Sustainable forest management in the context of REDD+

Ian Thompson
Canadian Forest Service
Sault Ste. Marie, Canada

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Sustainable forest management (SFM) and REDD+

- Under Cancun agreement, REDD+ includes a provision for improved forest management
- UNFCCC chose to call this "sustainable management of forests" instead of SFM
- SFM is defined as "a dynamic concept to maintain economic, social and environmental values from forests"
- SFM is applied at multiple scales: landscape, stand, site
- Involves planning, best management practices, inventory, and assessment of results vs. objectives (monitoring)

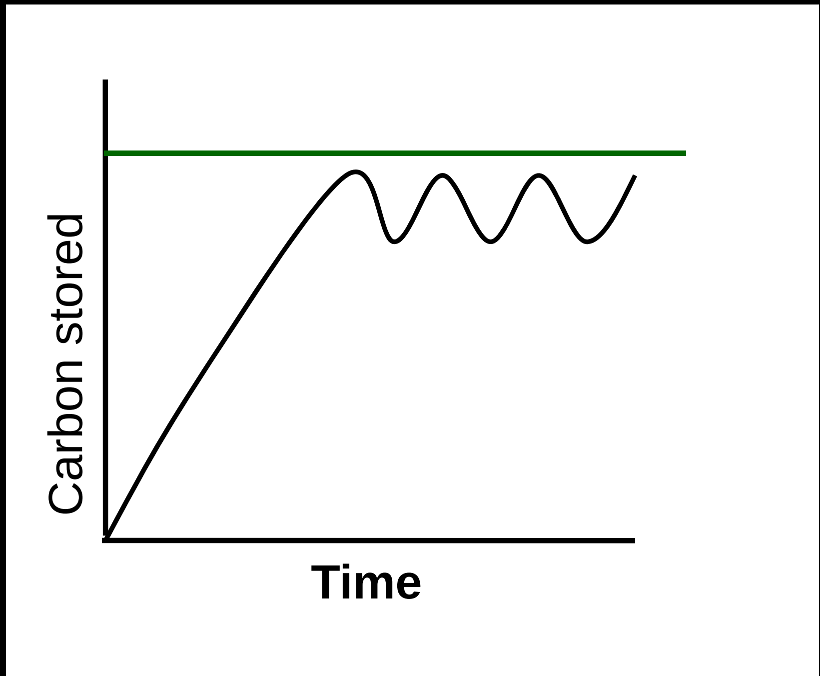
Why do we need SFM for REDD+?

- The focus of REDD is for carbon, but for long-term storage of carbon we need functioning ecosystems, not plantations
- SFM provides stable and multiple ecosystem services over time
- Priority actions for REDD+ in rank order of benefit to carbon stored and services provided:

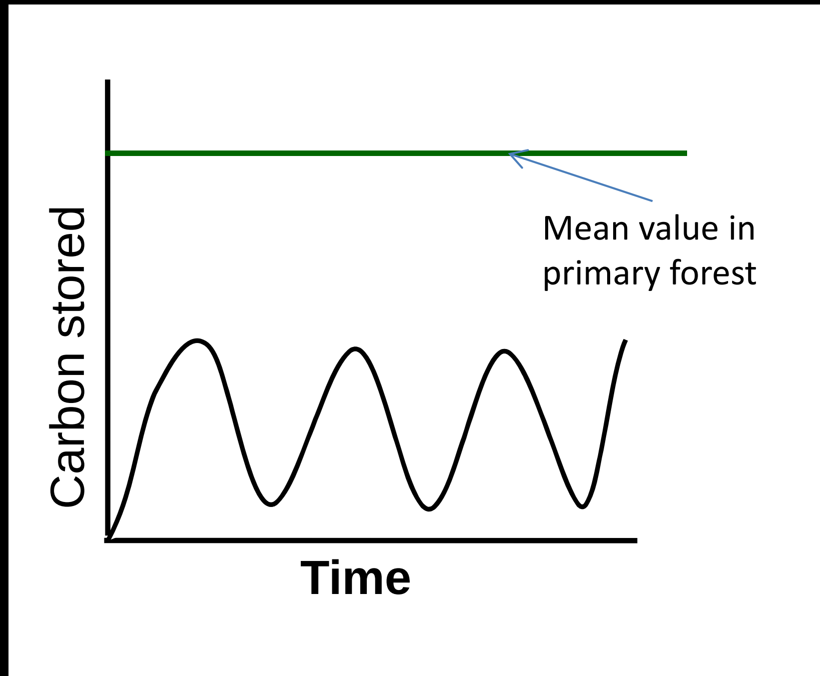
1. Protect primary forest
2. **Manage forests sustainably**
3. Reforestation, afforestation (on deforested land)
4. Other: improve agriculture production, intensive agriculture, reduce fire, etc.

Carbon storage in a plantation and a sustainably managed forest

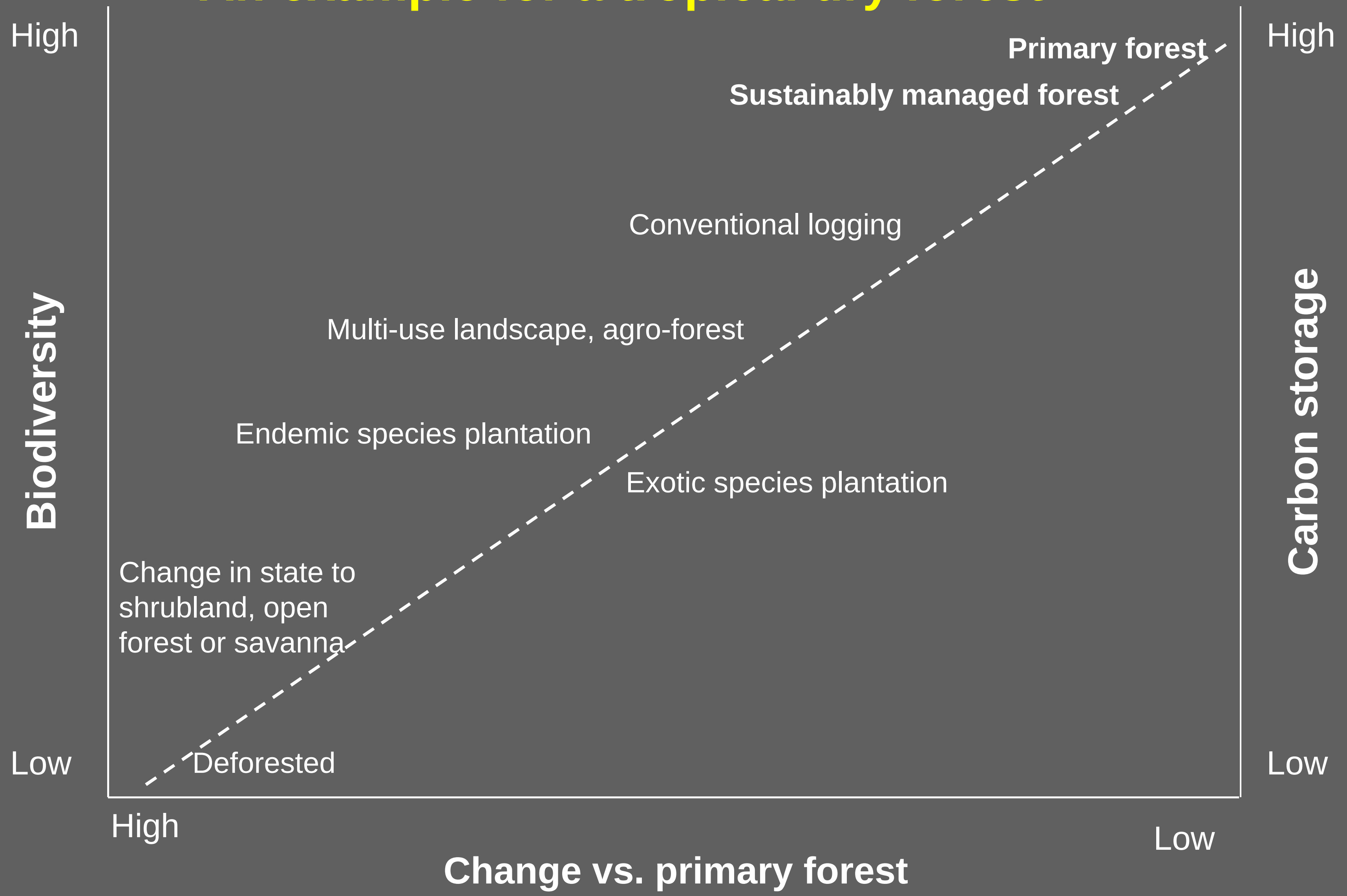
Sustainably managed forest



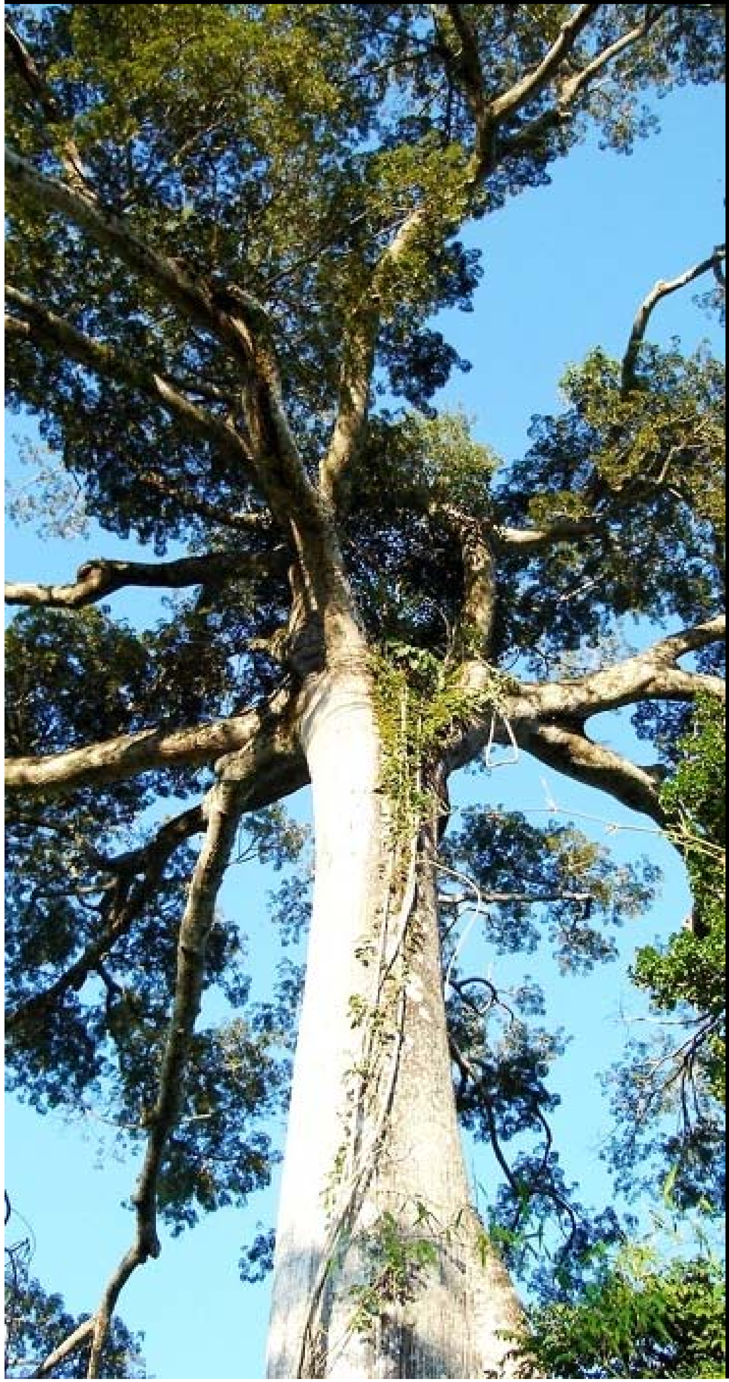
Fastwood plantation forest



An example for a tropical dry forest



From Thompson, Okabe, et al. 2013. Ecology and Society 18 (2): 20.



Management paradigms have evolved as a result of public pressure and scientific advances:

Unplanned multiple goods and services

Improved forestry

Non-declining flow of timber

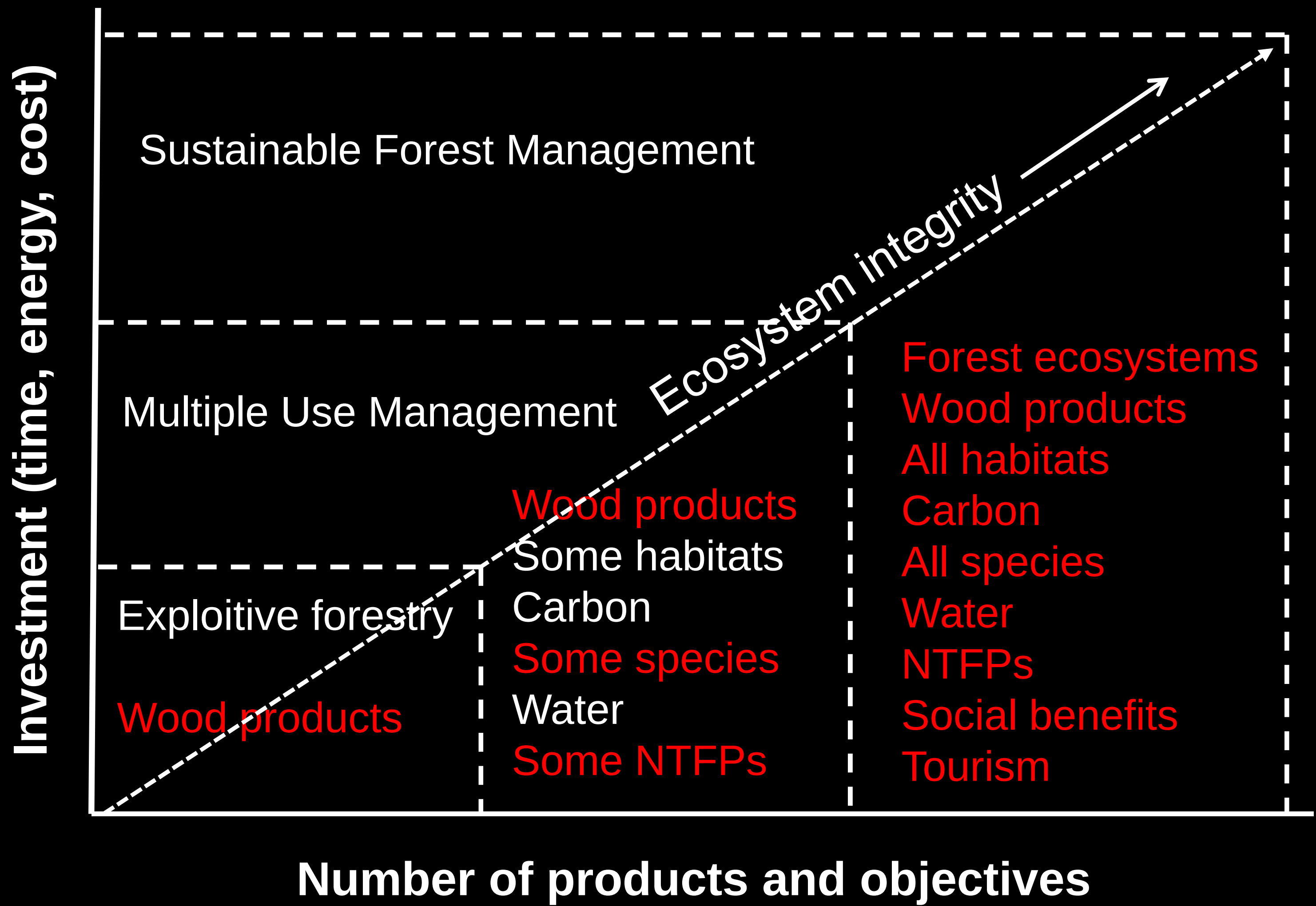
Sustained yield of wood products

Planning for multiple use

Sustainable forest management

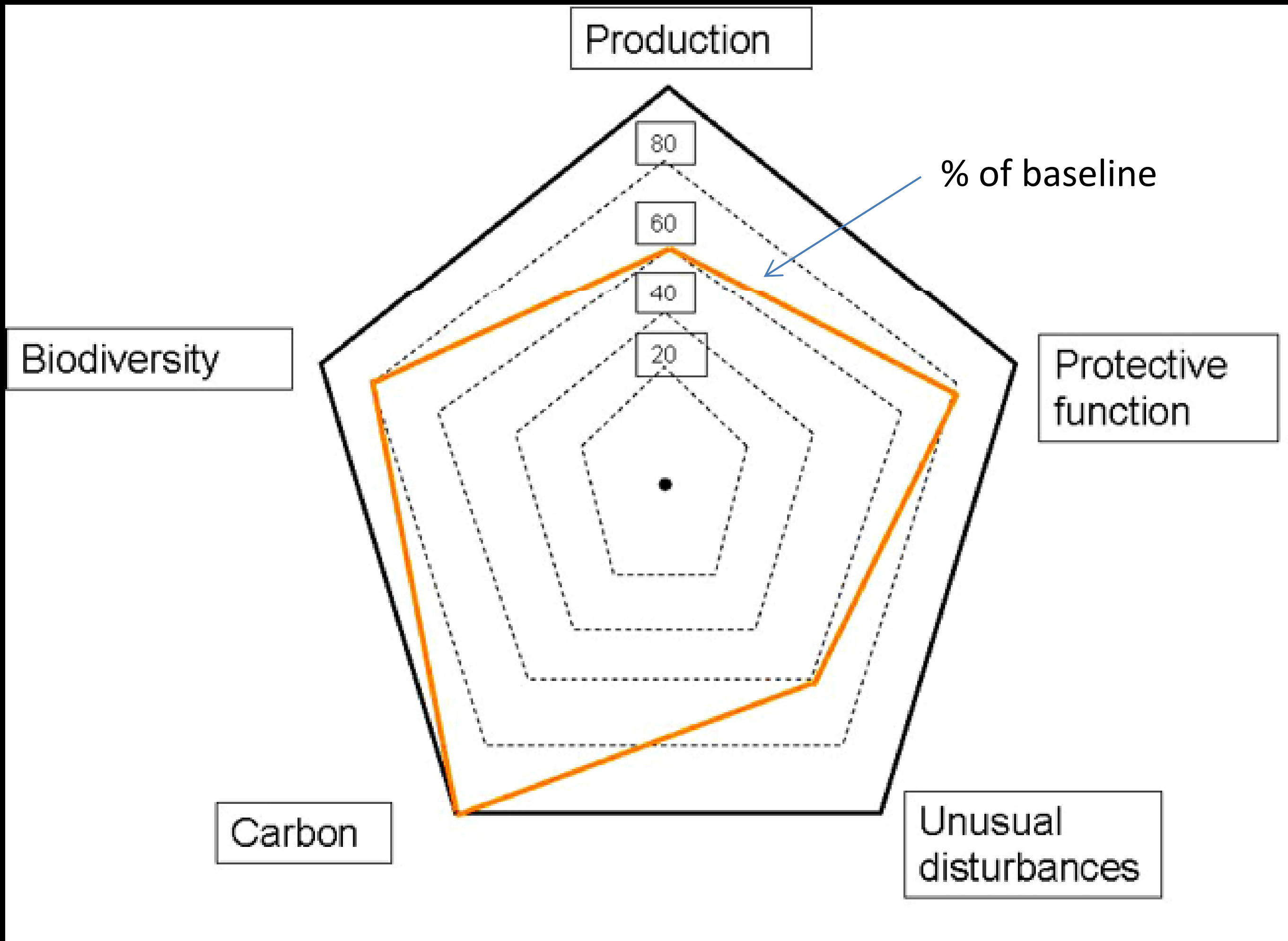
I stole this slide from R. Nasi, CIFOR ☺

Types of forest management



Lack of SFM leads to forest degradation

- Loss of capacity of forest to provide goods and services
- Opposite of Sustainable Forest Management



From Thompson, Okabe, et al. 2013. Ecology and Society 18 (2): 20.

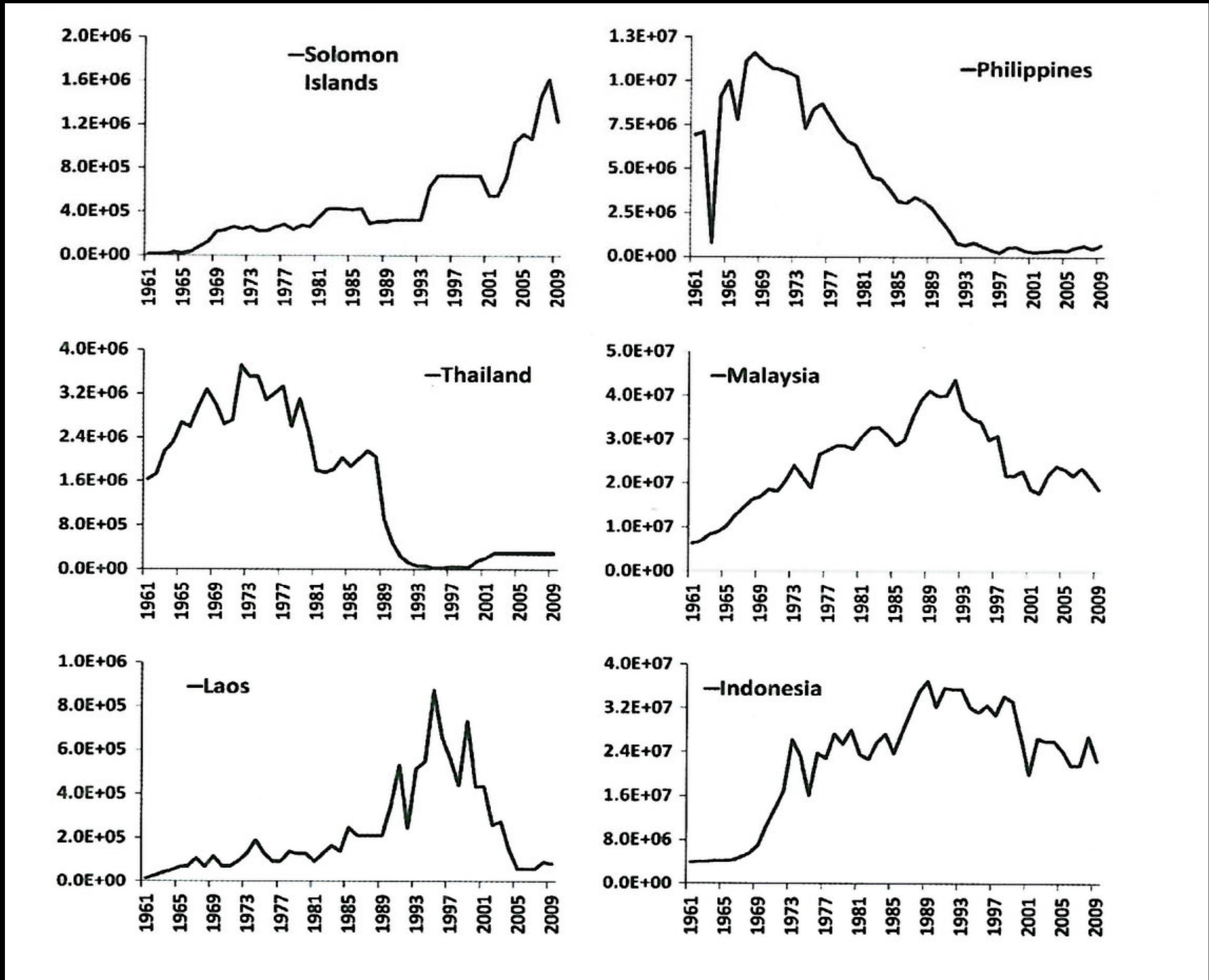
Quantifying sustainable forest management

- Sustained yield of wood products and……
- Conservation of biodiversity, and social benefits
- SFM measured through a series of criteria and indicators: production, biodiversity, protected areas, social benefits, carbon, etc.
  - At least 8 international processes (e.g., Montreal, Forest Europe, Laperatique, etc.)
  - Numerous independent forest certification processes (e.g., FSC, PEFC, SFI)
- Considerable technical and scientific advice available from: ITTO, FAO, CBD, IUCN, etc.

However, SFM is mostly not practiced in tropical forests:

- Emphasis is still on wood products
- Saw timber is the main desired commodity (from a small proportion of tree species)
- Maximising short-term profits is the norm
- Forest conversion and degradation remain common
- Estimated 90% of tropical logging is unsustainable even though the area under SFM has doubled since 2005 (Blaser et al. 2011)

Logging in most tropical areas continues to be unsustainable: saw and veneer log production as evidence



Shearman et al. 2012; Data from FAOstat 2011

So, why is there not more application of SFM?

1. Governance

- Lack of serious intent by governments, industry, or communities
- High opportunity costs vs. maintaining forests as forests ¥
- Lack of tenure security or unclear tenure and resource rights
- Illegal logging

2. Economic

- Weak global market demand for certified products ¥
- Incremental costs of SFM and high cost of certification ¥
- Lack of clear financial benefits for improved management ¥
- Global corporations have no stake in local forest quality ¥
- No incentives for forest workers to do better ¥

3. Knowledge and technical capacity

- Inadequate transfer of knowledge about improved management
- Lack of local capacity for SFM ¥
- Improved management regulations appear too complicated

(partly from: Nasi et al. 2011. Forests 2: 200-217)

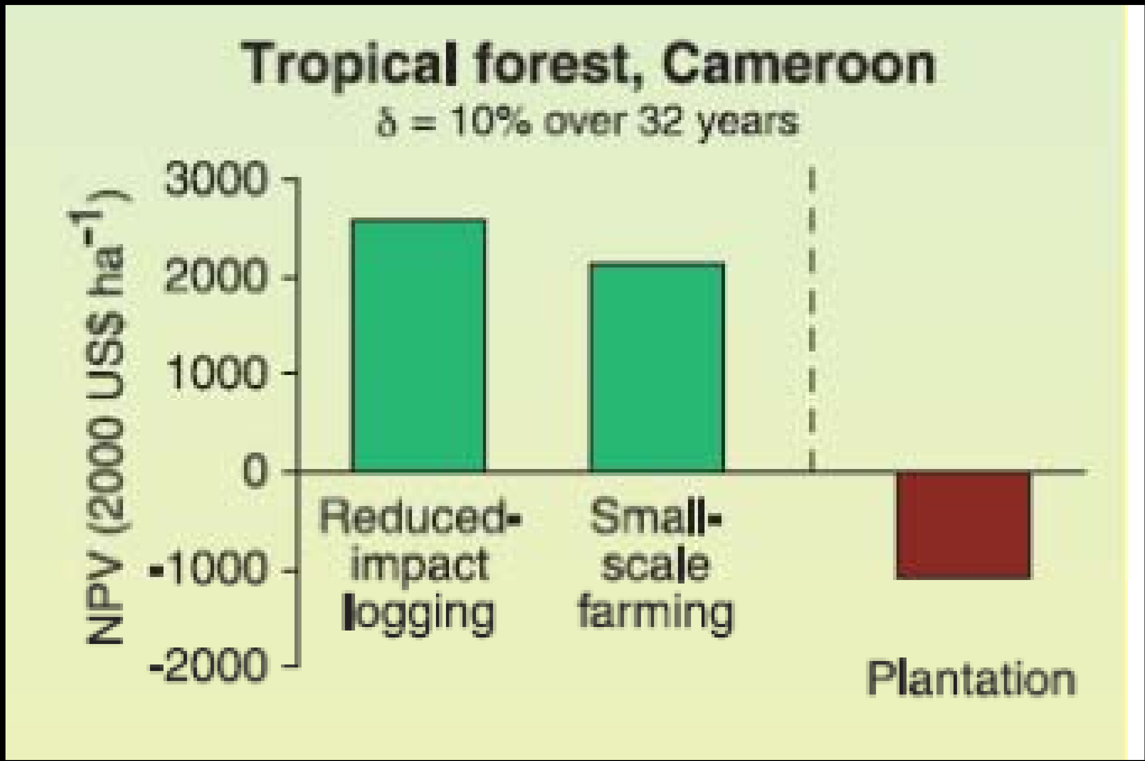


The future for global forest conservation may be REDD but….

- Fundamental issues remain:
    - Unsustainable forest use
    - Poor governance
    - Rights and tenure issues
    - Forest loss

- Compounded by new issues:
    - Carbon-based management
    - SFM = degradation and ‘business as usual’
    - Biofuels
    - Biochemicals

There are alternative visions for forest lands



Source: Balmford et al. 2002

- first step is to properly value ecosystem goods and services
- logging, if done right (i.e., SFM), provides 18% higher value than farming in this example
- this is where REDD+ can have a huge impact on C storage but also on livelihoods and biodiversity conservation

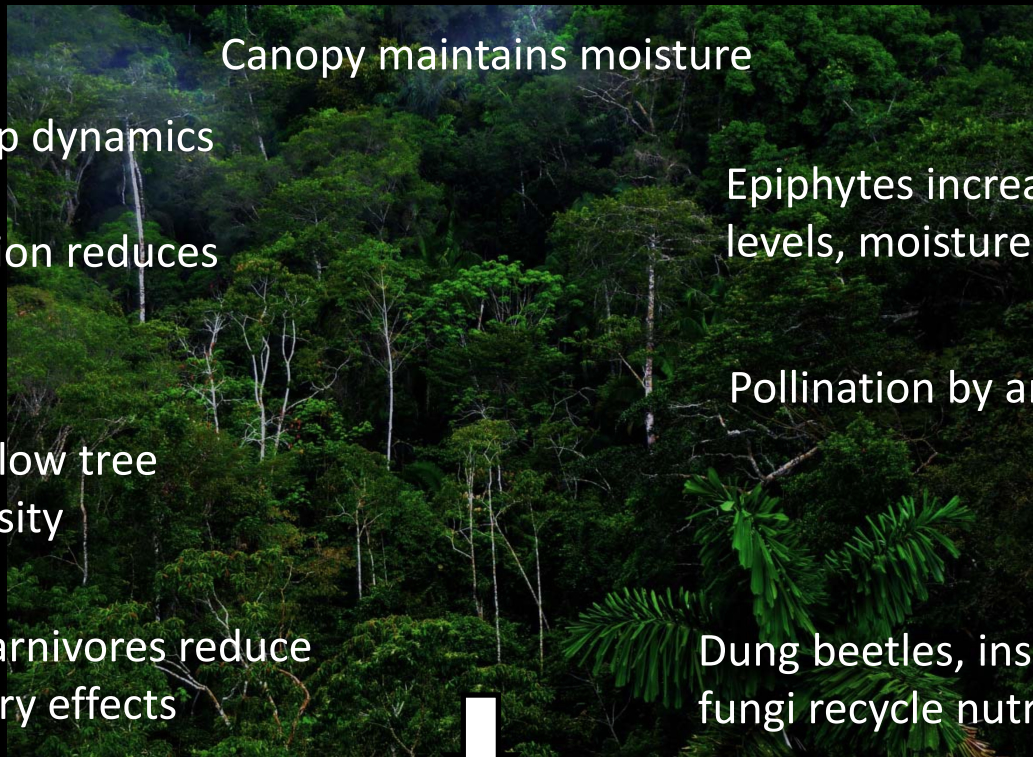
Ecosystem services and biodiversity

- Recent science supports the clear relationship between biodiversity (species richness) and provision of ecosystem services
- An important aspect of SFM is the recognition that forests provide multiple ecosystem services

Ecosystem service	**Strength of linkage to biodiversity**	**Quality of evidence**
Pollination	**High**	**High**
Decomposition	**High**	**High**
Carbon sequestration	***High***	***High***
Carbon storage	***Mixed***	***High***
Erosion control	**Low**	**High**
Pest control	**High**	**High**
Seed dispersal	**High (except wind)**	**High**
Water quality	**Low**	**Poor**
Water quantity	**Medium to high**	**Some**

Sustainability means maintaining ecosystem functions

- multiple functions in forest ecosystems
- resilience is related directly to biodiversity in the forest ecosystem
- a key objective of SFM is to maintain forest resilience – the capacity to recover from disturbance



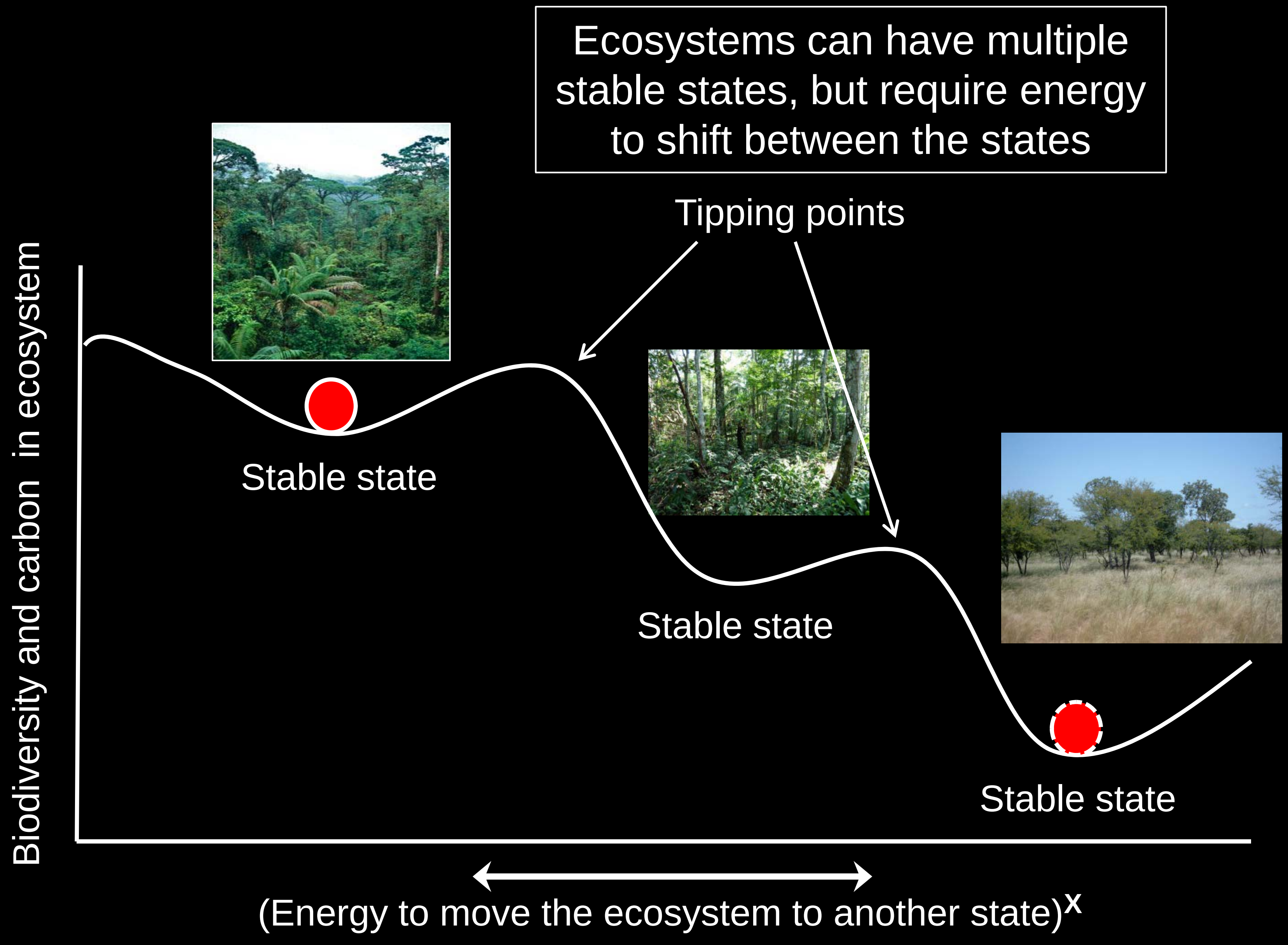
Long-term stable state

Resilience is an emergent ecosystem property

- most primary forest ecosystems are resistant and resilient to natural disturbances
- a result of biodiversity at multiple scales: genes, species, and regional diversity among forest types
- loss of biodiversity can alter the forest resilience
- loss of resilience means increased uncertainty about future forest condition….and carbon storage

Change in ecosystem state is not SFM

A key objective for SFM is not to exceed a tipping point



Mechanisms for the linkage between biodiversity and ecosystem stability and resilience

- biodiversity provides functional connectivity in the system: e.g., pollinators adapted to plants
- diseases and disturbances do not affect all species equally, so, greater species richness = less losses
- redundancy among species: a previously less important species may fill a vacated role
- landscape heterogeneity enables movement, conservation of species, and insurance against disturbances

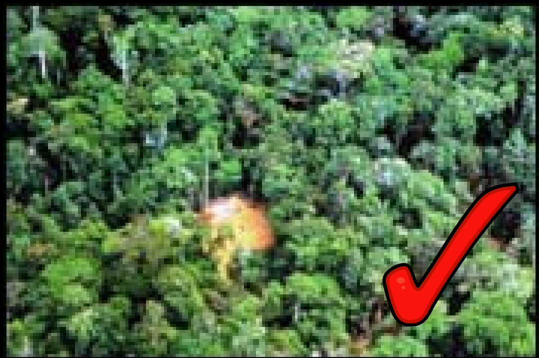
How to manage for resilience using SFM in the tropics

- Zoned landscapes: large protected areas, SFM forests, fastwood plantations, agriculture and agro-forests
- Understand and *emulate natural disturbances* and other ecosystem processes
- Maintain biodiversity – especially functional species
- Reduce roads, reduce collateral impacts and secondary effects (land clearing, illegal logging, mining, etc.)
- Promote convergence using best practices – e.g., ITTO Guidelines

Emulating natural disturbances for SFM

- Concept is to understand natural processes and use the pattern as a guide to management
- E.g., in tropical wet forests, wind results in ‘gap-phase-dynamics’ – mahogany grows on disturbed sites
- Avoid fire or clear-cutting – not natural processes
- Limited selection harvesting is recommended, as adapted and modified to local processes and species
- Will <u>only</u> work with strong governance



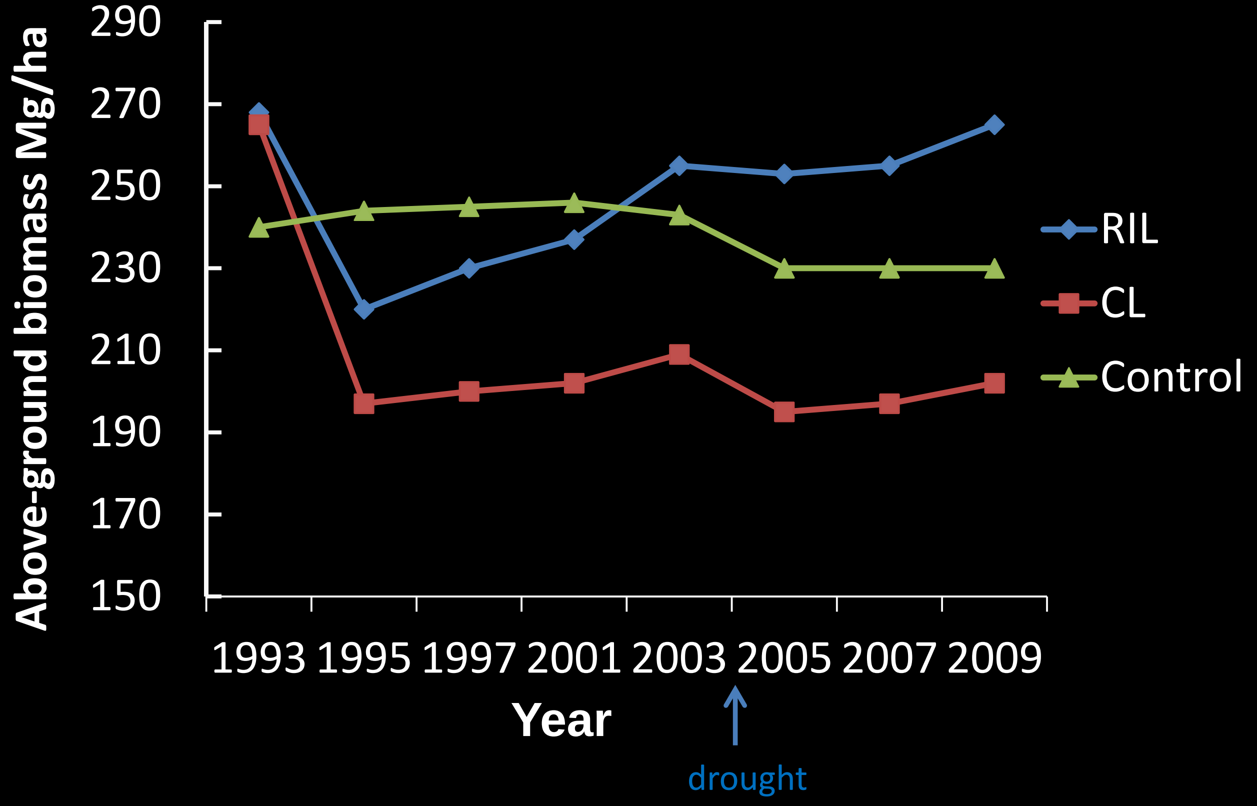


Examples of best practices

- Retain some large trees – where most carbon is stored
- Retain some carbon-dense trees as seed trees
- Protect advanced regeneration
- Protect key habitats to support landscape processes
- ‘Reduced impact logging’ - can lower carbon emissions by 30% (vs. conventional logging) while reducing damage
- Manage for high tree species diversity to enhance services
- Increase return time (>30 yrs) to enable regeneration

What can reduced impact logging do for carbon in a forest ecosystem?

Comparing reduced impact logging (RIL) to conventional logging (CL) in Amazon wet tropical forest



Graph from: West et al. For. Ecol. Mngt. 2014

The need for more science

SFM is defined as a dynamic concept – we learn by doing

Objective: reduce uncertainty

- Understanding how ecosystem services are affected by species, species density, biomass, and interactions
- Understanding optimal scales for delivery of ecosystem services
- Improving silviculture for forest restoration
- Understanding functioning in novel forest ecosystems
- Defining ecosystem thresholds

SFM is valuable to REDD to……

1. ensure and enhance ecosystem functioning,

2. enhance the value of the forest to local communities,

3. increase carbon in the system as a co-benefit to maintaining biodiversity, and

4. increase the longevity of carbon storage through developing/maintaining resilient forest ecosystems.