

were completed by a partnership between Botanic Gardens Conservation International, Universiti Brunei Darussalam, Sabah Forestry Department, Universiti of Malaysia Sabah, Forestry Department Sarawak, Bogor Botanic Gardens, The Indonesian Institute of Sciences (LIPI) and Arboretum Sylva Untan (Pontianak, Kalimantan). All these organizations carry out research on and conservation of dipterocarps both in situ and ex situ. This work is showcased in seven case studies in the report.

Only 47 of the 162 endemic species are held in ex situ collections, but 146 species (90%) occur in protected areas. Priorities for the group are investment in and maintenance and expansion of in situ conservation, particularly for the 15 threatened species that do not occur in either protected areas or ex situ collections.

Dipterocarps are under serious threat in their centre of diversity and a range of conservation actions are needed to protect them. To mobilize and inspire conservation efforts for this group, conservation recommendations are outlined in the report, including details of the Global Conservation Consortium for Dipterocarps, established in early 2021, which aims to develop a network of dipterocarp experts to coordinate action and share knowledge and expertise.

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Nubian flapshell turtle found in northern Uganda

The Nubian flapshell turtle *Cyclanorbis elegans* is categorized as Critically Endangered on the IUCN Red List (2021) and is one of the five most threatened chelonians. This species, which was previously presumed extinct, was rediscovered in 2017 along the White Nile in South Sudan, where for the last 4 years we have been studying its distribution, population size and conservation status, and potential threats (Luiselli et al., 2021, *Oryx*, 55, 490).

In August–September 2021, funded by the Turtle Survival Alliance, USA, we focused our surveys on the border region between South Sudan and Uganda, where the species has never previously been recorded. This area is characterized by gallery forests along the White Nile river course, and the marshlands of the Onyama River and of the Paanzalla, Difule and Laropi areas. This was once the last sanctuary in this region for the white rhinoceros *Ceratotherium simum*, which was extirpated in the late 1980s during the civil unrest that afflicted Uganda and South Sudan.

During our surveys, by five surveyors in 600 person-hours over 12 days, we observed one live Nubian flapshell



A Nubian flapshell turtle *Cyclanorbis elegans* found in northern Uganda. Carapace length was 73.4 cm. Photo: Gift Simon Demaya.

turtle and the shells of three additional individuals, in a remote area of northern Uganda bordering South Sudan (the exact location is not provided here, for the security of the species). Nothing is as yet known about the population size and viability of this population, although we presume that it may be overexploited, as the turtle is captured by local fishermen both for subsistence and for sale. As the area is remote and not yet severely altered by development, habitat loss in this region does not appear to be a threat to the species.

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Human–carnivore conflict management in the central High Atlas mountains of Morocco

The central High Atlas mountains of Morocco encompass an area of 10,502 km² and have a rich biological diversity. The last observations of the serval *Leptailurus serval*, leopard *Panthera pardus* and Barbary lion *Panthera leo* in Morocco were in these mountains. This area is still home to eight carnivore species (golden jackal *Canis aureus*, African wolf *Canis lupus lupaster*, red fox *Vulpes vulpes*, wild cat *Felis silvestris*, striped hyaena *Hyaena hyaena*, Eurasian otter *Lutra lutra*, common genet *Genetta genetta* and least weasel *Mustela nivalis*), two of which are categorized as Near Threatened on the IUCN Red List.

On 5 May 2021, the M'goun Geopark Association and the Moroccan Association of Life and Earth Sciences Teachers, in collaboration with the Sultan Moulay Slimane, Cadi Ayyad and Hassan II universities, organized a workshop to examine the

major threats to carnivores and the challenges to their conservation in this region and to provide recommendations for the protection of biodiversity in the central High Atlas. The workshop was an opportunity to reflect on past conservation studies and actions and to discuss coordination among researchers, local people, regional and national authorities, and NGOs.

The carnivore species of the High Atlas are threatened by overhunting, habitat destruction, highly fragmented populations and the risk of local extinction. Surveys of carnivores in the central High Atlas during 2019–2021 by AE and AF, with support from The Rufford Foundation, indicated there is increasing conflict between people and wild carnivores, particularly in the context of the predation of domestic animals. The majority of inhabitants have negative attitudes towards wild carnivores, and hunt and kill them to protect their livestock. Although the inhabitants know it is illegal to capture or kill wild carnivores, they continue to do so, using techniques such as poisoning.

To conserve the native carnivores of the central High Atlas, the workshop participants agreed that urgent measures need to be taken to (1) encourage rural community development projects, (2) help the inhabitants use non-lethal techniques to protect their livestock from carnivores, (3) manage human–carnivore interactions to increase public tolerance for wild carnivores, (4) raise awareness about the ecological and economic roles of wild carnivores, and (5) develop compensation programmes to assist local people by reimbursing them for losses attributable to predators.

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Beliefs that Indian pangolins have mystical powers threaten the species

The Eastern Ghats are a discontinuous chain of mountain ranges in South India. The Indian pangolin *Manis crassicaudata*, categorized as Endangered on the IUCN Red List, inhabits these human-dominated landscapes, especially where there is an abundant supply of ants and termites. A survey during August 2020–July 2021 of households in 21 villages in the region, outside protected areas, revealed that promulgation, through social media, of local beliefs that pangolins can produce electricity, is leading to increased demand for pangolin scales, and may be contributing to a decline in this species across the region.



An Indian pangolin rescued from a village by the Eastern Ghats Wildlife Society. Photo: Appanna Saragada.

Our survey revealed that the high economic value of the scales has resulted in increased hunting and trapping of pangolins. The scales are sold for USD 500–1,000 per kg on the local black market, and are used to make pendants to deter evil spirits, although this use is not apparently prevalent amongst the younger generation. It was also reported to us that some remote tribal communities use the scales as earrings, and that pangolin meat is consumed in some areas.

There are claims that pangolins produce a mysterious energy and can emit electrical sparks when the keratinised scales are probed with a testing screwdriver. Videos of the light of a testing screwdriver glowing when used to probe a pangolin's scales have been circulating on various social media platforms. Pangolins do not generate electricity and the screwdriver was presumably rigged to produce the glow. Our interviews also revealed another popular myth about pangolins: that forest fires can be caused by a pangolin rubbing its scales against dry grass or leaf litter in summer.

Beliefs and myths about the pangolin's mystical powers and medicinal value are part of the culture of the Eastern Ghats, and will need to be addressed as part of conservation efforts to halt the illegal trade in this species. Although education and awareness programmes can help instruct people about the ecological significance and conservation status of the Indian pangolin, tailored behaviour change campaigns through community outreach and engagement are required, along with proactive law enforcement measures, to influence behaviour and decision-making processes for reduction of anthropogenic pressures on the Indian pangolin in the Eastern Ghats.

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