International Conference on Ecological Sciences ("sfécologie 2018"), Rennes, 24 Oct. 2018

Saving the threatened terrestrial biodiversity in the French Overseas tropical islands

Which research strategy to improve conservation?

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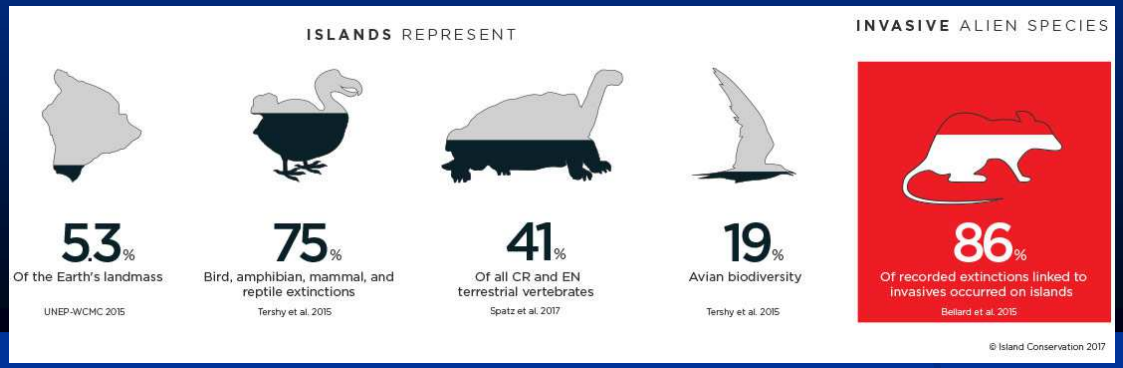
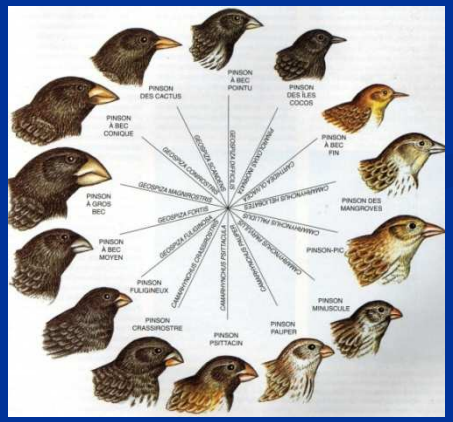
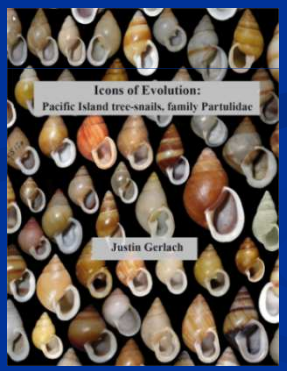
(www.revue-naturae.fr)

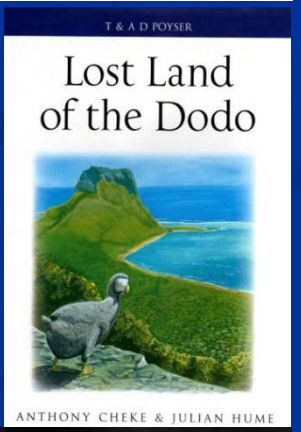
Islands: unique but highly threatened biota

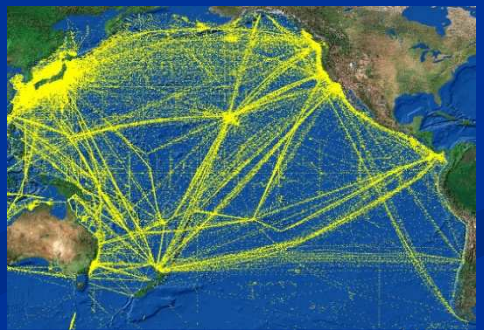
- **Relative high species richness** (20% of all species on 5% of the world area)
- **Very high endemism** (*e.g.* 89% flowering plants in Hawaii)
- **Spectacular adaptative radiations** (*e.g.* Galápagos finches, tree snails)
- **Front line and sentinel of global changes** (sea-level rise, extreme climate events, pollutions, over-exploitation, biological invasions…)
- **Epicenter of he extinction crisis!**

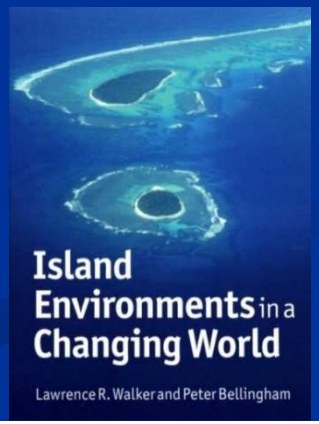


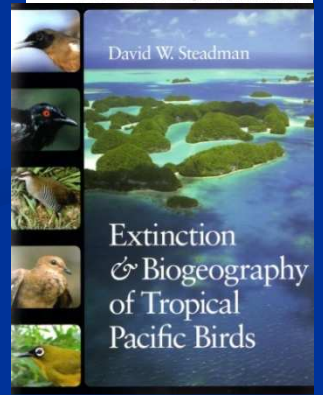




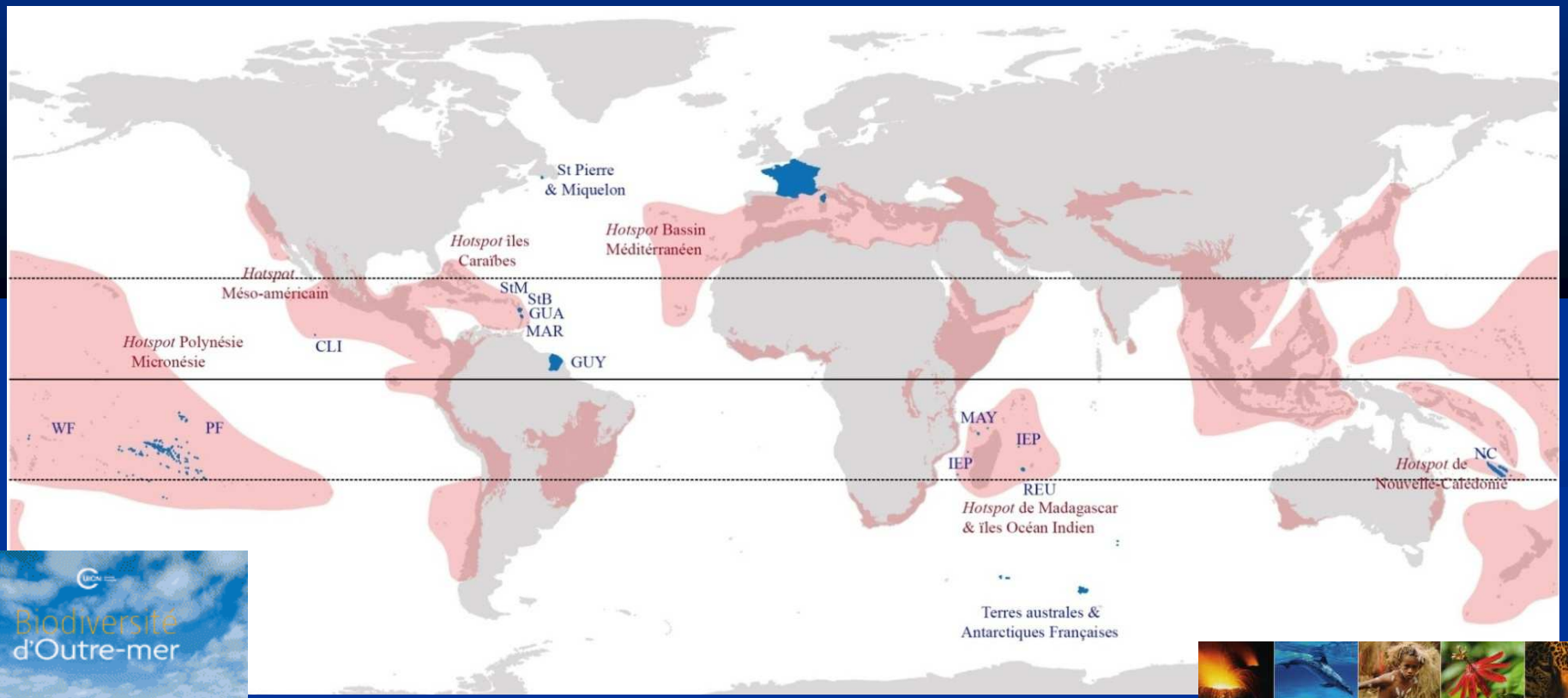






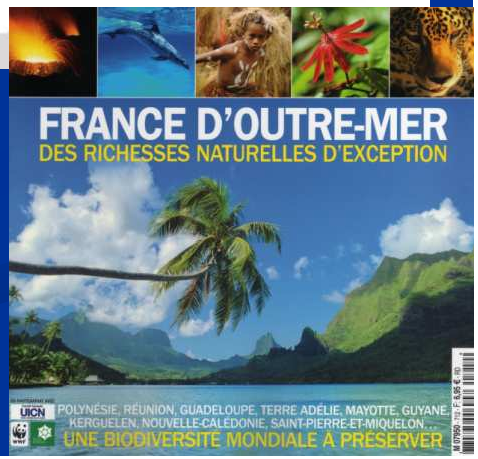


The French Overseas tropical island territories



(Bocquet & Gargominy, coord. 2013)

- 11 territories (140+ main islands) in 3 oceans
- 5 of the 36 "biodiversity hotspots"
- 70% of the ca. 18,000 French terrestrial endemic plants and animals



Island endemics

- **"old relicts" and "new" lineages**

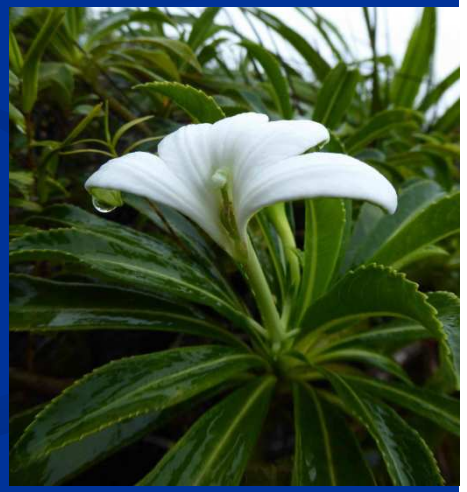
Rhynochetos jubatus (New Caledonia)
Photo : H. Jourdan

Anolis roquet (Martinique)
Photo : C. Delnatte

Lobelia conglobata (Martinique)
Photo : C. Delnatte

Microcystis saintjohni (Tubuai, Austral Is., French Polynesia) Photo : O. Gargominy

Lentipes rubrofasciatus (Marquesas, French Polynesia) Photo : P. Keith



Sclerotheca raiateensis (Raiatea, Society Is., French Polynesia)

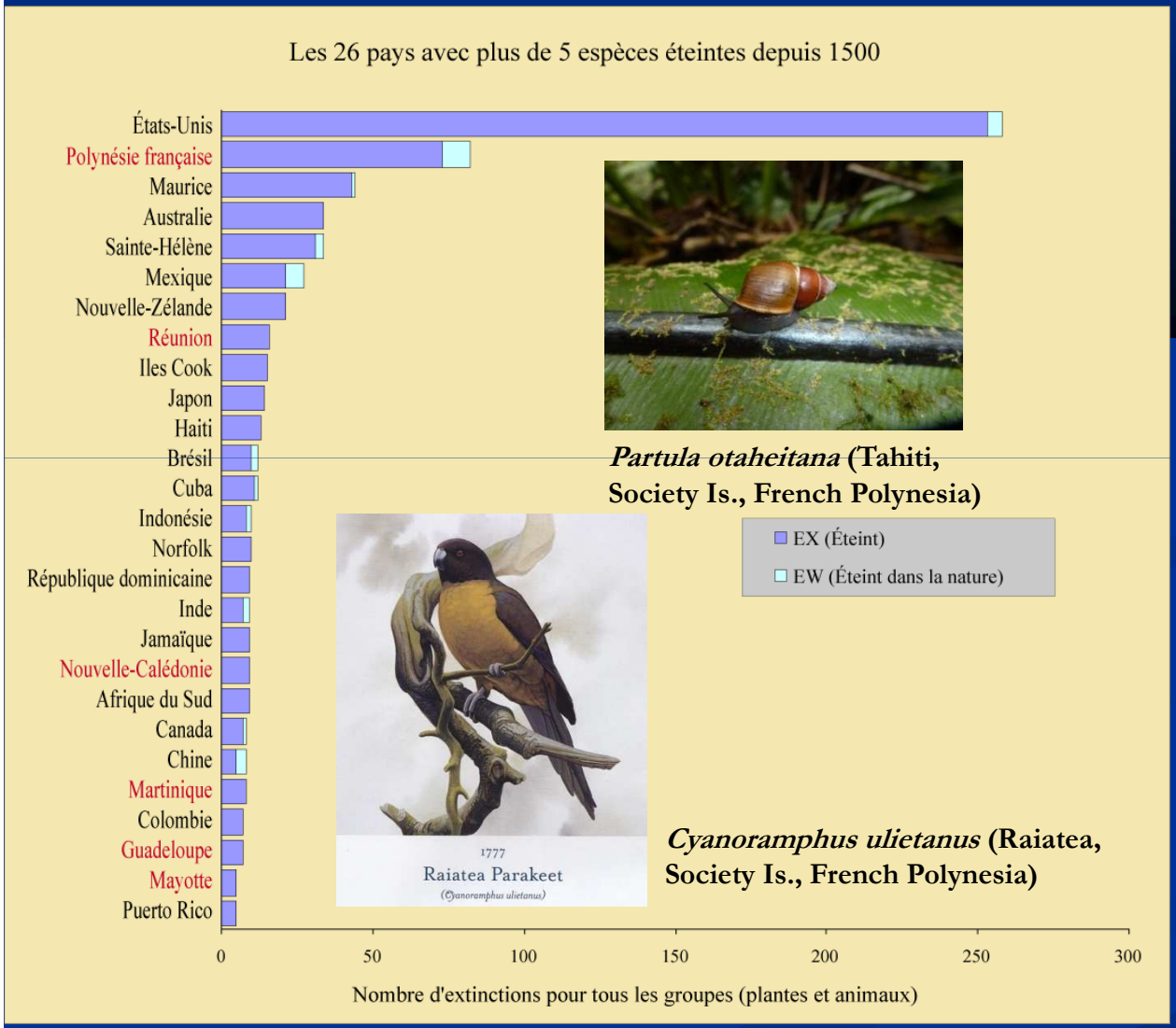
Endemism & « explosive » plant radiations

Archipelago/Island (area)	Native flowering plants	Endemic flowering plants (%)	Endemic species density (per sq. km)
Fiji (18,270 km²)	1,302	799 (61%)	0.050
Hawaii (16,880 km²)	966	859 (89%)	0.051
Galápagos (7,900 km²)	233	241 (51%)	0.030
New Caledonia (19,060 km²)	3,063	2,448 (80%)	0.128
La Réunion (2,512 km²)	797	309 (39%)	0.123
French Polynesia (3,520 km²)	659	478 (72%)	0.136

Psychotria (Rubiaceae), 78 endemic species in New Caledonia, 27+ in French Polynesia

Cyrtandra (Gesneriaceae) 28+ endemic species in French Polynesia

Extinctions & vulnerability



Partula otaheitana (Tahiti, Society Is., French Polynesia)

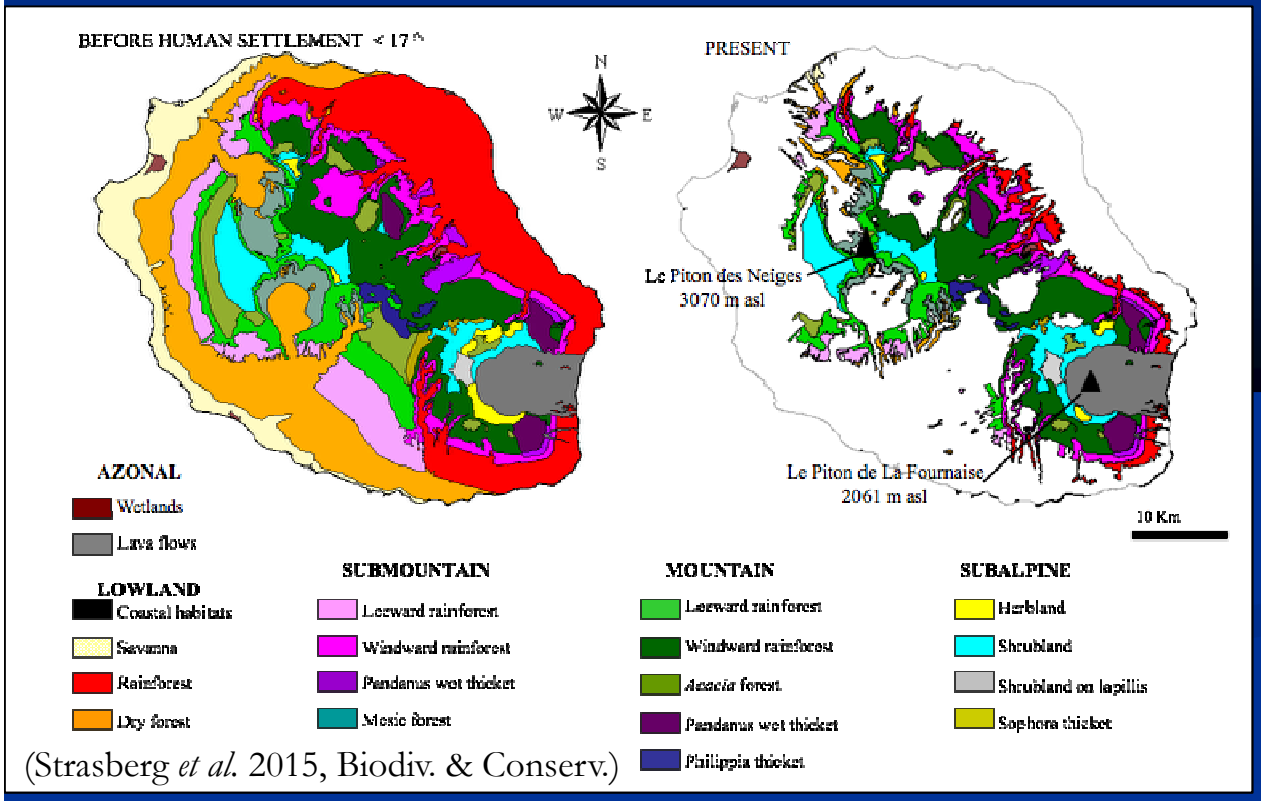
Cyanoramphus ulietanus (Raiatea, Society Is., French Polynesia)

(*in* Gargominy (éd.) 2001, Biodiversité et Conservation dans les Collectivités françaises d'Outre-Mer.UICN, Paris)

- France = 2nd rank for extinct species
- 4th for threatened animal species
- 9th for threatened plant species

- French Polynesian Endemic Plants : 118 CR, 134 EN, 50 VU

Forest loss & habitat fragmentation



(Strasberg *et al.* 2015, Biodiv. & Conserv.)

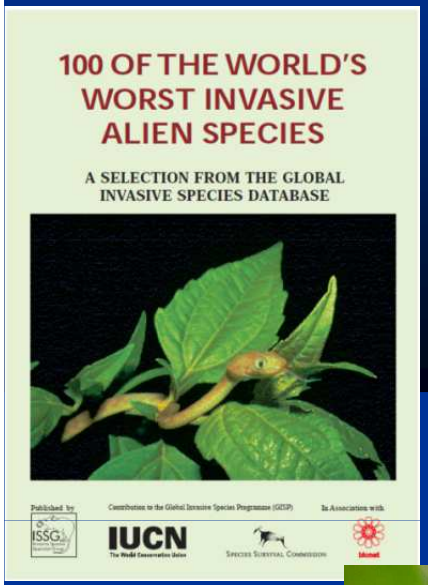
Rivière St-Denis (La Réunion)
Photo : D. Strasberg

Tahiti (Society Is., French Polynesia)

Makatea (Tuamotu Is., French Polynesia)

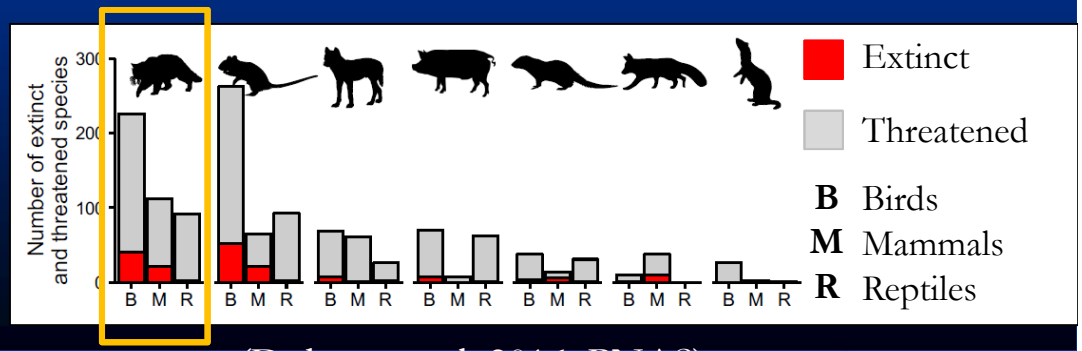
Eiao (Marquesas Is., French Polynesia)

Invasive alien species



Collaborative Project « FERAL CATS » (2014-on going)

- **Local Governments funding:** New Caledonia & French Polynesia and private companies (Société Le Nickel)
- **Impacts of feral cats on biodiversity** (birds, reptiles, mammals, invertebrates…)
- **Ecological studies** (ecology, density, range, movement, diet…)
- **Transfer to managers**: key-site management areas?

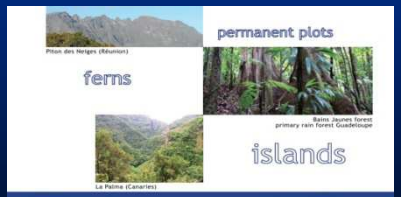


(Doherty et al. 2016, PNAS)

20 IUCN Red-Listed animals as preys! (Palmas *et al.* 2017, Biol. Cons.)

Collaborative Project « MOVECLIM » (2012-2015)

- **European funded biodiversity research initiative (ERA-NET "NetBiome"):** effects of climate change by studying the spatial variation of sensitive organisms (bryophytes, ferns) along elevational gradients
- **Multi-island research collaboration between** Macaronesia (Canaria, Azores), Caribbean (Guadeloupe), Pacific (Tahiti, French Polynesia) and Western Indian (La Réunion) with local managers and NGO!
- **Permanent plots** for long-term studies and monitoring environmental changes
- **Common sampling methodology and shared data:** global diversity analysis, taxonomy, phylogeny, ecophysiology…



« Mossy » tropical montane cloud forest (La Réunion)
Photos : D. Strasberg

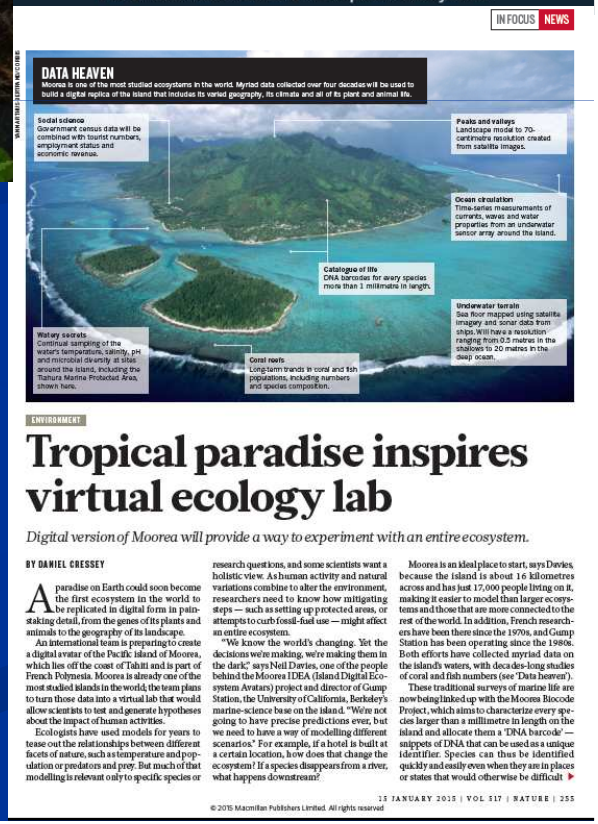
Mt Orohena, (2,240 m), Tahiti, French Polynesia

Cooperative Project « Moorea BIOCODE »

- **An island model system:** Mo'orea, French Polynesia (140 km²)
- **Private funding & Research consortium:** USA, France, French Polynesia
- **Biodiversity inventory:** marine and terrestrial macrobiota (native and alien animal and plant taxa)
- **Barcoding an entire ecosystem!**

Gordon and Betty MOORE FOUNDATION

https://mooreabiocode.org/



Research for conservation… with managers and local communities

- Evolution, endemism
- Extinction process, rarity
- Biotic interactions, multi-invasions, "novel/hybrid habitats"
- Ecological networks
- Tropical forest dynamics
- Resilience of ecosystems

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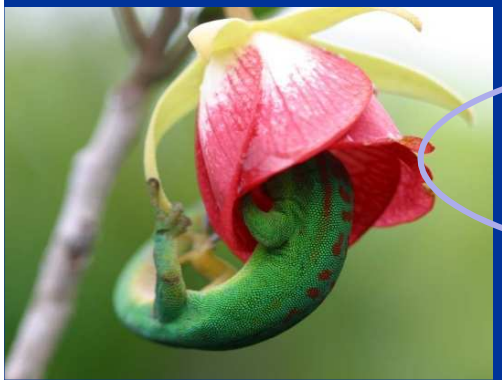
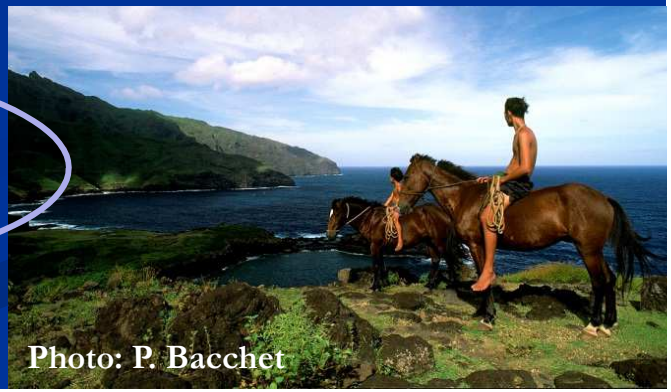
- Protected areas & species
- Invasive species control & management
- Habitat restoration, rehabilitation
- Species re-introduction, translocation, "ecological substitutes"



SOCIO-ECOLOGICAL SYSTEMS
Nature-Human Interactions



Conclusions : conservation sciences in islands

- Crucial and « grand » challenges!
- Cooperative science-based programs are required (*e.g.* multi-sites and long-term monitoring plots)
- Collaborative conservation projects between all stakeholders are essential (*e.g.* adaptative management)
- Islands are paradigmatic places, natural laboratories, models for small socio-ecological systems…but also incubators of new ideas, novel strategies and approaches

(*Plant Talk*©)

« LET'S ISLAND OUR PLANET ! »

16-20 April 2018, Honolulu, HAWAI'I (USA)

Super Dupont (*Gotlieb*©)