

Sustainable Use of Biodiversity and Tropical Rain Forests through Ecosystem-based Forest Management

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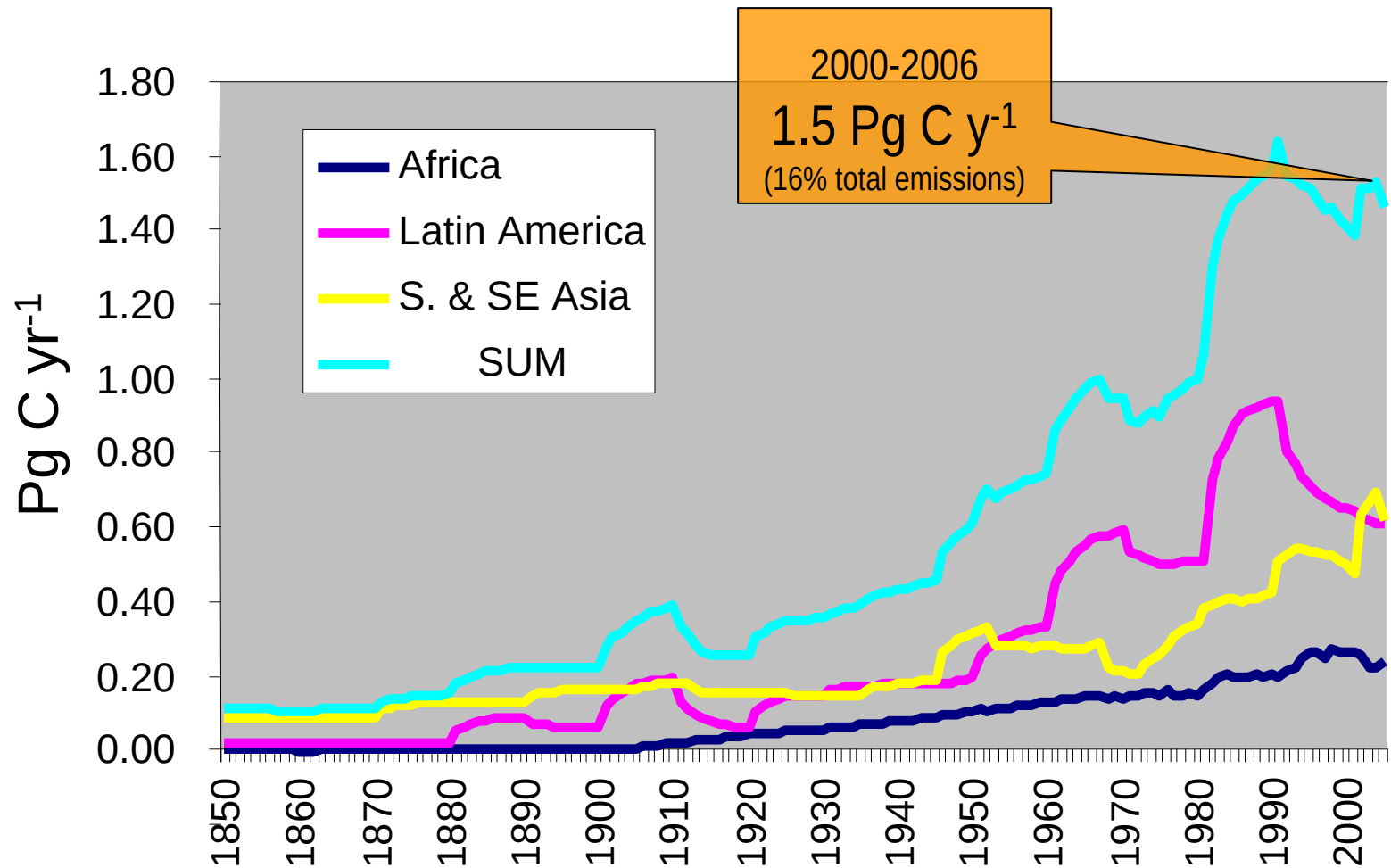
School of Agriculture

Kyoto University

(on behalf of my research team)

Rapid deforestation in SE Asia

Carbon Emissions from Tropical Deforestation



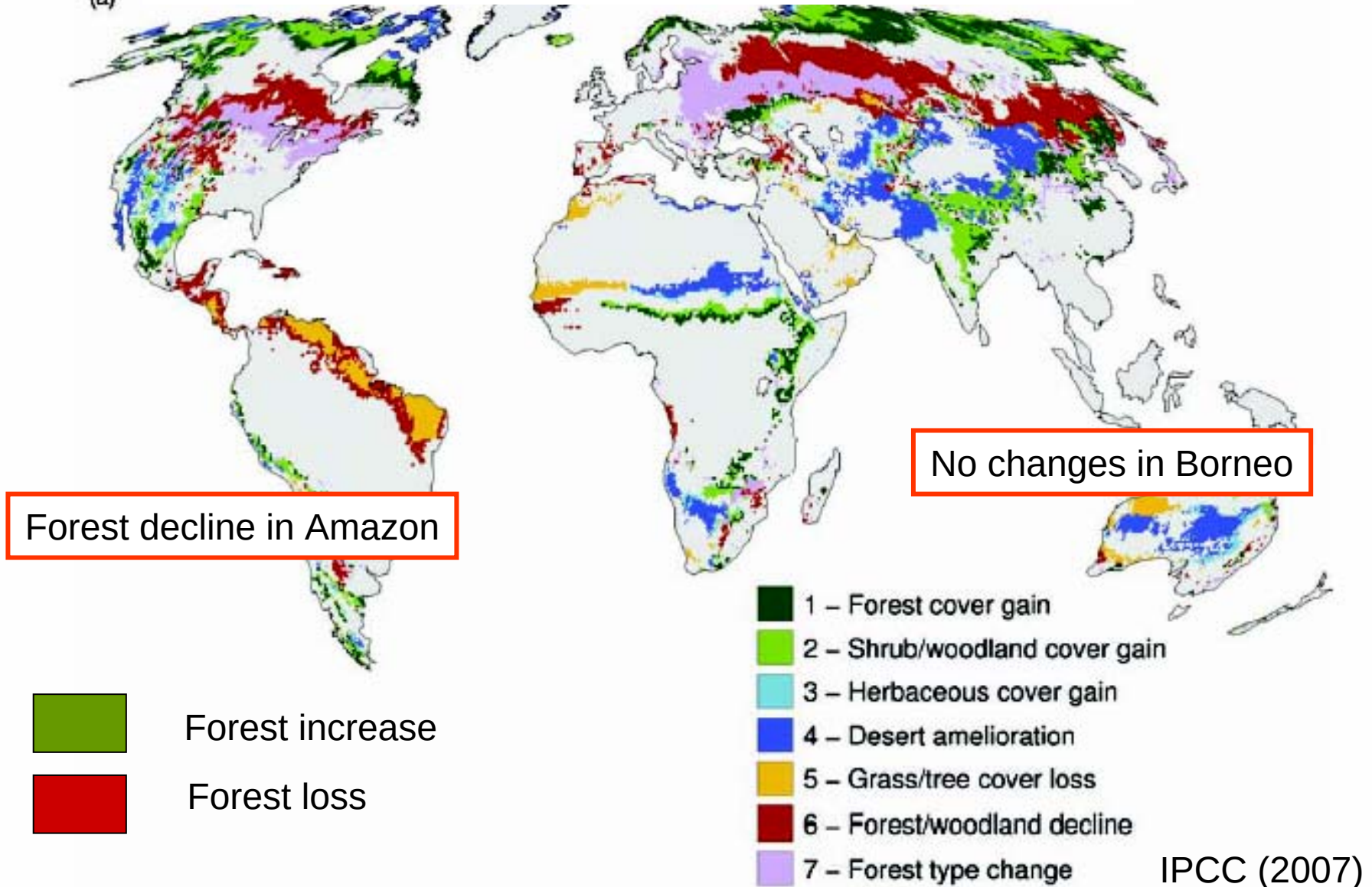
Houghton, unpublished

Figure cited from GCP

How Borneo looks like in the future?

Vegetation changes A2 Scenario (2000 vs. 2100)

(a)

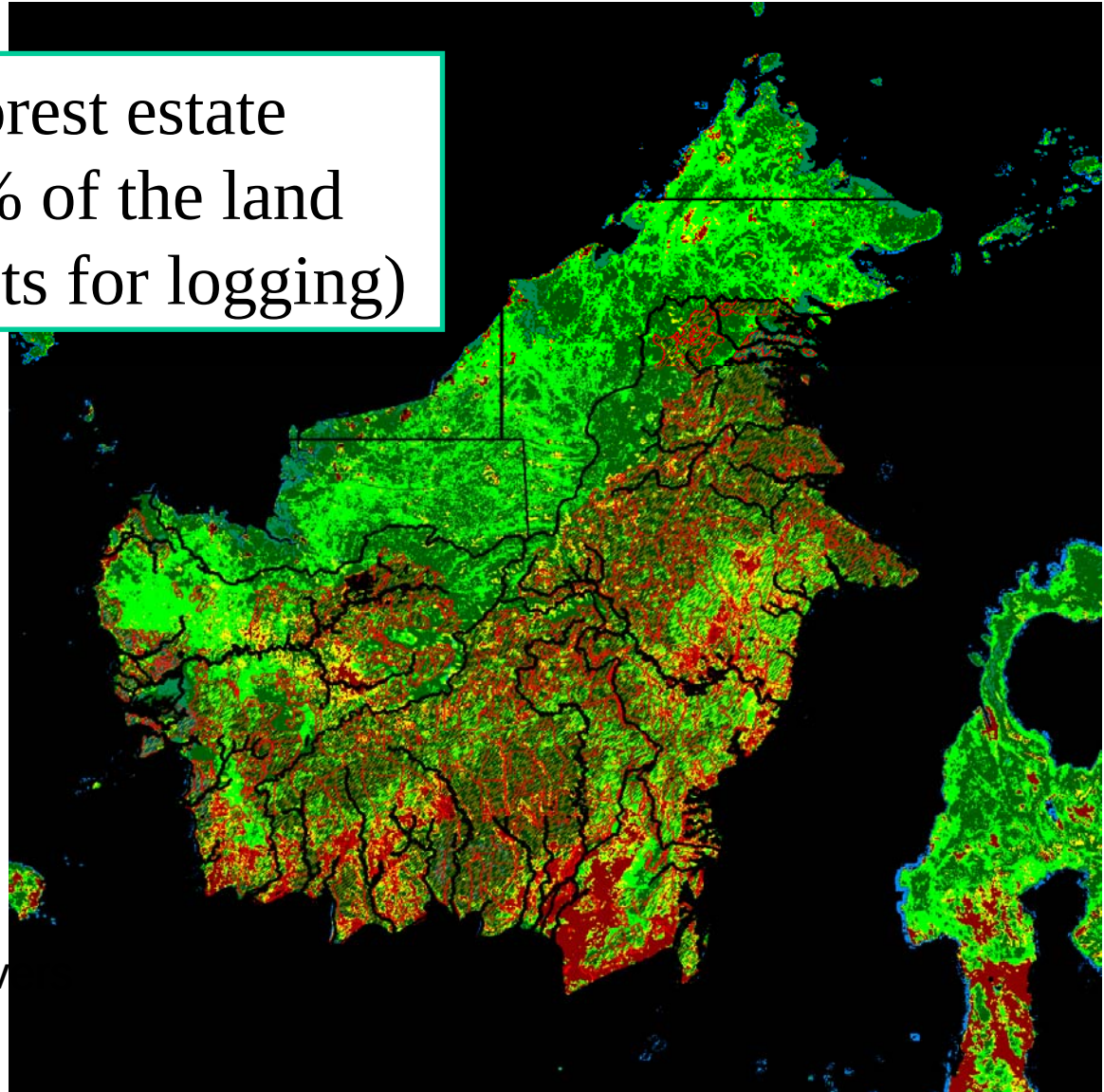


Interactions of climate change and land-use adverse influences on ecosystems

Land tenure in Borneo

Permanent forest estate
38 mill ha, 50% of the land
(Production forests for logging)

Black: State borders/riv
Red: HPH borders



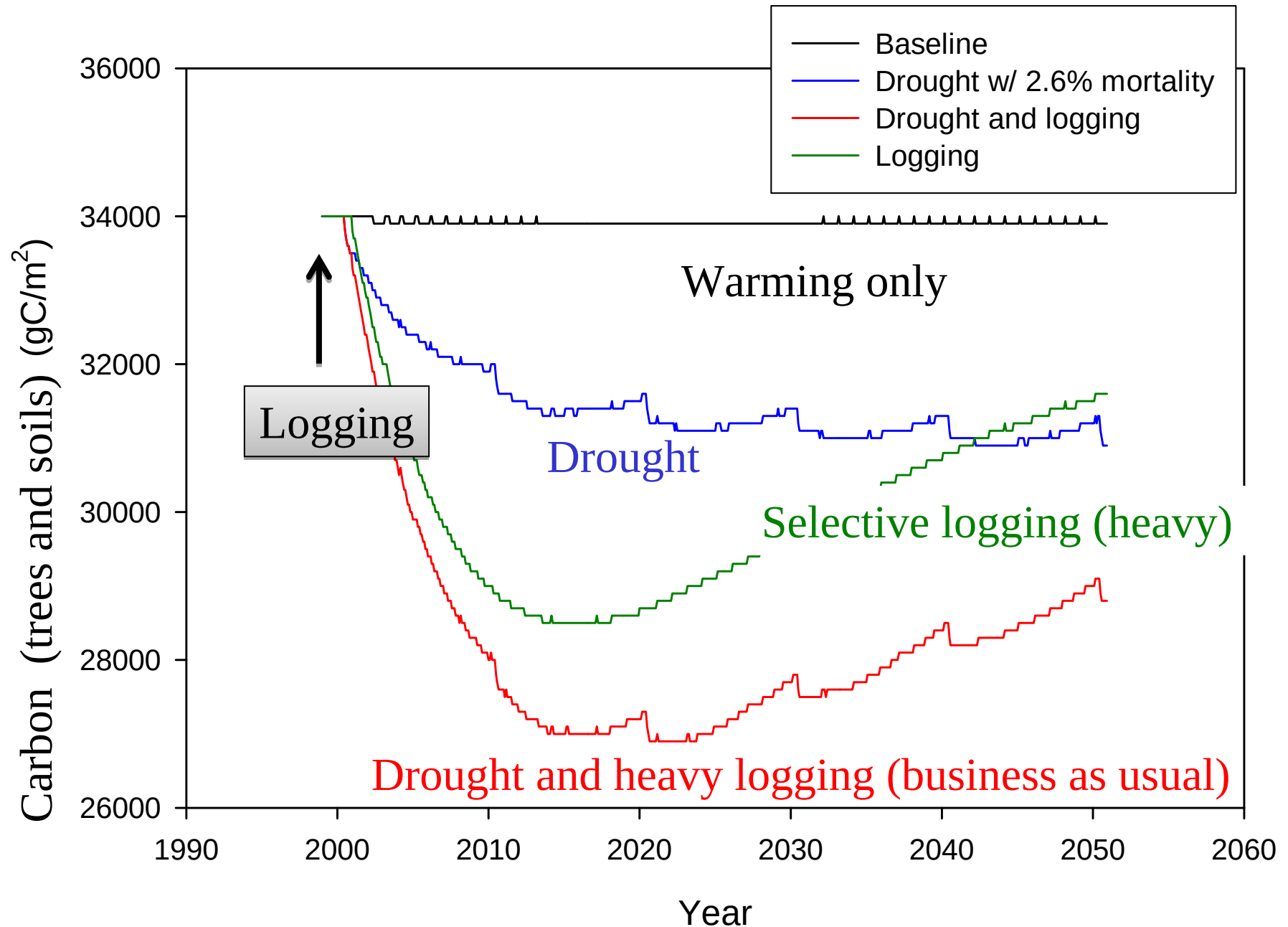
Production forests



Degraded production forests due to
unregulated “conventional” logging
(Business as usual, baseline)



Dynamics of carbon in “a” Bornean rain forest: CENTURY model



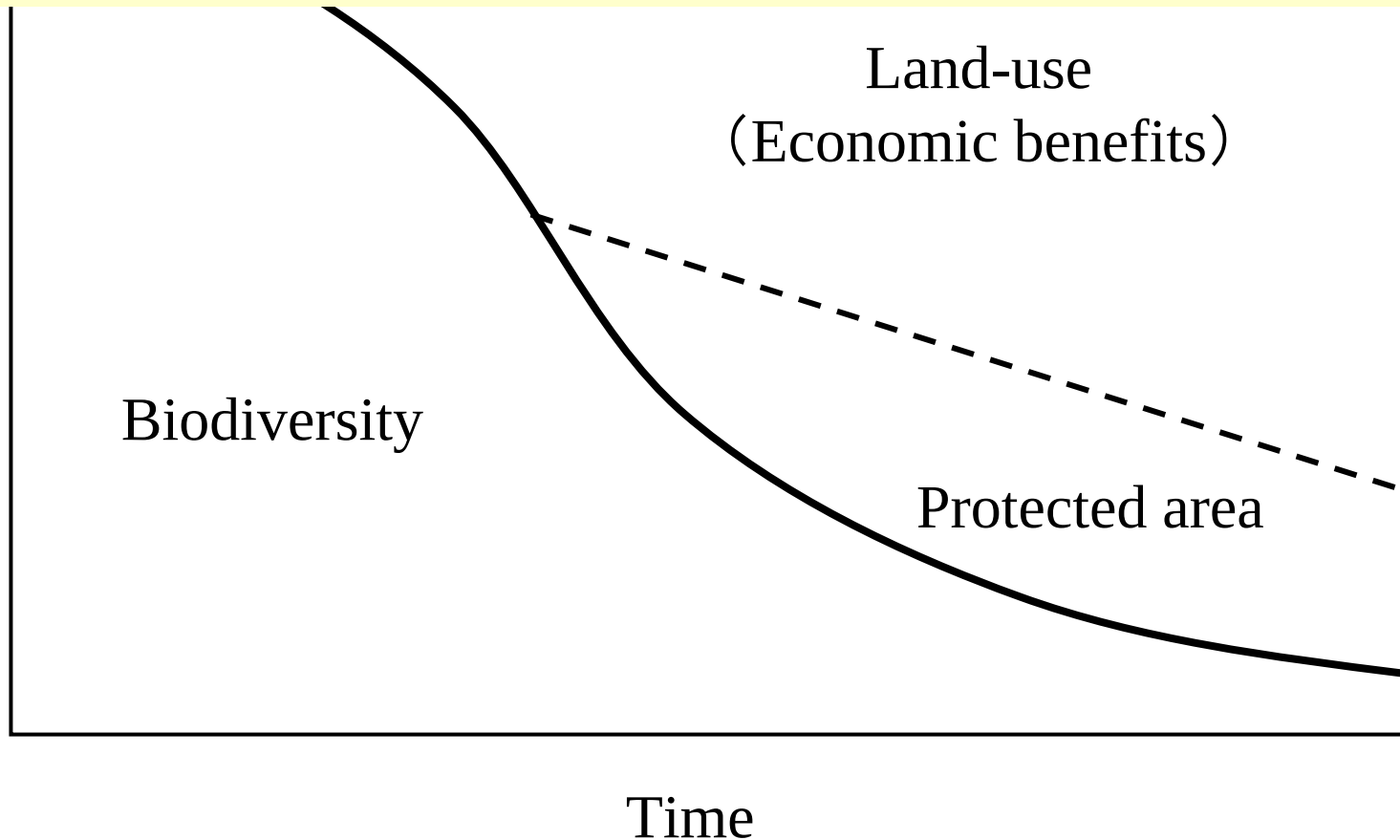
Projection in Borneo

Nearly entire permanent forest estate (50% area) will be highly deteriorated due to logging and droughts

c. Another 40% area will completely lose (has lost) forest covers

Only 8.3% (or 6.2 million ha protected areas) of Borneo will remain relatively intact (but illegal encroachment)

Synergize timber production and conservation

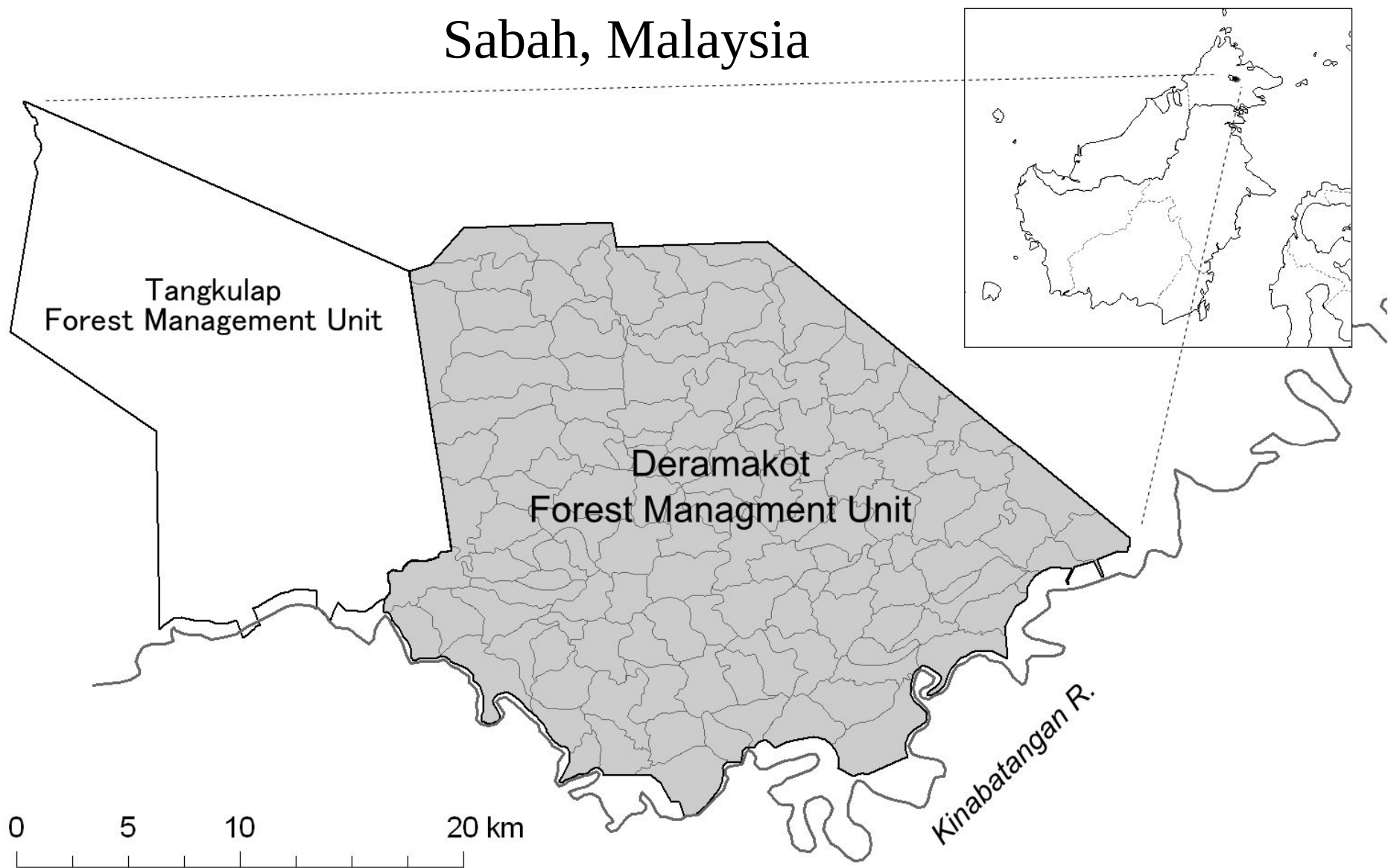


Synergize land-use (timber
production), mitigation,
adaptation and conservation

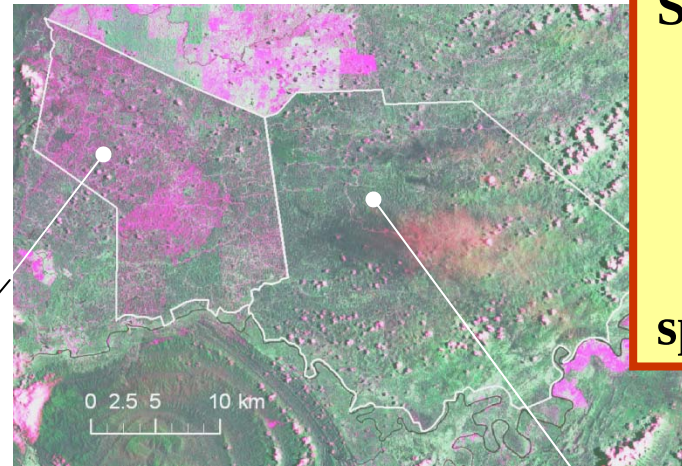
Project in Deramakot,
Sabah, Malaysia

Project #F071 & D1006 of the
Ministry of the Environment, Japan

Sabah, Malaysia



Deramakot



Sustainable forest management

Long-term planning

Reduced harvest

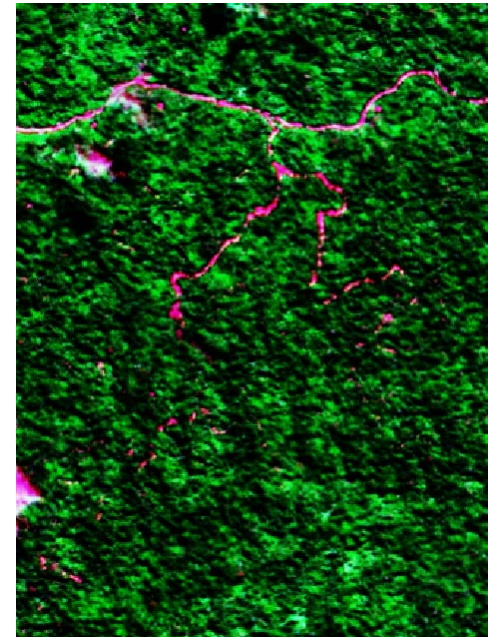
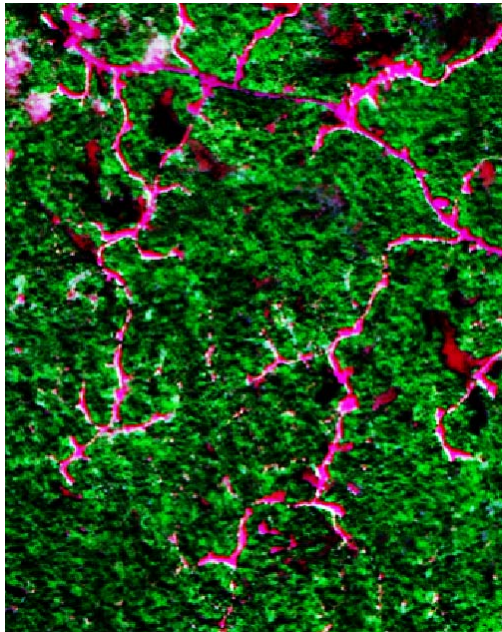
Reduced impact logging

**Protection of keystone
species**

Ecological monitoring

**Unregulated convent. logging
(heavy impacts, BAS)**

**Sustainable forest management
(improved management since 1989)**



0 0.25 0.5 1 km

Project site as of 2002



Unregulated conventional logging (heavy impacts)



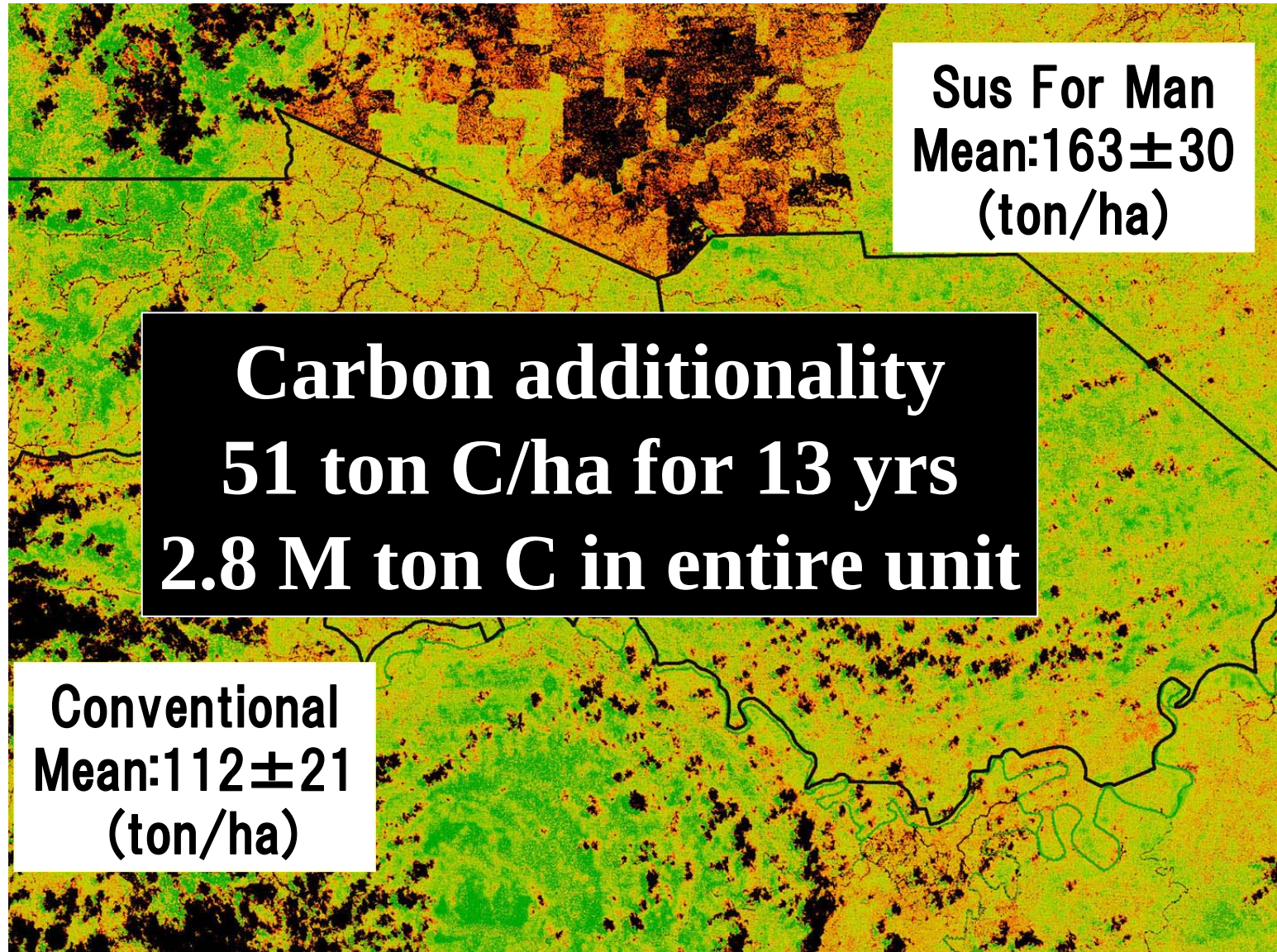
**Sustainable forest management
(Reduced-impact logging)**



Pristine forest

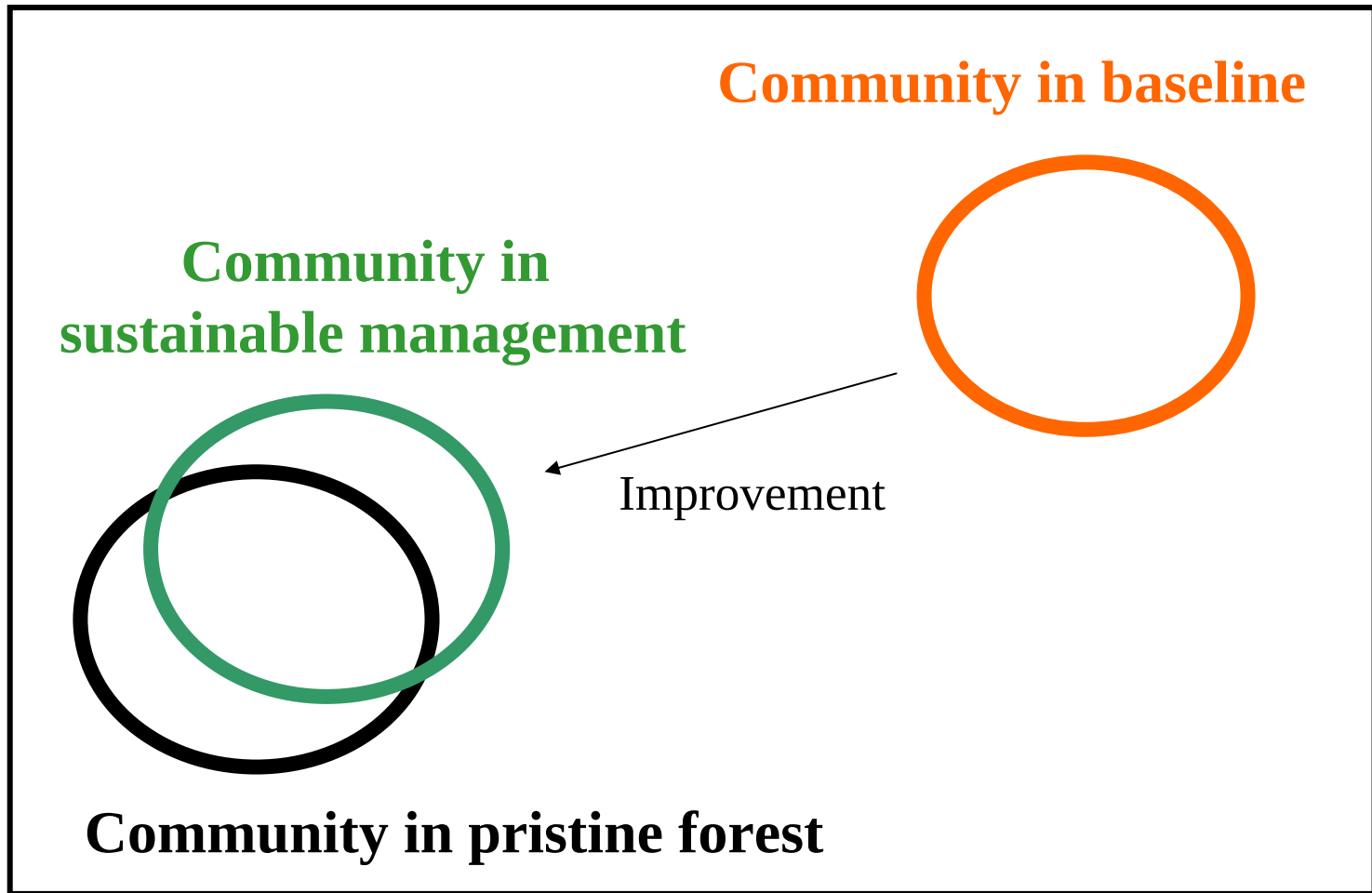
Carbon accounting: satellite remote sensing 2002

accuracy $\pm 10\%$ (+25% in highly degraded area)



Beneficial effects of sustainable forest management on various organisms

Biological communities (trees, soil fauna, microbes, etc)



Beneficial effects of sustainable forest manag'nt

Positive effects

Canopy tree

○

Mammals

Middle/Large

○

Decomposer

Large soil fauna

○

Ants

○

Spring tail、Mites

○

Decomposer flies

○

Fungi

○

Soil microbes

○

Multiple benefits in timber,
climate (carbon) and biodiversity

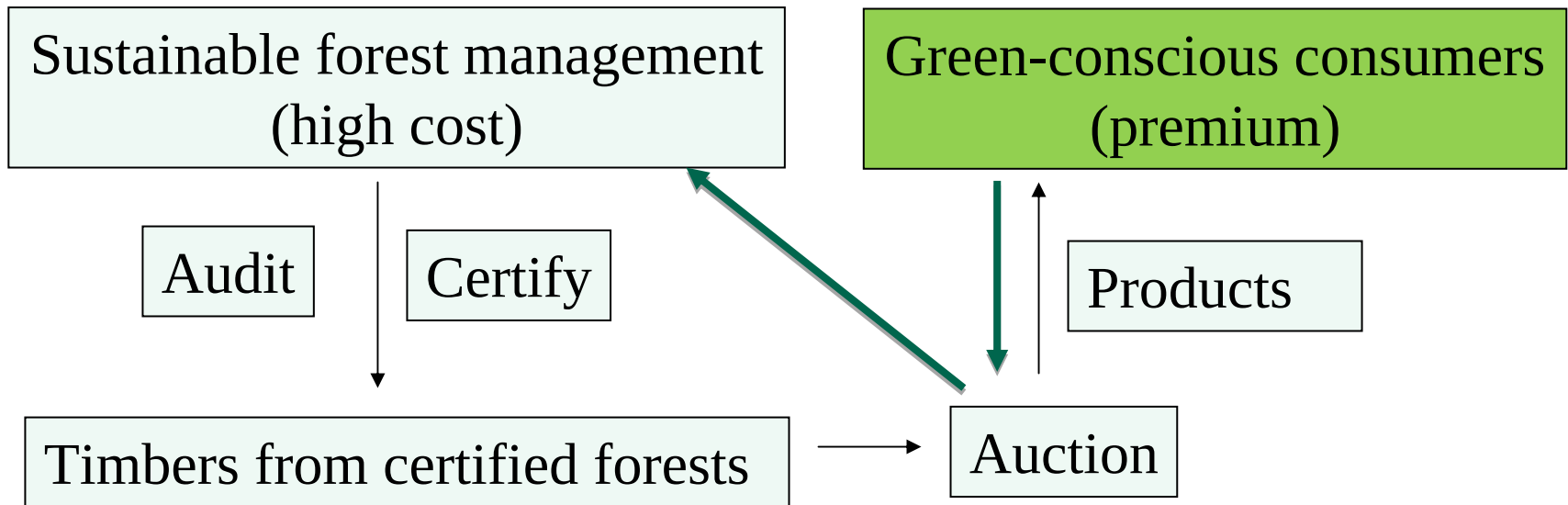
Is sustainable-forest-
management system per se
sustainable?

For a sustainability system to be sustainable

Forest Certification

An economic incentive

-Consumers pay for the additional cost of the sustainable management



Adequate incentives are necessary

- Forest certification and labeling
- REDD incentives (Reducing Emissions from Deforestation and Forest Degradation)
- Payment for Ecosystem Services

Otherwise, we will fail

3 roles of biodiversity in ecosystem-based sustainability

- Provides functions and services: ecological principles in land-use management (protecting keystone species)
- Diagnoses ecosystem health and validity of management (standards and indicators)
- Adds a premium that will be an incentive for producers (institutions with incentives)

Achieving sustainability

Socio-economic scenario
Climate scenario

Prediction of ecosystem responses
(Ecosystem ecology)

Climate change policies
Adaptation and mitigation
(Precautionary & No-regret policies)

Land-use policies
Sustainable production
(Ecological principles)

Conservation

Biodiversity (functions, diagnostic, premium)

Institutions (incentives) and capacity

Sciences

Society and governance