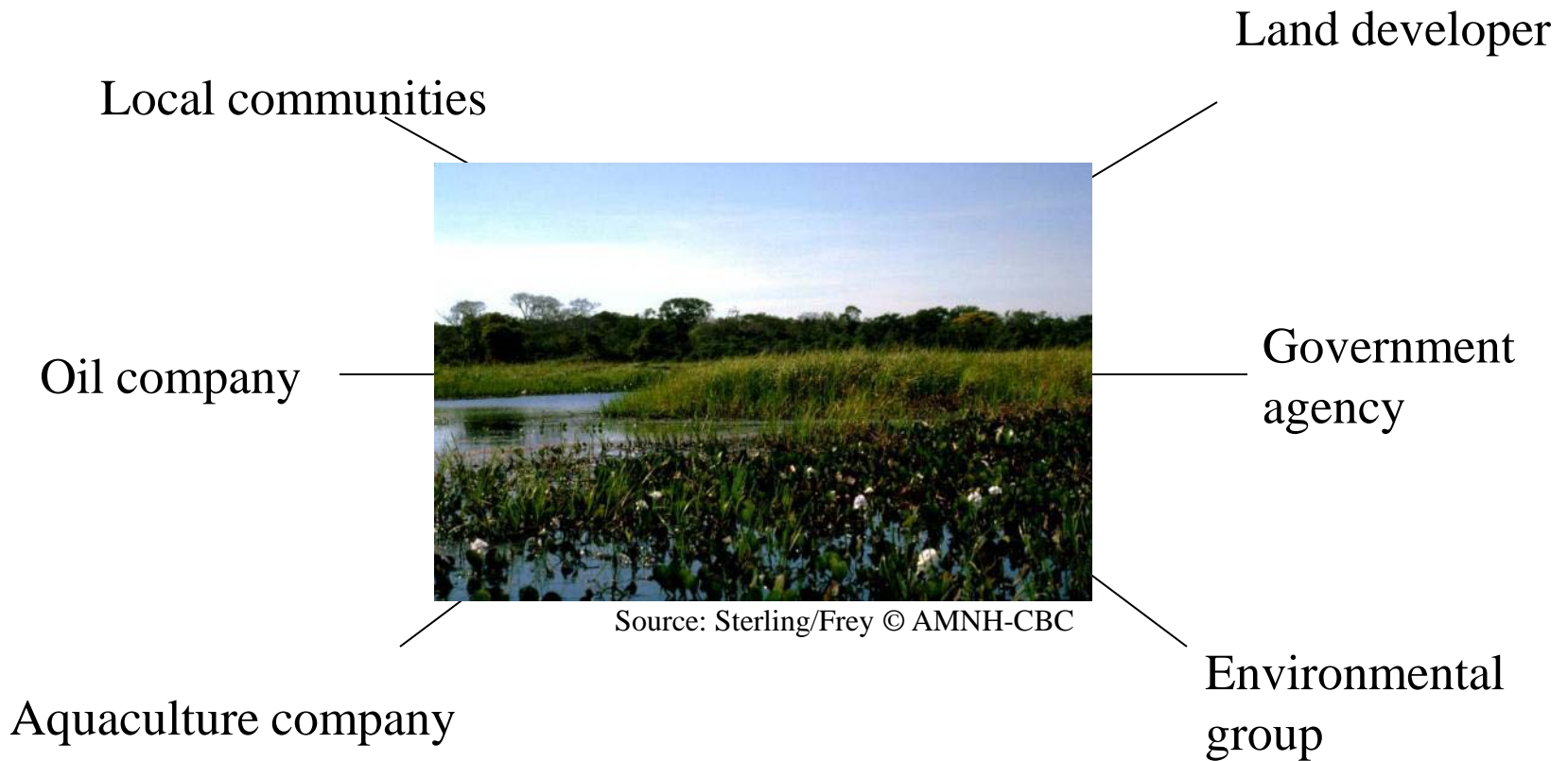


# Forest Conservation Biology

- Why is biodiversity important?
  - Intrinsic/inherent value
    - The value of something independent of its value to anyone or anything else
    - A philosophical concept
  - Extrinsic/utilitarian/instrumental value
    - Uses or applications of biodiversity

# Forest Conservation Biology

- Values of Biodiversity



# Forest Conservation Biology

- Values of Biodiversity

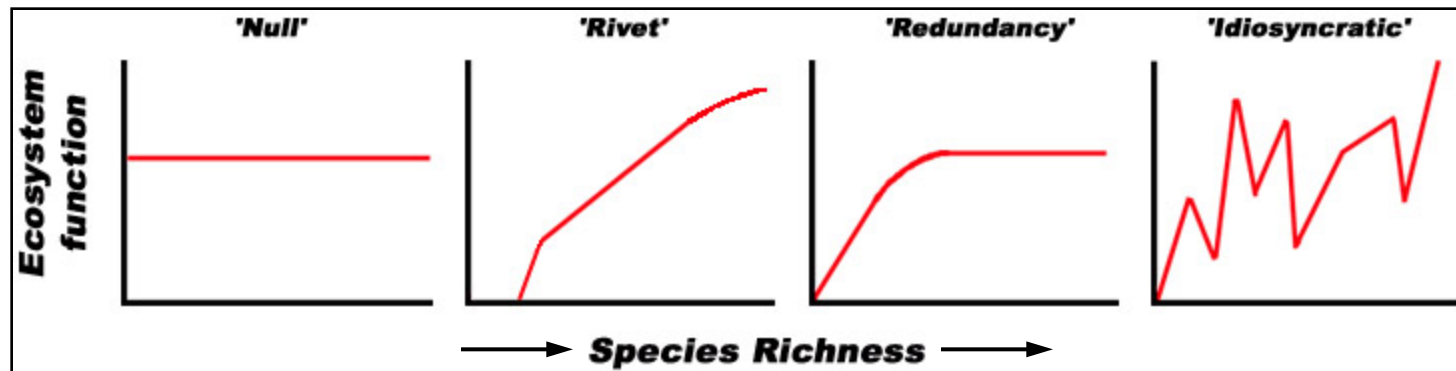
<b><i>Direct Use Value(Goods)</i></b>	<b><i>Indirect Use Value (Services)</i></b>	<b><i>Non-Use Values</i></b>	
<b>Food, medicine, building material, fiber, fuel</b>	<b>Atmospheric and climate regulation, pollination, nutrient recycling</b>	<b>Potential (or Option) Value</b>	<b>Future value either as a good or service</b>
	<b>Cultural, Spiritual and Aesthetic</b>	<b>Existence Value</b>	<b>Value of knowing something exists</b>
		<b>Bequest Value</b>	<b>Value of knowing that something will be there for future generations</b>

# Forest Conservation Biology

- Biodiversity and Ecosystem Function
  - Is biodiversity important in determining the goods and services that ecosystems provide?
    - Stable ecosystems are characterized by (1 or more):
      - Constancy (Lack of fluctuation)
      - Resistance (Resistance to perturbation)
      - Resilience (Ability to recover)
    - Not all species are critical to ecosystem function
      - Many fill redundant roles
      - Basis for community stability (resistance and resilience)
    - If too many species or keystone species are lost, eventually it leads to the failure of ecosystem function
      - Rivet-popper vs. Redundancy hypotheses

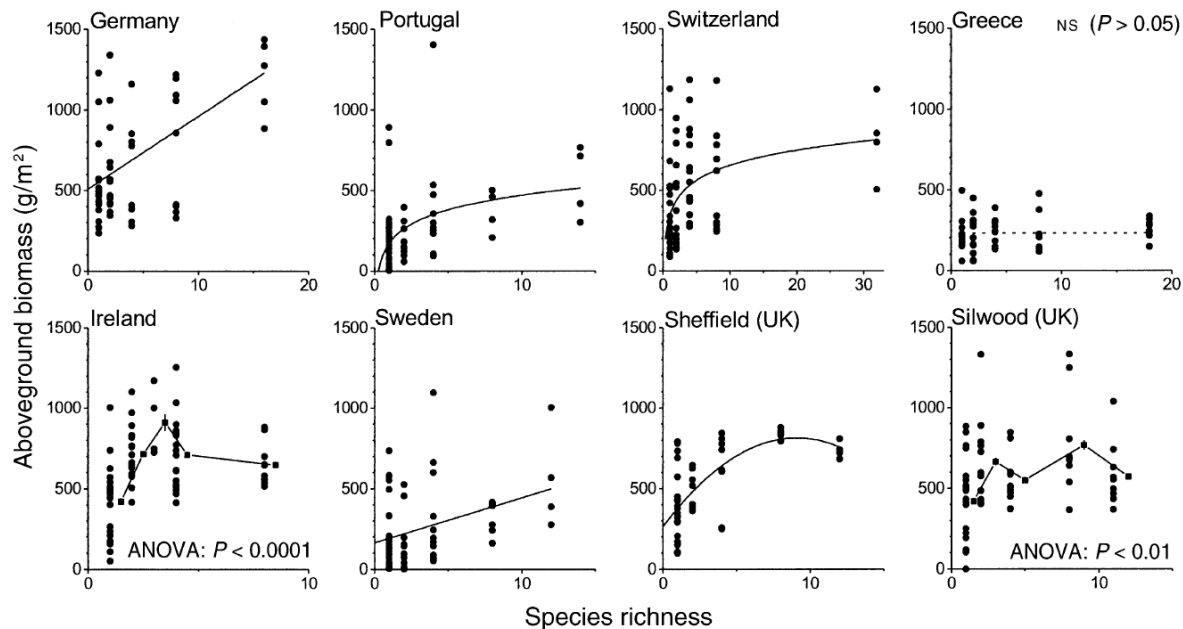
# Forest Conservation Biology

- Biodiversity and Ecosystem Function
  - Is biodiversity important in determining the goods and services that ecosystems provide?



# Forest Conservation Biology

- Biodiversity and Ecosystem Function
  - Studies indicate that there is a correlation between biodiversity and ecosystem function
    - But it varies somewhat from system to system
    - Redundancy hypothesis seems to have the most support



# Forest Conservation Biology

- What are the current threats to biodiversity?
  - Direct threats
    - Habitat loss and fragmentation
    - Invasive species
    - Overexploitation
    - Pollution
    - Global Climate Change

# Forest Conservation Biology

- What are the current threats to biodiversity?
  - Underlying causes
    - Human overpopulation
    - Human over-consumption
    - Lack of incentive for conservation
    - Lack of enforcement

# Forest Conservation Biology

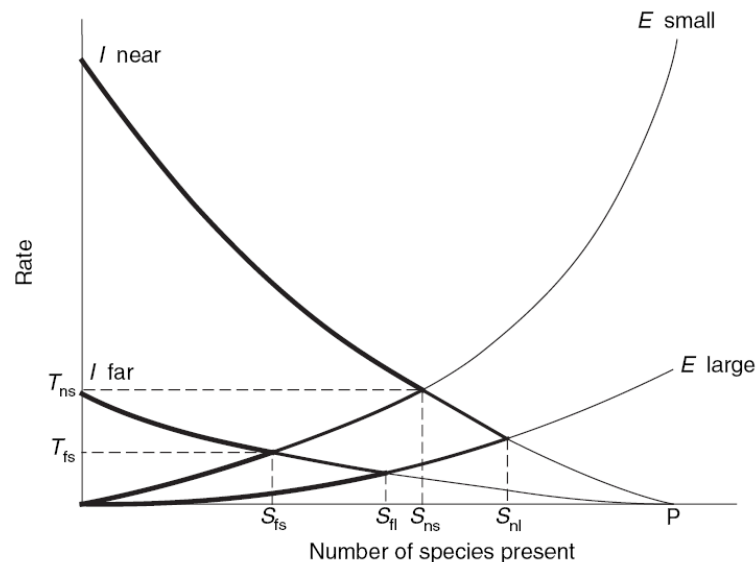
- Habitat loss and fragmentation

- *The end result of human settlement and resource extraction in a landscape is a patchwork of small, isolated natural areas in a sea of developed land... (Gascon et al. 1999)*

- Remnant patches are analogous to islands

- Island Biogeography Theory

- Biodiversity is a function of island size and distance to other islands



(MacArthur and Wilson 1967)

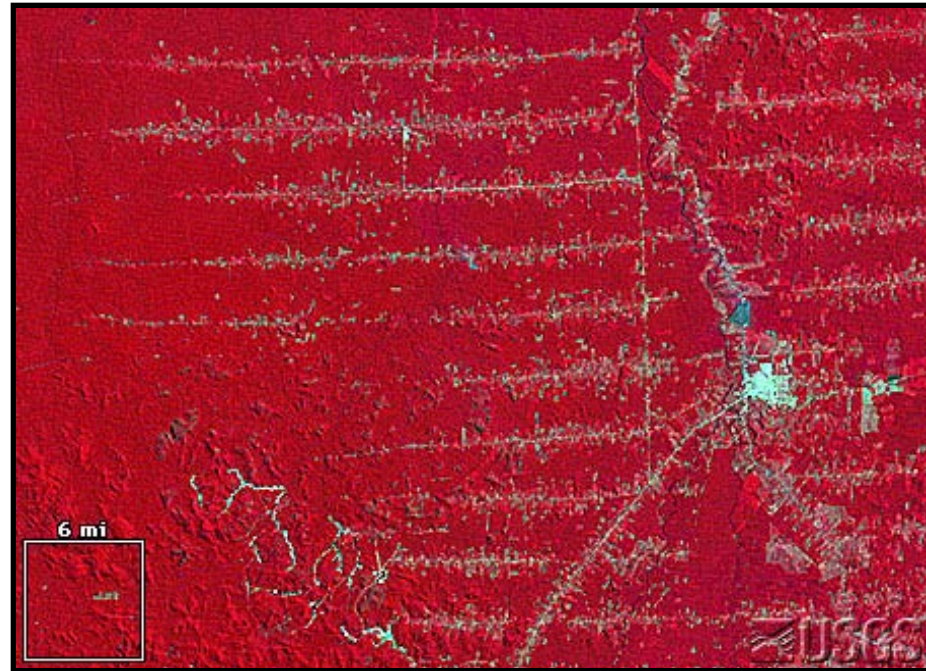
# Forest Conservation Biology

- Habitat loss and fragmentation
  - Example from tropical moist forest in Rondonia, Brazil

**1975**



**1986**



# Forest Conservation Biology

- Habitat loss and fragmentation

<b>Patch Characteristic</b>	<b><i>Natural</i></b>	<b><i>Human</i></b>
<b>Structure</b>	Complex	Simple
<b>Wildlife habitat</b>	Suitable to many species	Not always suitable & to fewer species
<b>Contrast between patches</b>	Lower	Higher
<b>Edge effects</b>	Less abrupt	Abrupt
<b>Roads &amp; other Human structures</b>	Never	Uniquely occur and create unique dangers

# Forest Conservation Biology

- Invasive Species

## Hawaii

*Psidium cattleianum*



*Pennisetum setaceum*



*Puccinia rust*



# Pre-human Hawaii

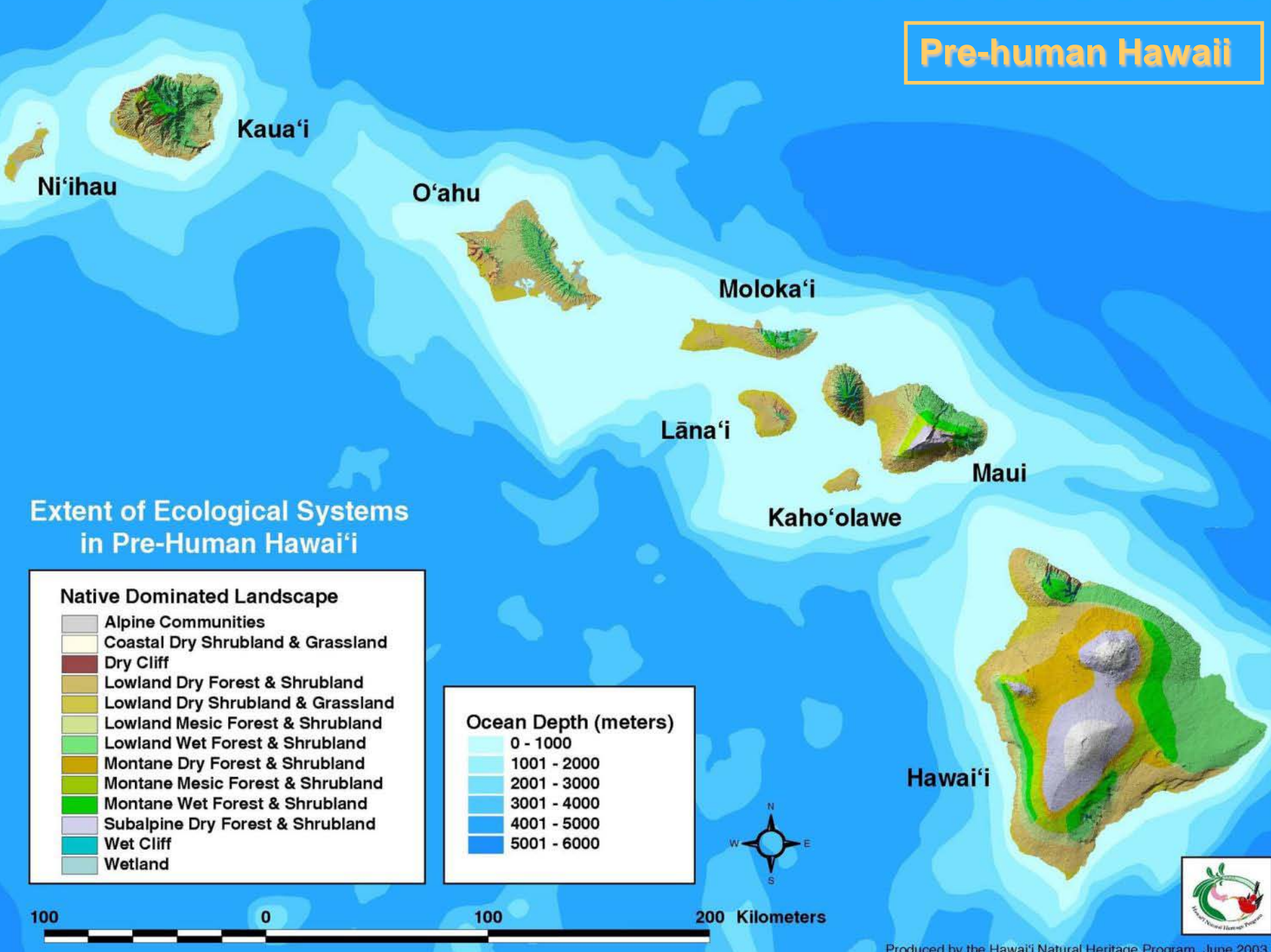
## Extent of Ecological Systems in Pre-Human Hawai'i

**Native Dominated Landscape**

- Alpine Communities
- Coastal Dry Shrubland & Grassland
- Dry Cliff
- Lowland Dry Forest & Shrubland
- Lowland Dry Shrubland & Grassland
- Lowland Mesic Forest & Shrubland
- Lowland Wet Forest & Shrubland
- Montane Dry Forest & Shrubland
- Montane Mesic Forest & Shrubland
- Montane Wet Forest & Shrubland
- Subalpine Dry Forest & Shrubland
- Wet Cliff
- Wetland

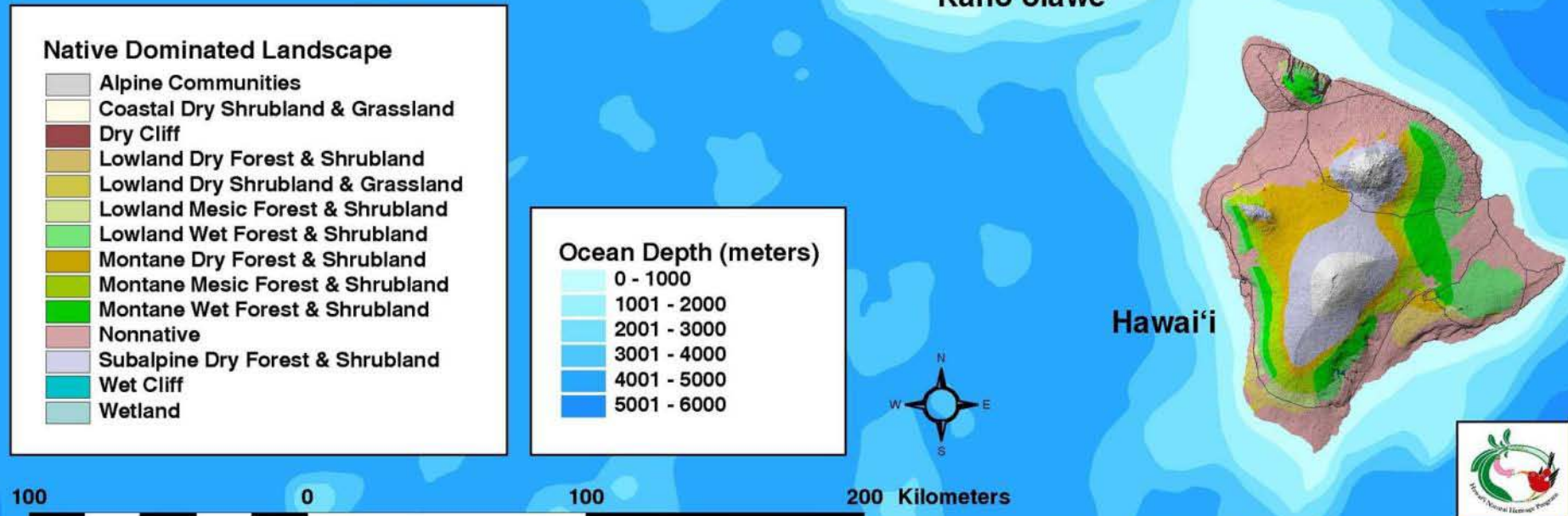
**Ocean Depth (meters)**

- 0 - 1000
- 1001 - 2000
- 2001 - 3000
- 3001 - 4000
- 4001 - 5000
- 5001 - 6000



•Present day Hawaii

Remaining Native Ecosystems in Hawai'i Today



# Forest Conservation Biology

- Overexploitation

- Direct

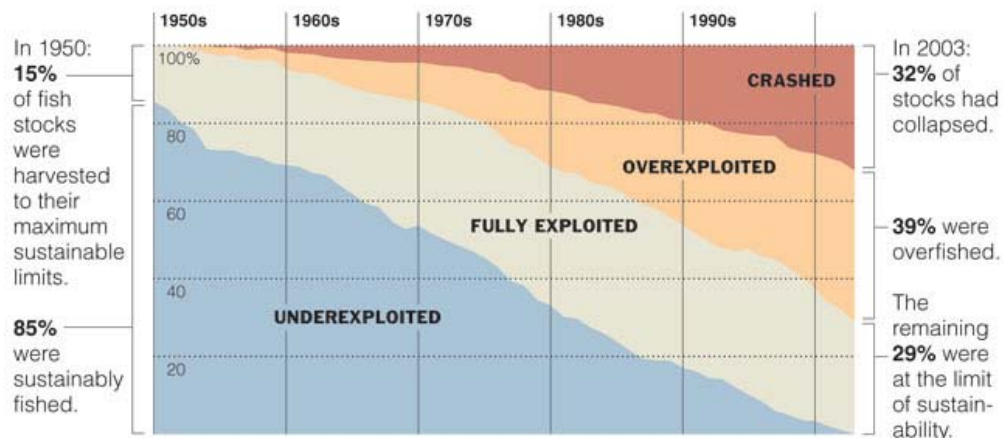
- Commercial harvests

- Indirect

- Unintentional harvests (e.g., bycatch of sea turtles in fishery operations)

## At the Breaking Point

The condition of the world's fisheries has declined drastically because of overfishing.



# Forest Conservation Biology

- Pollution

**N fixation**



← Natural →

**N deposition**



vs.



← Anthropogenic →



# Forest Conservation Biology

- Global Climate Change

