

Antananarivo – July 2019

BioSceneMada

Biodiversity scenarios under the effects of climate change and deforestation in Madagascar



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[1] Cirad AMAP, [2] WCS, [3] ETC Terra/Nitidæ, [4] Cirad ASTRE, [5] ONE

Plan

- ① Science
 - Articles accepted
 - Articles submitted
 - Articles in prep
- ② Formation
 - Student training
 - Capacity building

- ③ Products
 - Databases
 - Maps
 - Methods and softwares
- ④ Communication
 - Meetings
 - Conferences
 - Websites
 - Media
- ⑤ Impact on policy

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Articles accepted

3 scientific articles accepted

- ① **Vieilledent G., C. Grinand, F. A. Rakotomalala, R. Ranaivosoa, J.-R. Rakotoarijaona, T. F. Allnutt, and F. Achard.** 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. [[doi:10.1016/j.biocon.2018.04.008](https://doi.org/10.1016/j.biocon.2018.04.008)].
- ② **Grinand C., G. Le Maire, G. Vieilledent, H. Razakamanarivo, T. Razafimbelo, and M. Bernoux.** 2017. Estimating temporal changes in soil carbon stocks at the ecoregional scale in Madagascar using remote-sensing. *International Journal of Applied Earth Observation and Geoinformation*. 54 : 1-14. [[doi:10.1016/j.jag.2016.09.002](https://doi.org/10.1016/j.jag.2016.09.002)].

3 scientific articles accepted

- ③ **Vieilledent G., O. Gardi, C. Grinand, C. Burren, M. Andriamanjato, C. Camara, C. J. Gardner, L. Glass, A. Rasolohery, H. Rakoto Ratsimba, V. Gond, J.-R. Rakotoarijaona.** 2016. Bioclimatic envelope models predict a decrease in tropical forest carbon stocks with climate change in Madagascar. *Journal of Ecology*. 104 : 703-715.
[[doi:10.1111/1365-2745.12548](https://doi.org/10.1111/1365-2745.12548)].

Articles submitted

2 scientific articles submitted

- ① **Vancutsem Ch., F. Achard, J.-F. Pekel, G. Vieilledent, S. Carboni, D. Simonetti, J. Gallego.** Pantropical analysis of the Landsat archive reveals unprecedented deforestation rates in evergreen forests. *Nature Communications*. Submitted.
- ② **Grinand C., G. Vieilledent, T. Razafimbelo, J.-R. Rakotoarijaona, M. Bernoux.** Modelling and forecasting deforestation, land degradation and regeneration in Madagascar using machine learning tools and a global land cover change dataset. *Land Degradation and Development*. Submitted.

7 articles in preparation

- ① **Vieilledent G., Ch. Vancutsem and F. Achard.** High-resolution spatial modelling and long-term forecasting of anthropogenic deforestation in the tropics. In prep.
- ② **Vieilledent G., C. Grinand, M. Pedrono, T. Rabetrano, J.-R. Rakotoarijaona, B. Rakotoarivelo, F. A. Rakotomalala, L. Rakotomalala, A. Razafimpahana and F. Achard.** It's not only poverty : global trade and bad governance are responsible for the unceasing deforestation in western Madagascar. *Conservation Letters*. In prep.
- ③ **Muniz-Tagliari M., J. Lenoir, P. Danthu, G. Vieilledent.** Species whose range is determined by seasonnality should move towards the equator : the case of baobabs in Madagascar. *Ecography*. In prep.

7 articles in preparation

- ④ **Clement J., G. Vieilledent.** jSM : an R package for Joint Species Distribution Modelling. *Ecography*. In prep.
- ⑤ **Knoploch C., C. Grinand, G. Vieilledent.** Extinction risk of the Lemurs of Madagascar under both the effect of climate change and deforestation. *Conservation Biology*. In prep.
- ⑥ **Vieilledent G., W. F. Laurance, S. Peedell and F. Achard.** The fate of tropical forests associated to the demographic explosion in Africa. *Current Biology*. In prep.
- ⑦ **Vieilledent G., Ph. Verley, and F. Achard.** Including spatial-autocorrelation in deforestation model to obtain realistic deforestation projections at national or continental scales. *Landscape Ecology*. In prep.

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Student training

1 PhD student, 1 Master I student, 6 Master II students

- Clovis GRINAND (PhD thesis)
- Ruoyin LONG (deforestation)
- Mario MUNIZ-TAGLIARI (SDM Baobabs)
- Margaux CHARRA (GDM)
- Aurélien COLAS (speciesatlas)
- Jeanne CLEMENT (jSDM)
- Corentin KNOPOLOCH (speciesatlas/SDM Lemurs)
- Vololoniaina Marie Rosine SOJANDRIMALALA (ReBioMa)



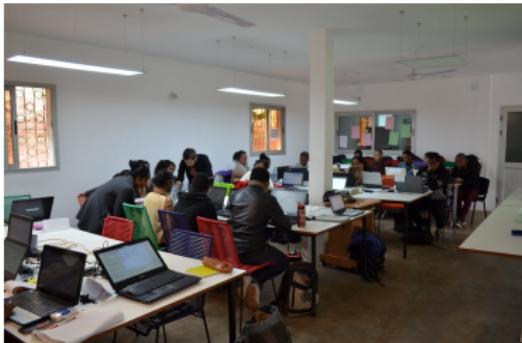
Capacity building

- Deforestation modelling, October 2018, 3 days, 20 participants
- CeRSAE, FOFIFA
- Many different institutes : MEDD, Environmental NGOs (WRI, CI, WCS, Blueventures, MBG, WWF), Université d'Antananarivo (MBEV, IOGA, ESSA), Research Institutes (Institut Pasteur, LRI), etc.



Capacity building

- Deforestation modelling, July 2019, 2 days, 30 participants
- Niche modelling, July 2019, 2 days, 30 participants
- Campus Numérique Francophone, Ankafotsy
- Many different institutes : MEDD, Environmental NGOs (WRI, CI, WCS, Blueventures, MBG, WWF), Université d'Antananarivo (MBEV, IOGA, ESSA), Research Institutes (Institut Pasteur, LRI), etc.



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Databases

- Biodiversity database
- Dryad : <https://doi.org/10.5061/dryad.9ph68>
- Cirad dataverse : <https://doi.org/10.18167/DVN1/AUBRRC>

Maps

- Climatic data (present-future)
- Forest carbon in 2010
- Historical deforestation (1953-2017)
- Spatial probability of deforestation in 2010
- Future forest cover (2050, 2100)
- Species distribution (atlas, eg. <http://etclab.org/atlas>)

<https://forestatrisk.cirad.fr/mada/>

Methods and softwares

- GitHub repositories with code, eg.
<https://github.com/ghislainv/deforestation-maps-Mada>
- hSDM, jSDM R packages
- speciesatlas R package
- forestatrisk Python package

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Meetings

8 meetings to present the advances and results of the BioScèneMada project :

- 5 annual meetings : March 2014 Tana (kick-off), Avril 2015 Tana, June 2016 Tana, November 2017 Montpellier, July 2018 Tana (closure)
- Seminar at Kew Royal Botanic Gardens, July 2015, London
- Journées FRB, "Les scénarios de la biodiversité à l'heure du changement climatique", October 2015, Paris
- Plénière du COS de la FRB, December 2018, Paris

Conferences

Results of the BioSceneMada project have been presented to 5 scientific conferences :

- **ICCB-ECCB 2015**, Montpellier (1 poster, 1 presentation)
- **ATBC 2016**, Montpellier
- **Scennet 2016**, Montpellier (2 presentations)
- **ISEC 2018**, Saint-Andrews (Scotland)
- **ATBC 2019**, Antananarivo (4 presentations)

Websites

- <https://bioscenemada.cirad.fr>
- <https://madaclim.cirad.fr>
- <https://forestatrisk.cirad.fr>
- <https://ecology.ghislainv.fr/jSDM>

- Press releases :
 - Forests and climate change : [Cirad](#)
 - Deforestation in Madagascar : [Cirad](#)
 - Balancing development and biodiversity conservation in Madagascar : [Cirad](#)
- Press articles :
 - Forests and climate change : [The Conversation](#), [Le Figaro](#), [Le Point](#), [FranceTV info](#), [El Mercurio](#), [Midi-Libre](#)
- Radio : [Radio Classique](#) ([3 minutes pour la planète](#)), [France Inter](#) ([Le temps d'un bivouac](#))
- Video : [YouTube](#)

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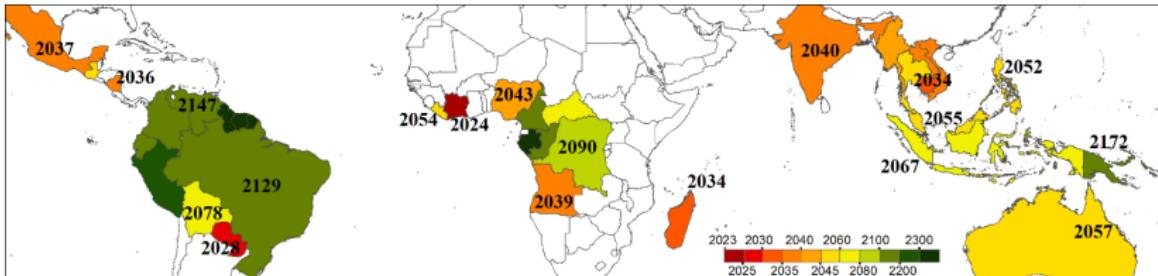
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Impact on policy

- Malagasy President's communication to council of ministers on 27/02/2019 untitled "**Recouvrir Madagascar de forêt**". One Planet Summit Nairobi.



- On 23 July 2019, the European Commission presented a set of actions to protect and restore the world's forests. **EC Communication**.





... Thank you for attention ...
<https://bioscenemada.cirad.fr>



cirad Etc Terra



Olivier Nkembi pour l'Environnement



POUR LA RECHERCHE
SUR LA BIODIVERSITÉ

