



WATERLOO
ENVIRONMENT



Novel ecosystem management strategies in Borneo

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Humans and nature: a strained relationship

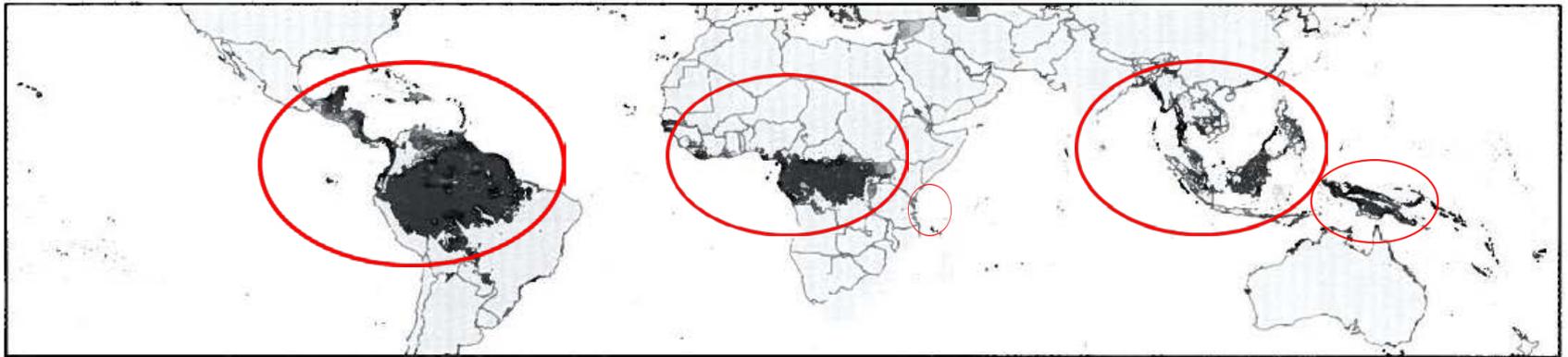
- All ecosystems affected by change
- Human dominance and mismanagement
- Biodiversity and global environmental alterations with drastic consequences
- Results in novelty and novel ecosystems
- Can compromise human survival
- Adapt management to new conditions

Novelty and the ecosystem

- Natural, novelty, hybrid, novel?
- Definitions, perceptions, consequences
- All ecosystems showing the effects of human influence = novel...ty
- New or different species combinations
- Past or current influence and how much?
- Changes in natural capital stores
- Altered ecosystem functions and services

Areas of tropical rainforest

- Over 85% of the world's poor in tropics
- Degradation tied to deforestation, conversions, and short-term management
- Happening right now, accelerating with population growth and climate change



From Cortlett & Primack, 2008

Tropical context

- Mismatch between scientific and external goals, past management results, and wants of affected populations
- Need to meet many simultaneous goals
- Local indigenous peoples
- Settling subsistence farmers
- Active conservation organizations
- Development and government interests
- Research and scientific community

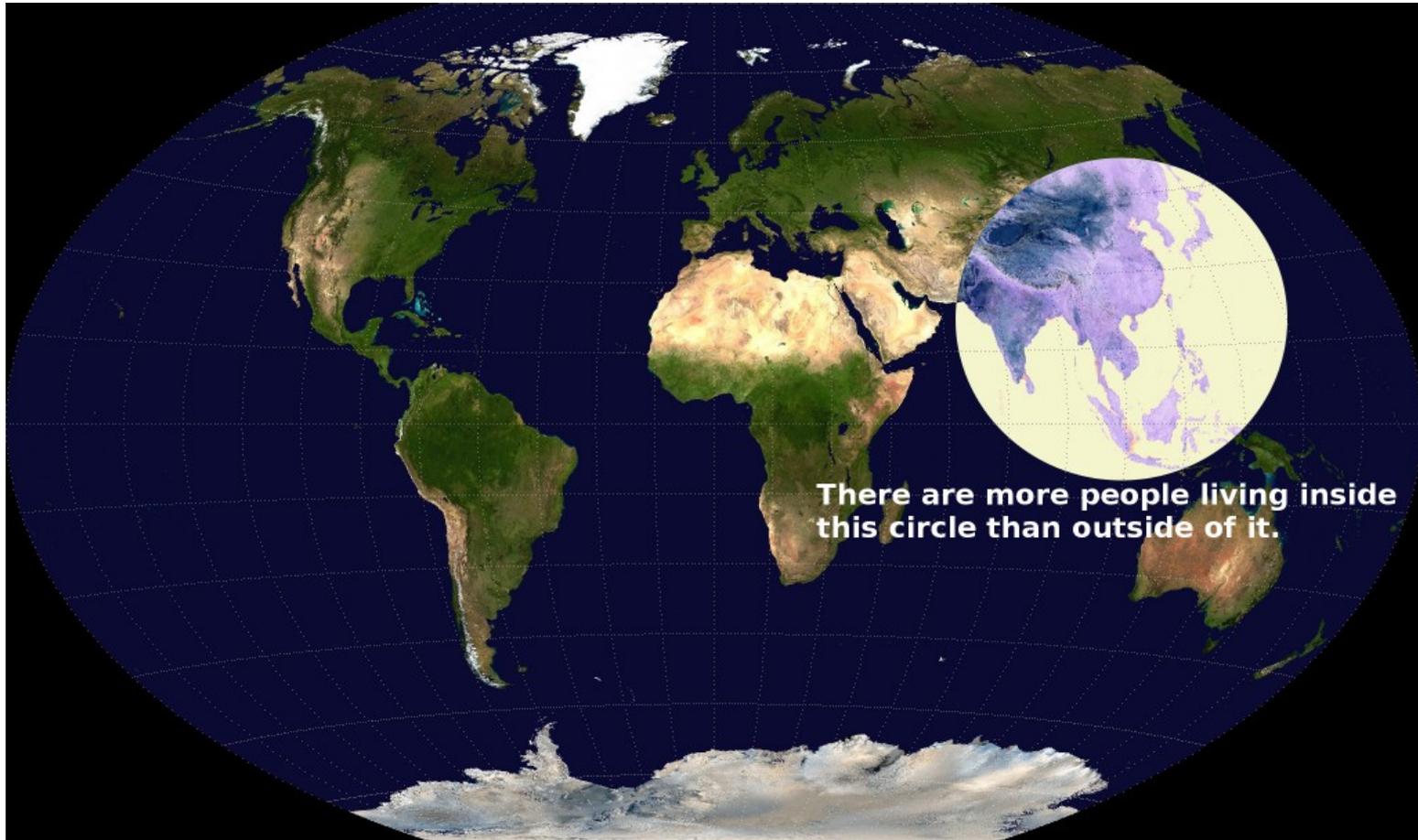
Research context

- Observational study of different lowland rainforest management strategies
- Heavy deforestation, resource extraction, agricultural, and development pressures
- Decreases in biodiversity, native lifeways, quality of life while climate changes
- Promote options for compromise
 - Why have differing strategies?
 - What keeps strategies divided?
 - Where can they meet and co-exist?

Research goal

- Develop specific tropical forest management scenarios with traditional, local, and scientific perspectives
- Focus on developing agroforestry-based systems that replicate and enhance natural forest ecosystem services
- Understand larger processes at work in developing management plans
- Recommendations for alterations in approach and dissemination

Why Southeast Asia?



Washington Post, 2013

Why Borneo?

Malaysia

- State of Sarawak
- Dipterocarp forest
- Iban and Bidayuh peoples
- Heavier rain season January
- Increases in rain entire year

Borneo



Methods

- Understand current happenings in ecosystems and their effects
- Combine data to form ecosystem management baselines
- Model and evaluate potential ecosystem strategies for:
 - Net biodiversity
 - Carbon sequestration & biofuels
 - Nutritional output & livelihoods
 - Energy flow including work inputs

A remnant example



A hybrid example



A novel tropical forest



Findings: Rumah Siba Perdu

- Most of area is hunting and fishing reserve
- Former subsistence upland rice farming
- Recent shift to artisanal peppercorns
- Peppercorns grown on fertile clearings
- System now depends on:
 - Artificially cheap Vietnamese rice
 - Subsidized fertilizers and herbicides
 - Diesel for generators and transport
 - Agroforested latex as insurance crop

Rumah Siba Perdu



Findings: Sarawak Forestry

- Preserves of dipterocarp forest
- Habitat for orangutans, proboscis monkey
- Elephants and rhinos notably absent
- Indirect carbon storage management
- Reserves set for future lumber concessions
- Main threat is nearby subsistence farmers
- Some illegal logging and poaching
- Current ecotourism income stream

Sarawak Forestry



Agroforestry as compromise?

- Already practicing latex farming
- Transitional management for cassava, peppercorns, and vegetable crops
- Requires inclusion of N-fixers, other species
- Opportunity for controlled novelty as N-fixers not dominant in dipterocarp forests
- Can act as buffer in border areas
- Habitat maintained while allowing for local extraction

Species Mixes

- Dipterocarp dominant (preferred by SF)
- Pan-tropical species
- Biodiversity-based
- Food production and livelihoods
- Carbon storage and biofuels
- Overall productivity-based
- What's easiest to establish and maintain?

Stages

- Multi-stage system mimicking regrowth
- Current rice or peppercorn clearings
- Initial transition – cassava and peppercorn with palm, latex, and N-fixer
- Maturing growth – hardwood plantings such as mahogany, teak, or cacao
- Initial maturing – harvest palm, tap latex
- Climax maintenance – hardwood harvest
- Questions?