



## Resilient Forest Landscapes Threats and Opportunities

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### What do we mean by resilience

- Originally applied to the ability of a material to recover its shape after deformation.
- In Ecology: the ability of a system to quickly recover from shocks or to resist the influence of changes in the environment
- Our Human Ecology definition: the ability of a system to continue to provide the goods and services required by man in the face of shocks and environmental change.
- For the agricultural livelihood system: to increase in resilience from and during the expected transition of land-use and climate change.

### What are forest landscapes/Forest landscape restoration?



Many formerly forested landscapes are in need of restoration of productivity for mosaics of forest, trees and agriculture.







### What are forest landscapes for?

- Delivering water quantity and quality over time (incl. dry seasons, climate fluctuation)
- Delivering goods and other ecosystem services for local livelihood and development (incl. diversification of livelihood income)



### Forests and Water a resumé

- How forests and trees affect waters
  - Forest Cover and trees increases infiltration and reduces surface runoff.
  - Trees use more water than other plants to grow.
  - Thus, less water reaches streams in a forested catchment.
  - But, as more water reaches the groundwater instead of surface runoff - in a catchment with trees there is more water in wells and streams in the dry season.
  - Thus streamflow is better regulated in a catchment with trees and the groundwater path keep it clean.
- With increasing competition for water in semiarid areas there are fears for trade-offs between various values of trees and too high water consumption of trees.





### Land use change affecting the precipitationshed.



Sink Potential 70% Potential Land-use Region Land-use Population Relative Vulner-Changes Land-Number of Changes in Precipi-Precipita-Nations in ability Increasing use Region tationshed tionshed Decreasing Inten-Evapora-Precipitato Evaporation in (millions of Area tionshed Landsity tion in the the (million people) use Precipita-Precipitationshed  $km^2$ ) Change tionshed and Degredation station Afforestation Salinization Urbanization Irrigation Terrestrial Total Defore XX Х 19.4 7.2 Med. Argentina Med. 7 114 East Verv Х Х X Х 29 2294 37.1 28.6 High China high Eastern XX Х Х 24.7 Med. High 72 719 32.5 Sahe1 North XX X Х X Х High 23 1589 34.0 29.0 High China Very Pakistan-Х Х Х Х Med. 38.4 26.7 16 184 India high Southern Х Х Х Х Med. 15 135 14.0 6.5 Med. Africa Western Х X Х Х 25.6 Med. High 83 991 33.1 Sahe1

### Water and Forests, a resume.

- How water affects forests.
- Less well studied.
- Groundwater Forests
- Rainfed Forests
- Flooded Forests
- Fire maintained grasslands
  - Thunderstorms



Kathu







Tierra del Fuego

# Relevant research and systematic (multidiciplinary) apporaches and their applications needed.





Need to rely on process understanding but also to integrate on relevant scales where "Landscapes" often relate well with ES, village and farm dependence area etc.

# Not knowing everything is not a valid excuse to do nothing.

- We know enough to guide us.
  - Lack of knowledge is not a valid excuse.
  - Of course we need to know more.
- We can be forest and water engineers if we want to be.
  - Remember that engineers apply scientifically determined knowledge to find solutions
  - The scientists have done a good enough job (to get us a long way.)
- But forests exist in a social context which will determine what happens to them (and therefore to us).

### The Social Context

- 'Buy land, they're not making it any more' Mark Twain
- Forested landscapes are about land use decisions.
- These decisions are largely made by individuals in the framework of the customary, legal and economic environment (governments seek to influence these decisions).
- If forest as a land use provides clear benefits to those individuals then forests will stay or be created.



40,000ha forest reserve in the Ivory Coast with all trees killed in two years by massive immigration due to civil war.

### Threats

- Increasing demand for land for cultivation
  - You can't eat trees (but if you can sell them you can buy food).
- Capital value of standing timber
  - Seima Reserve in Cambodia US\$28000-100,000/ha, very attractive resource for criminals (10,000ha of clearing yields 280million – 1 billion US\$)
- Lack of stakeholder rights/capacities/interests
  - People cannot access the benefit of the forest or trees in the landscape so it has no value to them.
- Unsustainable forest management
  - Due to poor knowledge of how to do it right, accompanied by bad forest management laws. In combination with that other land-uses that give quicker and better return
- Continued degradation
  - Due to overuse, small scale conversion for agriculture, degraded forest more prone to fire

### Opportunities

- Capital Value of Standing Timber
  - If the local individuals can access these values they have the potential to be transformative.
- Stakeholder presence
  - The stakeholders are on the spot and will protect the forest if they see it as being valuable for them (not all values are commercial).
- Non timber values
  - Commercial NTFPs, Subsistence NTFPs, Ecotourism.
  - Environmental services (short range and long range)
  - Value chains and livelihood resilience contribution of tree-related products
- International Interest

### A Complex Problem

#### Problems targeted in the Fair Wood project

Startup	Starting up local TPE, according to a fair trade model with transparency
Forest	Capacity building for forest owners in value optimizing responsible forestry
Market	Market development support both regionally and in export markets
Processing	Implementation of small-scale high quality sawing and drying
Certification	Development of and support for certification that suits smallholders



And coming transformations of landscapes' effects on ES is so much more than biogeophysical empirics... (Swedish historical experience and current competense and capability)

1900









### The Way Ahead

- Developing systems to ensure forests are protected and created.
  - Supporting forest rights for smallholders.
  - Supporting smallholders to apply good forest management.
  - Supporting smallholders to transition from farming to forestry
  - Supporting the development of market mechanisms that deliver real value to smallholders
- Filling the knowledge gaps by research
  - Semi-arid Zone landscape and continental forest hydrology
  - Socio-cultural forest frameworks
  - Micro economics of forest and tree products management in developing countries