




Advancing conservation of threatened primates

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Our closest living relatives—the non-human primates—are in trouble. Approximately 64% of the 536 currently recognized species are included in one of the threatened categories of the IUCN Red List, with 16% categorized as Critically Endangered. How did this happen? Many factors combine to threaten primates: deforestation and habitat fragmentation reduce resources and restrict dispersal and gene flow; encroachment and urban expansion into primate habitats extend the human–wildlife interface, heightening the potential for conflicts and pathogen transmission; and extraction of primates for biomedicine, consumption and the pet and wildlife trade (notably for rituals and so-called medicine) reduces populations and affects demography. These threats drive mortality, decrease adaptability and lead to local extinctions, with profound—and potentially irreversible—effects on primates and the ecosystems they inhabit. Unsurprisingly, all articles in the primate conservation theme in this issue of *Oryx* concern threatened species.

Primates have long generation times (e.g. 22 years for gorillas; 12 years for howler monkeys and langurs; 6 years for tamarins), advanced ages at first reproduction, long lifespans and low fertility. Their conservation thus requires a matching long-term vision sustained by continuous efforts and resources. But, as Hameed et al. (2024) note in their review of primates in India, monitoring of primate populations is often short-lived and limited in geographical coverage.

Further hindrances to primate conservation include challenges of financing and logistics for environmental education, community conservation initiatives, maintenance of study sites, surveys and ranger patrols. Some logistical problems, however, are now being addressed by the application of technologies such as camera traps, acoustic monitoring and drones, improving the efficiency of data collection, especially for arboreal or cryptic species: unoccupied aerial vehicles have been used to survey the Critically Endangered cao vit gibbon *Nomascus nasutus* in China and Viet Nam (Wearn et al., 2024); the northern muriqui *Brachyteles hypoxanthus* and buffy-headed marmoset *Callithrix flaviceps*, both Critically Endangered, have been detected in Caparaó National Park, Brazil, using arboreal infrared camera traps (Kaizer et al., 2022); occupancy-based camera-trap surveys have been used to assess the Critically Endangered Celebes

crested macaque *Macaca nigra* across its range in North Sulawesi, Indonesia (Johnson et al., 2020); and multi-strata camera traps have been used to examine habitat use by the Endangered dryas monkey *Chlorocebus dryas* in the Democratic Republic of the Congo (Alempijevic et al., 2022). We cannot develop conservation plans for threatened primates without accurate population assessments (Rylands et al., 2020). These novel studies, together with more traditional research—such as for the Endangered ring-tailed lemur *Lemur catta* in Madagascar (Randrianjaka et al., 2024), the Endangered golden monkey *Cercopithecus mitis kandti* in Rwanda (Tuyisingize et al., 2023), the Critically Endangered Vieira's titi monkey *Plecturocebus vieirai* in Brazil (Costa-Araújo et al., 2022), and the Critically Endangered Delacour's langur *Trachypithecus delacouri* in Viet Nam (Nguyen et al., 2022)—all deal with surveys and the provision of essential baseline data.

A further challenge is ensuring that evidence from research is used appropriately and promptly by policymakers for management and conservation purposes. An example of a success story in this respect is the marked increase in the population size of the Critically Endangered white-headed langur *Trachypithecus leucocephalus* in China (Tang et al., 2024) following government intervention to reduce poaching. Population surveys conducted in 2010/2011 and 2020/2021 in the Chongzuo White-Headed Langur National Nature Reserve, Guangxi Province—home to 95% of the few known individuals—recorded an increase in the number of both individuals and groups over this period. Poaching for food and traditional medicine is no longer the main threat to these langurs, although forest loss and fragmentation continue.

Like other animals, primates do not respect national boundaries, and threatened species that occur in more than one jurisdiction potentially face additional problems from uneven conservation efforts. Transboundary collaboration and coordination are key in such situations. For example, the only known population of the cao vit gibbon occurs along the border between China and Viet Nam, and the home ranges of groups often span the two countries. Collaborative transboundary censuses in the Bangliang Gibbon National Nature Reserve in China and Trung Khanh Cao Vit Gibbon Species and Habitat Conservation Area in Viet Nam demonstrated a slow increase in this population from 2007 to 2016 (Ma et al., 2020). A memorandum of understanding between the two countries for cooperative conservation of the cao vit gibbon, along with a transboundary action plan, collaborative approaches to counter hunting, and informal meetings on the border have all facilitated the conservation of this species. But as

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with the white-headed langur (Tang et al., 2024), habitat carrying capacity is limiting further growth of the population. Other transboundary primate conservation efforts known to us include those for the Critically Endangered Raffles' banded langur *Presbytis femoralis* in Malaysia and Singapore (Ang et al., 2016), the Vulnerable brown howler monkey *Alouatta guariba* in Argentina and Brazil, and the Critically Endangered Cross River gorilla *Gorilla gorilla diehli* in Nigeria and Cameroon.

To appreciate the broader picture over and above the plight of individual species and locations, we need to step back and look at wider groups and regions. Rafanoharana et al. (2024) and Hameed et al. (2024) do this for lemurs in Madagascar and primates in India, respectively. Madagascar often makes headlines for its high deforestation rates and conservation challenges but extrapolation of current deforestation rates to 2050 indicates that the protected area system will provide a stronghold for the conservation of forest ecosystems and lemurs for at least the next 30 years. This should allow sufficient time for the implementation of effective conservation measures. In contrast, a systematic review of research on Indian primates conducted during 2000–2021 on 20 of the country's 26 primate species shows, overall, declining population trends, and that only seven species have been surveyed or re-surveyed in the last 5 years. As elsewhere, hunting and habitat loss and fragmentation are the main threats.

With so many species threatened, and with conservation hindered by the availability of both funding and time, how can the future of our closest relatives be secured? From our personal perspectives across three continents, local participation is key to the development and implementation of conservation actions. Primate conservation needs to be embedded in local leadership and knowledge, and to foster inclusivity. Across the major regions where primates live—Africa, Asia, Madagascar and the Neotropics—we see an urgent need to enhance local capacity-building programmes and networking to nurture and support the next generation of primate conservationists, as noted in an earlier editorial for conservation more widely (O'Connell & Carter, 2022).

Local stakeholders and researchers need to be engaged in research and conservation work and to be provided with the opportunities and resources to support long-term endeavours that match the long generation times of primates. Amongst others, the Latin American Society of Primatology, African Primatological Society, and Southeast Asian Primatological Association are helping primatology to flourish. The connections fostered by these and other regional and national organizations can catalyse effective conservation, capacity-building, long-term field studies and transboundary collaboration.

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