

## A canopy connection: lemurs, forests, and Madagascar's conservation journey

By Serge C. Rafanoharana, F. Ollier D. Andrianambinina, H. Andry Rasamuel, Patrick O. Waeber, Lucienne Wilmé and Jörg U. Ganzhorn, 14th November 2023

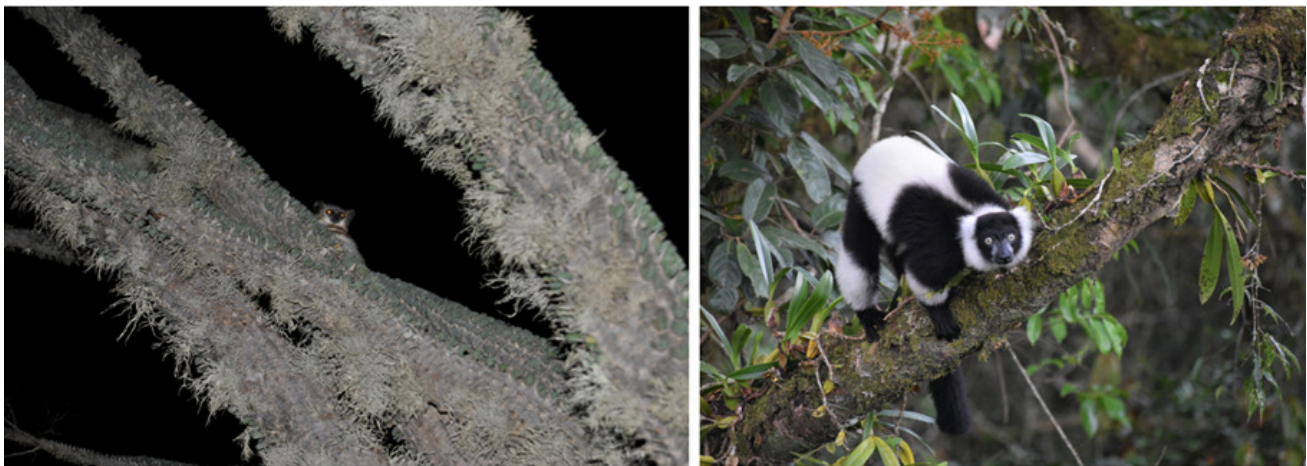
Madagascar, although a renowned biodiversity hotspot, has often made headlines for its high deforestation rates and conservation challenges. Despite these ongoing challenges, however, it is not all doom and gloom for the biodiversity of this unique island and particularly for its iconic lemurs. Our [recent study](#) brings a glimmer of hope as it delves into the dynamics of Madagascar's protected areas, specifically its wet and dry forests, and the implications for lemur conservation. Our findings support the idea that Madagascar's protected area system will continue to provide a stronghold for the conservation of forest ecosystems for at least the next 30 years.



More than 100 species of lemurs occur in Madagascar, such as the spectacular diademed sifaka *Propithecus diadema* in the humid forest. Photo: Ute Meede.

In 2003, Madagascar embarked on an ambitious journey to protect its rich biodiversity by tripling its protected area coverage. By 2016, the protected area system had quadrupled in size—a commendable effort deserving recognition. However, a look into the intricacies of this expansion raises important questions regarding effectiveness of the newly added protected areas in safeguarding the country’s unique and diverse forest ecosystems. Most of Madagascar’s endemic plants and animals are inextricably linked to these natural forests, but their future is shrouded in uncertainty.

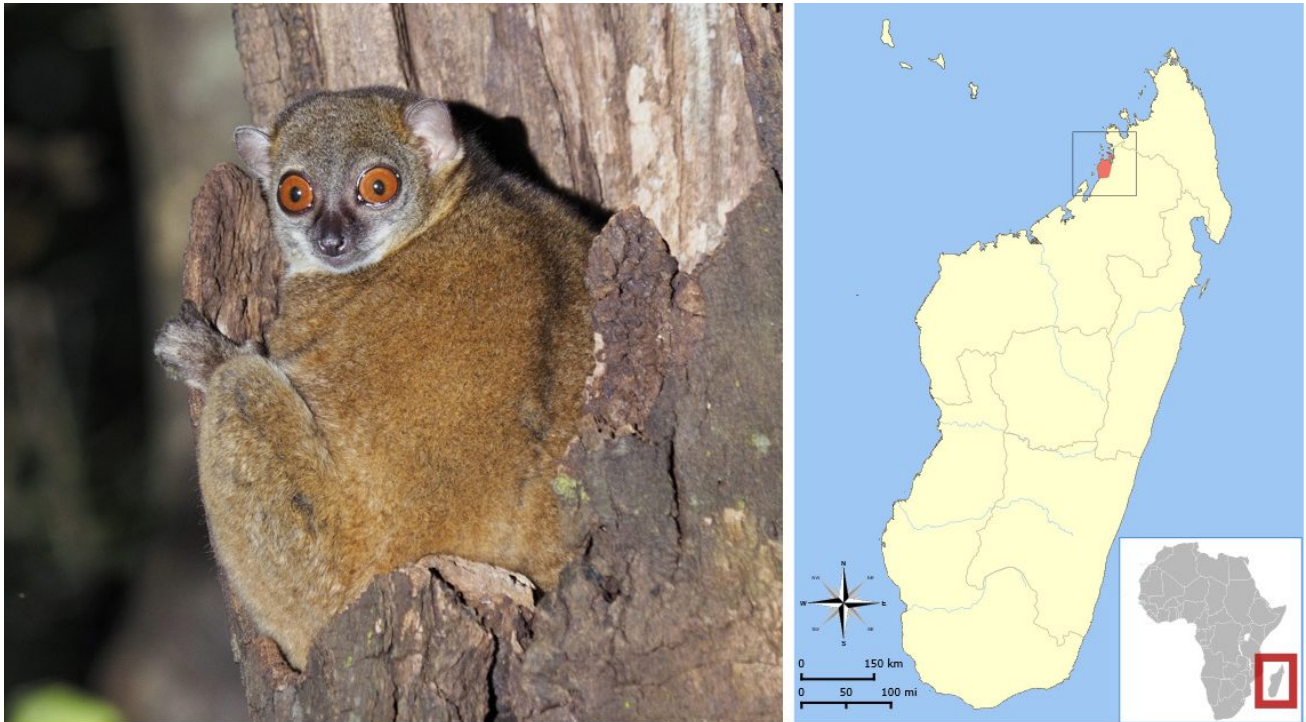
Conservation assessments of terrestrial ecosystems generally distinguish between forest and non-forest areas, yet classifying Malagasy forests uniformly as ‘forest’ risks overlooking the incredible complexity of the country’s vegetation. It is like attempting to capture the vivid tapestry of a tropical forest—dry or humid—with only black and white photography: it provides a vague idea, but you miss the vibrant nuances that make it truly remarkable. However, despite its limitations, this simplified classification can provide a starting point for navigating the intricate landscape of biodiversity protection on this incredible island.



Two extremes of Madagascar’s forest. Left: the spiny forest of south-western Madagascar with the nocturnal Petter’s sportive lemur *Lepilemur petteri*, in a region with erratic rainfall, often with several years without rain. Right: the evergreen humid rainforest of Ranomafana with the diurnal black-and-white ruffed lemurs *Varecia variegata*, with more than 2,000 mm of rain per year. Photos: Yedidya Ratovonamana (left) and Ford Bendell, Ranomafana Ruffed Lemur Project (right).

Protected areas come in a bewildering variety of shapes, sizes, management systems, ownership and governance patterns. To help make sense of it all and to define and record the growing number of areas designated for the conservation of nature and natural resources, the IUCN has developed a system for categorizing different protected areas. The categories range from I, with the strictest level of protection (all human disturbance except scientific study, environmental monitoring and education is prohibited), to VI, which permits sustainable use of natural resources. But although these categories are by now well established, details about their conservation effectiveness are often unknown. Madagascar’s original protected areas, which fall into IUCN categories I to IV, have provided reasonable protection over the last few decades. But the recent additions, primarily in categories V and VI, face resource and capacity challenges, potentially making them less effective for conservation. This raises concerns about the role of these new protected areas in mitigating the impacts of ongoing deforestation in Madagascar.

Endemic to the island, lemurs have become icons of Madagascar's wildlife. Using these charismatic primates as examples for assessing the future of forest-dependent taxa, our analysis projects their fate from 2017 to 2050, against the backdrop of ever-changing levels of forest cover. To estimate lemur populations for our analysis, we used the size of forest blocks as a representation of the number of lemurs per block. By meticulously extrapolating the numbers of lemurs within protected areas, which belong to different IUCN categories and have different rates of forest change, we sought to decipher the current and projected status of lemur populations in the face of shifting forest landscapes. Contrary to expectations based on the long history of catastrophic news from Madagascar, our results suggest the vast majority of protected areas will retain forest blocks large enough to allow lemurs to persist well beyond the year 2050.



Some lemur species, such as the Critically Endangered Sahamalaza sportive lemur *Lepilemur sahamalaza* occur in small forest fragments that need special and specific conservation measures to survive the next few years to come. Photo: Sam Cotton, Bristol Zoo & AEECL. Map of *L. sahamalaza* range: Alex Dunkel/Wikimedia Commons, with distribution data from the [IUCN Red List](#).

Yet this optimism is tempered by the sobering reality that several lemur species reside only in minuscule forest fragments, teetering on the brink of extinction. The forest sanctuaries that protect them are both a refuge and a battleground; beyond the encroaching deforestation, another shadow looms ominously: hunting. These endearing creatures, celebrated worldwide for their charm, face a grave threat that cannot be halted by conservation efforts alone. In this intricate tapestry of hope and concern, Madagascar's lemurs stand as emblematic figures for the health of its ecosystems. As the nation grapples with these challenges, one thing remains clear: it is not enough to protect the forests; we must safeguard their inhabitants by improving the livelihoods of people around the protected areas and reconciling human population growth with the limits set by economic advances.

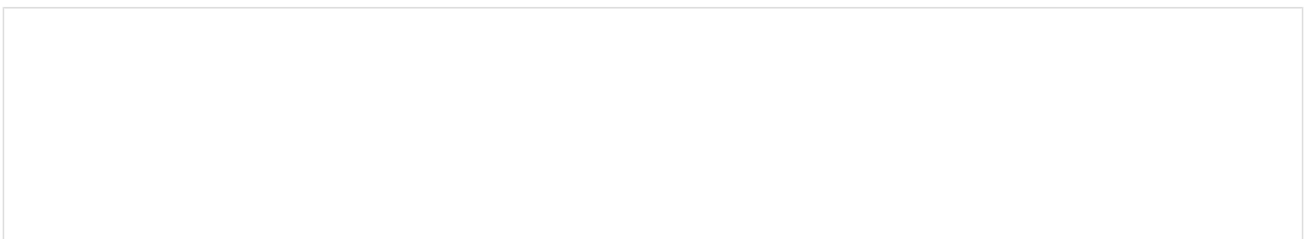


Collaborative training from Madagascar National Park and the [World Resources Institute \(WRI\)](#), combining forest inventories on the ground with remote sensing. Photo by Andry Rasamuel, WRI.

Amid this complexity, the World Resources Institute (WRI) Madagascar is working on [advanced tools for tree canopy monitoring](#), such as remote sensing, including satellite imagery and aerial photography. The use of these tools can enhance our understanding of the impact of deforestation on lemurs by unravelling the connections between lemurs and the evolving canopy, offering a more informed path toward their conservation (find out more by watching this [video](#)) and providing hope for the conservation of both lemurs and their forested homes.

The article '[Projecting forest cover in Madagascar's protected areas to 2050 and its implications for lemur conservation](#)' is available open access in *Oryx—The International Journal of Conservation*.

Header image credit: Randy McEoin / Flickr.





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The analyses are the result of a collaboration between Serge C. Rafanoharana (pictured: right), H. Andry Rasamuel and Lucienne Wilmé from the World Resources Institute (WRI), Madagascar, a team working on improving methods for remote sensing of the development of different types of forest in Madagascar.

F. Ollier D. Andrianambinina (pictured: left) works for Madagascar National Parks (MNP) and WRI, linking WRI's approach to MNP's mission to establish, conserve and sustainably manage the network of parks and reserves of Madagascar.

Patrick O. Waeber from the Swiss Federal Institute of Technology Zurich combines conservation biology and analyses of social-ecological systems with concepts towards sustainable development.

Jörg U. Ganzhorn, retired in 2022 from the University of Hamburg. He has been member of the IUCN SSC Primate Specialist Group, working on ecology, conservation and development issues in Madagascar, since 1984.