across pathogens-wildlife species-environment. When this balance is upset, pathogens develop novel survival strategies to reproduce in the new hosts they are exposed to, including humans, and can become more infectious (zoonotic) or lethal (Grange et al., 2021; McMahon et al., 2020; Melin et al., 2020).

Despite the conservation efforts of NGOs and researchers, human activities continue to have a significant and widespread impact on wildlife populations. Nearly 60% of NHPs are threatened with extinction, with human impacts including: poaching (i.e., illegal bushmeat trade, hunting for pets and/or folk medicine); habitat loss (deforestation, resulting from the expansion of livestock and other farming, logging concessions); the illegal pet trade; and disease transmission (e.g. Ebola, anthrax, respiratory illnesses; Kaur et al., 2008; Leendertz et al., 2006; Strindberg et al., 2018; Walsh et al., 2003). These are often driven by a focus on development or economic profit, while excluding consideration of social and environmental needs.

In the 1950s, the arrival of the first international primatologists in Africa to habituate primates for both research and tourism, led to an increase human-NHP interactions increasing the transmission risks of zoonoses (Woodford et al., 2002). These activities generated understanding, revenue, and public awareness for conservation; for example: a reframing of the ecological services of biodiverse tropical forests, including the wider study of medicinal plants, including those used by other primates (zoopharmacognosy), primates' role in reforestation by seed dispersal (e.g., Beaune et al., 2013; Huffman, 2003). However, understanding and concerns have steadily grown about the negative impact of disease transmissions between humans and other primates (e.g., Pafčo et al., 2017; Woodford et al., 2002). To address these risks, in 2020 the IUCN/SSC Primate Specialist Group released updated best practices guidelines for great ape tourism and research (see http://www.primatesg.org/best_practice_tourism/).

One factor driving the illegal wildlife trade has been increasing demand for wildlife products in East Asia, in particular China, where wildlife protection laws are typically less restrictive. During the COVID-19 pandemic, the link between human health and wildlife exploitation has been highlighted with new intensity, and the Chinese government has expressed increased willingness to combat illegal trade and consumption of wild animals in order to minimise future zoonotic risks (Koh et al., 2021). And if 2020 was the year of all the excess of human pressure on the environment (human spoil wildlife in African rainforests)! Due to the data gap between seized and missed wildlife products to boundaries it would be difficult to assess the consequences.

Most recent global health crises (Ebola, HIV, Avian Flu, monkeypox, and recently COVID-19) in the world are caused by pathogens that come from other animals as reservoirs (Gebreyes et al., 2014). We are the root cause of our own problems. The type and extent of negative

impacts of human activities on the environment remain a part, present, and future question to be debated. If we fail to take action the human as an apex ‘predator’ would be responsible not only just for his own extinction, but that of many other life forms. As highlighted by Réjou-Méchain et al. (2021), even the most sceptical conservationists now accept that if nothing is done today, following climatic and human pressures in the near future, the forests of the Congo Basin could disappear. This irreversible worst case scenario cannot be imagined. The forests of the Congo Basin and their extensions through Central Africa are the second most important carbon sink reserve after those of the Amazonian rainforests to reduce the impact of greenhouse gas emissions on human and global health. It is therefore vital to take a “Global ONE HEALTH approach” to safeguard biodiversity between humans, wildlife species, and the wider environment, to prevent future diseases and large scale global impacts. Two essential steps include: i) mitigating climate change through reducing the production of non-biodegradable waste, and eco-responsible use of forest resources (e.g., foods, medicinal plants, housing, etc.), and ii) ecological investments: less expensive and more sustainable “zero” impact approaches, such as use of renewable energies, and to consider and encourage the creation of green jobs.

Reducing our overexploitation of the environment is of critical importance for our survival, it is “a duty” of all living organisms, because, if we do not die from a pandemic, we will certainly die from the effects of climate change.

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