

Forest Conservation Biology

- How do we manage for biodiversity in forests?
 - Restoration
 - Protection
 - Sustainable forest management
 - Includes sustainable harvest for financial income
 - Not necessarily mutually exclusive

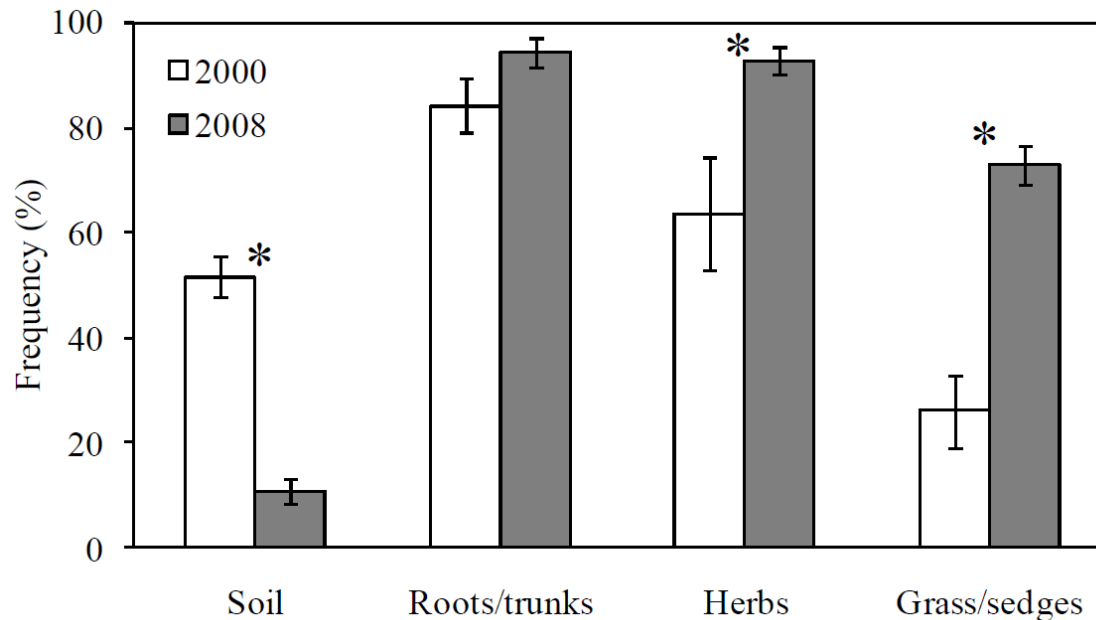
Forest Conservation Biology

- Restoration of biodiversity
 - Restoring native Hawaiian wet forests impacted by nonnative feral pigs (*Sus scrofa*)



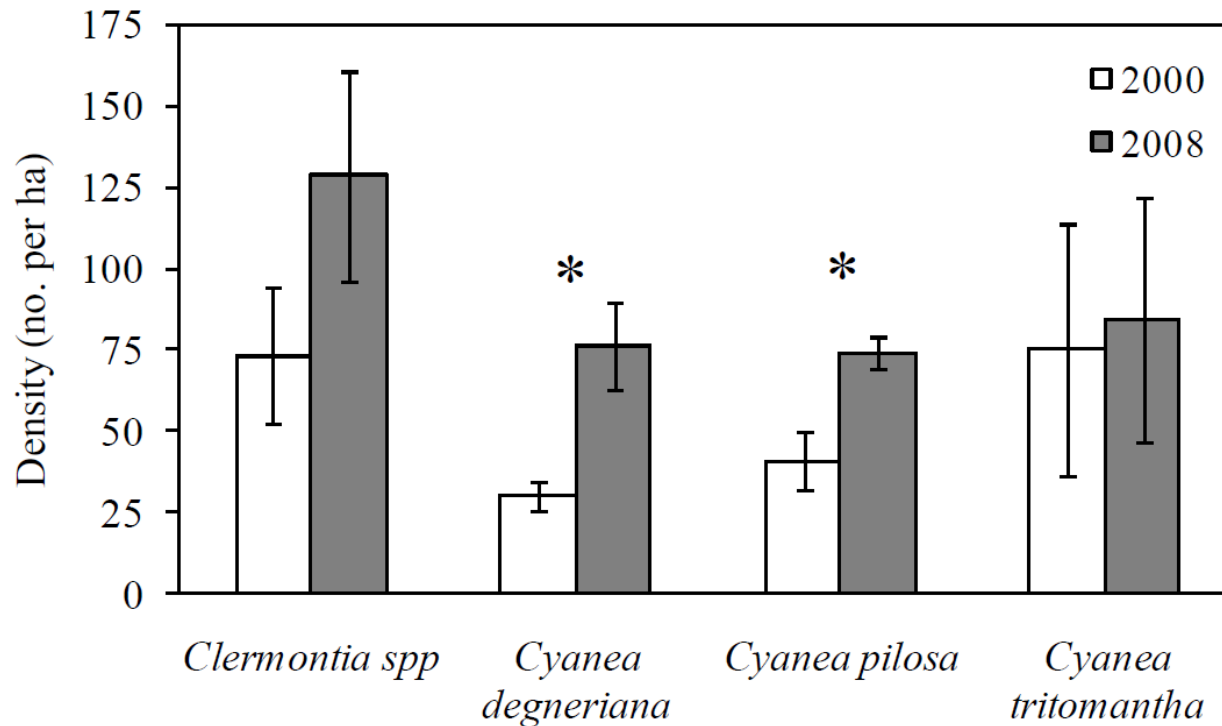
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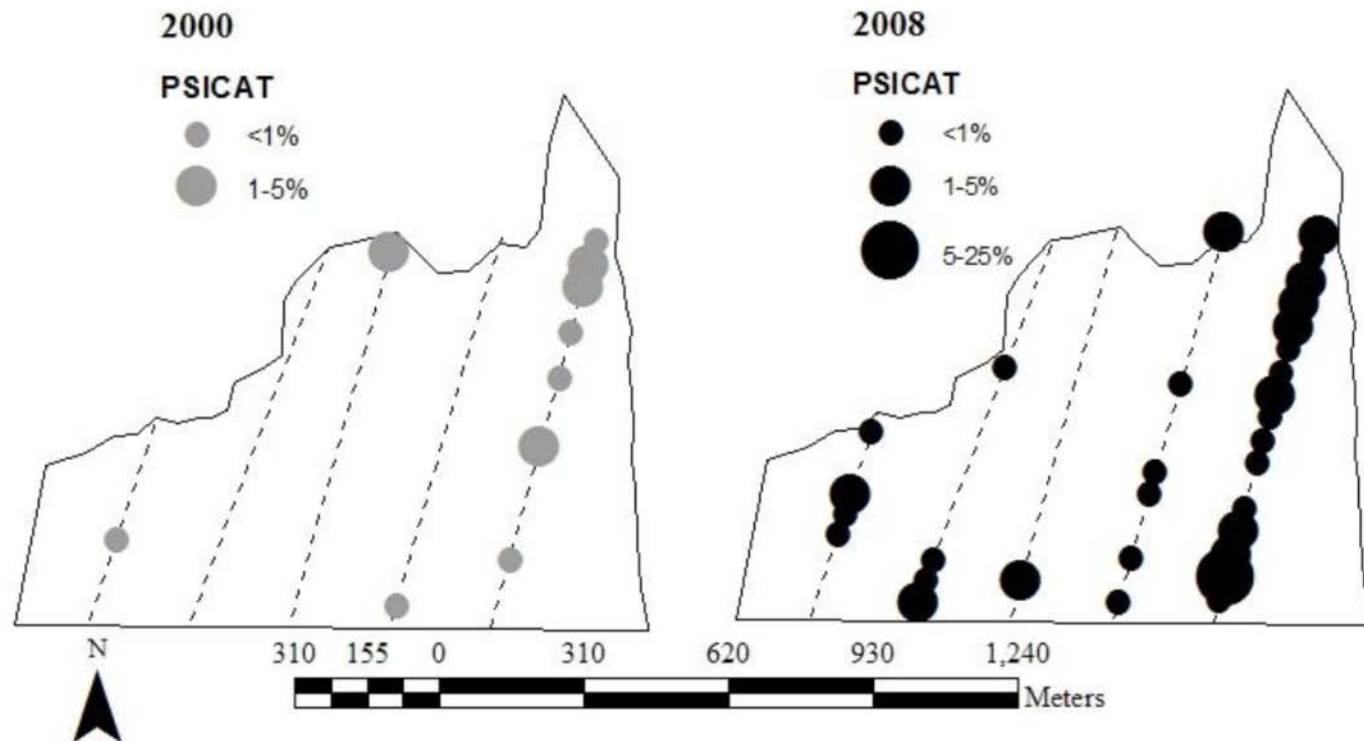
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(Ainsworth *et al.*, *In review*)

Forest Conservation Biology

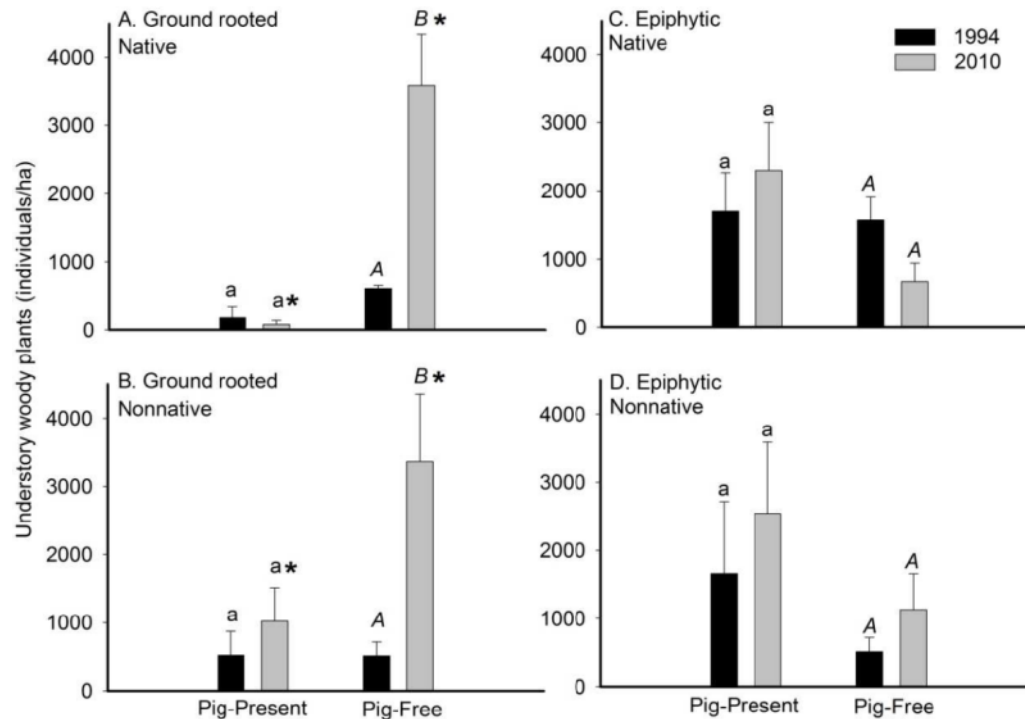
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Forest Conservation Biology

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(Cole et al., *In review*)

Forest Conservation Biology

- Protection of biodiversity
 - What are protected areas?
 - *“An area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means.”* (IUCN)



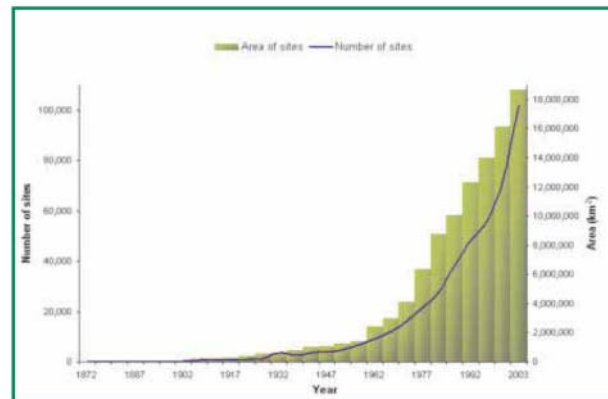
Arctic National Wildlife Refuge/USFWS



Tropical beach © E. Naro-Maciel, AMNH-CBC

Forest Conservation Biology

- Protection of biodiversity
 - Global protected areas
 - About 105,000 sites protecting ~12% of the earth's land surface
 - A large piece of this is Greenland, which contains the world's largest national park consisting primarily of snow
 - Most of these are terrestrial, and marine protected areas (MPAs) protect only about 0.5% of the world's oceans



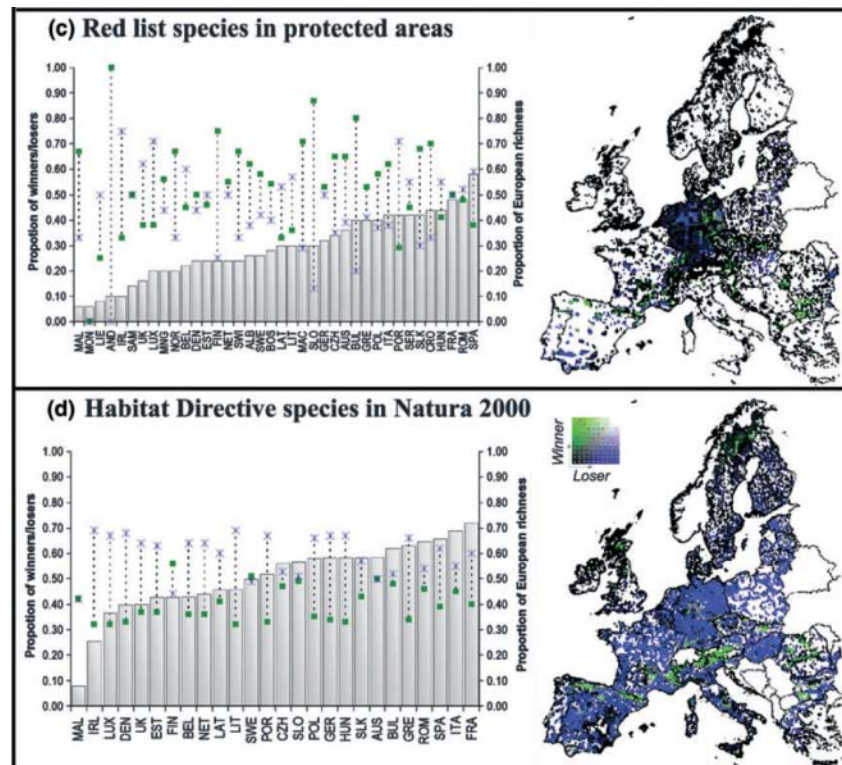
2003 UN List of Protected areas

Forest Conservation Biology

- Protection of biodiversity
 - Is the existing protected area system representative?
 - **Most Protected Biomes:** Temperate conifer forests (25%), Flooded grasslands and savannas (18%) and tropical or subtropical moist broadleaf forests (18%)
 - **Least Protected Biomes:** Temperate grasslands, savannas, and shrublands (5%), Mediterranean forests, woodland and scrub (6%), and tropical or subtropical conifer forest (6%)
 - Of the 11,633 species of mammals, amphibians, turtles, freshwater tortoises, and threatened birds analyzed, 12.2% (1424) of species are not covered by any protected area in the global network

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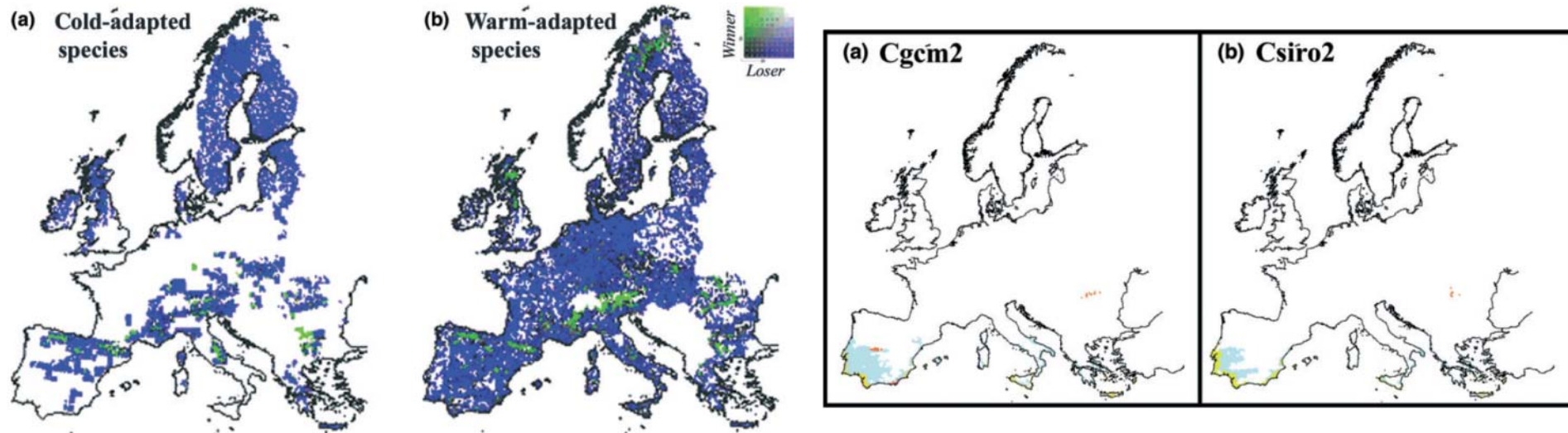
- Protection of biodiversity
 - How will current conservation areas conserve biological diversity with future climate change?



(Araújo et al., 2011)

Forest Conservation Biology

- Protection of biodiversity
 - How will current conservation areas conserve biological diversity with future climate change?



Forest Conservation Biology

- Sustainable forest management (SFM)
 - Aim is to “contribute to the management, conservation, & sustainable development of forests”
 - Relatively new concept (since 1992), even though sustainable management is at least 200 years old
 - Environmental, social, and economic components of sustainability are considered simultaneously
 - Little evidence that SFM, as currently practiced, is an effective means for conserving biodiversity
 - Indicators of forest biodiversity are insufficient & better indicators are needed
 - » Forest type, successional status, and protection status; degree of fragmentation; rates of conversion; % of forests impacted by humans; forest structure; forest-dependent species; conservation status

Forest Conservation Biology

• Sustainable forest management (SFM)

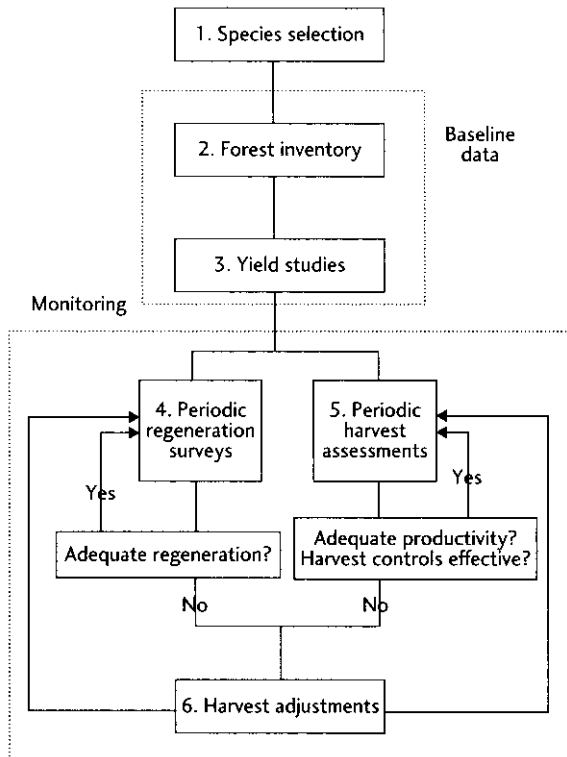


Table 8.2 The potential for sustainable use of different tree species, based on their biological characteristics (adapted from Peters 1994, <http://www.panda.org>).

		Low	Moderate	High
<i>Reproductive characteristics</i>	Flower number, size	Few, large	Intermediate	Many, small
	Fruit number, size	Few, large	Intermediate	Many, small
	Reproductive phenology	Irregular, supra-annual	Regular, supra-annual	Regular, annual
	Pollination system	Biotic, with specialized	Biotic, with generalist	Abiotic
	Pollinator abundance	Low (bats, hummingbirds)	Moderate (beetles, moths)	High (small insects)
	Sprouting ability	None	Low	High
<i>Regeneration processes</i>	Seed dispersal	Biotic, with specialized vector	Biotic, with generalist vector	Abiotic
	Disperser abundance	Low (large birds, primates)	Moderate (small mammals)	High (small birds)
	Seed germination	Low viability; recalcitrant	Intermediate	High viability; orthodox
<i>Population structure*</i>	Shade tolerance	Pioneer	Intermediate	Shade tolerant
	Regeneration niche	Narrow; specialized	Intermediate	Broad; generalist
	Size-class distribution	Type III curve (low representation in more than one size class)	Type II curve (low representation of reproductive adults)	Type I curve (inverse-J; exponential decay)
	Tree density	Low (0–5 adults ha ⁻¹)	Moderate (5–10 adults ha ⁻¹)	High (>10 adults ha ⁻¹)
	Spatial distribution	Scattered	Clumped	Evenly distributed

* See section 4.74.