



Appendix J

Thematic Paper 2

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His work on biodiversity, watersheds, and carbon links the biophysics to the policy domains.

Climate Change, Bio- diversity, Livelihoods and Sustainability

Meine van Noordwijk,
ICRAF-SEAsia



World Agroforestry Centre
TRANSFORMING LIVES AND LANDSCAPES

Realizing Challenges, Exploring Opportunities

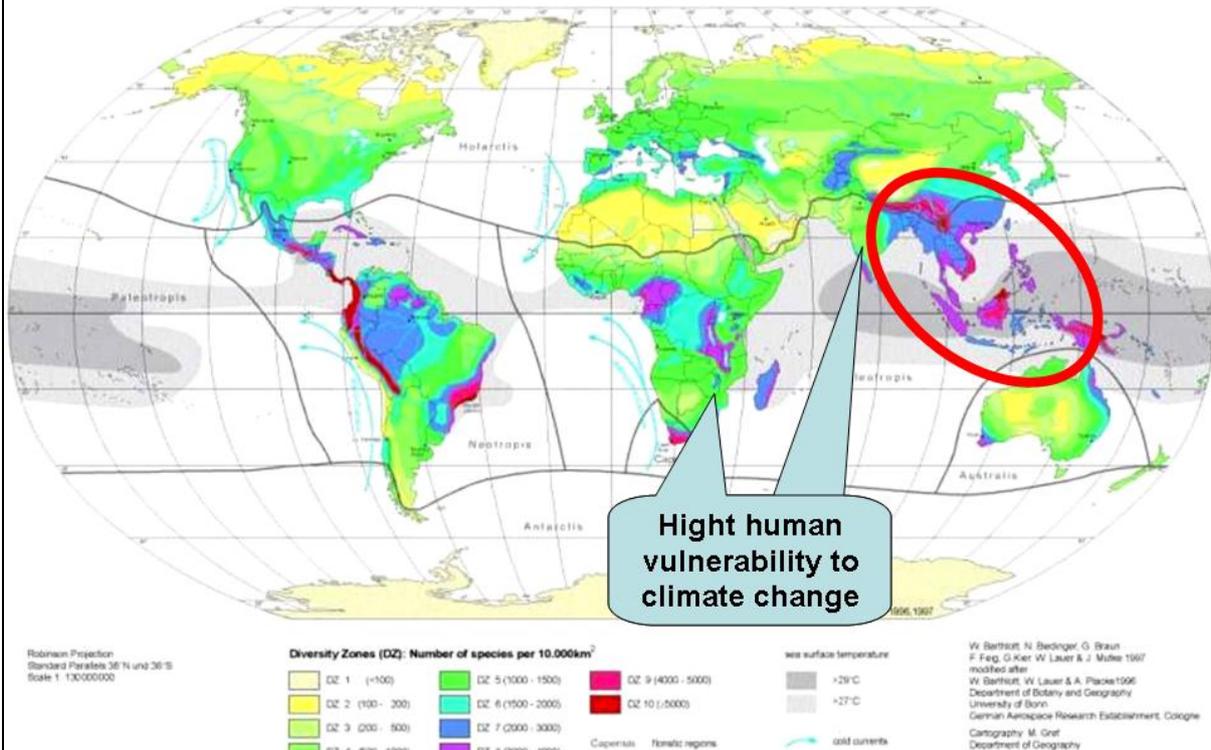
Proceedings of the International Conference-Workshop on Biodiversity
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Southeast Asia is one of the most densely populated *and* diverse flora & fauna areas of the world...

GLOBAL BIODIVERSITY: SPECIES NUMBERS OF VASCULAR PLANTS





Quick overview of contents

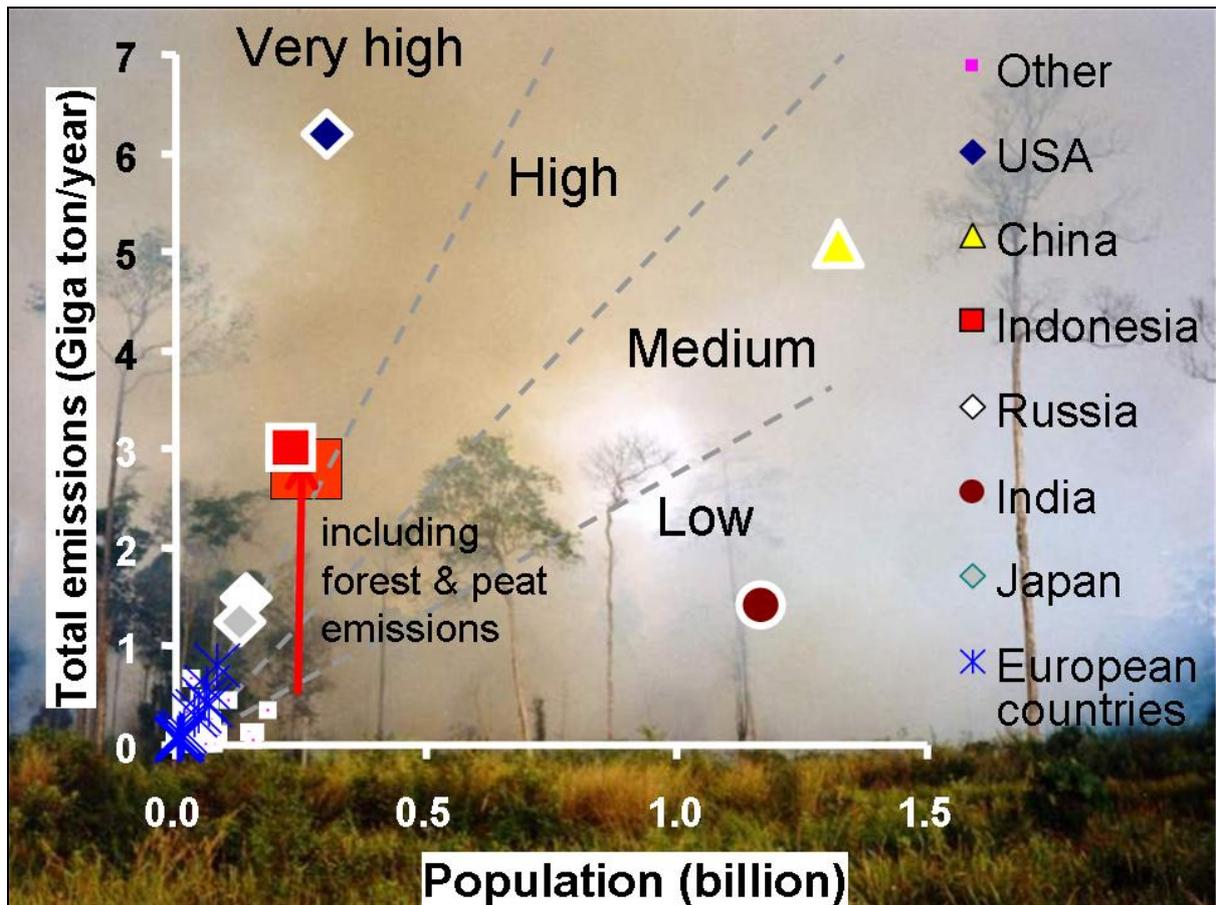
1. CC Mitigation/adaptation <> agroforestry
2. Agrodiversity: past/remnant, currently functional, future options
3. Intermediate vulnerability hypothesis
4. Sustainagility + sustainability
5. Need for commoditization of 'services'
6. The gap between A/R CDM and REDD
7. Adaptation: plans or diversity approach
8. Functional diversity: is 1 per group enough?
9. Sustainagility for flora and fauna: corridors
10. Can ES rewards sustain ecological connectivity?
11. The efficiency versus fairness challenge
12. Conclusions



1. Climate change mitigation/ adaptation <> agroforestry



Forest
Agroforest
Tree crops
Agriculture

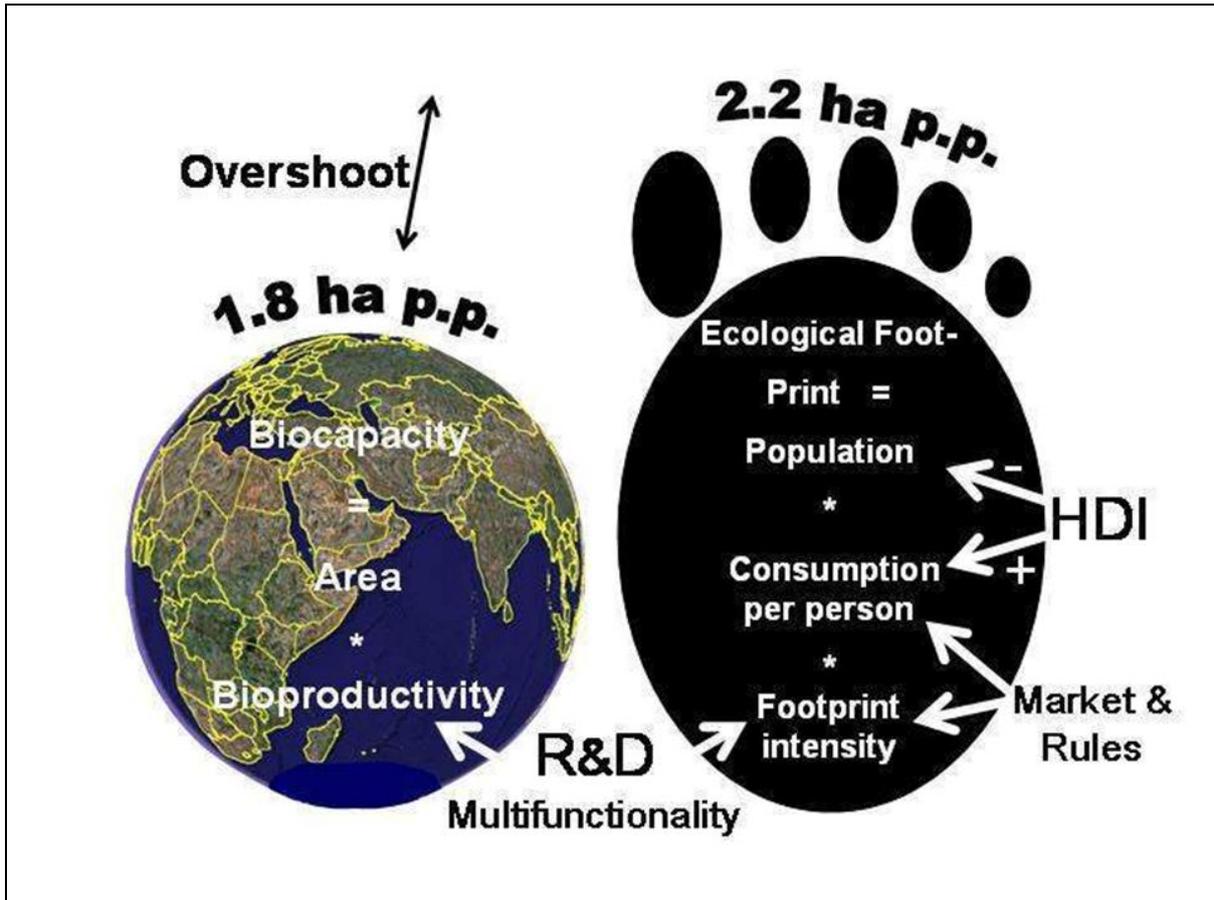


Realizing Challenges, Exploring Opportunities

313

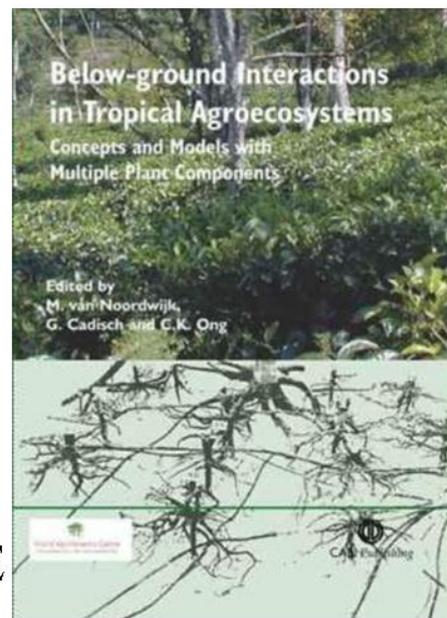
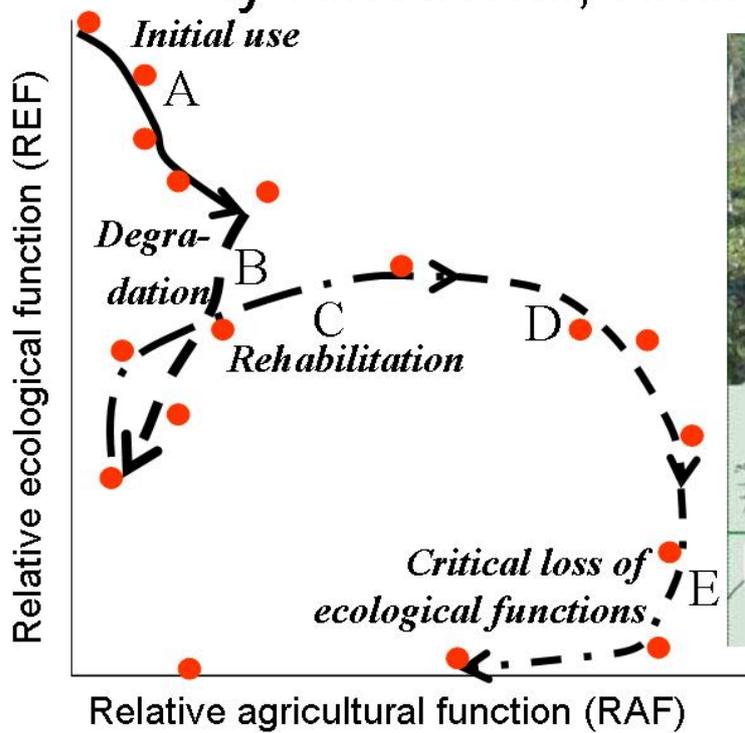
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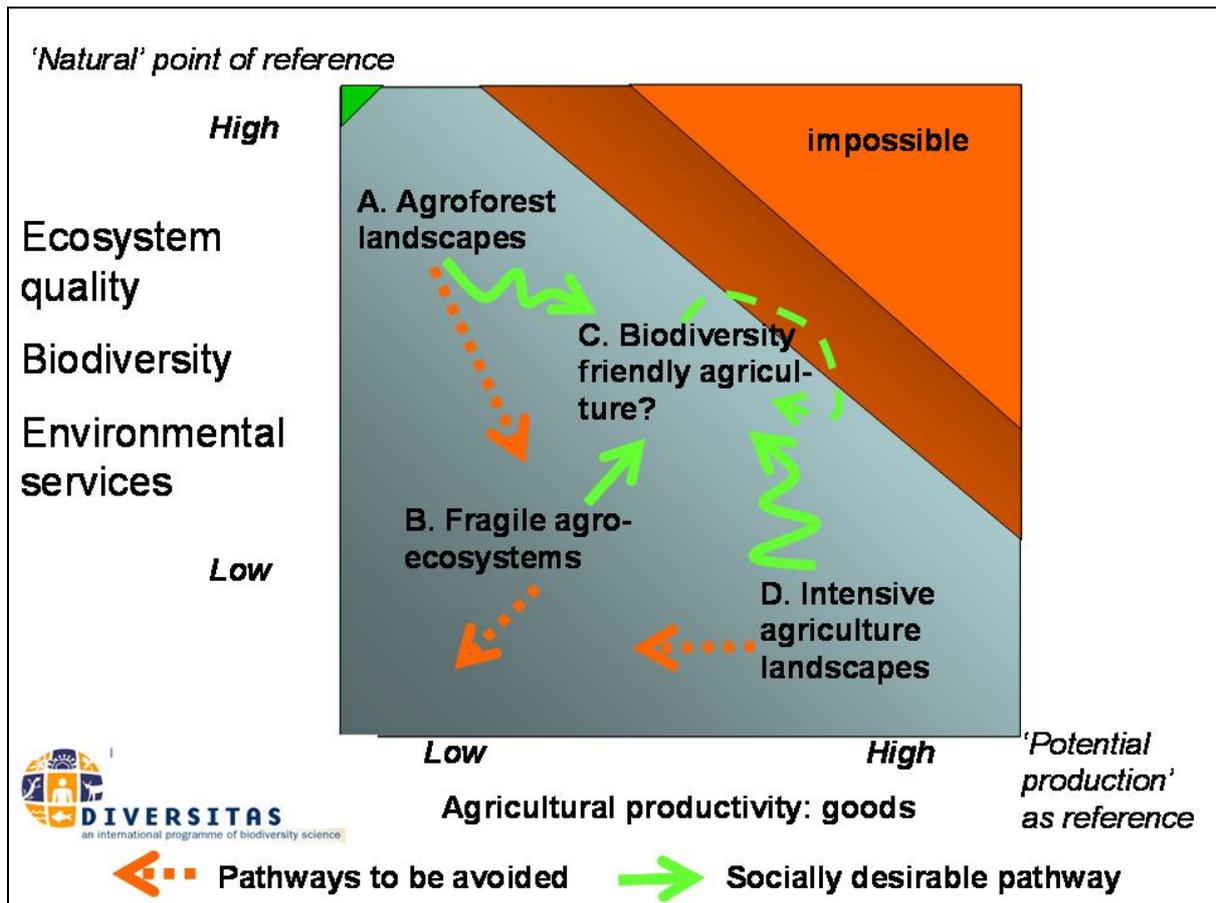
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2. Agrodiversity: past/remnant, currently functional, future options





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316

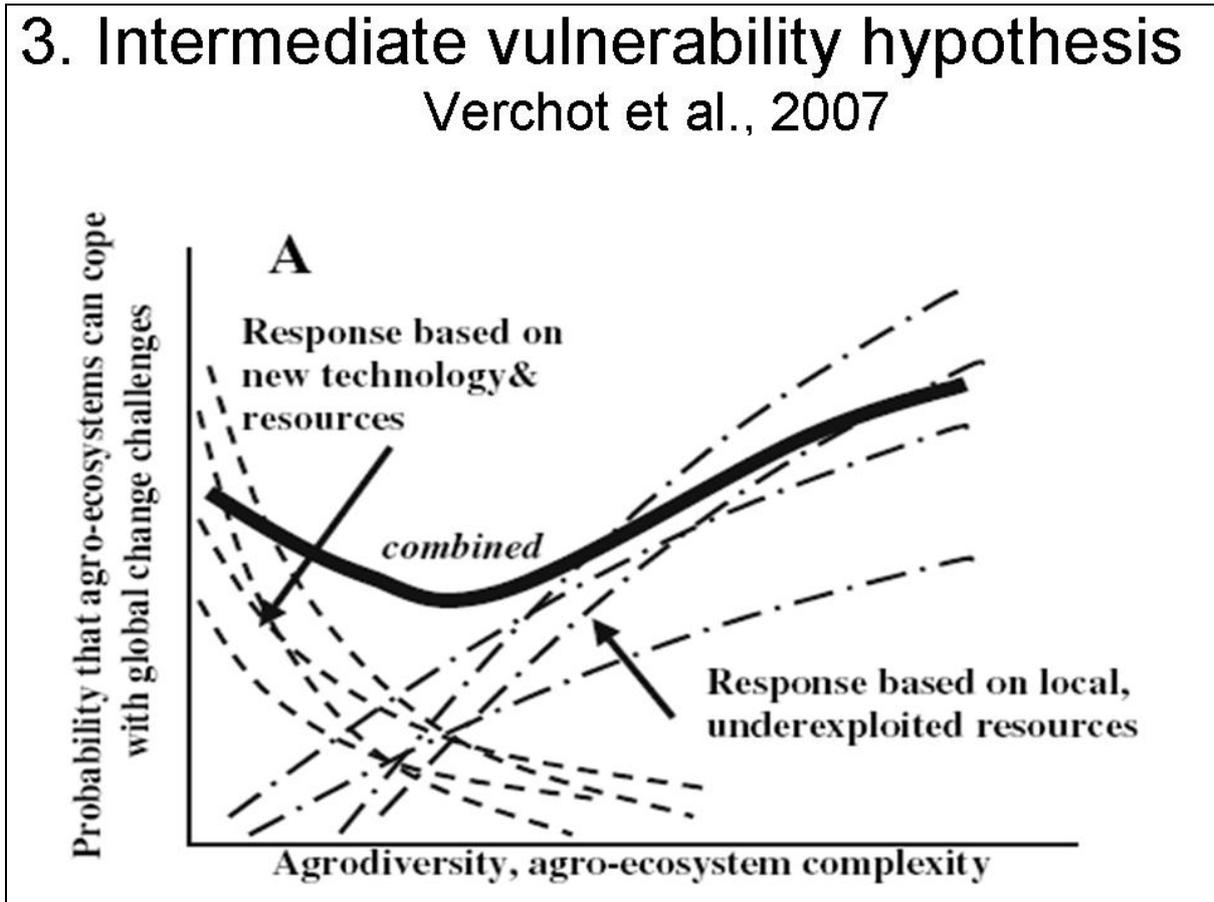
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3. Intermediate vulnerability hypothesis

Verchot et al., 2007





4. Sustainagility + sustainability

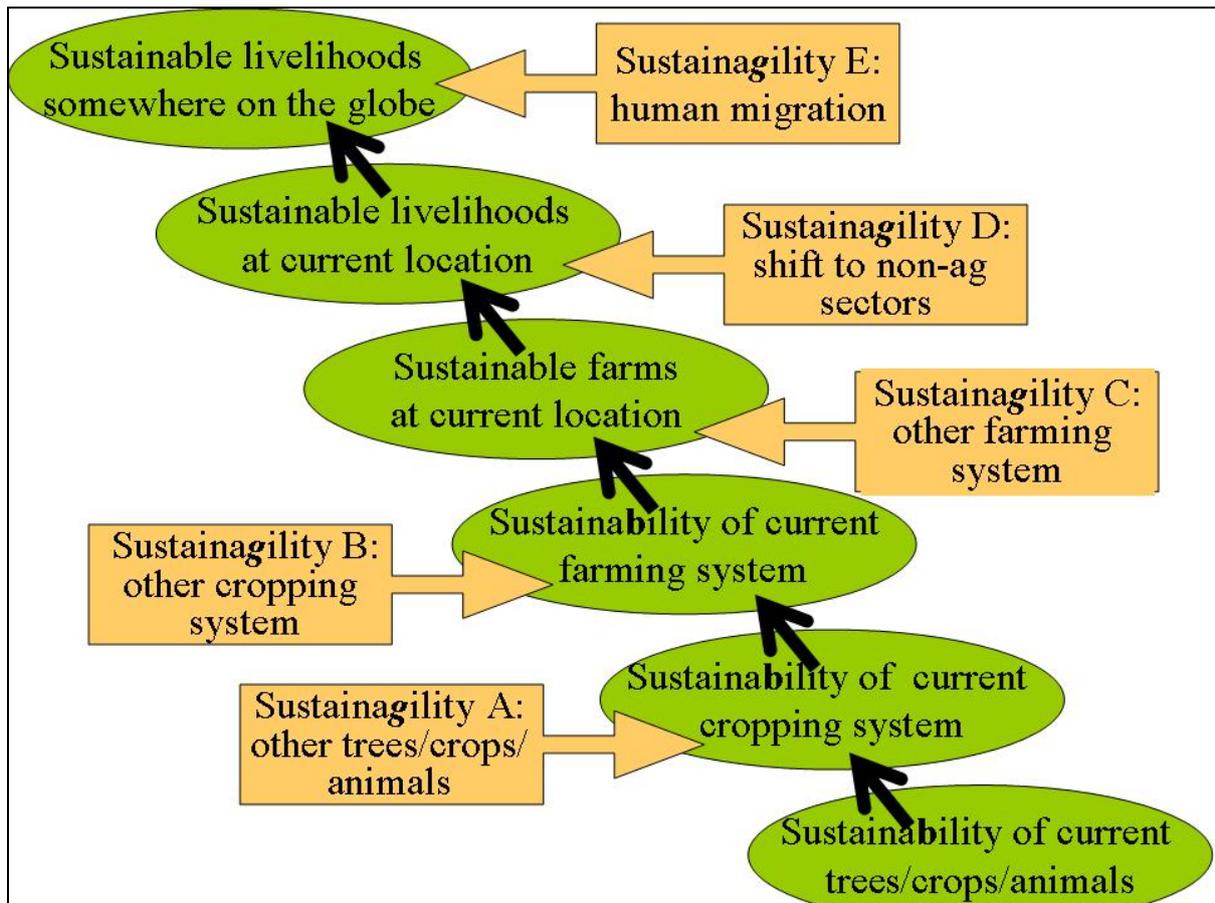
The climate change soup won't be eaten as hot as it is being served

Agility is more than resilience

Coping:

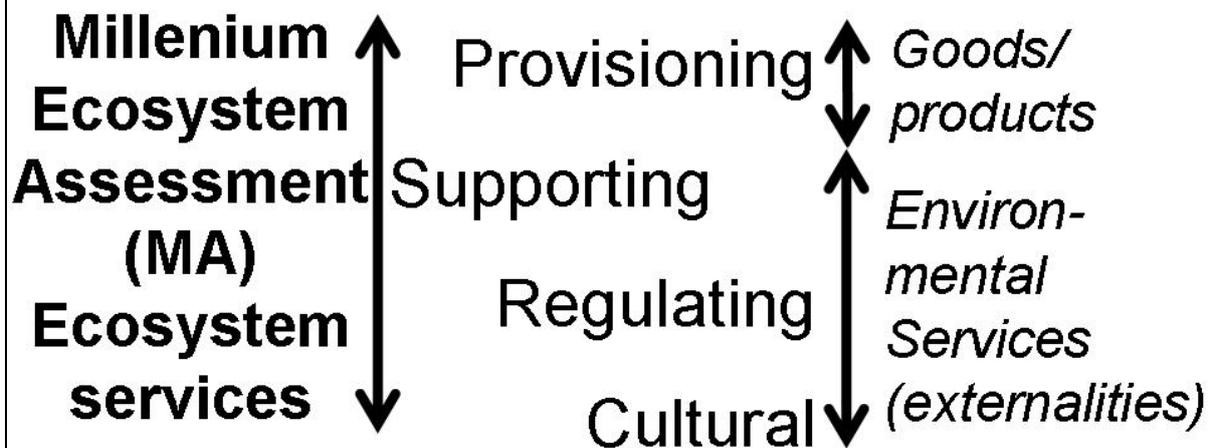
Genetic diversity → adaptation

Dispersal/migration → keep up with shifting habitat



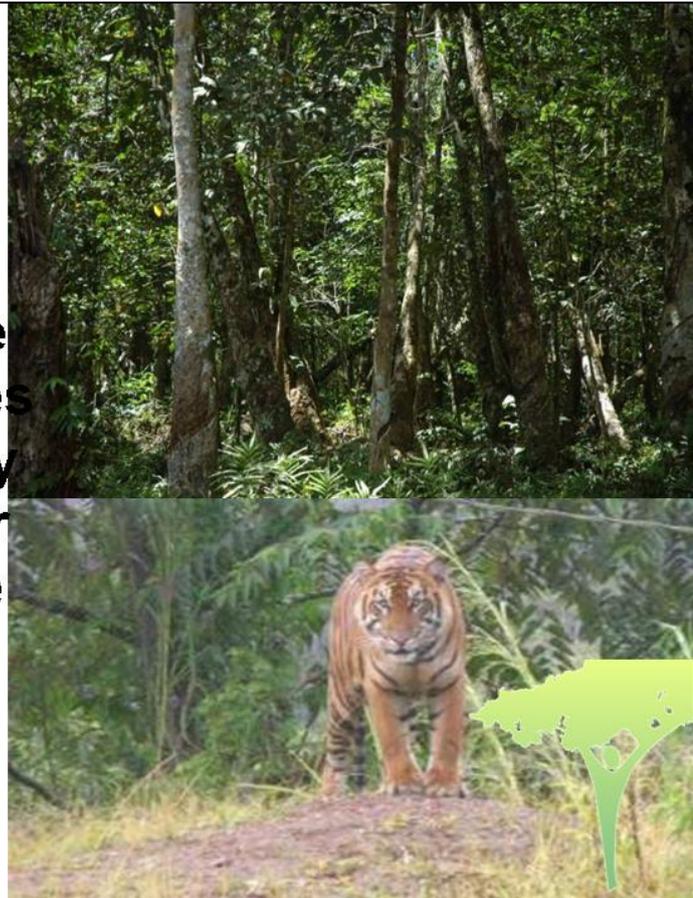


5. Commoditization of 'services'





30% of Indonesia's and 7% of global production of natural rubber comes from jungle gardens/ landscapes of high biodiversity value – this rubber deserves separate attention in the context of sustainable development





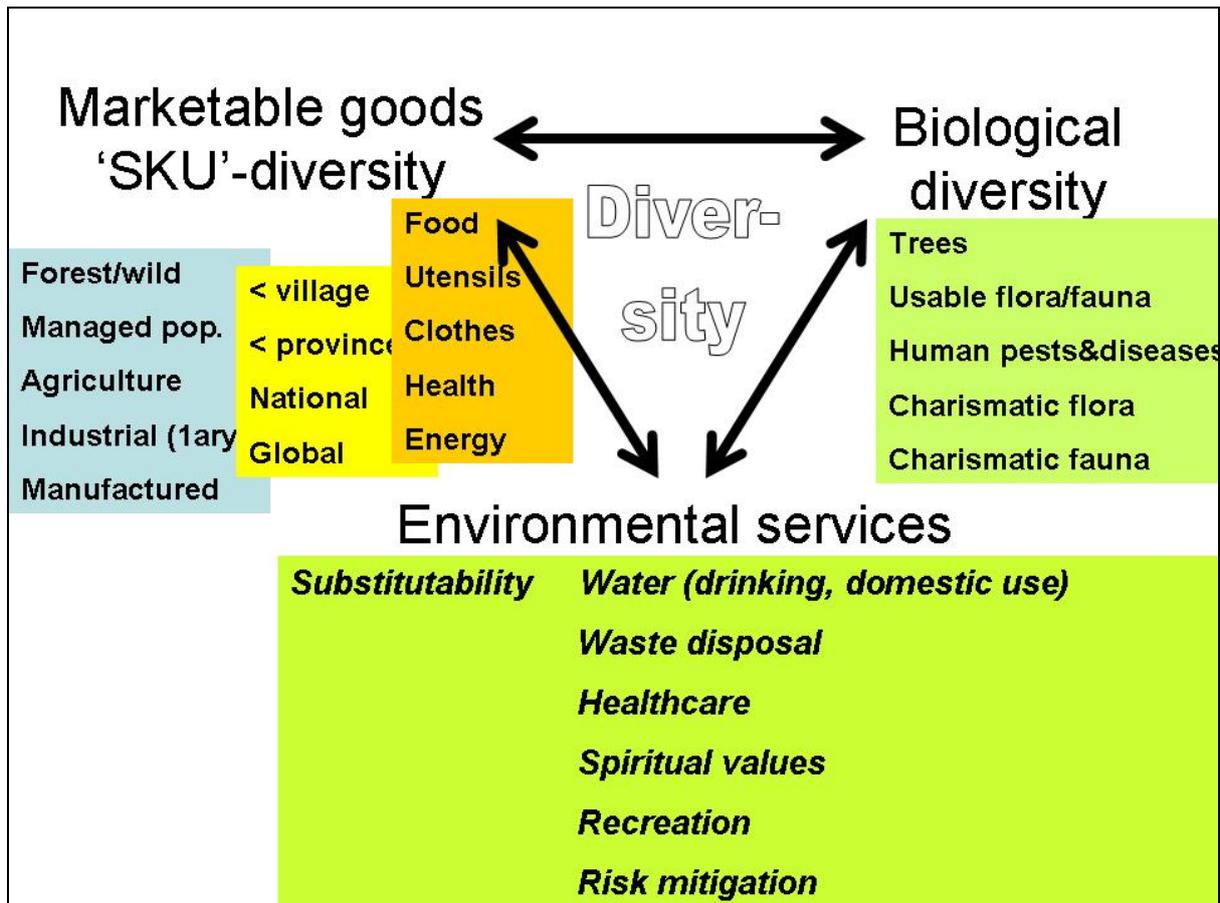
Processing
payments

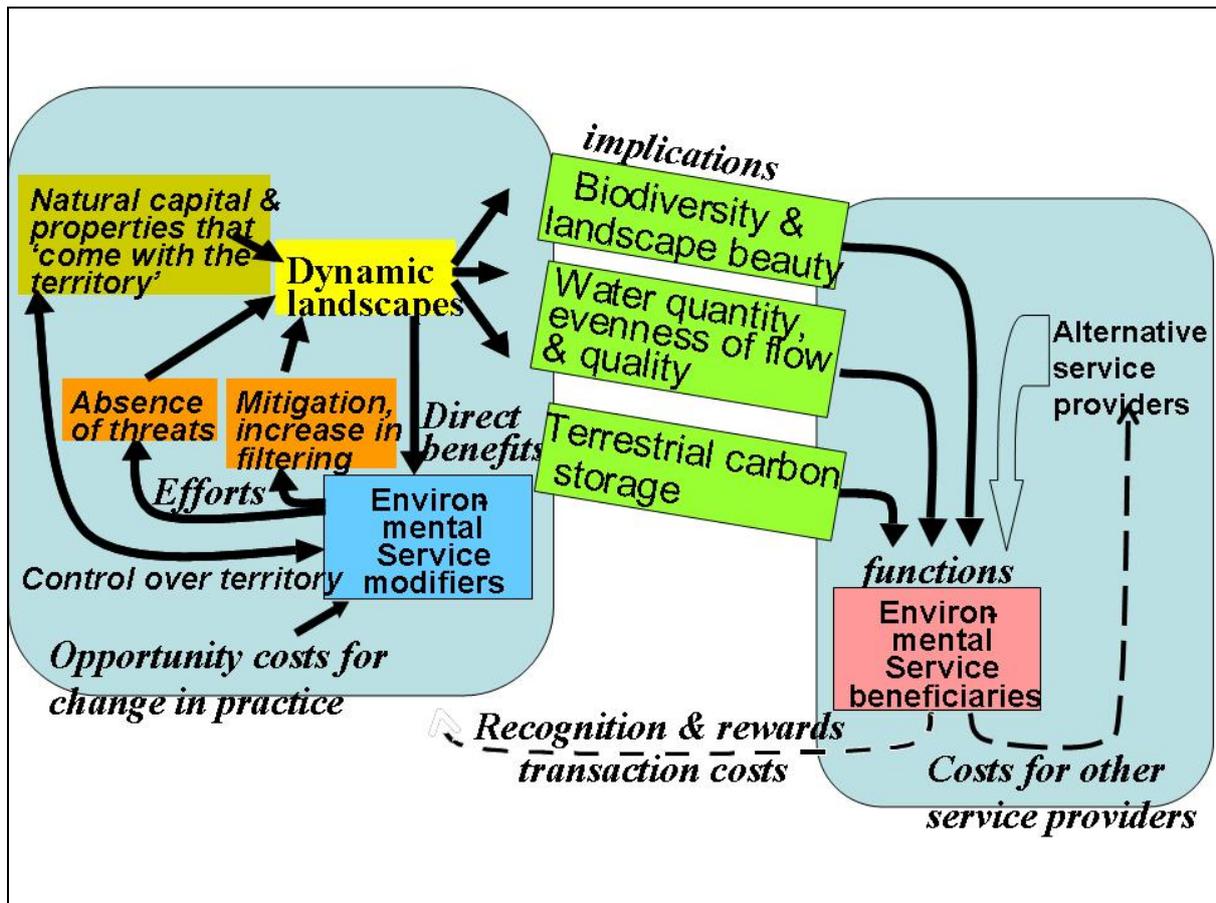
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322

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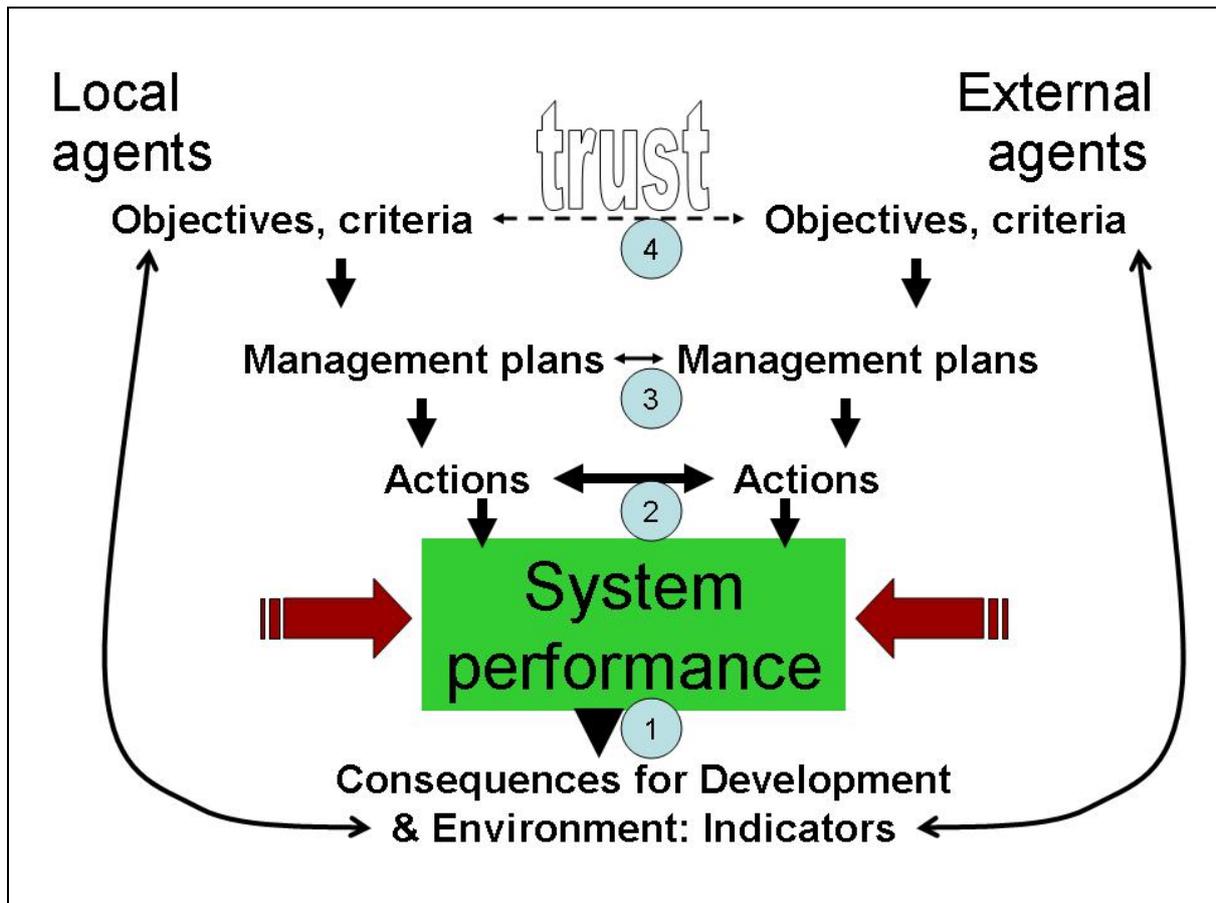
324

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RUPES - Rewarding Upland Poor for Environmental Services
 A program for developing mechanisms for rewarding the upland poor in Asia for the environmental services they provide (RUPES). ...
www.worldagroforestrycentre.org/Sea/Networks/RUPES/ -



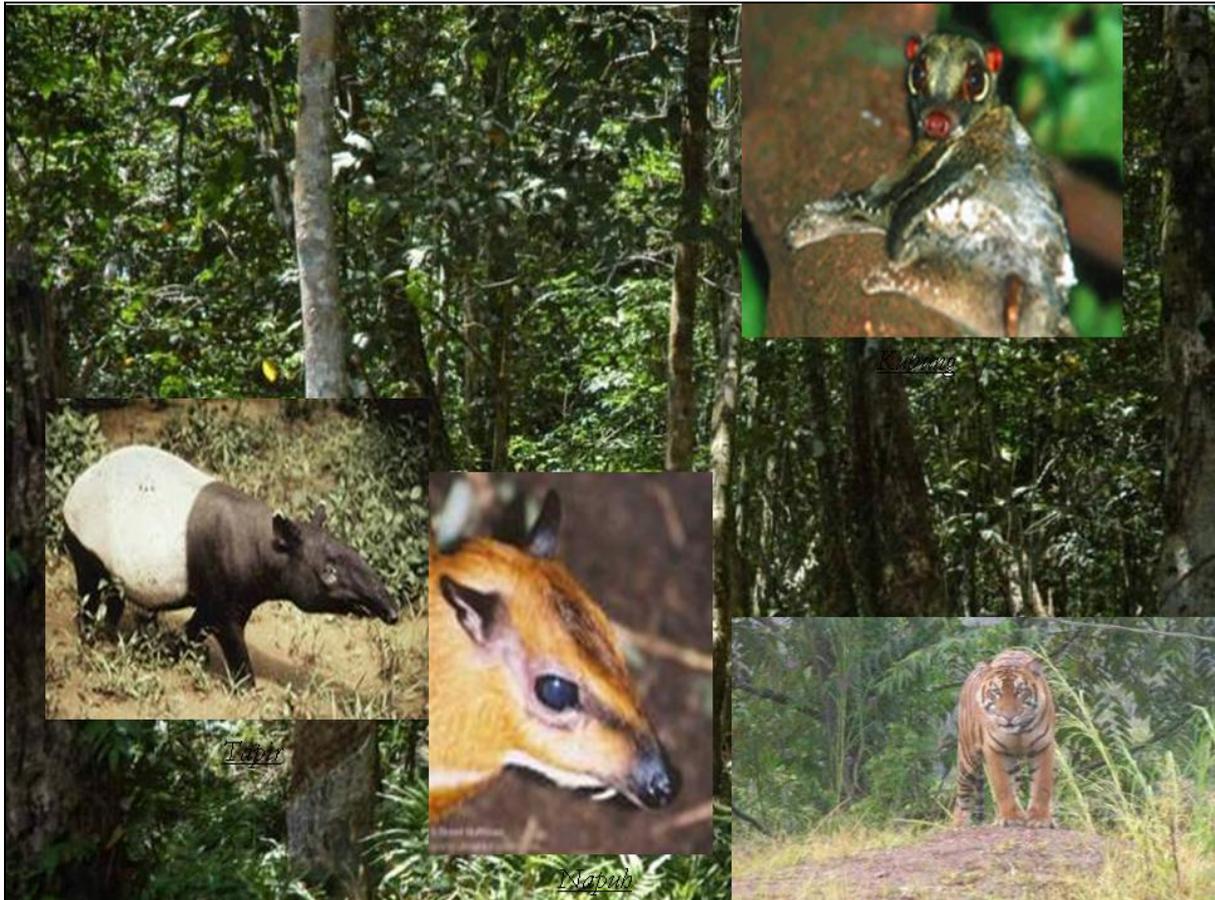


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327

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Realizing Challenges, Exploring Opportunities

328

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Realizing Challenges, Exploring Opportunities

329

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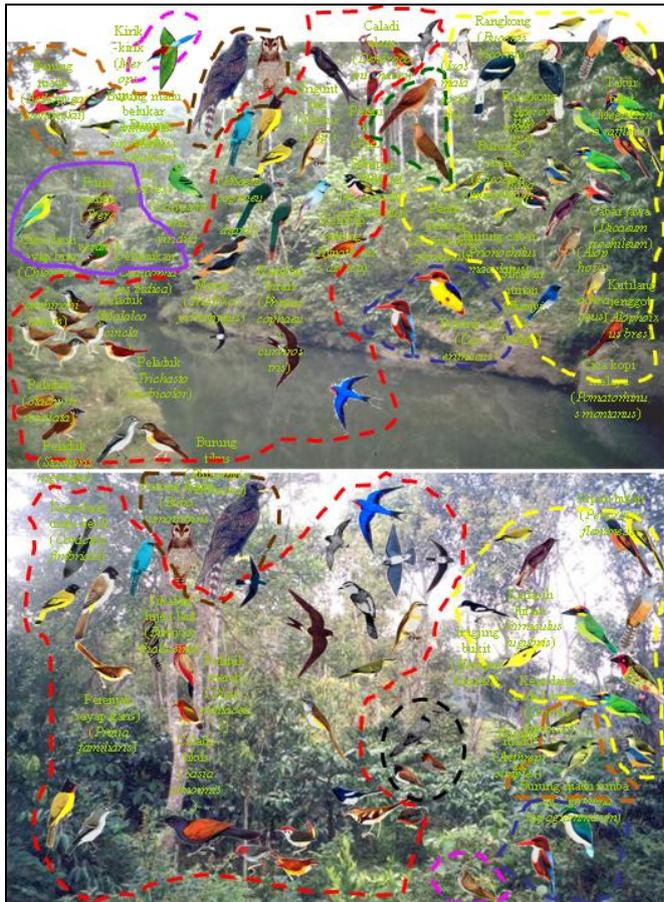
**Mixed tree garden:
Shade coffee**

Bird diversity in shade coffee is considerably greater than that in sun coffee

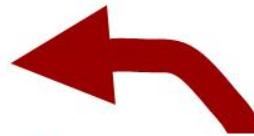
(Sumatra, Trudy O'Connor, 2006)



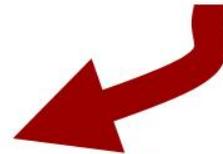
**Monoculture:
Sun coffee**



Forest



Yet, a number of groups of forest bird species are absent in shade coffee



Shade coffee



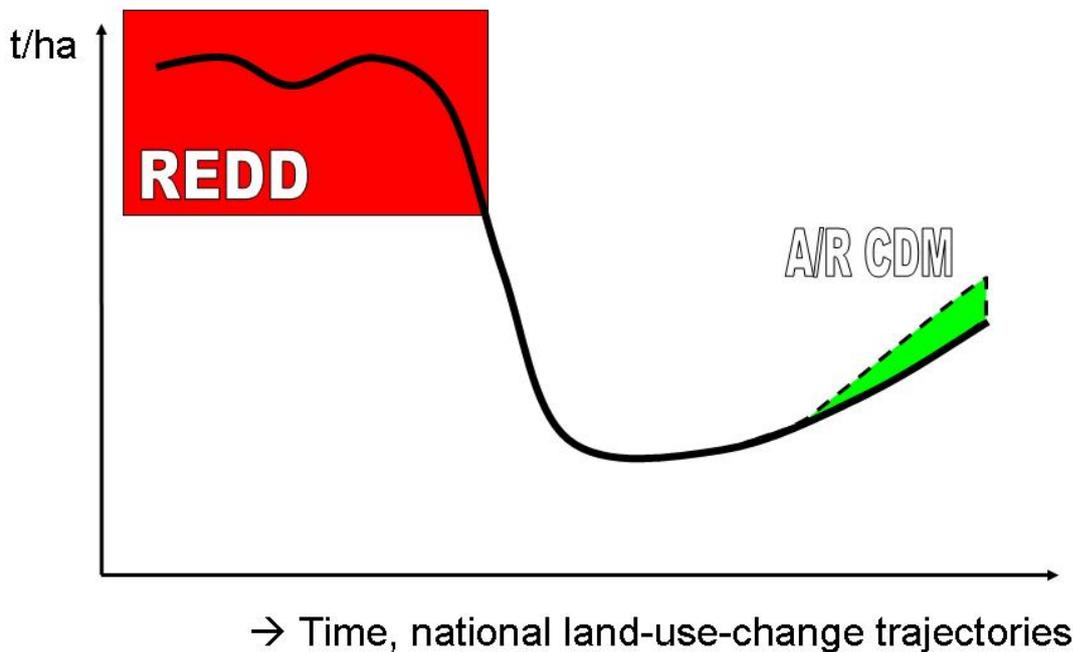
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6. The gap between A/R CDM and REDD

C-stocks

t/ha

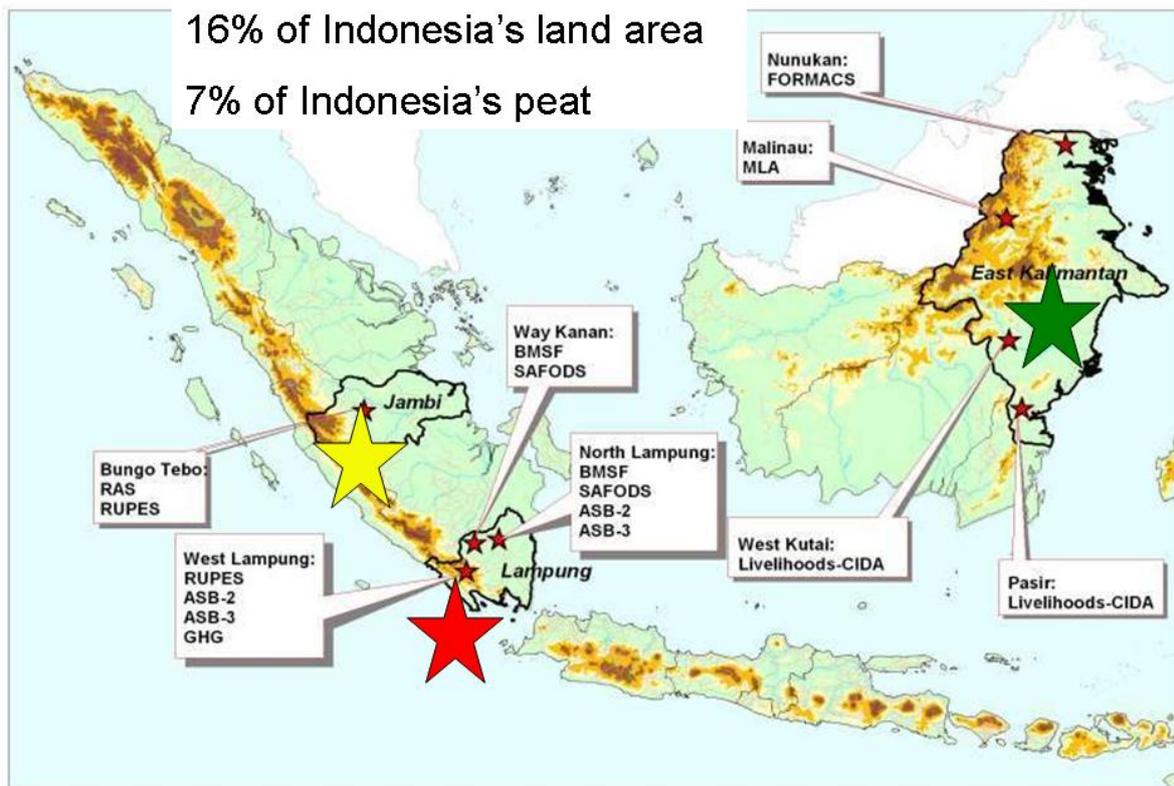


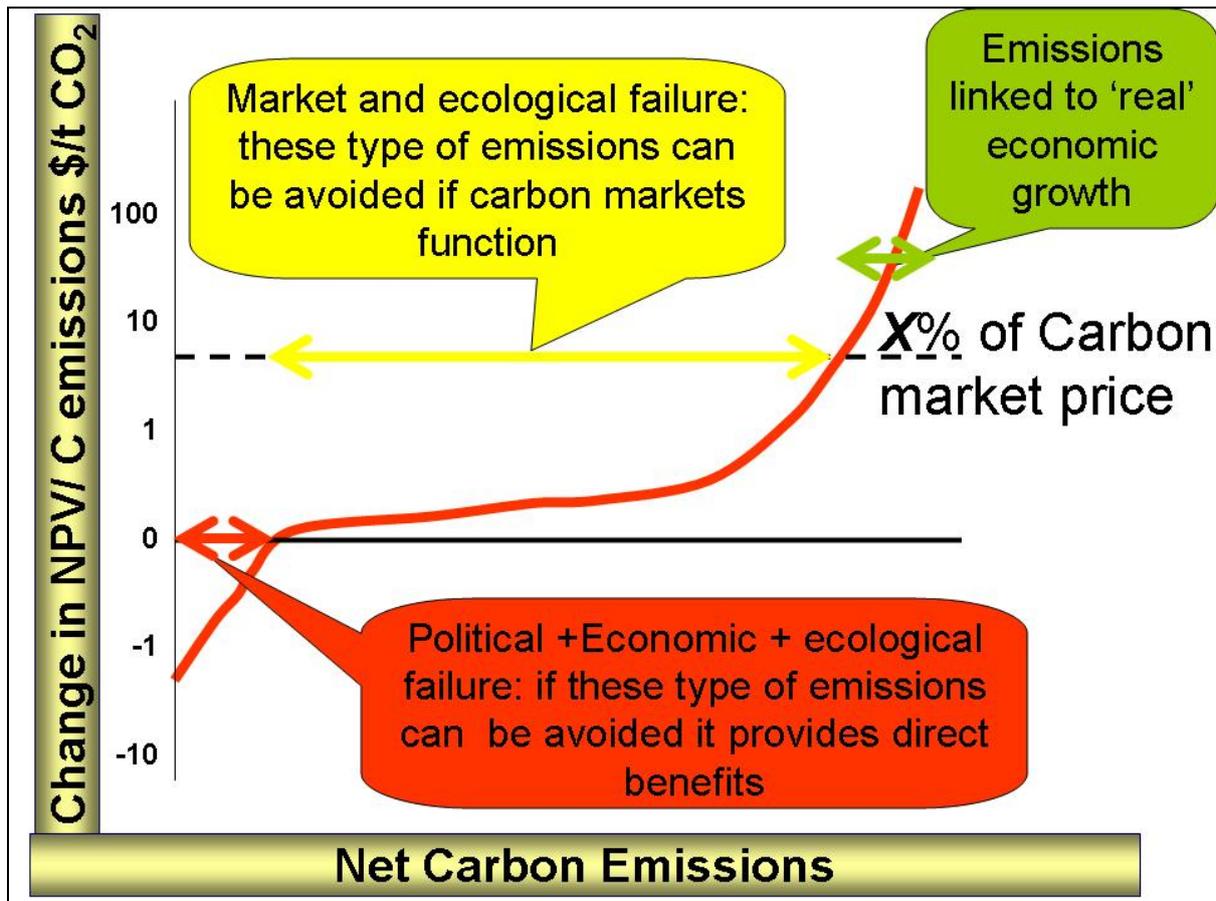


Three provinces:

16% of Indonesia's land area

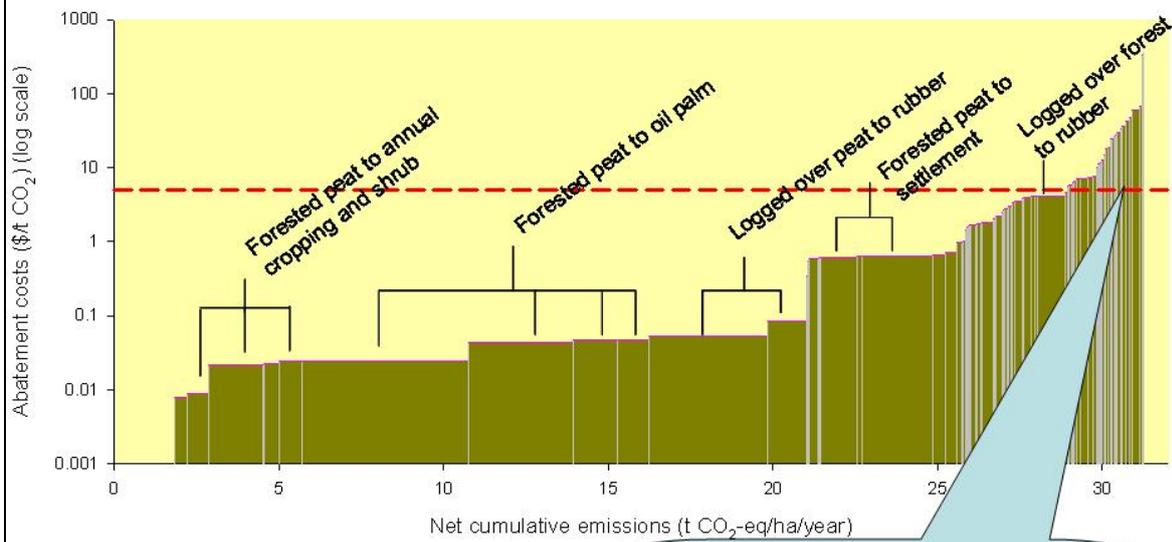
7% of Indonesia's peat



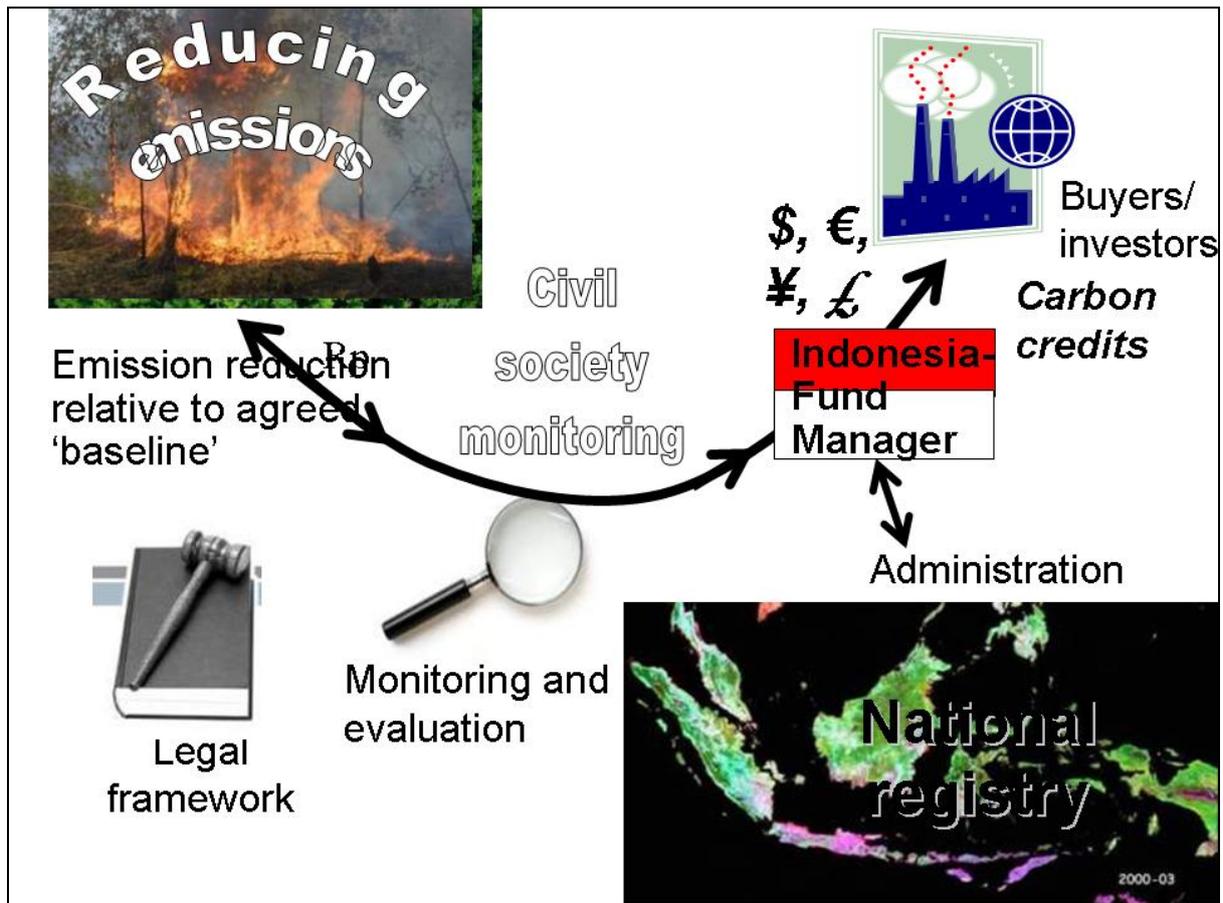




Jambi (peat lands included) : 31.2 t CO₂ / ha / year,
92.7% below 5\$/t CO₂



Oil palm and rubber on mineral soils





7. Limits to adaptation: plans or diversity approach

- We can predict the direction and size of the change and can *plan* to adjust what we do
- Uncertainty on direction but greater variability: we need to increase buffering and resilience: *diversity*
- ‘No regrets’: focus on what makes sense anyway...



Planning Diversity

Planned diversity,
Diversity of plans

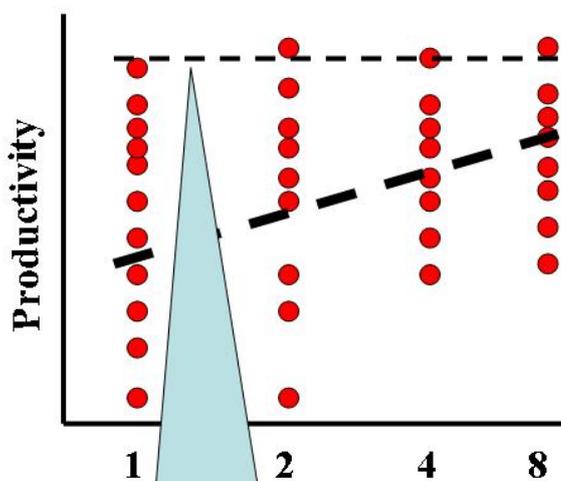


8. Functional diversity: is 1 per group enough?





Direct experiments to test importance of 'diversity' for 'ecosystem function'



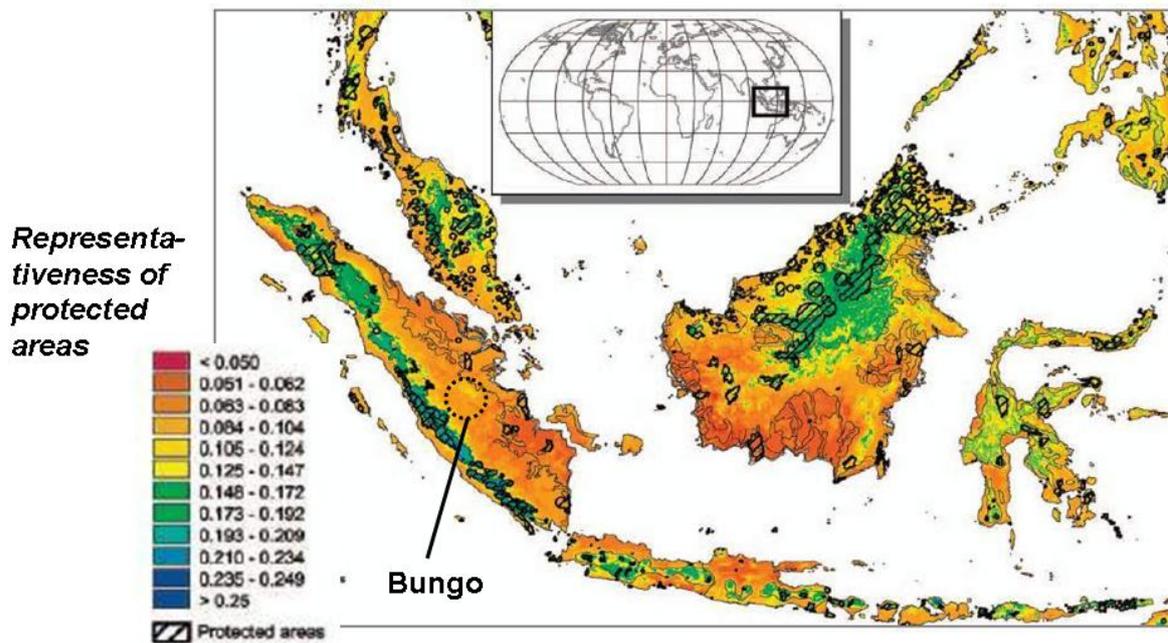
Average production is higher for more diverse systems, but.....

Some 'monocultures' are as good as the best 'mixtures'

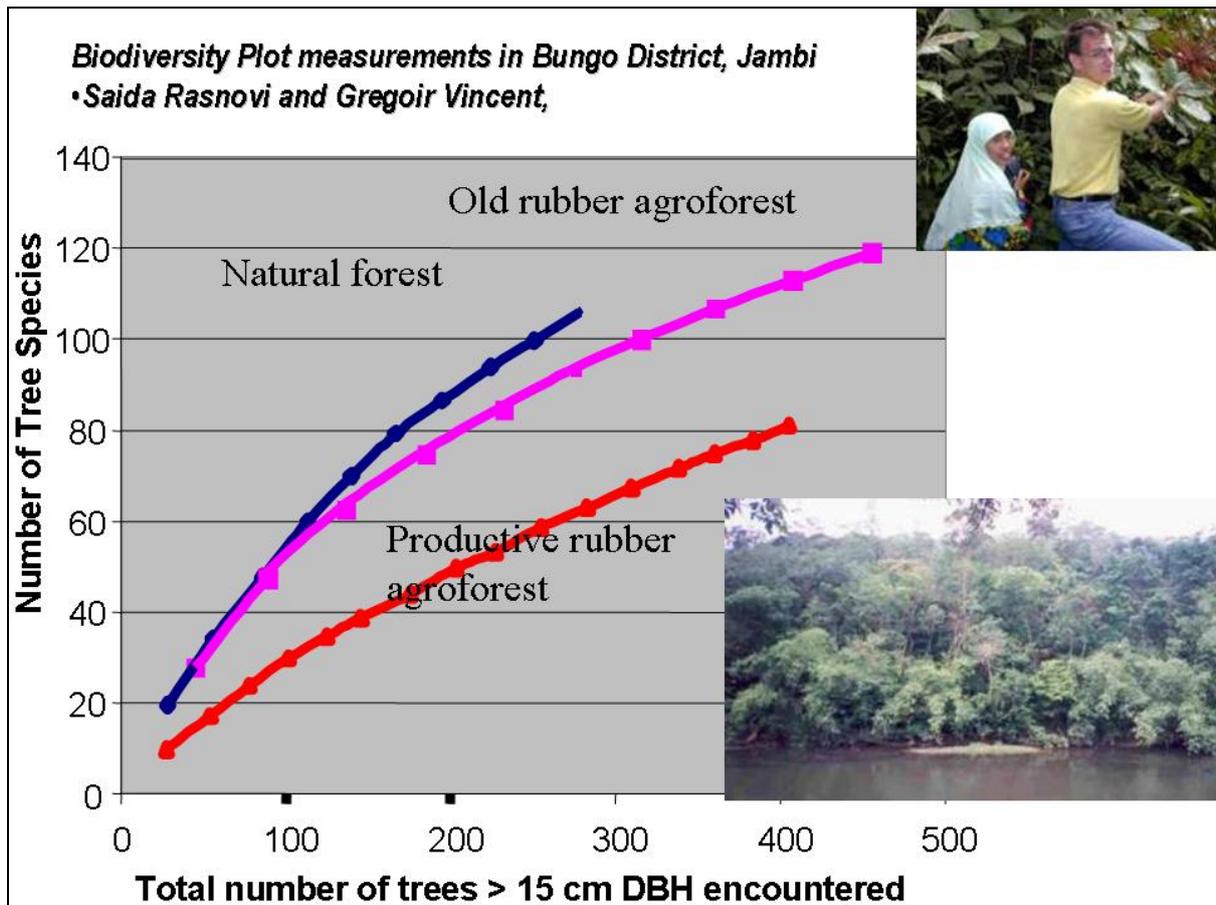
Experiments like this ignore the 'self selection': what actually coexists is a small sub-set of all possible combinations – it is this 'self selection' that matters, not richness per se



9. Sustainability for flora and fauna:



Ferrier, S. et al., 2004. Mapping More of Terrestrial Biodiversity for Global Conservation Assessment. *BioScience* 54: 1101-1109





Tree Dispersal Modes

Fruit/seed adapted to	Distance	Dispersal agent
Long-range Zoochory	≥ 100 m	Birds, bats, primates and other large mammals
Short-range Zoochory	< 100 m	Rodents and litter-layer fauna
Anemochory	≥ 100 m	Wind
Autochory	< 100 m	Gravity

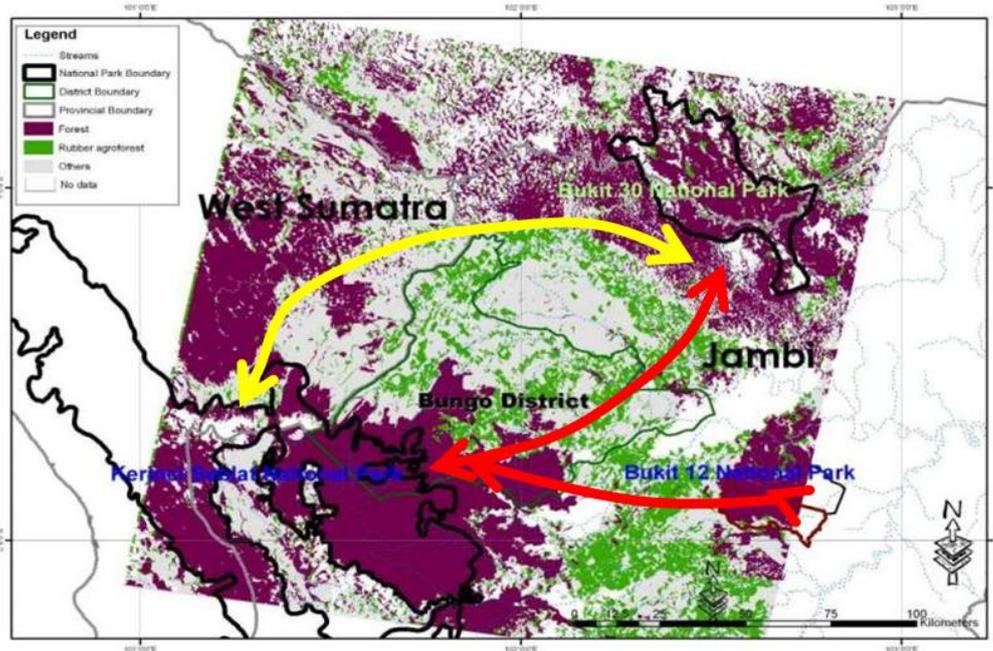


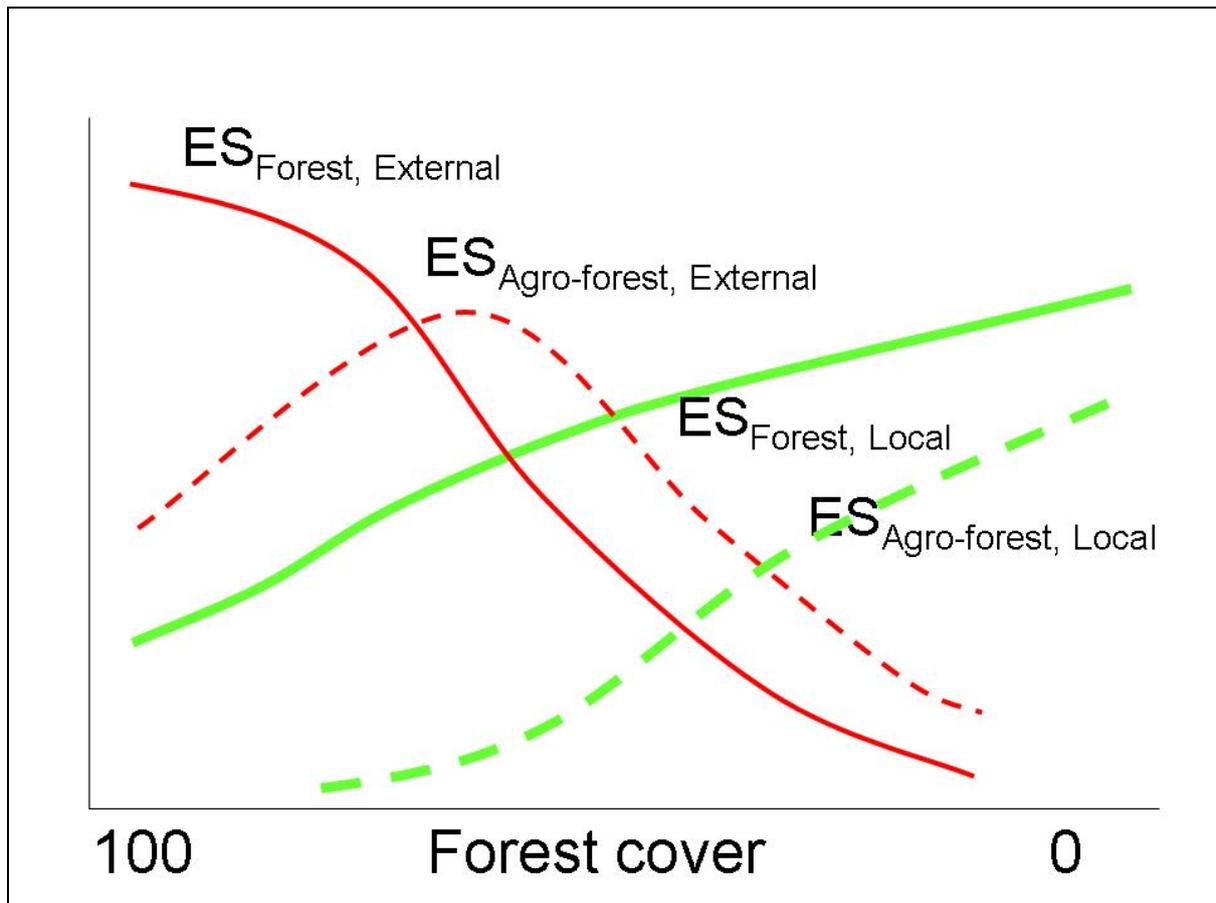
Dispersal strategy of tree saplings in rubber agroforest and forest (Saida Rasnovi)

	Total	Wind	Birds/ mam- mals	Short range fauna	Auto- chory	NA
Trees only observed in rubber agroforest	284	0.063	0.711	0.035	0.046	0.14
Trees observed in forest and/or agroforest	405	0.054	0.731	0.042	0.077	0.07
Trees only observed in forest	241	0.050	0.643	0.042	0.149	0.12
Total	930					



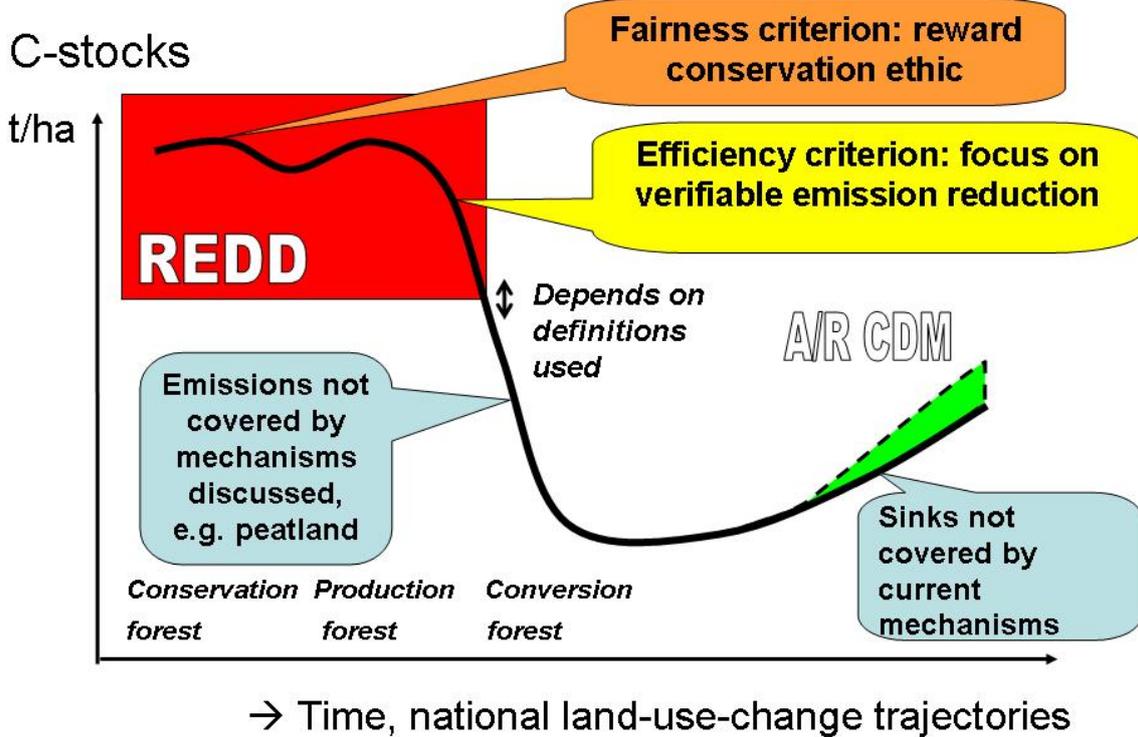
10. Can ES rewards sustain ecological connectivity?

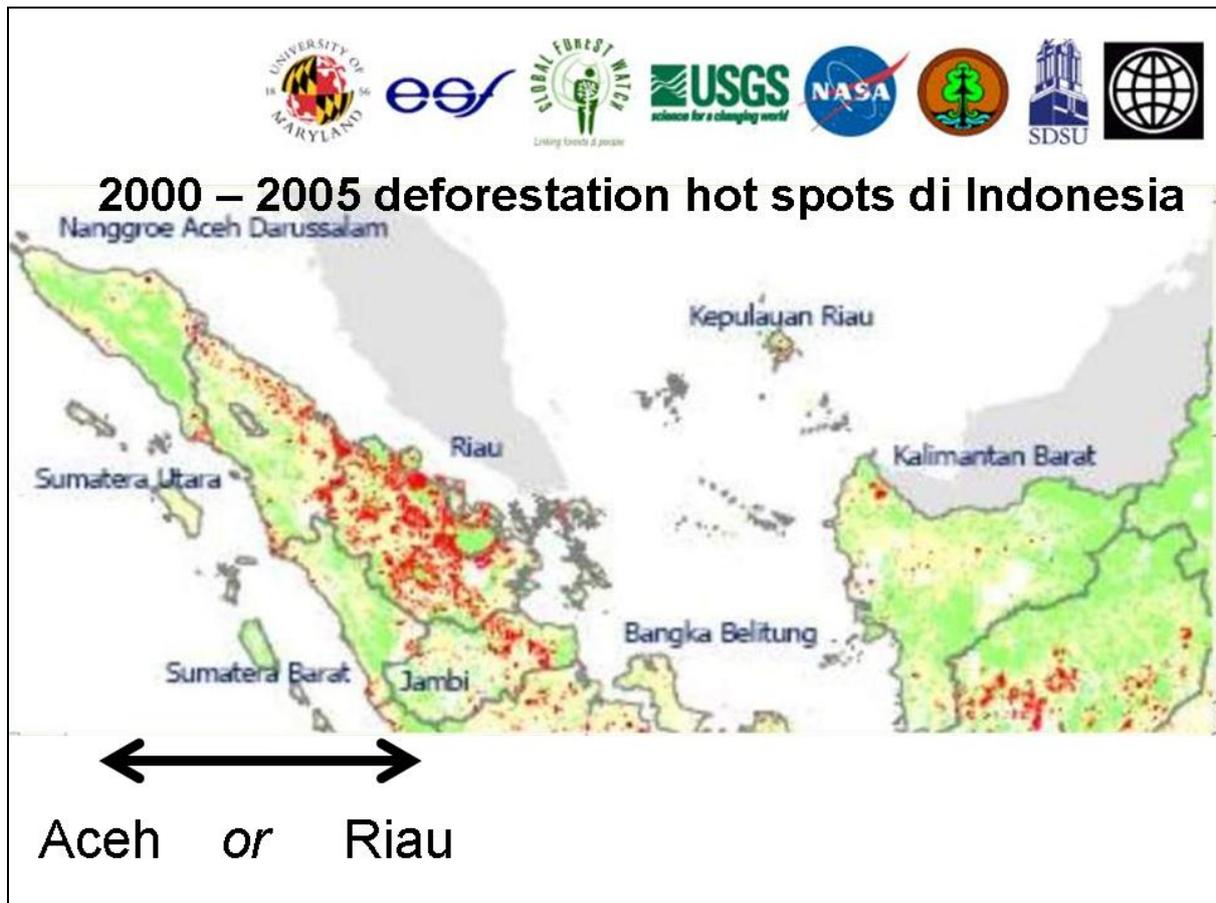






11. The efficiency versus fairness challenge







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Conclusions

- Mitigation requires comprehensive Carbon accounting rather than piece-meal approach
- Argument for generic agrobiodiversity as part of CC adaptation is still conceptual rather than empirically supported
- Planned diversity → enhanced complementarity between and within groups
- Diversity of plans, avoid the early prioritization trap: balance efficiency and fairness