

Biodiversity & OneHealth: Basics, links & threats

Biodiversité & Une seul santé:
Principes de base, liens & menaces



Prof. Dr. Peter Kappeler, PhD
German Primate Center (DPZ) & University of Göttingen
Germany



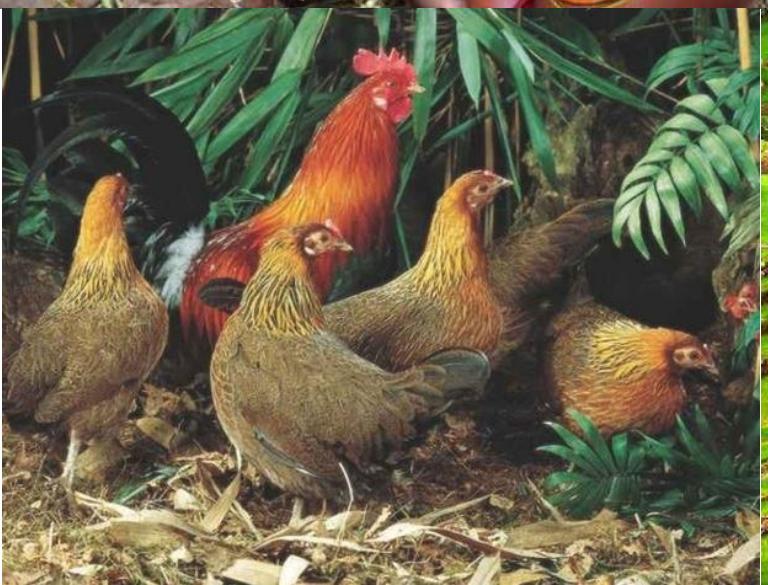
Programme de protection et exploitation durable des ressources naturelles (PAGE 2)

Mis en œuvre par
giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

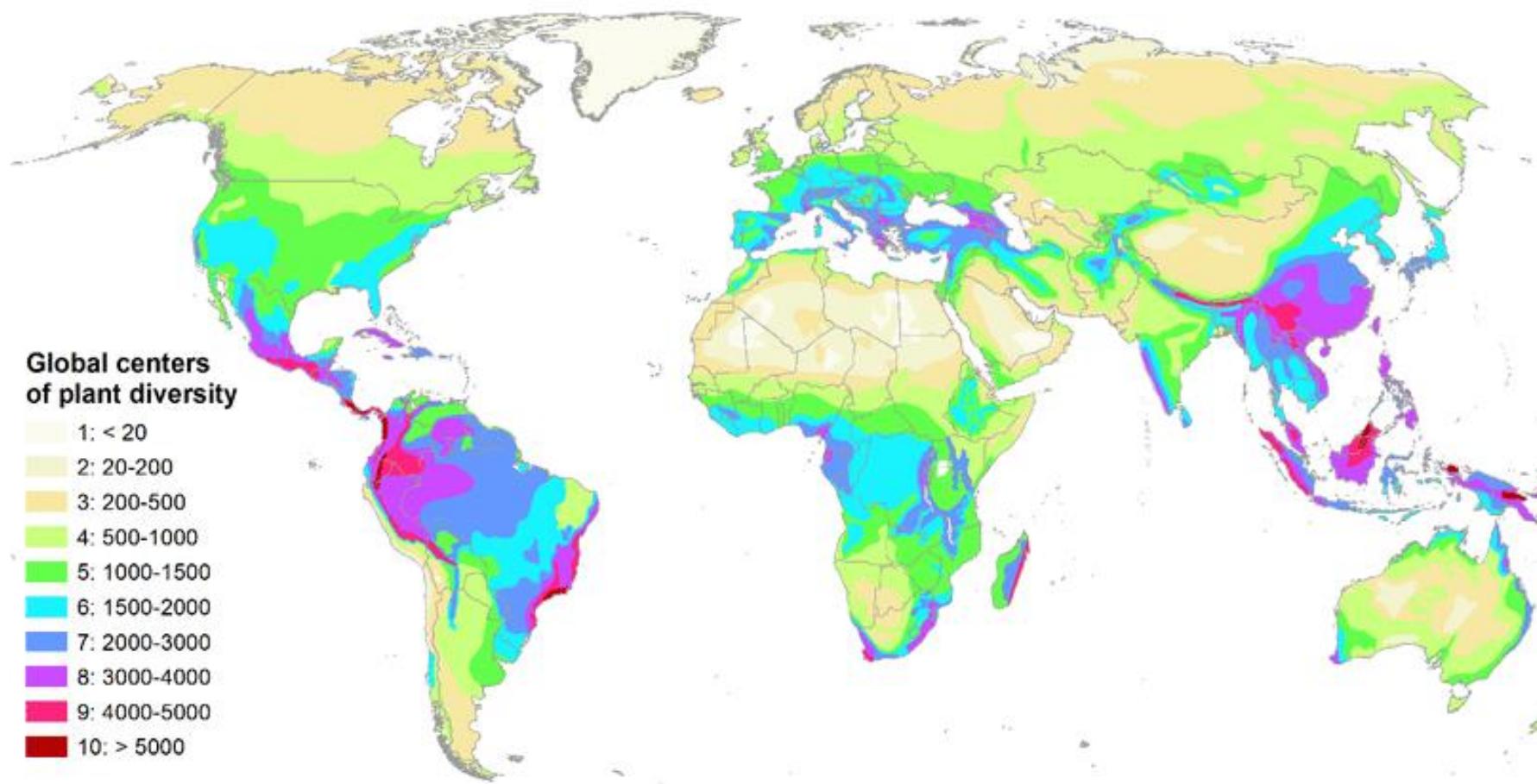




Foto: Kristian Bengtson, 2003







Kier et al. (2005) J Biogeogr 32:1107

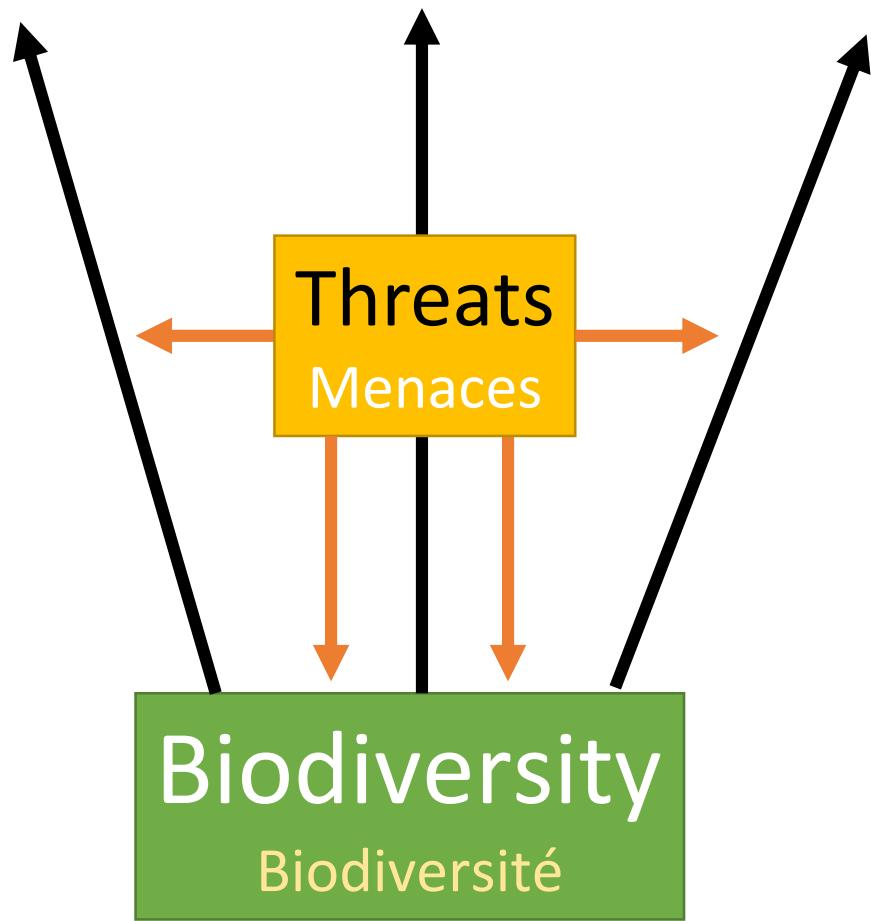


Biodiversity : α -diversity

Biodiversité : α -diversité

Human health & wellbeing

Santé et bien-être de l'homme





Coati

Ringtail cat

Vontsira

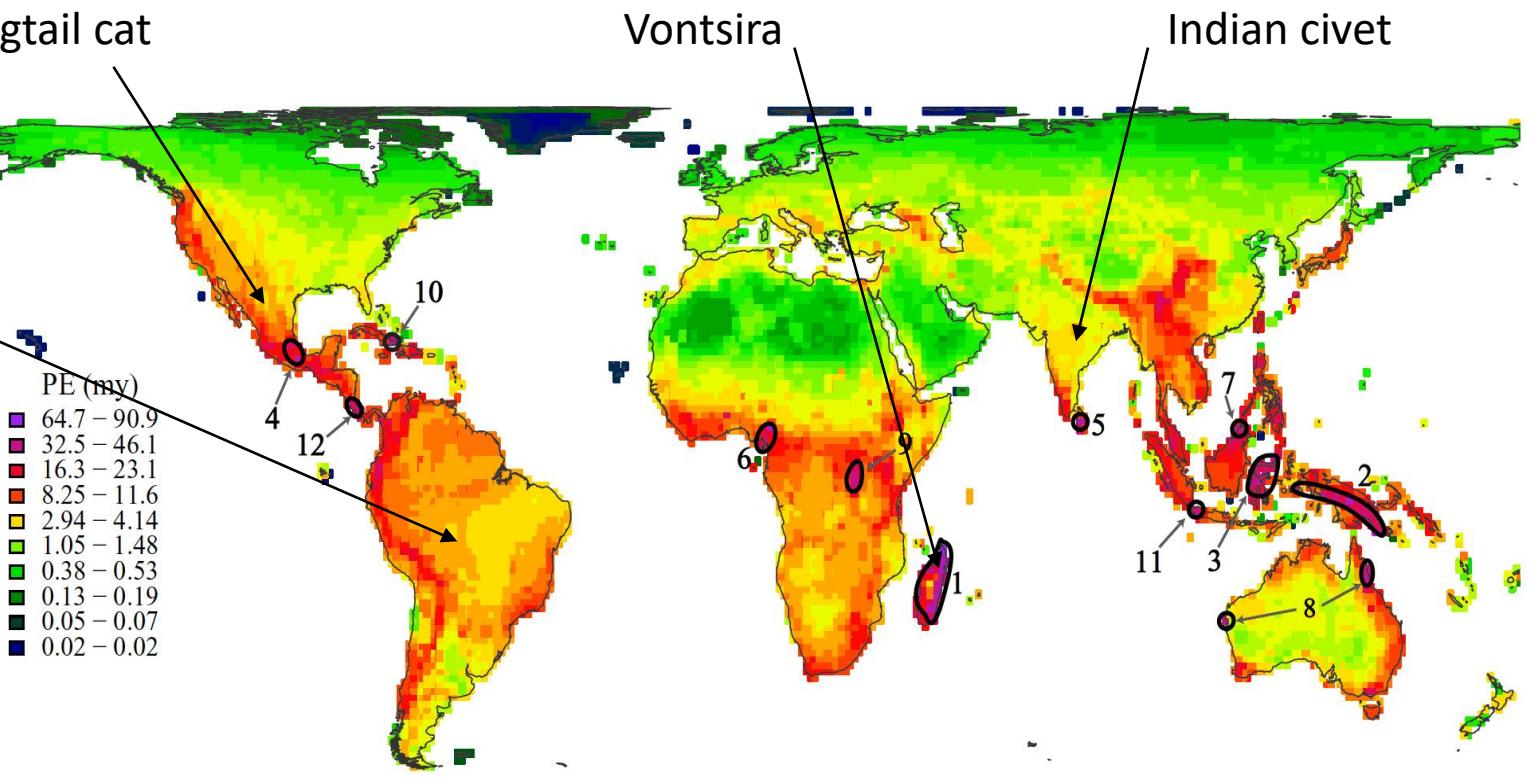
Indian civet

Biodiversity & endemism

Biodiversité & endémisme

Endemism(e):

the state of a species being native to a single defined geographic location
le fait qu'une espèce soit originaire d'un seul lieu géographique défini.



Phylogenetic endemism of terrestrial vertebrates
Endémisme phylogénétique des vertébrés terrestres



Diversity & Endemism



© Pinterest.com



© CEPphoto, Uwe Aranas



© MerlinTuttle.org
SCIENCE SOURCE



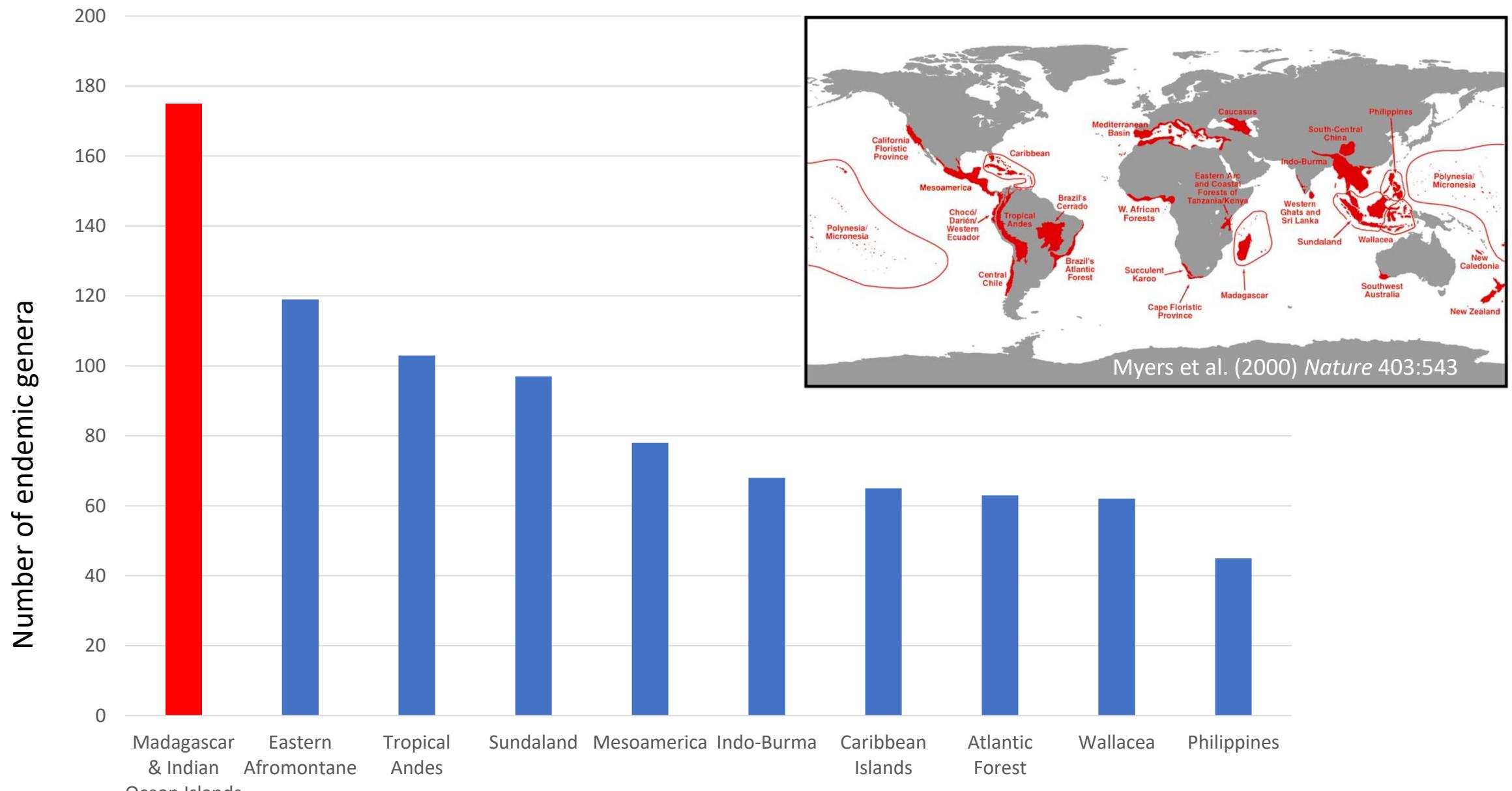
© M. Markolf



© A. Ozgul

Plants ($\approx 15.000 / > 80\%$)
Amphibians ($> 300 / 99\%$)
Reptiles ($346 / 91\%$)
Birds ($295 / 36\%$)
Bats ($46 / 60\%$)
Mammals ($215 / 100\%$)

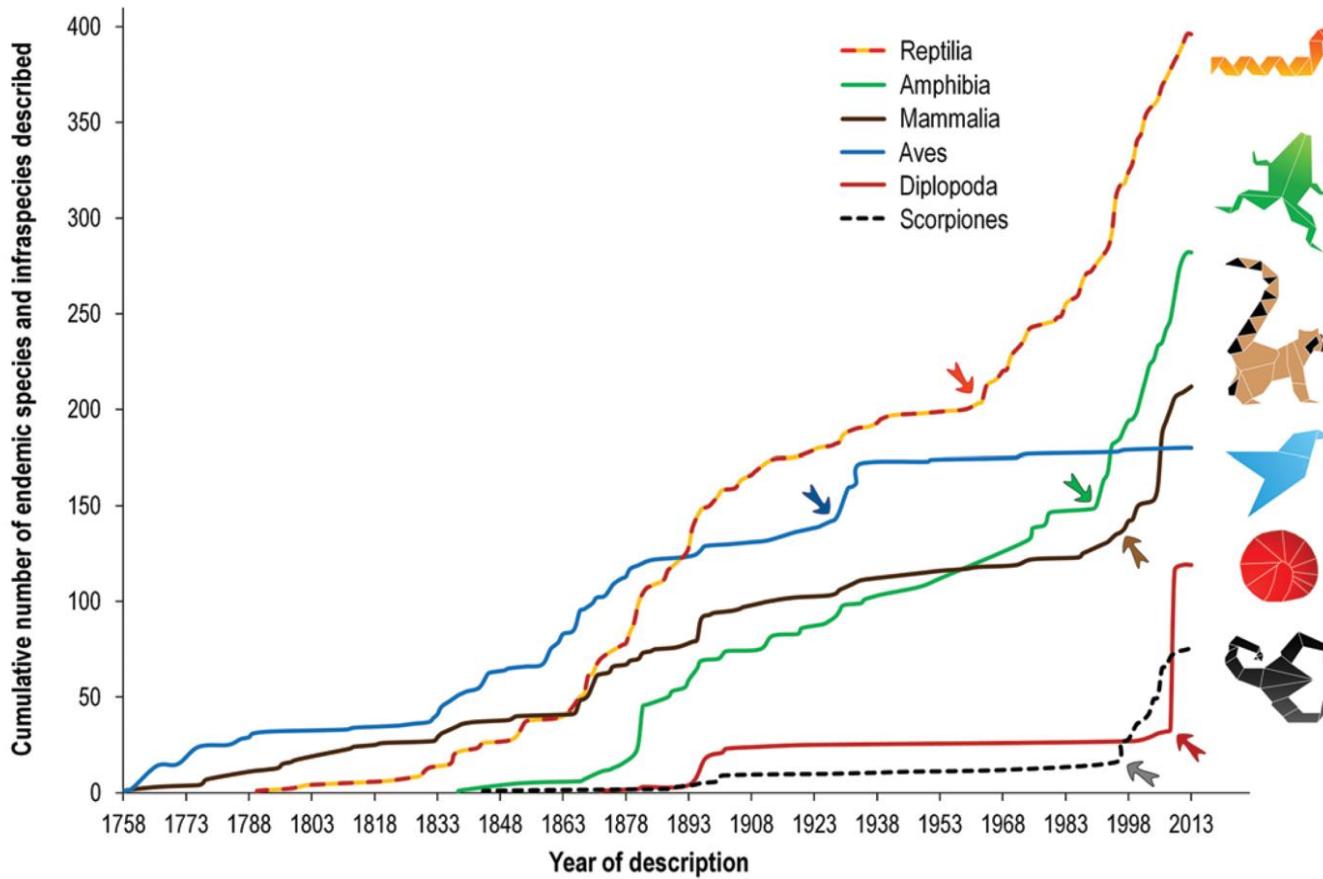




after Mittermeier et al. (2011) in „Biodiversity Hotspots“, Springer

Endemism: no end in sight

Endémisme : pas de fin en vue



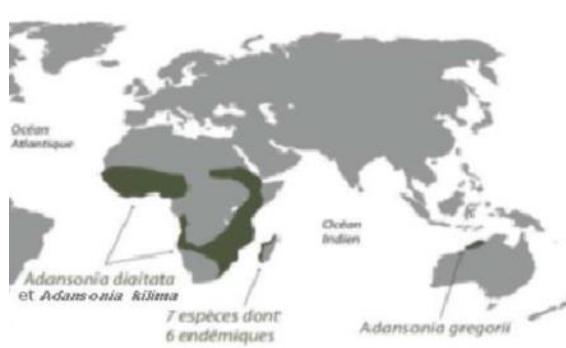
Waeber et al. (2015) Int For Rev 17:127

Vieitis et al. (2009) PNAS 106:8267



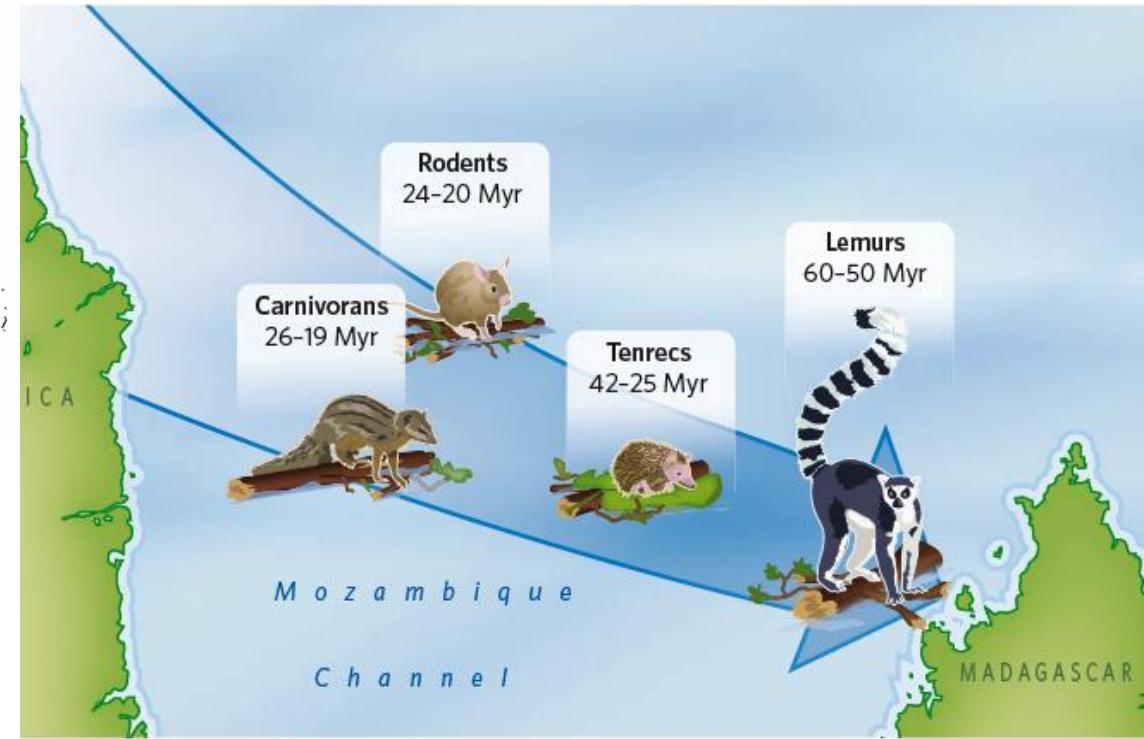
■ Gondwana residents

Résidents de Gondwana



■ Subsequent colonizers

Colonisateurs ultérieurs



Krause (2010) Nature 463:613

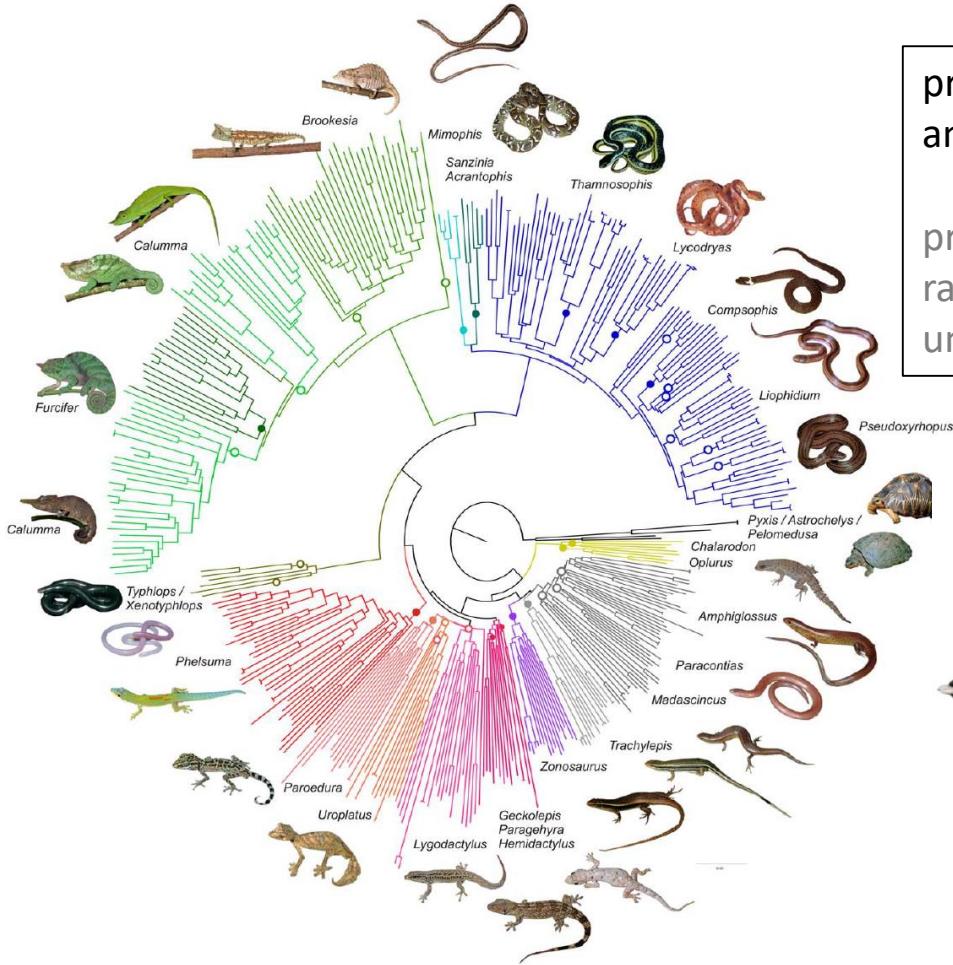


■ Adaptive radiations

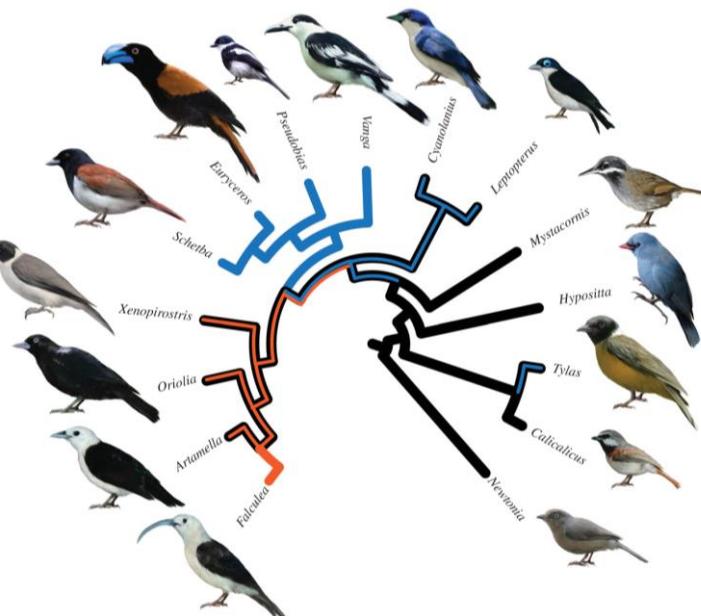
Radiations évolutives

process in which organisms diversify rapidly from an ancestral species into a multitude of new forms

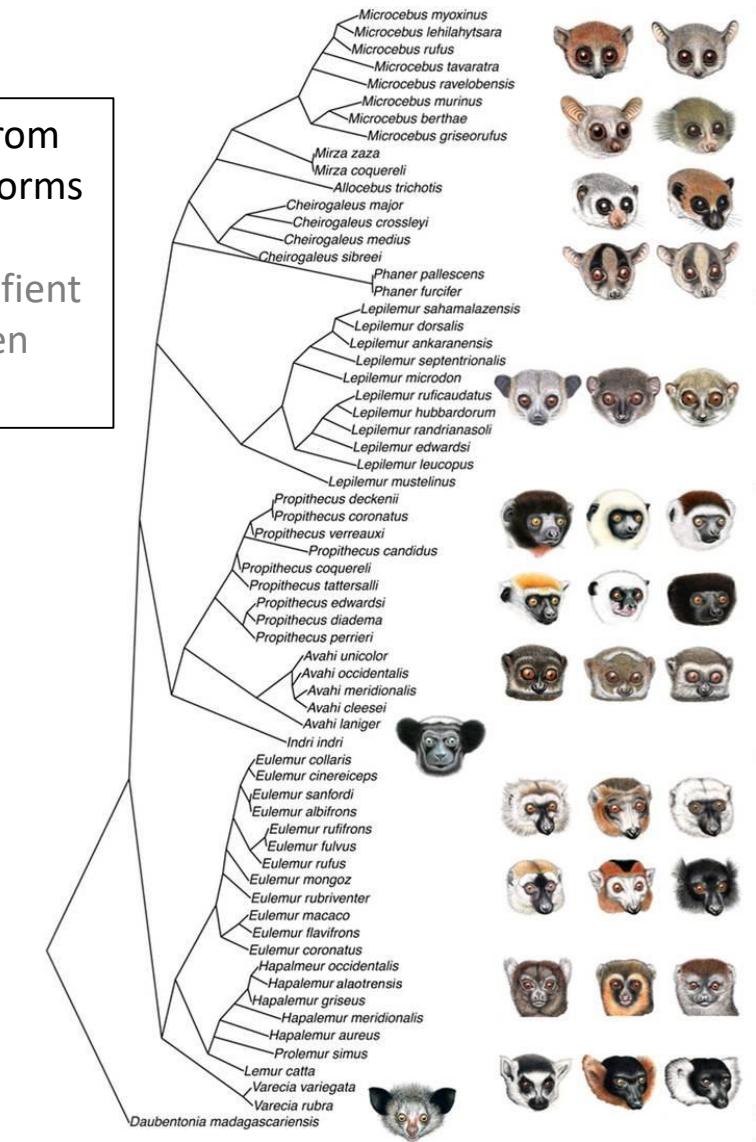
processus par lequel les organismes se diversifient rapidement à partir d'une espèce ancestrale en une multitude de nouvelles formes.



Nagy et al (2012) PloS One 7:e34506



Jönsson et al. (2012)
PNAS 109:6620



Rakotonirina et al. (2017) Sci Rep 7:15181

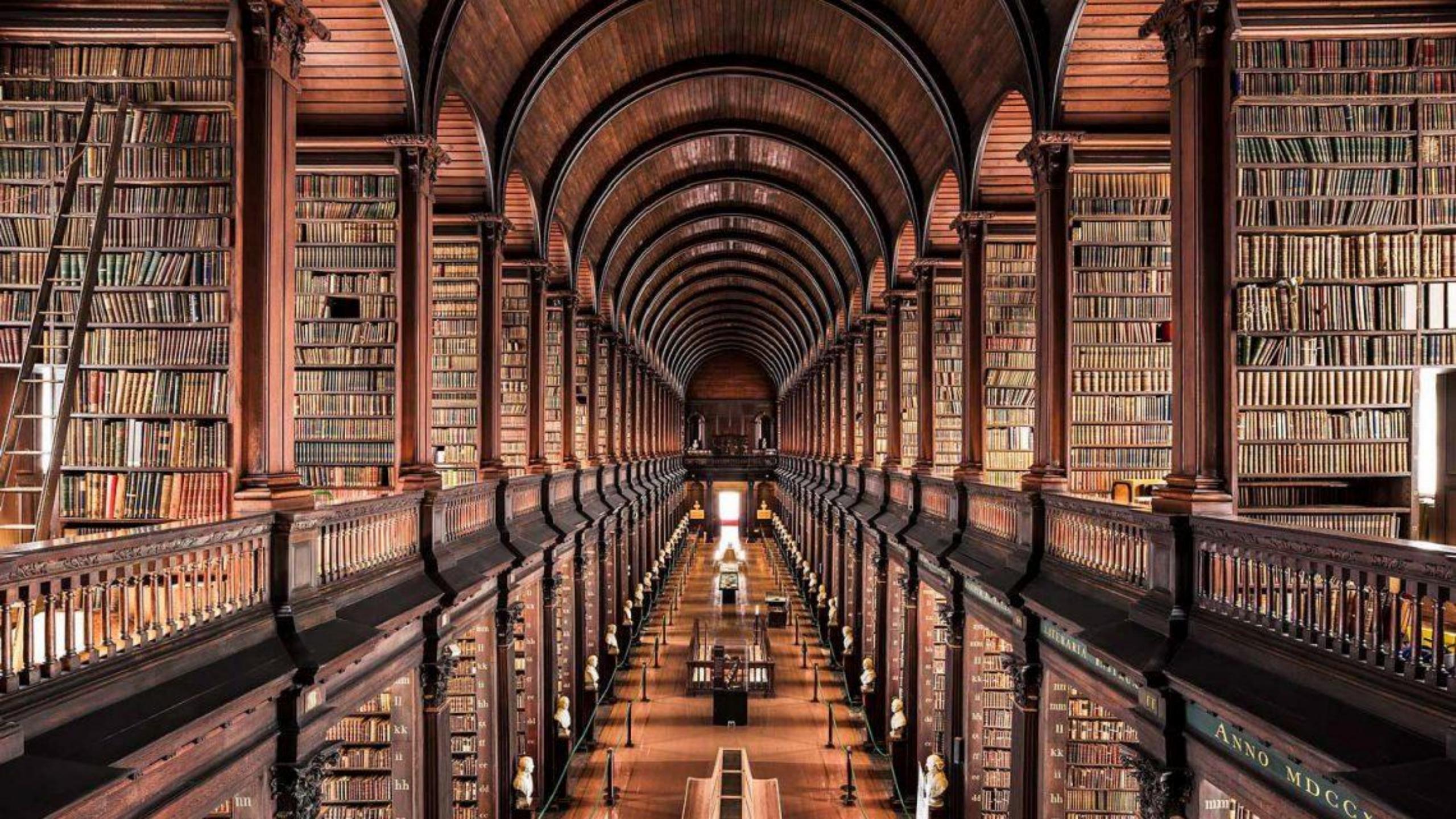


Why we need to protect biodiversity

Pourquoi nous devons protéger la biodiversité

1. Every species harbors unique genetic information
1. Chaque espèce possède une information génétique unique



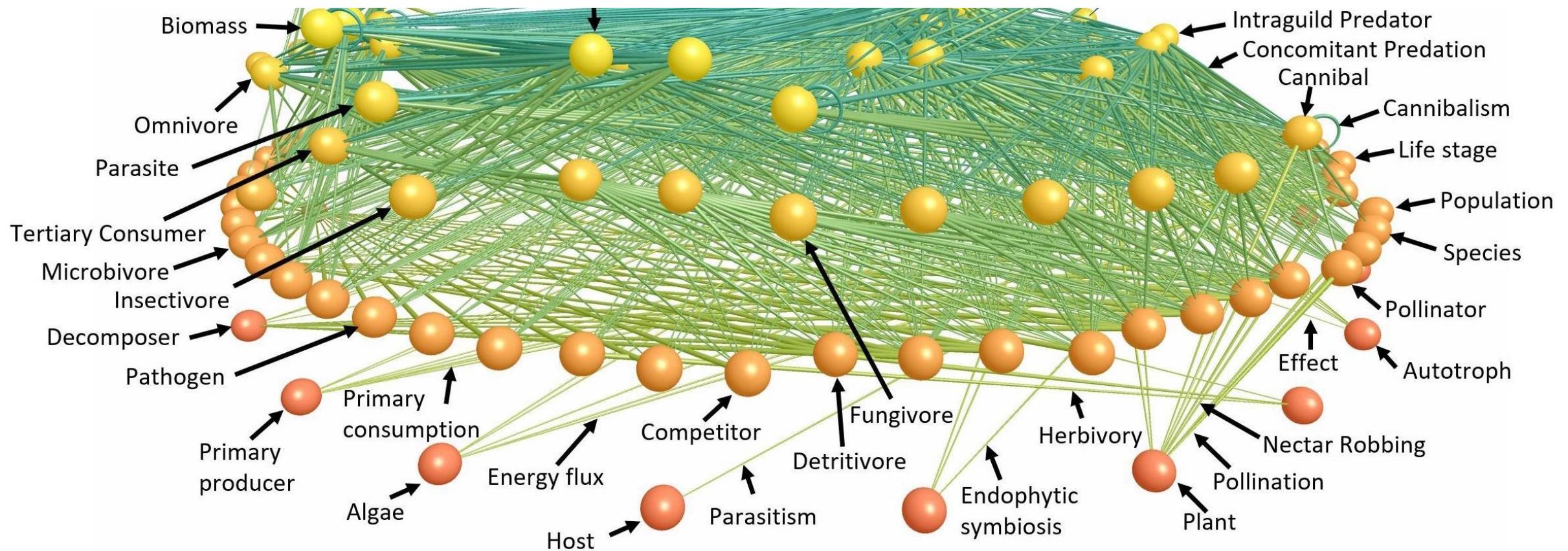


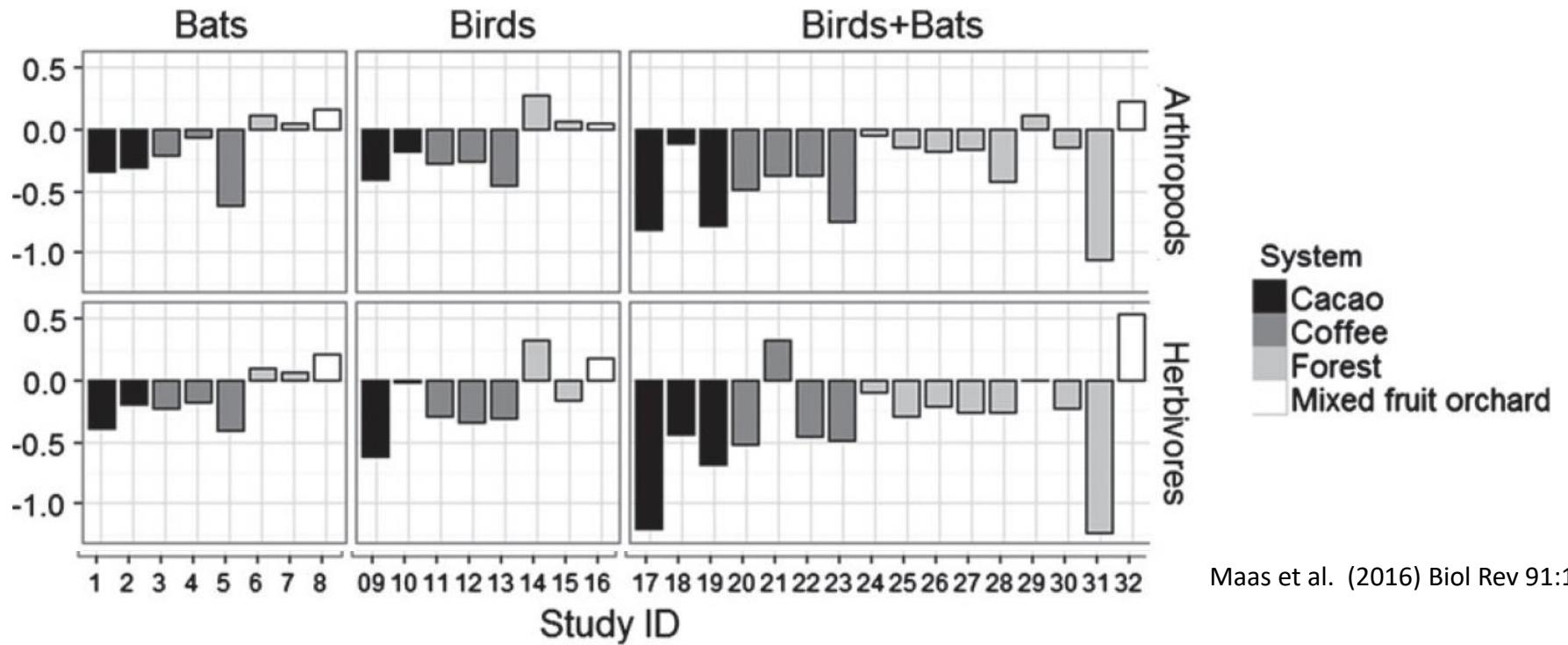


Catharanthus roseus

2. Ecosystem stability depends on every species

2. La stabilité de l'écosystème dépend de chaque espèce





Maas et al. (2016) Biol Rev 91:1081



3. Ecosystem services as benefits of biodiversity

3. Les services écosystémiques en tant que bénéfices de la biodiversité

- i) Biodiversity is good and important for the economy
- i) La biodiversité est bonne et importante pour l'économie



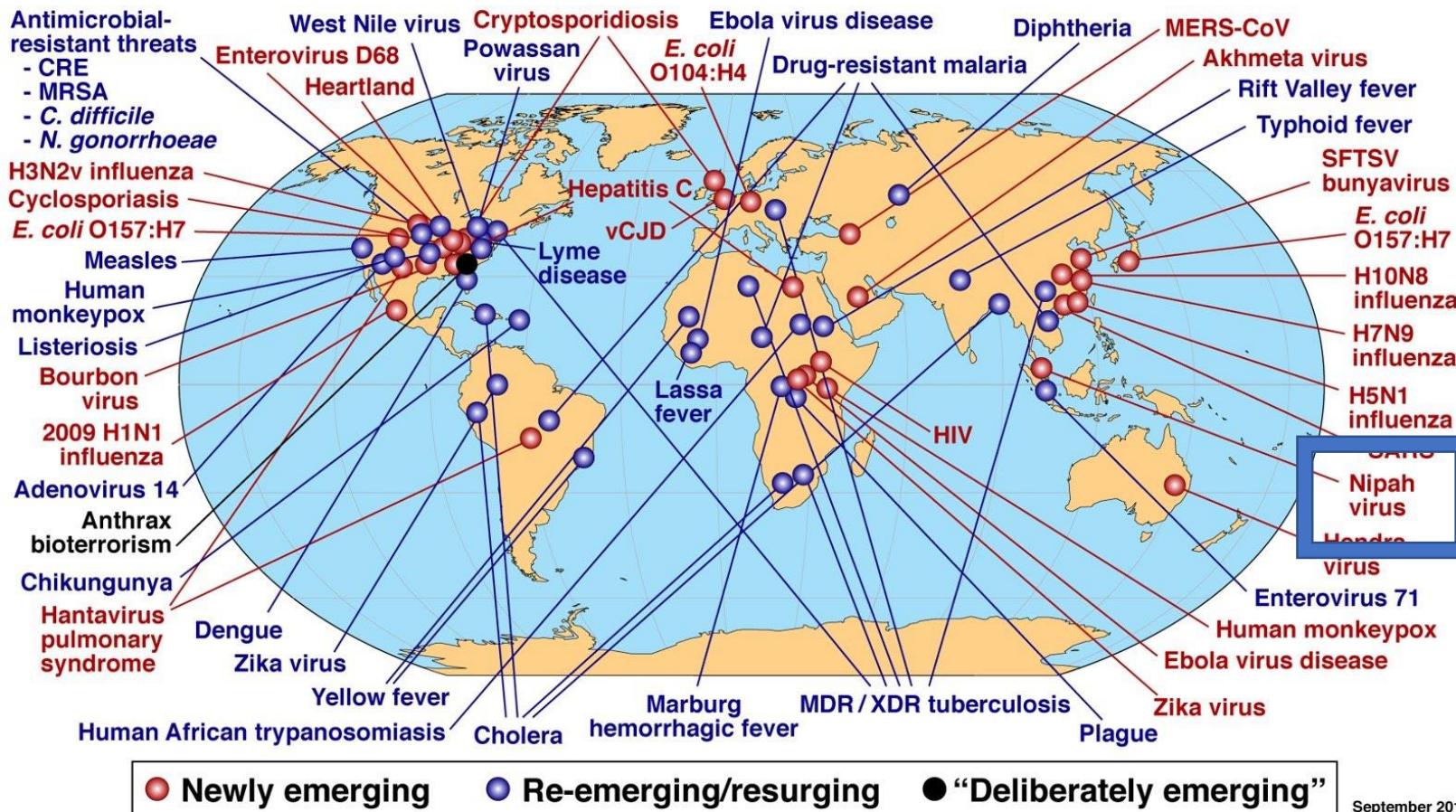
- ii) Biodiversity is part of the solution to slow climate change
- ii) La biodiversité fait partie de la solution pour ralentir le changement climatique



iii) Biodiversity promotes human health and well-being

iii) La biodiversité favorise la santé et le bien-être de l'homme

Global Examples of Emerging and Re-Emerging Infectious Diseases



Reduction of biodiversity

Réduction de la biodiversité



Instable ecosystems

Ecosystèmes instables



Parasites switch hosts

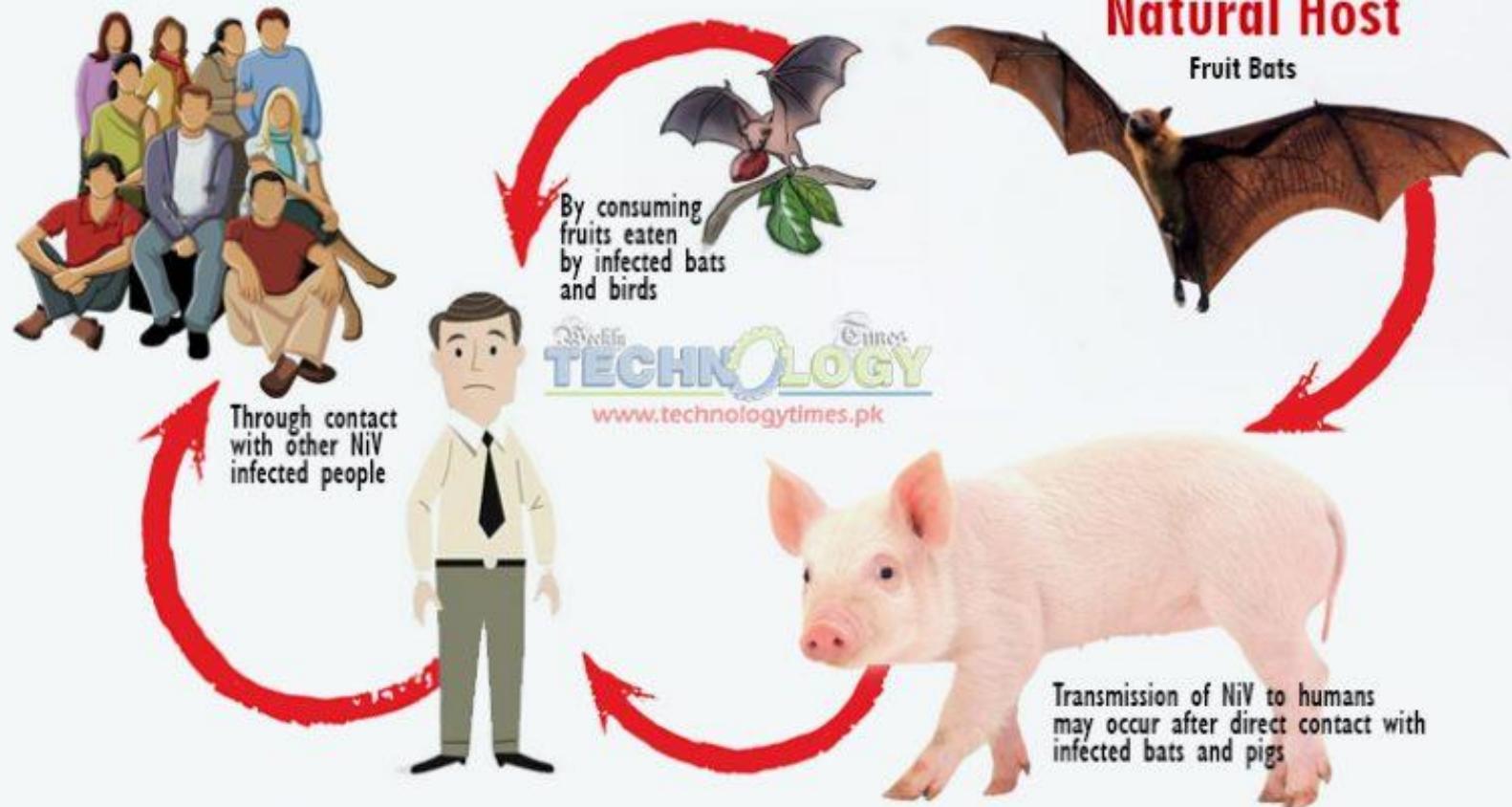
Les parasites changent d'hôte



Emerging diseases

Maladies émergentes

How NiV is Transmitted

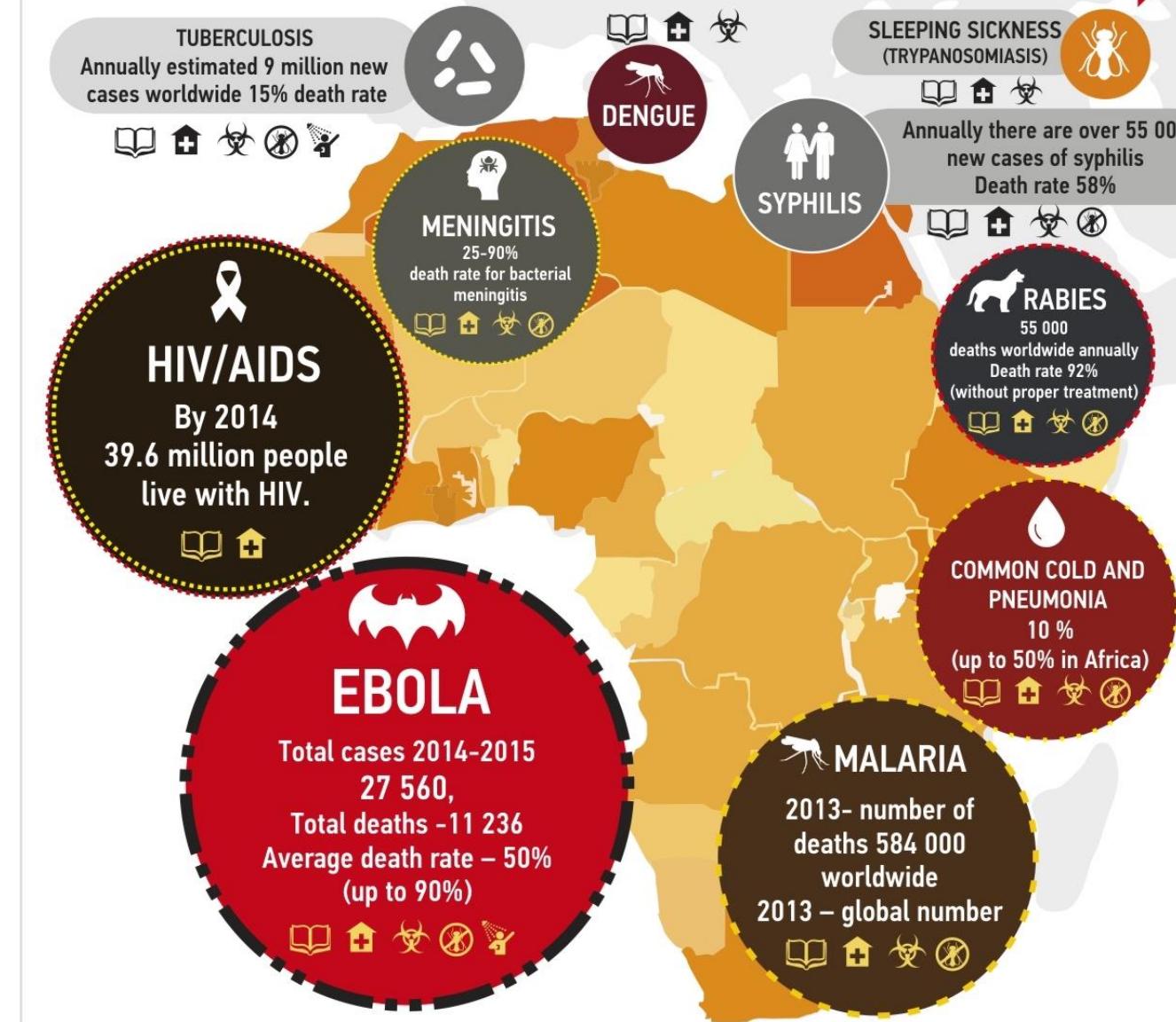


Biodiversity and emerging diseases

Biodiversité et maladies émergentes



TOP 10 DEADLY DISEASES IN AFRICA



5 main protection methods



Education



Therapy



Quarantine



Pest control



Hygiene

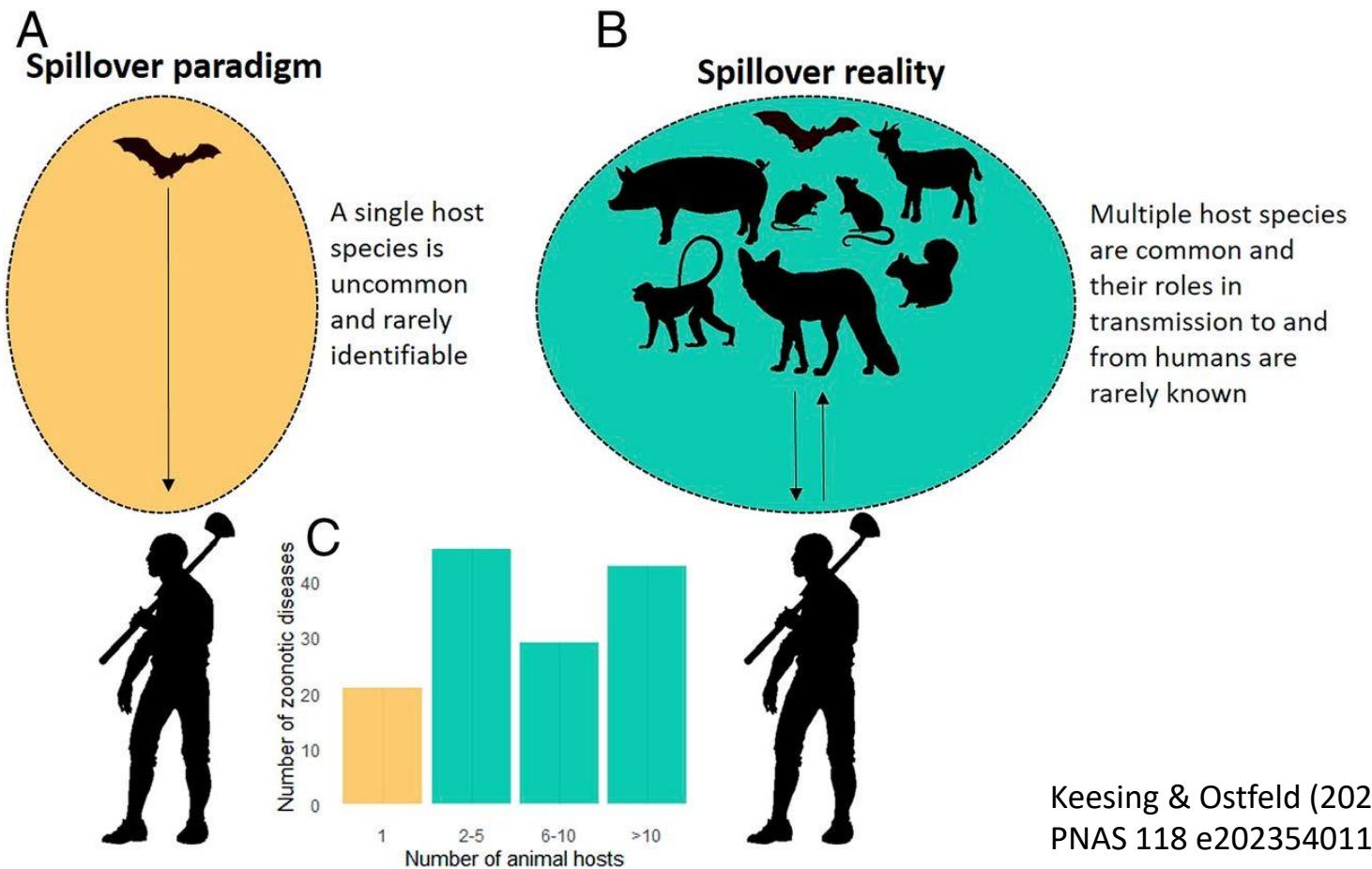
Biodiversity and emerging diseases

Biodiversité et maladies émergentes



Fig.1 | Clinical manifestations of leprosy in three chimpanzees at CNP, Guinea-Bissau and TNP, Côte d'Ivoire. a–c, Clinical signs of leprosy in two

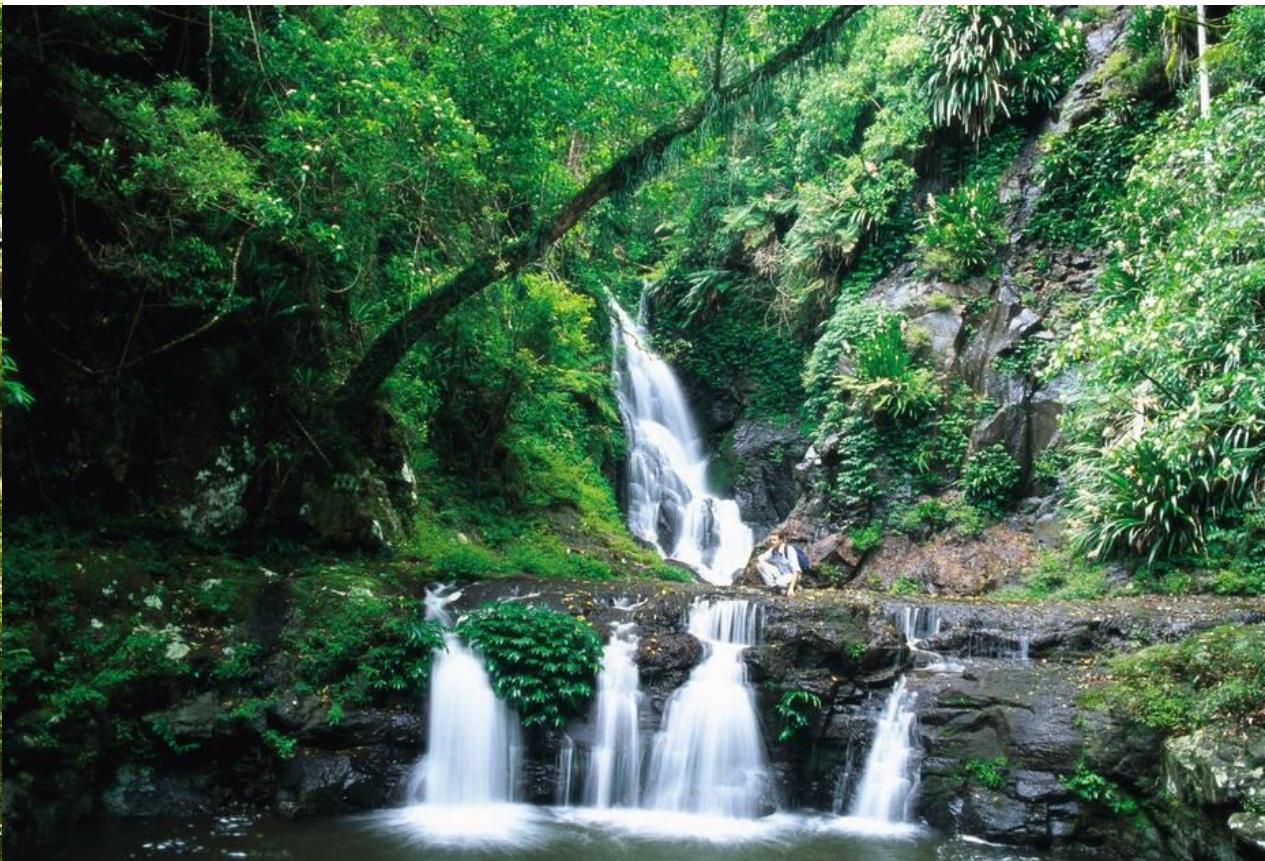
Hockings et al. (2021) Nature 598:652



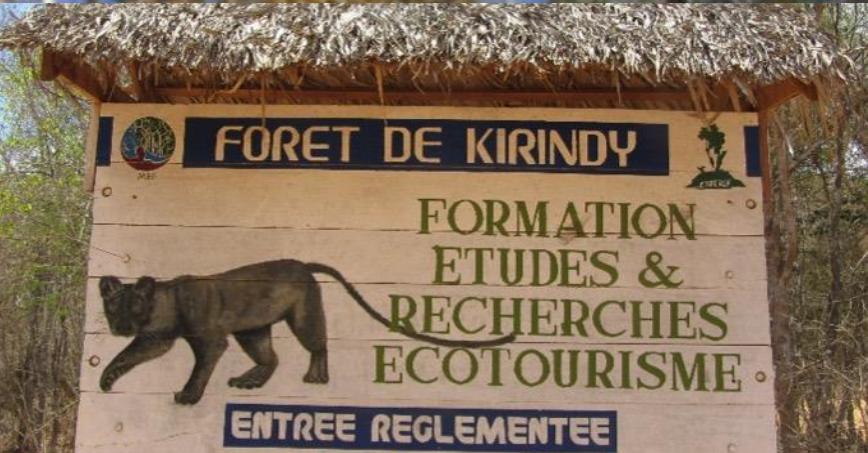
Keesing & Ostfeld (2021)
PNAS 118 e2023540118

Biodiversity & health: air & water

Biodiversité et santé : air et eau







Research station “Kirindy Forest”

Station de recherche “Forêt de Kirindy”



Menabe Antimena Protected Area

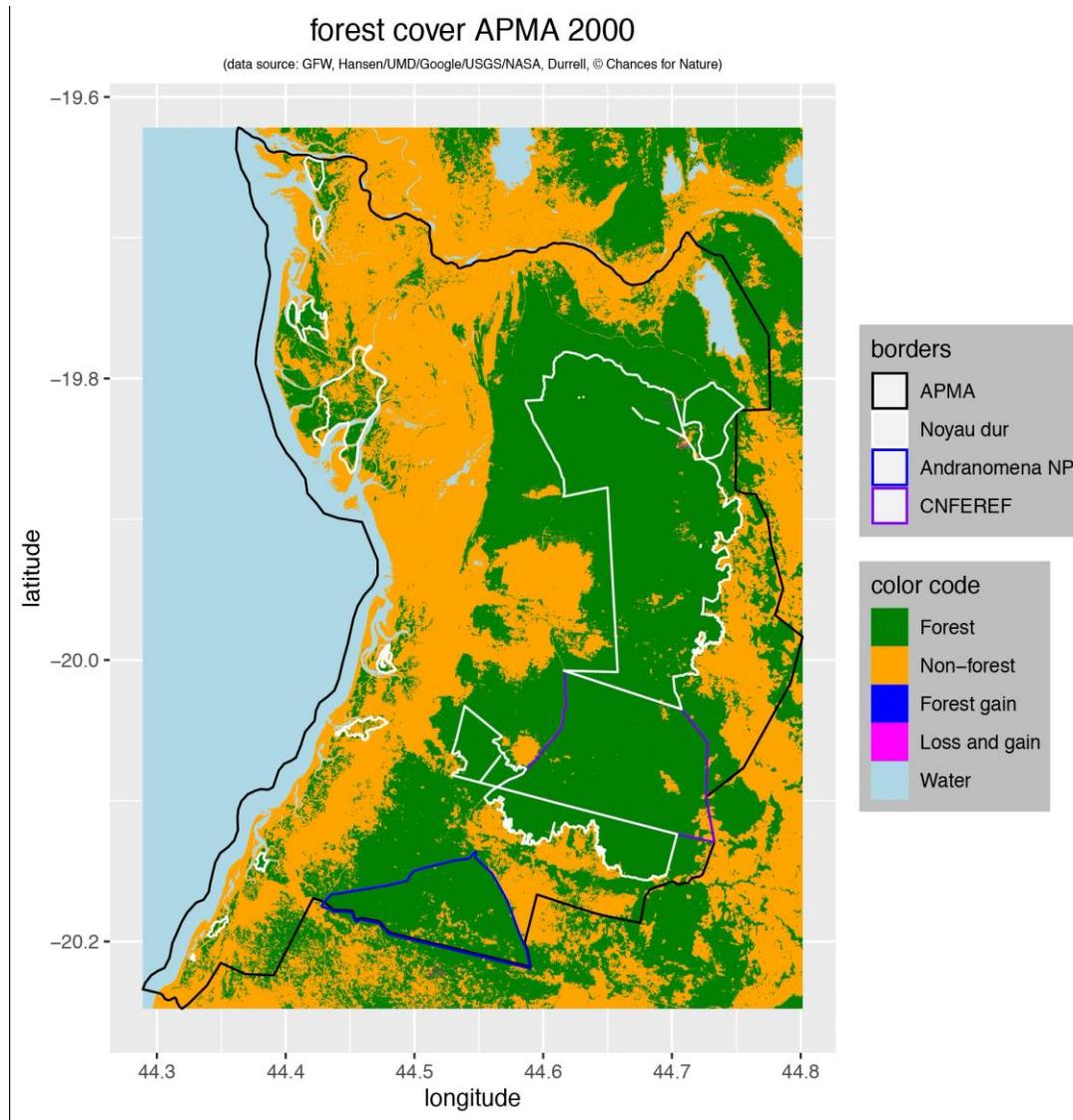


- **Protected area since 2015**
- **Aire protégé depuis 2015**
- **210.000 ha dry forest & mangroves**
- **Forêt sèche à feuilles caduques et mangroves**

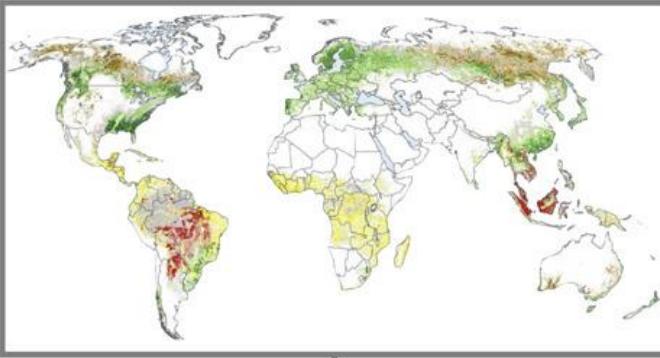


Forest loss Aire Protégé Menabe Antimena (2000 – 2020)

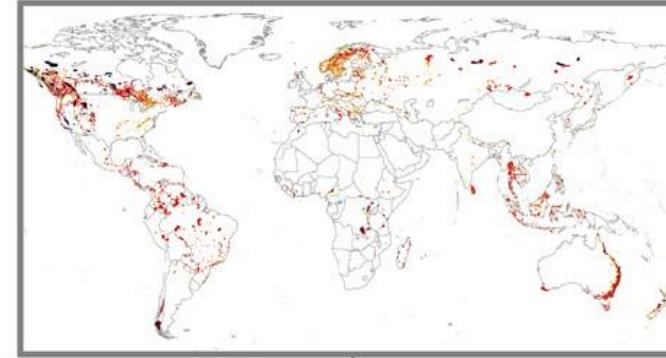
Perte de forêts APMA



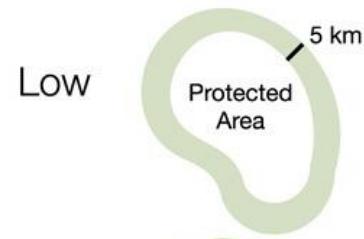
2000-2018 Forest loss patterns



2019-2036 Forest loss risk



If **current forest cover outside** of the protected area is:



Low

Medium

High



> Forest loss outside



~ Forest loss outside

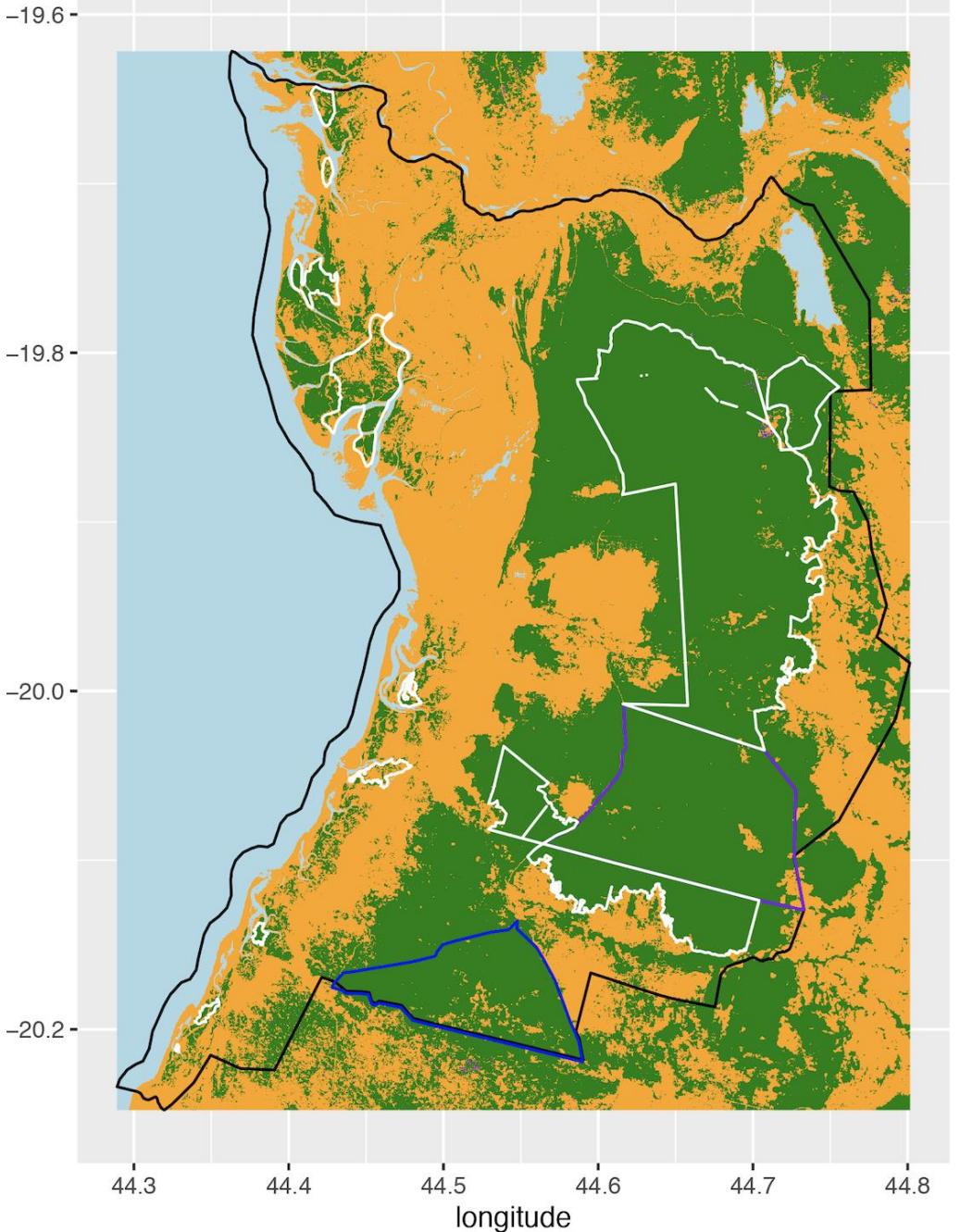


<< Loss outside

Burivalova et al. (2021)
Curr Biol 31:4620

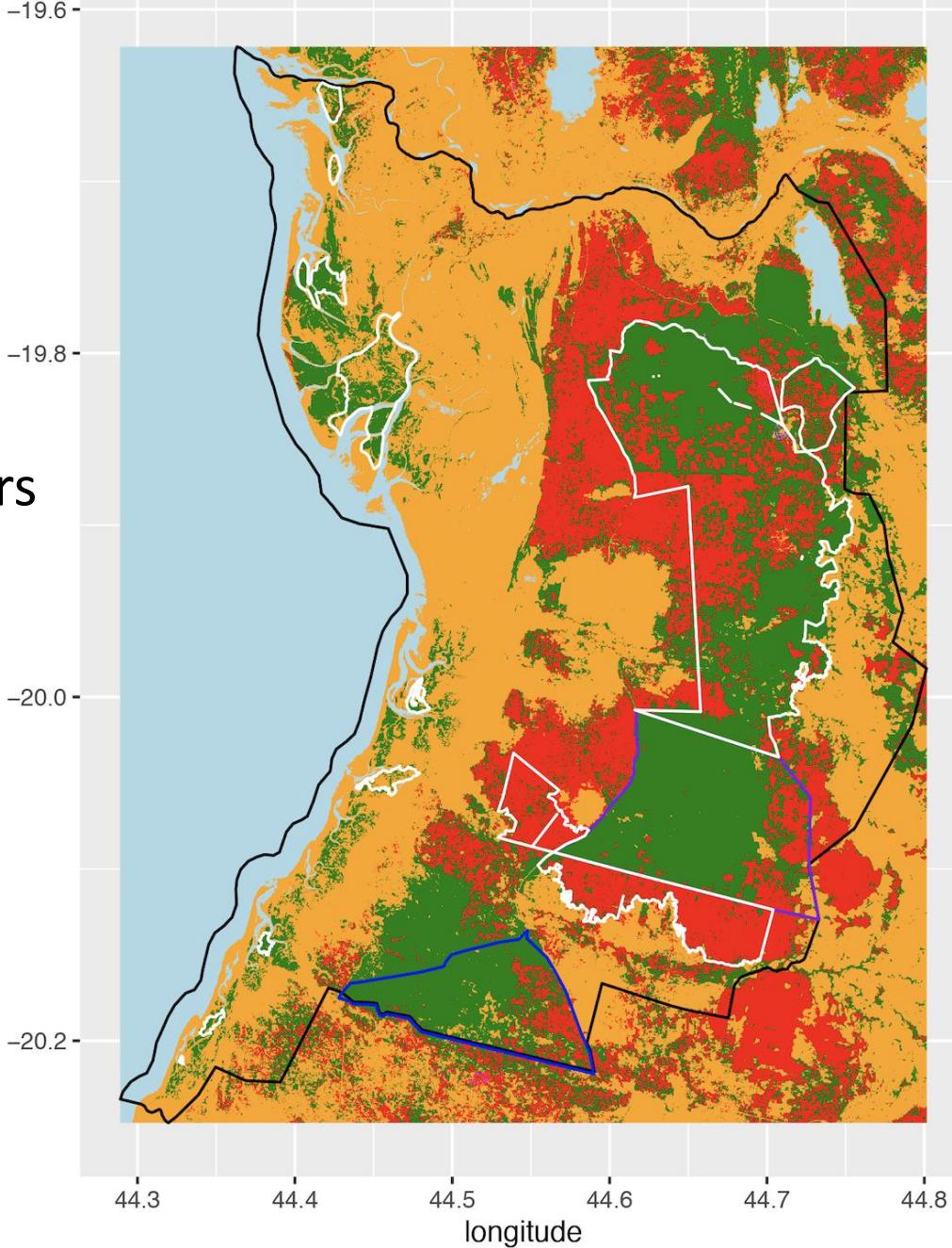
forest cover APMA 2000

(data source: GFW, Hansen/UMD/Google/USGS/NASA, Durrell, © Chances for Nature)



forest cover APMA 2020

(data source: GFW, Hansen/UMD/Google/USGS/NASA, Durrell, © Chances for Nature)



in just 20 years



en 20 ans
seulement

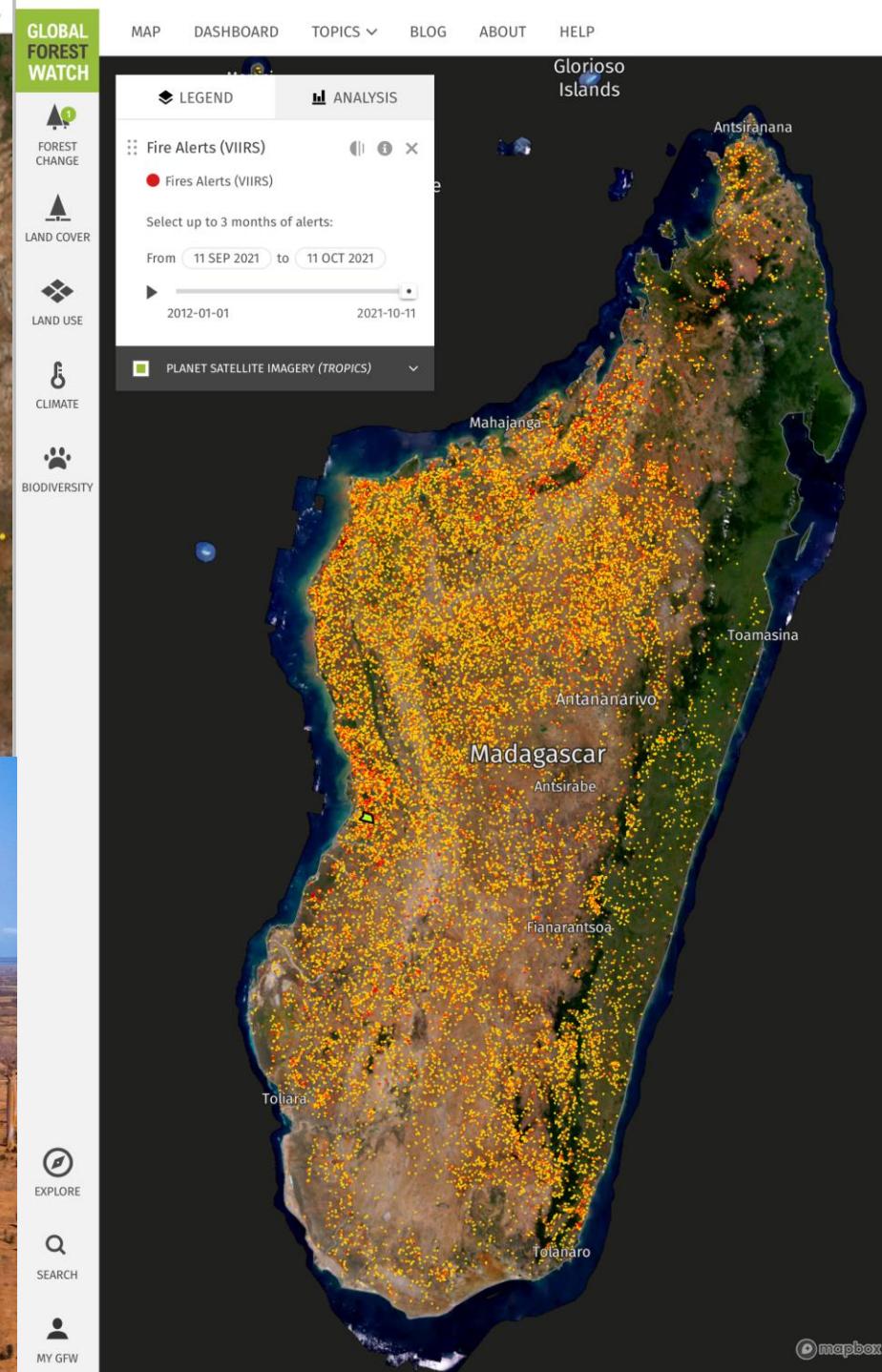






NGO/ONG: Chances for Nature





Biodiversity and human health

Health "is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity".

Biological diversity (biodiversity) is "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems."

Biodiversity underpins ecosystem functioning and the provision of goods and services that are essential to human health and well being.

The links between **biodiversity and health** are manifested at various spatial and temporal scales. Biodiversity and human health, and the respective policies and activities, are interlinked in various ways.



Direct drivers of biodiversity loss include land-use change, habitat loss, over-exploitation, pollution, invasive species and climate change. Many of these drivers affect human health directly and through their impacts on biodiversity.

Women and men have different roles in the conservation and use of biodiversity and varying health impacts.

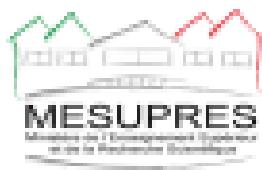
Human population health is determined, to a large extent, by social, economic and environmental factors.

The social and natural sciences are important contributors to biodiversity and health research and policy. Integrative approaches such as the Ecosystem Approach, Eco-health and One Health unite different fields and require the development of mutual understanding and cooperation across disciplines.



Misaotra betsaka noho ny fiheveranao!

ary ho an'ny fanasana sy ny fandaminana



Mis en œuvre par



Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

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

PAGE II section/ program of GIZ

Director Dr. Michaela Braun

Dr. Michael Nagel