

Enhancing community resilience to climate variability through ecosystem services from forests and trees in Indonesia



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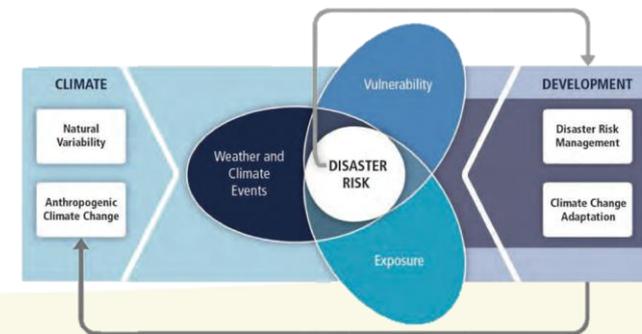
10th November 2015, South Africa

by Giacomo Fedele and Bruno Locatelli

Existing concepts

- Multiple benefits of forest and trees: shelter, safety nets and natural buffers protecting people and their livelihoods from climate variability.
- Linkages between ecosystems and people's resilience increasingly acknowledged in frameworks on human vulnerabilities.

e.g. Disaster (UNISDR/HES) and Climate Change (IPCC)



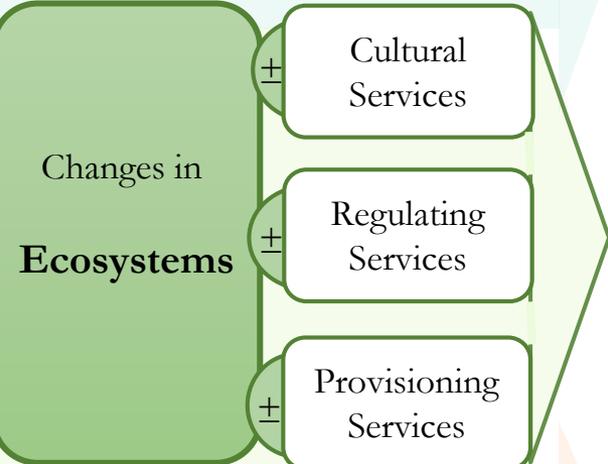
Knowledge gaps

- Complex effects of ecosystems on human vulnerabilities in social-ecological systems (Folke 2006, Birkmann 2006).
- How these effects depend on ecosystems' conditions (Estrella, Renaud & Sudmeier-Rieux 2013, Noordwijk et al. 2014) and be shaped through management (Laukkonen et al 2008, Harvey et al. 2013, Doswald et al., 2014)
- How interactions between ecosystem and society can be better described at lower level in rural areas (IPCC 2014, Hinkel et al. 2014, Diaz 2011).



Research question: How do social-ecological interactions shape human vulnerability?

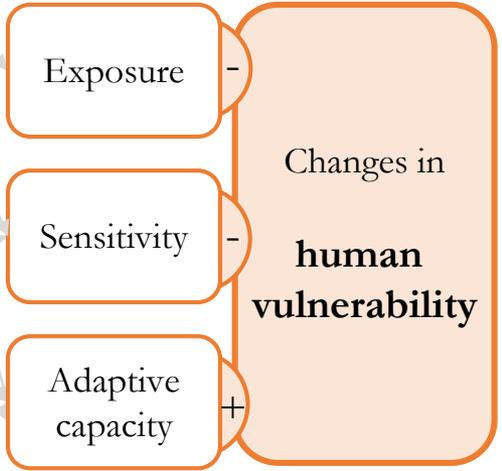
Governance systems



Social-economical context

Mediating factors

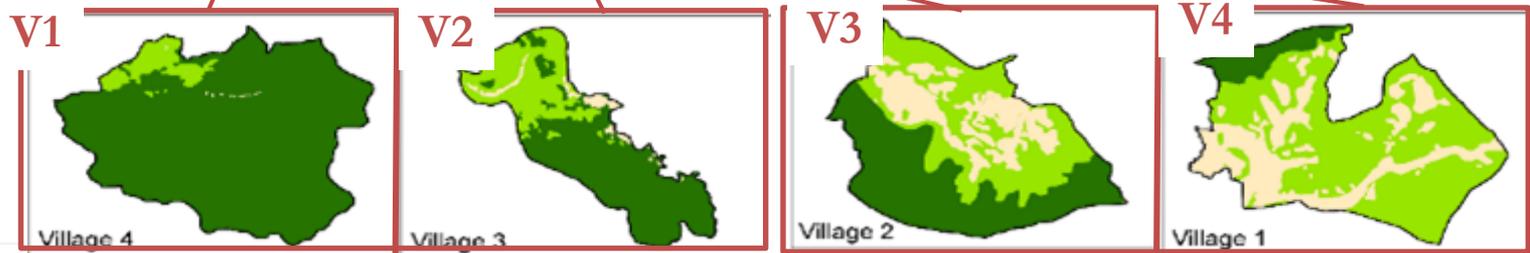
1. Institutional arrangements
2. Knowledge & Skills
3. Land cover management
4. Land-use practices
5. Technology
6. Finance and markets



Study sites: 4 villages in Indonesia



Legend:
■ Forest
■ Plantation
■ Non Forest



West Kalimantan

Central Java

Study sites: landscapes

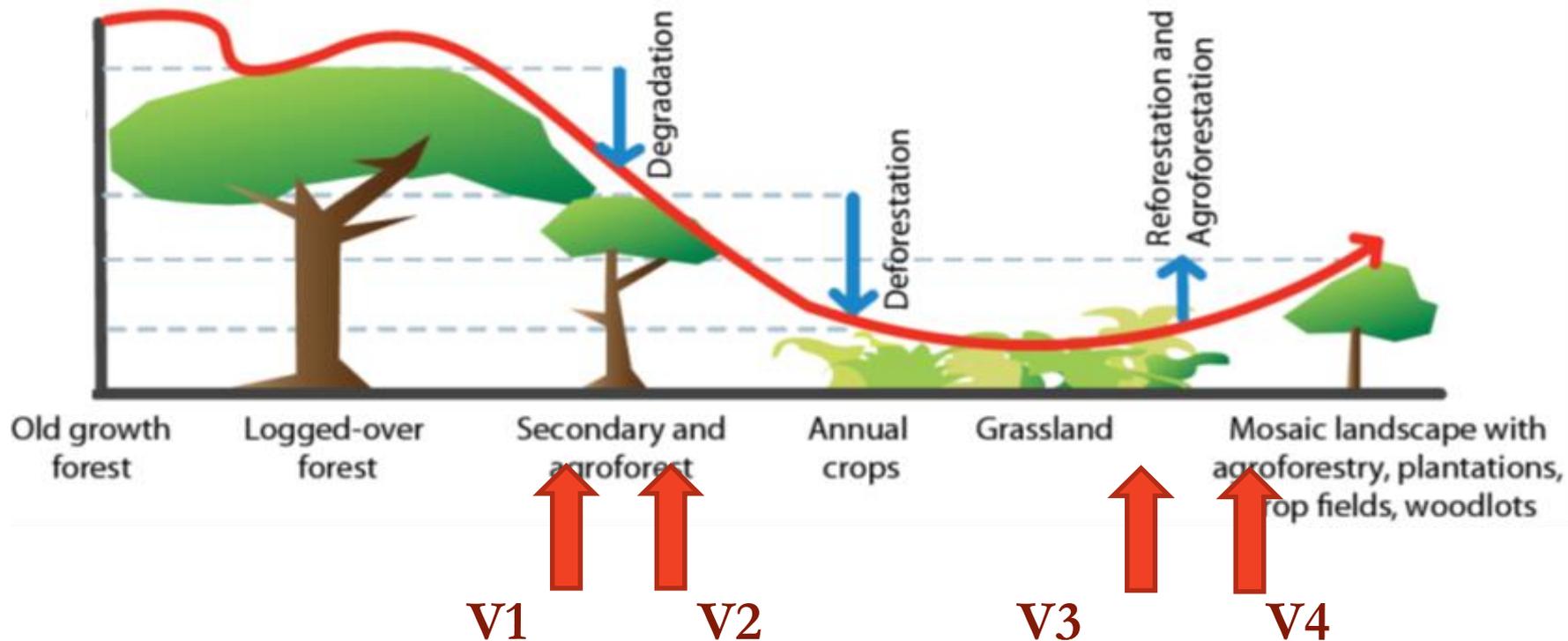


West Kalimantan site



Central Java site

Study sites: gradient of anthropization



Forested area/family
[ha forested areas/household]

V1
140 ha

V2
14 ha

V3
1.5 ha

V4
1 ha

Plantations

[% village territory]

4%

32%

35%

62%

Increased anthropization





Research methods

Methods

Objectives

Secondary data from satellites

Landsat (GIS)
TRMM satellite (Climate)

Study sites land-use maps with changes and precipitation series

4 meetings with communities and key informants

First contact and overview

26 Focus Group Discussions

Historical Timeline
Participatory Mapping
Seasonal Calendar
Sensitivity Matrix & Problem tree
Venn/Sociograms

Understand village history, landscape, livelihoods and practices, vulnerabilities

256 Household survey

Understanding impact of climate variability and responses

Trees products for livelihoods

 **Institutional arrangements**
(land tenure, access, rights)

- rights to access and harvest in communal forests + restrictions to outsiders => safety nets

- rights to harvest some products and cultivate in state-owned plantations => diversification, safety nets

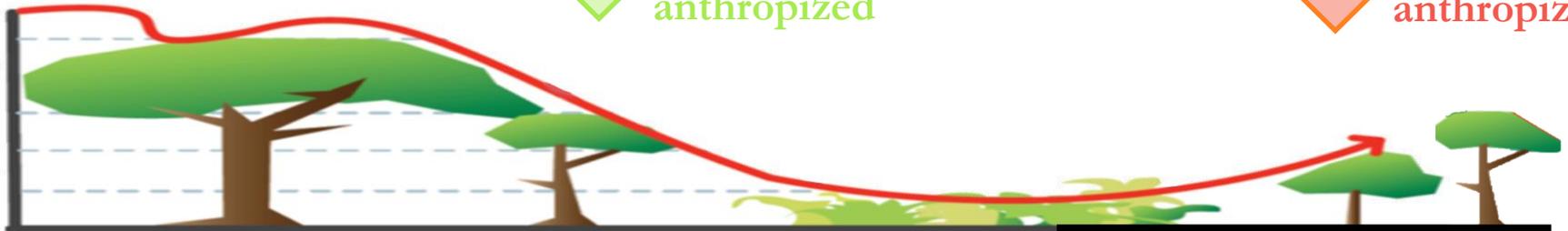
 **Finance and markets**
(taxes, markets, certificates)

- limited access to markets and job opportunities, low prices => more dependency on forest products, lower role in adaptation

- many off-farm job opportunities, high wood market prices => lower role of forests in livelihoods and adaptation

 less anthropized

 more anthropized



Trees for soil fertility & moisture in agricultural land



Institutional arrangements

(land use regulations, planning)

- local rules for protecting forests in strategic areas => water regulation for agriculture



Land use practices

(techniques)

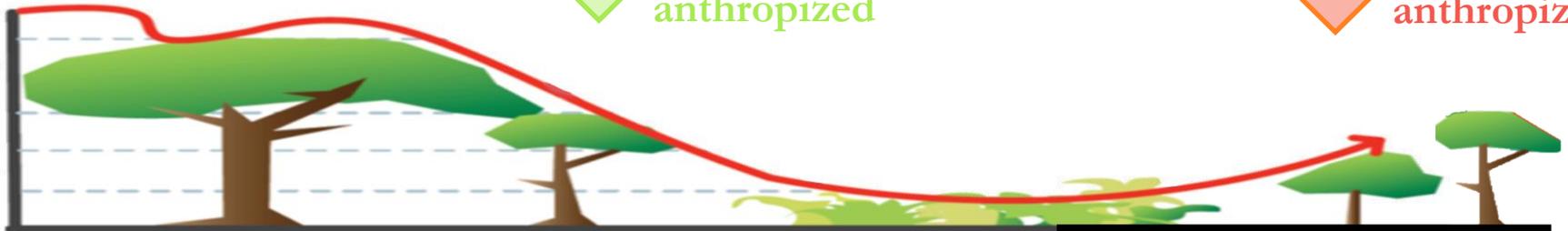
- limited use of fertilizers and irrigation technology => more dependency on regulating services

- identification of areas at risk/low productivity to plant trees rather than crops => lower agricultural vulnerability, diversification

- Increased selected trees areas near cropland => more soil water infiltration and better yields

↓ less anthropized

↓ more anthropized



Trees as barriers & buffers against extreme events



Institutional arrangements
(land use planning)

- forests as land reserve for emergency or future uses => safe places for assets/people relocation



Land cover management
(vegetative + structural measures)

- tree planting along riverbanks as protection => reduced losses due to soil erosion

- trees as buffer/alternative due to wild life intrusion in crop land=> decreased damages

- tree cover maintained or increased in dry lands + terracing, dams=> reduced erosion & landslides

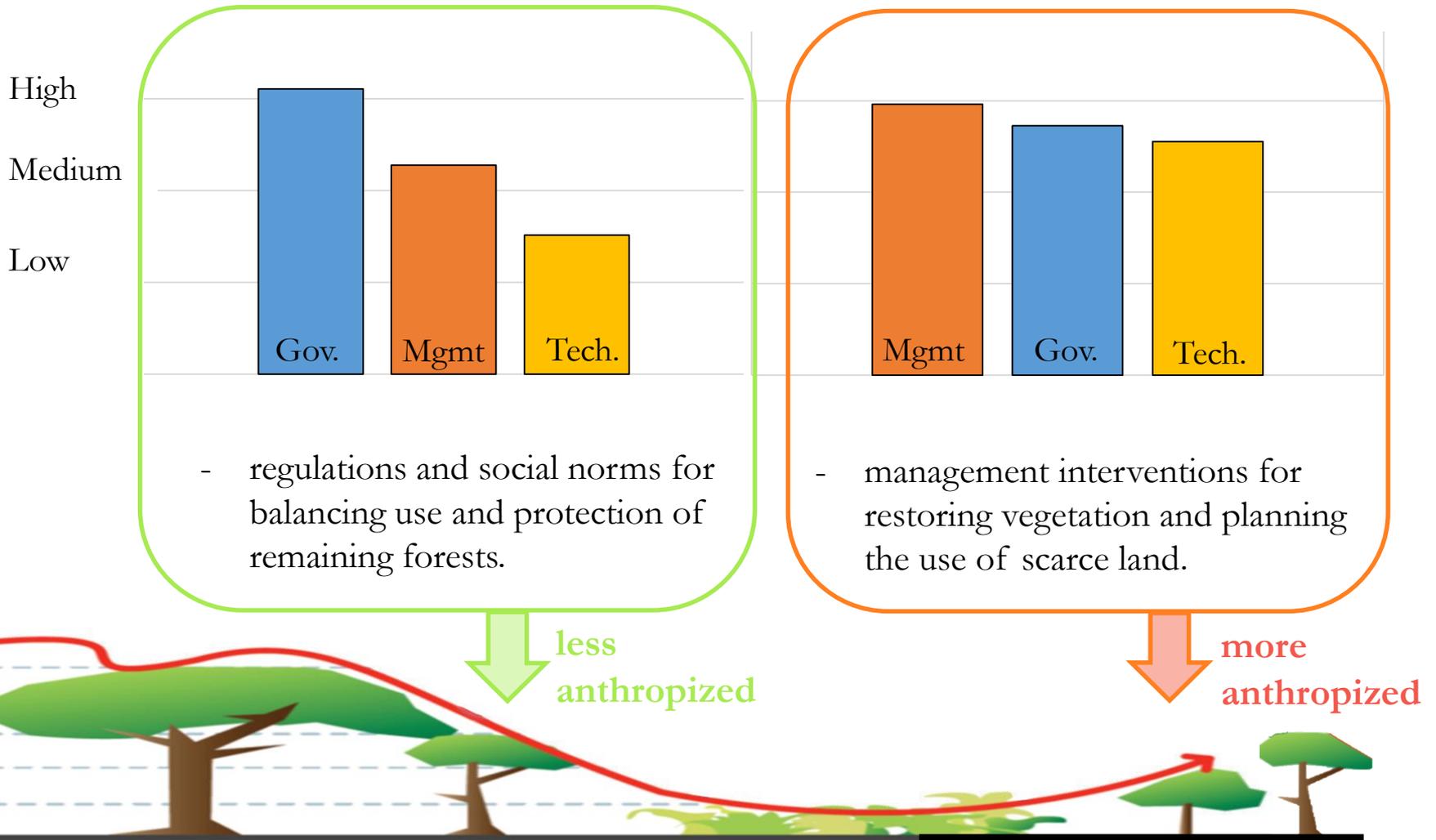
↓ less anthropized

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Importance of mediating factors

What are important factors for the resilience of people and their environment?





Key messages

- **Benefits from forest ecosystems for human vulnerabilities are regulated by multiple mediating factors:**
 - Policy arrangements (institutions, knowledge),
 - Environment management (land cover, land-use practices)
 - Financial & technical opportunities (markets, technologies)

- **To fully exploit the potential of forests & trees to reduce human vulnerabilities :**
 - diversify solutions depending on environmental conditions and development pathways
 - promote mediating factors that have enabling influences
 - control mediating factors that constrain response strategies

A woman wearing a large, traditional conical hat, a yellow long-sleeved top, and a colorful floral skirt stands with her back to the camera. She is looking across a wide, muddy river towards a lush, green forested mountain range partially shrouded in mist. In the foreground, several wooden boats are docked along the riverbank. The overall scene is peaceful and scenic, capturing a moment in a rural, tropical setting.

Thank you !

Literature

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