Deforestation, land degradation and natural resource management in Madagascar

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Programme de protection et exploitation durable des ressources naturelles (PAGE 2)

Introduction

Biodiversity is important

- How can it be protected, restored and sustainably managed?

  → Presentation of Sven Günter in the next session

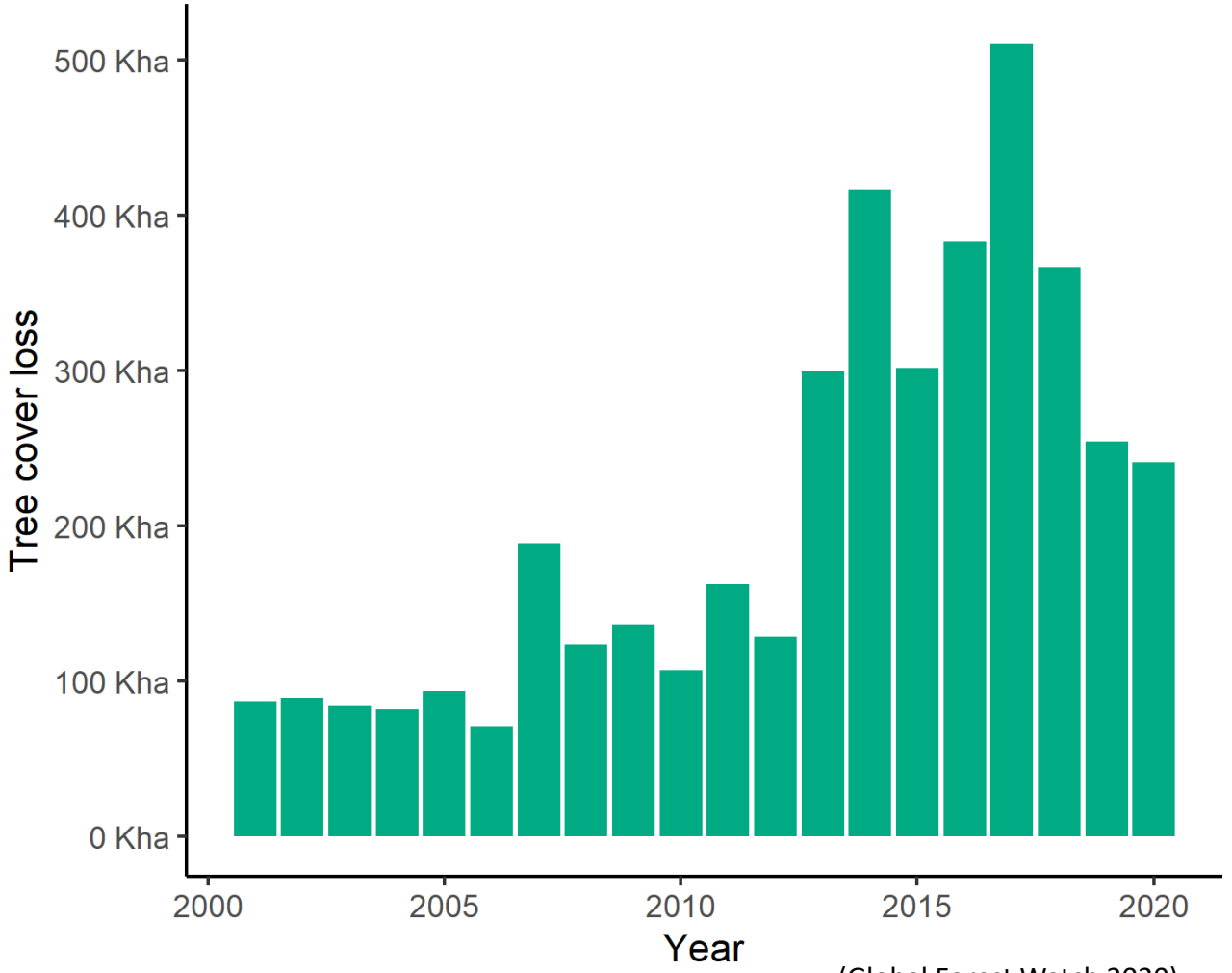
  → This presentation: Relevant background for Madagascar

Content:

1. Deforestation and land degradation
2. → Impacts
3. → Drivers
4. Past efforts for biodiversity protection and natural resource management

Past trends: Deforestation

- Majority of Madagascar was covered in forest before human arrival
  - Percentage of original forest cover disputed
- 44% of natural forest cover lost between 1953 and 2014 (Vieilledent et al. 2018)
  - Fragmentation: 46% of remaining forest is less than 100 m away from the forest edge
- Current hotspots:
  - Dry forests in the west and southwest
  - Rain forests in the northeast



(Global Forest Watch 2020)

Past trends: Land degradation

More challenging to quantify at the national level than deforestation

- Global Mechanism of the UNCCD, 2018:
  - 1.9 million people were living on degrading agricultural land in 2010
  - Annual cost of land degradation: 1.7 billion USD (= 23% of Madagascar's GDP)

Ample evidence from research at individual study sites

→Most ecosystems impacted (forests, agricultural land, coral reefs, …)

Impacts on biodiversity

- 90% of endemic animal species live exclusively in forest or woodland
  - “Because of the country’s high rate of endemism, the loss of one hectare of forest in Madagascar has a larger effect on biodiversity than forest loss elsewhere in the world” (CBD)

→Deforestation, forest fragmentation and forest degradation have significant negative impacts on biodiversity

Impacts on ecosystem services

Regulating services

- Erosion leads to lower soil fertility, damage to marine ecosystems, clogging of irrigation canals and siltation of rice terraces
- Reduction in flood and drought regulation
- Climate mitigation: Sector “Agriculture, Forestry and Other Land Use” is responsible for 89% of Madagascar’s total greenhouse gas emissions

Cultural services

- Loss of cultural and spiritual identity
- Reduction in touristic potential

Impacts on ecosystem services

Provisioning services

- Reduction in the availability of …
  - Water for household use and irrigation
  - Fuelwood
  - Wild food
  - Medicinal plants

Impacts on livelihoods

High dependence on natural resources

- Agriculture is principal or secondary economic activity for 81% of households
  - Mostly smallholder subsistence farming with low levels of productivity
- Ecosystem services important for food security
  - Sources of food (fisheries, wildlife hunting, wild food)
  - Regulating services support agriculture (e.g. freshwater for irrigation, pollination, pathogen control)
- Wood is main source of energy

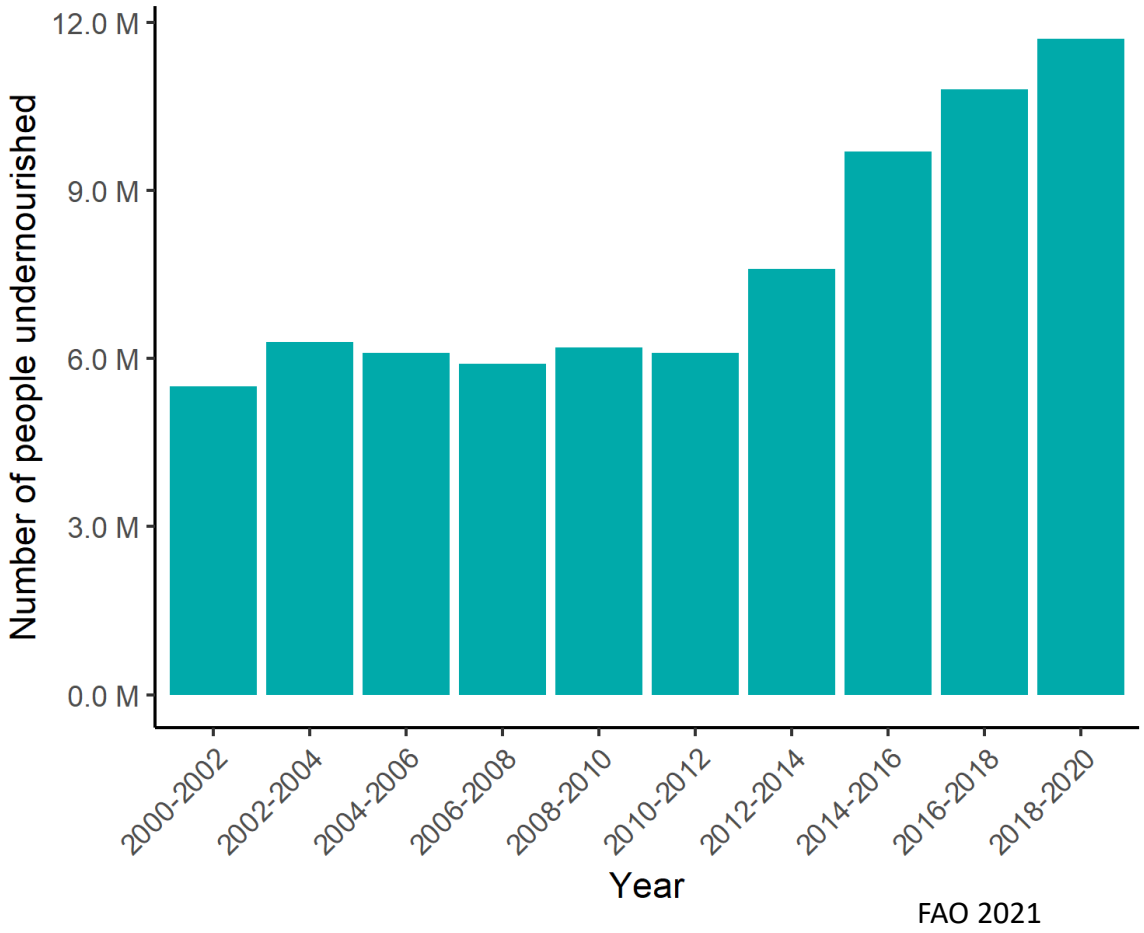
Impacts on livelihoods

Non-sustainable forest use and deforestation can have positive short-term impacts

On the long term, crop yields are likely to stagnate or even decline

- Rising food insecurity and recurrent food crises in some areas
- Encourage mass migration from rural areas to urban centres

More disease exposure for humans and domestic animals



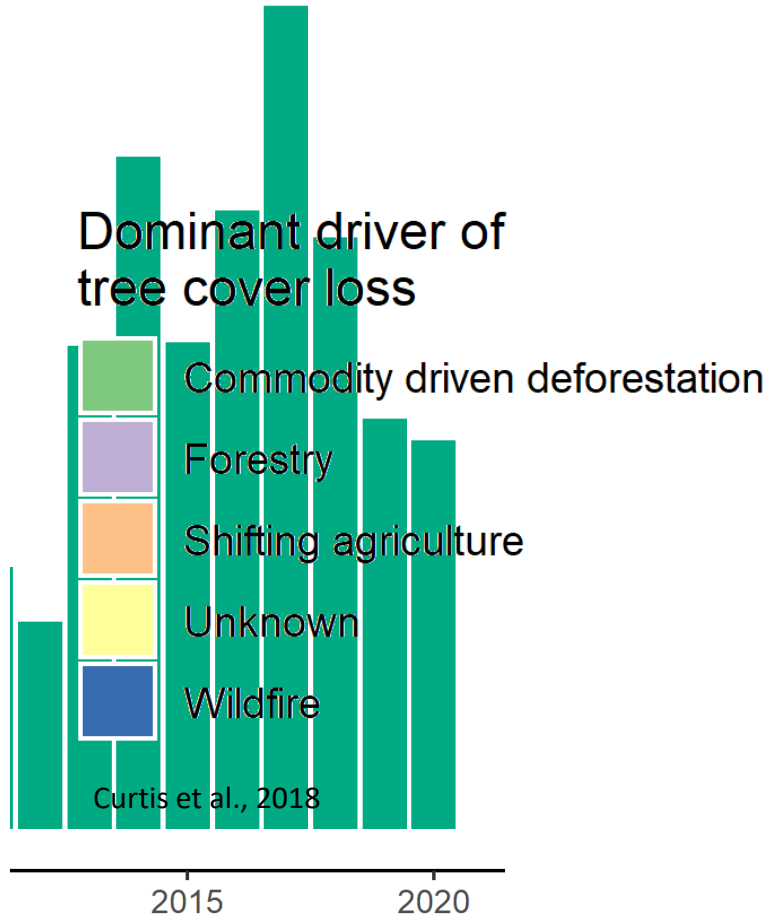
FAO 2021

Drivers of deforestation and forest degradation

Proximate causes

- Agricultural expansion
- Wood extraction
- Infrastructure extension

Other



(Global Forest Watch 2020)

Drivers of deforestation: Shifting agriculture

“Tavy” or “hatsake” in the Malagasy language

Field preparation by slash-and-burn of forest

→Ash from burned trees fertilizes the soil

- Cultivation of crops for some seasons
- Fallowed for > 10 years to regenerate soil and vegetation

→ Traditional practice can be sustainable

Drivers of deforestation: Shifting agriculture

Increased demand for food products due to population growth leads to …

- Reduction of fallow periods

→ Soil fertility decreases with every rotation

- More areas under shifting agriculture
- Use of steep slopes and higher altitudes

→ Increased deforestation and land degradation

Drivers of forest degradation

Livestock

- Important driver in western and southern Madagascar
  - Grazing pressure in forests is a major cause of degradation
  - Burning grasslands to promote re-growth often destroys forests and natural habitats

Logging for timber

- Sourced almost exclusively from protected rain forests of eastern Madagascar
  - Mostly illegal logging
  - Mostly for the Chinese market
- → Depletion of rare, endemic trees of *Dalbergia* species (rosewood)

Drivers of forest degradation

Fuelwood and charcoal

- Fuelwood collection drives forest degradation
- Charcoal production causes degradation, but also deforestation
  - Mainly produced for growing urban population

Hunting and overexploitation

Drivers of deforestation and forest degradation

Proximate causes

→ Mainly subsistence needs of smallholders

- Large-scale agribusiness less important than in many other countries

Underlying causes

Other factors

Past efforts for conservation

For decades, tackling deforestation and land degradation has been on the agenda for the national government, multilateral donors and researchers

Main approaches (Jones et al., 2021):

1. Protected areas
2. Community-based forest management
3. Alternative agricultural practices and livelihoods to reduce shifting agriculture

Past efforts for conservation: Protected areas

Protected area network: 144 parks

In 2003, increased from 3% to 10% of Madagascar's area

- Most new protected areas are multiple-use sites:
  - Sustainable extraction (e.g., fuelwood, NTFPs)
  - Co-management between NGOs and local communities

Past efforts for conservation: Protected areas

Have protected areas succeeded in reducing deforestation rates?

- Debated in science, but overall: Deforestation in protected areas is lower, but only marginally (Waeber et al., 2016)
- Illegal exploitation continues

Evaluating the effectiveness is challenging:

- Forests in protected areas generally had less deforestation pressure before establishment than non-protected forests
- Leakage: Was deforestation displaced from protected to non-protected forests?

Past efforts for conservation: Community-based forest management

Implemented in 1994

- Madagascar one of the first southern hemisphere countries to introduce CBFM

Has CBFM succeeded in reducing deforestation rates?

- Debated in science, but overall: No significant difference between deforestation in areas with and without CBFM (Rasolofoson et al., 2015)

Past efforts for conservation: Community-based forest management

Reasons for low efficiency of CBFM (Ramamonjisoa, 2014; Pollini and Lassoie, 2011):

- Did not increase the income of communities
  - … but generated additional duties and time-investment
- Resource capture by local elites
- Lack of monitoring and support
- Lack of capacity building

Past efforts for conservation: Alternative agricultural practices

Objectives:

- Sustainable yield increase
- Regeneration of degraded lands
- Transformation of fallow land to more productive permanent agricultural fields

Methods:

- Conservation and regenerative agriculture techniques (e.g. agroforestry)
- Permaculture

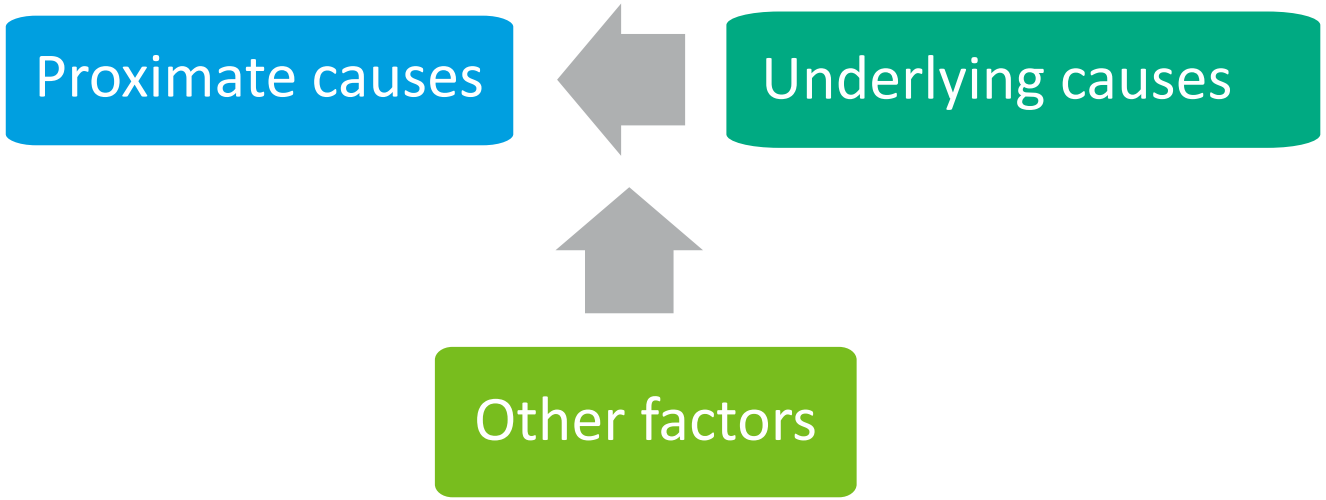
No widespread adoption → Shifting agriculture still prevalent

Outlook

Did past efforts for conservation fail?

- Deforestation and land degradation continues despite all efforts
- However, it is impossible to know what would have happened without past efforts

Why were results not as initially expected?



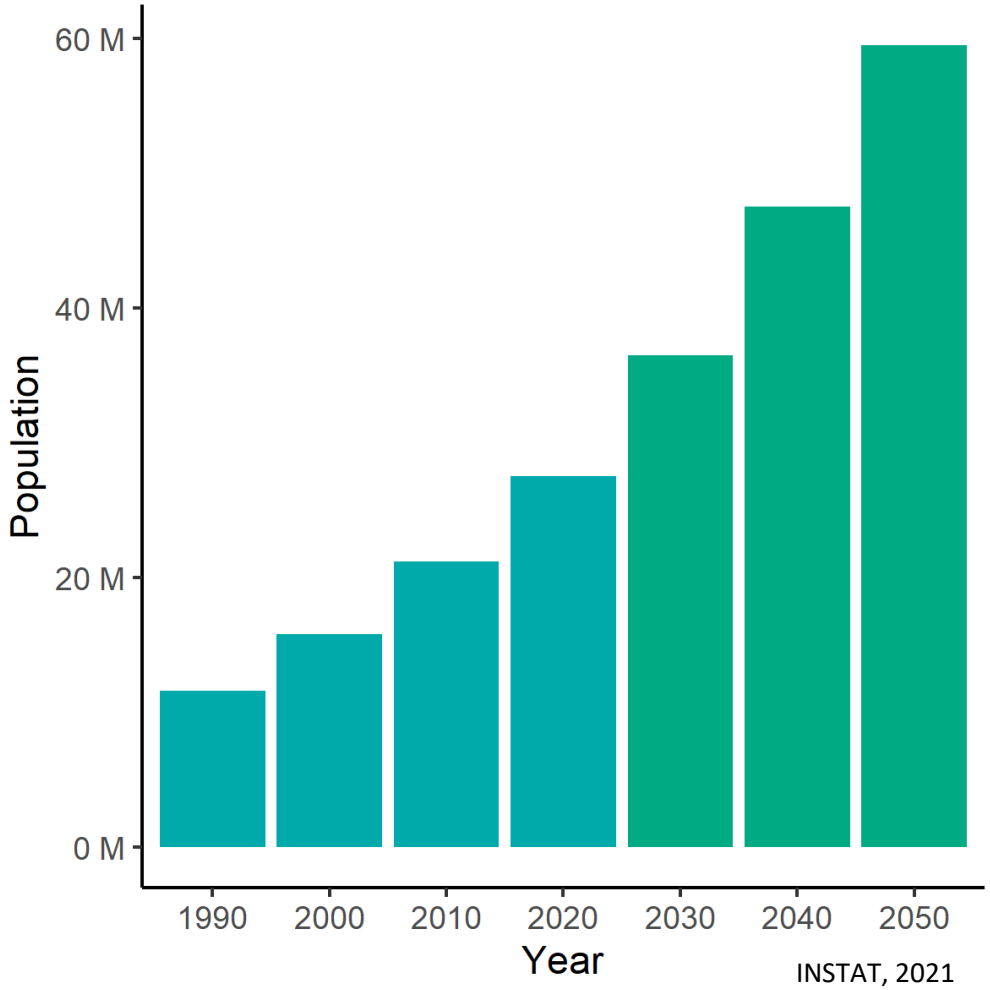
Outlook

Main underlying causes for deforestation and degradation

- Poverty & Population growth

Intricately linked indirect economic, political, ecological and social causes:

- Political instability
- Insecure land tenure
- Rank of Madagascar in the Corruption Perceptions Index: 149/180 (Transparency International 2021)
- Shifting agriculture is deeply ingrained in culture
  - … and often the only option to ensure food security of smallholder households



INSTAT, 2021

Outlook

Other factors

Climate change will have potentially significant adverse impacts on crop yields and food security in the next decades

Madagascar on the brink of climate change-induced famine

By Andrew Harding
Africa correspondent, BBC News

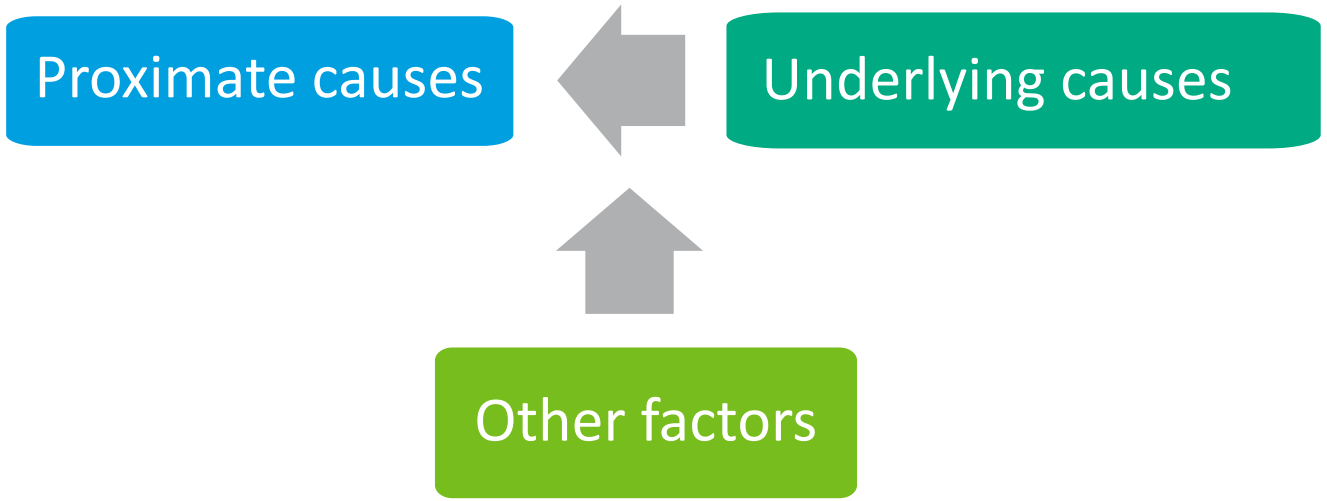
25 August

BBC, 2021

Outlook

Approaches to protect biodiversity, reduce deforestation and land degradation and improve natural resource management have to be

- Holistic & intersectoral
- Consider needs of smallholders
- Take all relevant drivers into account



Thank for your attention!

Misaotra!

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References:

BBC, 2021. Madagascar on the brink of climate change-induced famine. https://www.bbc.com/news/world-africa-58303792.
CBD. Madagascar Country Profile. https://www.cbd.int/countries/profile/?country=mg (accessed 1 November 2021).
Curtis, P.G., Slay, C.M., Harris, N.L., Tyukavina, A., Hansen, M.C., 2018. Classifying drivers of global forest loss. Science (New York, N.Y.) 361, 1108–1111. https://doi.org/10.1126/science.aau3445.
FAO. FAOSTAT Statistical Database: Madagascar. https://www.fao.org/faostat/en/#country/129 (accessed 1 November 2021).
Geist, H.J., Lambin, E.F., 2002. Proximate Causes and Underlying Driving Forces of Tropical Deforestation. BioScience 52, 143. https://doi.org/10.1641/0006-3568(2002)052[0143:PCAUDF]2.0.CO;2.
Global Forest Watch. Tree cover loss in Madagascar. www.globalforestwatch.org (accessed 11 November 2021).
Global Mechanism of the UNCCD, 2018. Country Profile of Madagascar. Investing in Land Degradation Neutrality: Making the Case. An Overview of Indicators and Assessments, Bonn, Germany.
INSTAT, 2021. Population et Démographie après l'année 2018 : Combien sommes-nous actuellement ? Quelle tendance jusqu'en 2050 ?
Jones, J.P.G., Rakotonarivo, S., Razafimanahaka, J.H., 2021. Forest Conservation in Madagascar: Past, Present, Future.
Pollini, J., Lassoie, J.P., 2011. Trapping Farmer Communities Within Global Environmental Regimes: The Case of the GELOSE Legislation in Madagascar. Society & Natural Resources 24, 814–830. https://doi.org/10.1080/08941921003782218.
Ramamonjisoa, B., 2014. Managing Environmental Risks and Promoting Sustainability: Conservation of Forest Resources in Madagascar, in: Kaneko, N., Yoshiura, S., Kobayashi, M. (Eds.), Sustainable Living with Environmental Risks. Springer Japan, Tokyo, pp. 73–86.
Rasolofoson, R.A., Ferraro, P.J., Jenkins, C.N., Jones, J.P., 2015. Effectiveness of Community Forest Management at reducing deforestation in Madagascar. Biological Conservation 184, 271–277. https://doi.org/10.1016/j.biocon.2015.01.027.
Transparency International. Country data: Madagascar. https://www.transparency.org/en/countries/madagascar (accessed 1 November 2021).
University of Maryland, World Resources Institute. Global Primary Forest Loss. www.globalforestwatch.org (accessed 11 November 2021).
Vieilledent, G., Grinand, C., Rakotomalala, F.A., Ranaivosoa, R., Rakotoarijaona, J.-R., Allnutt, T.F. et al, 2018. Combining global tree cover loss data with historical national forest cover maps to look at six decades of deforestation and forest fragmentation in Madagascar. Biological Conservation 222, 189–197. https://doi.org/10.1016/j.biocon.2018.04.008.
Waeber, P.O., Wilmé, L., Mercier, J.-R., Camara, C., Lowry, P.P., 2016. How Effective Have Thirty Years of Internationally Driven Conservation and Development Efforts Been in Madagascar? PloS one 11, e0161115. https://doi.org/10.1371/journal.pone.0161115.