

Last chance for Madagascar's biodiversity

Madagascar's recently elected president ran on a platform of improving the economy and raising people out of poverty. We suggest that addressing the precipitous decline of biodiversity will help to deliver this commitment, and we lay out ways in which President Rajoelina could firmly put the country on a trajectory towards sustainable growth.

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Madagascar's extremely high rates of endemism are well known. Unfortunately, this unique biodiversity is severely threatened; nearly 50% of remaining forest is now less than 100 m from an edge¹, and deforestation, illegal hunting and collection for the pet trade has pushed many species to the brink of extinction². The pressures on biodiversity have significantly increased over the last decade; with new threats emerging and old ones increasing in scale (see Fig. 1). President Andry Rajoelina's five-year term, starting in 2019, may be the last chance to avoid habitats and species being committed to extinction. However, Madagascar is one of the poorest countries in the world; more than 40% of children under five suffer from stunting³. Conservation of biodiversity must therefore contribute to, not detract from, efforts of the country to develop economically.

Why the President should care about biodiversity

While Madagascar's incredible natural wealth is a source of national pride, it is also the country's unique selling point internationally. Tourism is a vital source of revenue (the total contribution of travel and tourism was 16.6% of gross domestic product in 2017; ref. ⁴), and the President identified the potential to greatly increase tourism during his campaign. The vast majority of international tourists visit protected areas⁵, and wildlife features strongly in marketing by the Malagasy national tourism board. Malagasy companies looking for international investment often use biodiversity in their advertizing, and the President's own election manifesto (<http://iem-madagascar.com>) featured images of baobabs and ring-tailed lemurs. Following the examples of Costa Rica and Rwanda (which have both benefited greatly from tourism attracted by their biodiversity), Madagascar's wildlife could play a central role in sustainable development.

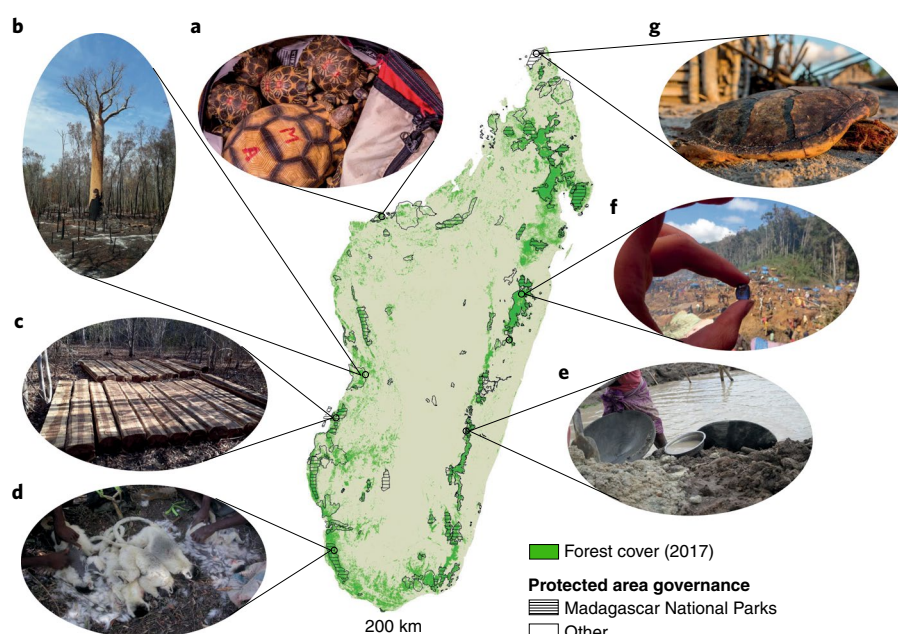


Fig. 1 | Madagascar's protected area network showing forest cover¹ and pressing threats. Forest continues to be lost within protected areas and many sites face severe and growing pressures from collection of threatened species for the pet trade (a), illegal land clearance for large-scale agricultural expansion (b), illegal timber exploitation (c), hunting of protected species (d,g), gold mining (e) and gem pit mining (f). These threats are increasingly linked to organized crime and involve people far from the local area. Credit: Chris Scarffe Film & Photography Ltd (a,g), Tahina Roland Frédéric (b,c), Madagasiakara Voakajy (d), Ricardo Rocha (e) and Rosey Perkins (f).

The vast majority of Malagasy people are rural and vulnerable to environmental shocks. Natural ecosystems are well known to contribute to resilience to climate change and provide other benefits to livelihoods. For example, the country's diverse marine ecosystems provide benefits to millions of coastal residents⁶, terrestrial forest can reduce surface water flooding, and recent work from Madagascar shows that bats suppress agricultural pests⁷. Madagascar without its biodiversity would be a much poorer place economically, as well as in other ways.

Improving the rule of law for both people and nature

Insecurity and corruption reduce investment and result in exploitation of national assets without taxes being paid, thus slowing development. The rule of law in Madagascar is in decline. The country fell eight places in the World Justice Project's Rule of Law Index between 2016 and 2018 (ref. ⁸). As well as being bad for economic development, weak governance has serious impacts on the environment. The threats faced by Madagascar's protected areas are increasingly linked to corruption⁹ (see Fig. 1).

Illegal logging of precious timber from protected areas attracted international condemnation when it dramatically increased in scale ten years ago¹⁰. The past decade has also seen an increase in mining within protected areas. The western dry forests are being rapidly cleared for large-scale cultivation of cash crops; recent reports suggest those clearing the land are being paid, and protected, by local elites¹¹.

The rampant exploitation of protected areas and species over the past few years, without regard to national laws and without taxes being paid, does not benefit ordinary people. There have also been many incidents where illegal activities in and around protected areas have been linked to insecurity, which directly harms local development. For example, in November 2018 illegal gold miners operating in Ranomafana National Park (one of Madagascar's most highly visited protected areas) raided a village and an investigating policeman was shot dead¹². There is concern in the nearby town that such insecurity will affect the tourism on which their economy depends.

Urgent action needed

We suggest five positive ways in which President Rajoelina could rapidly improve the state of Madagascar's biodiversity, benefitting both people and nature.

Tackling environmental crime. The technical capacity of the government to control wildlife crime has improved recently through the uptake of tools such as the Spatial Monitoring And Reporting Tool (SMART) for protected area law enforcement. New technologies, such as remote sensing and the use of rapid DNA barcoding allowing protected species to be easily identified, could help further. However, to be effective, improvements in how the Ministry of Justice handles environmental crimes are needed. Given the challenges faced by the judiciary and prison system¹³, we are certainly not advocating a clamp-down on poor farmers who break environmental laws. Effective prosecution and significant fines for traffickers (for example, of rosewood or critically endangered species for the pet trade), however, must be a priority so criminals cannot profit from destroying Madagascar's natural heritage. Recent attempts to improve prosecution success of those involved in rosewood trafficking in the northeast of Madagascar, through collaboration between a range of stakeholders, point to a way forward.

Investing in Madagascar's protected areas. While it is clear that Madagascar's protected

areas have not been completely effective (many suffer from under-investment), they did, on average, slow deforestation compared to unprotected areas, at least up to 2010 (ref. ¹⁴). The recently expanded network (Fig. 1) is an invaluable national and international asset. The Madagascar Biodiversity Fund has more than US\$75 million invested for the benefit of the protected area system (<http://www.fapbm.org/>) but income from this endowment covers only about 10% of the management costs for the full network. Policy, legal and economic conditions that encourage further investment in nature need to be developed, such as improving infrastructure to develop tourism around protected areas, payments for ecosystem services, and debt for nature swaps. Management of protected areas must ensure local people, who may bear costs from establishment and management, are properly considered¹⁵.

Ensuring major infrastructure developments limit impacts on biodiversity. Only 13% of Madagascar have electricity and much of Madagascar's transport infrastructure is in a dilapidated state. The country also has untapped mineral resources which will play an important role in the country's economic development. Madagascar joined China's belt and road initiative in 2017 and the Chinese government promise significant investment. The existing environmental impact assessment law is more than 20 years old and needs to be revised to explicitly require the use of strategic environmental assessment and the mitigation hierarchy. However, laws also need to be enforced. A recent US\$2.7 bn deal between a private Malagasy association with links to the former president and a Chinese consortium involving fishing rights has raised significant concerns¹⁶ and local communities are concerned that the deal will decimate their livelihoods. A robust and credible planning process is essential to maximise benefits from large investments, while avoiding unnecessary environmental and social costs.

Strengthening tenure rights for local people over natural resources. Tenure has long been recognised as vital for the effective management of natural resources. Madagascar was ahead of the curve in introducing legislation to support community management in the late 1990s, and more than 15% of forests are now under community management¹⁷. Locally Managed Marine Areas are being increasingly established along Madagascar's coasts and initial reports suggest they can be successful at improving marine resource

management¹⁸. However, legal changes are needed for these to be recognised in national law. Clarifying private tenure can also play a role in improving management. The fact that most farmers on Madagascar's forest frontiers cannot get certification for their land (the 2005 tenure reforms explicitly excludes land within protected areas) discourages them from investing in settled agriculture, potentially contributing to ongoing forest clearance¹⁹. Further review of Madagascar's tenure laws, considering the equity implications, could therefore help both local people and biodiversity.

Addressing Madagascar's growing fuel wood crisis. The vast majority of Malagasy depend on wood or charcoal for cooking. Renewable resources (from sustainably managed woodlots and plantations) are already insufficient to meet the growing need, contributing to pressures on protected areas. The situation is projected to worsen as populations continue to rise. The country has made strong commitments to reforestation under both the Bonn Challenge and the United Nations Framework Convention on Climate Change. So far, however, while scattered initiatives are making progress, the areas effectively planted remain small. Facilitating investment in reforestation efforts, if sensitively done, could provide environmental and economic benefits. Since his election, President Rajoelina has expressed great ambition in this area²⁰.

Given its current economic situation, Madagascar is likely to require donor support for some time. However, no amount of international aid can solve Madagascar's biodiversity crisis. Sustained commitment from the national government is essential. Without urgent action, it will soon be too late to save some of Madagascar's most iconic habitats and species. By making progress in the five areas we highlight, the recently elected President's term could instead result in a turning point for Malagasy biodiversity. □

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