

Ecosystem-based strategies for community resilience to climate variability in Indonesia



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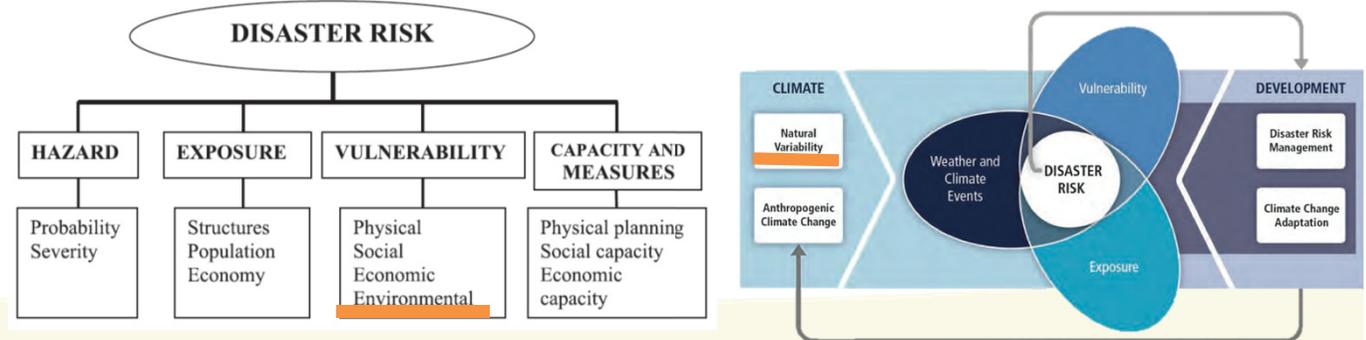
by Giacomo Fedele and Bruno Locatelli



Background: existing concepts

- Forest and trees: 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. SES by Ostrom, SLF by DFID, CCA as in IPCC, DRR as in UNISDR, PAR model by UN HES).



Knowledge gaps

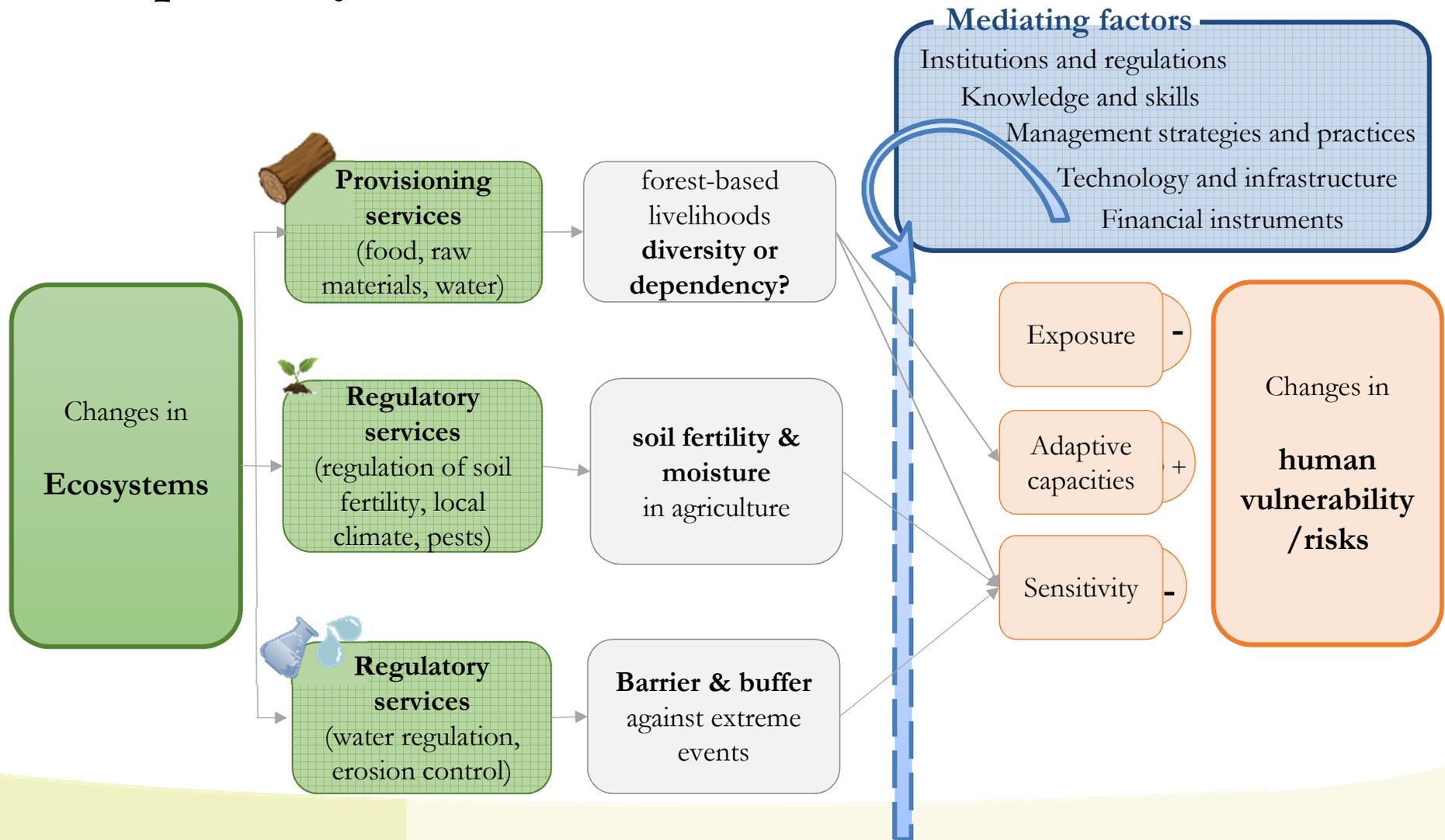
- Multiple and complex effects of ecosystems on risks or vulnerabilities. (Birkmann 2006, Cardona 2004)
- How these effects depend on ecosystems' conditions (e.g. spatial patterns, species characteristics, land use intensities)? (Estrella, Renaud & Sudmeier-Rieux 2013, Noordwijk et al. 2014)
- How to operationalize locally and “test in real world” in rural areas? (Olsson et al. 2004, IPCC 2014)



Research question:

How do ecosystems influence human vulnerability?

Three pathways

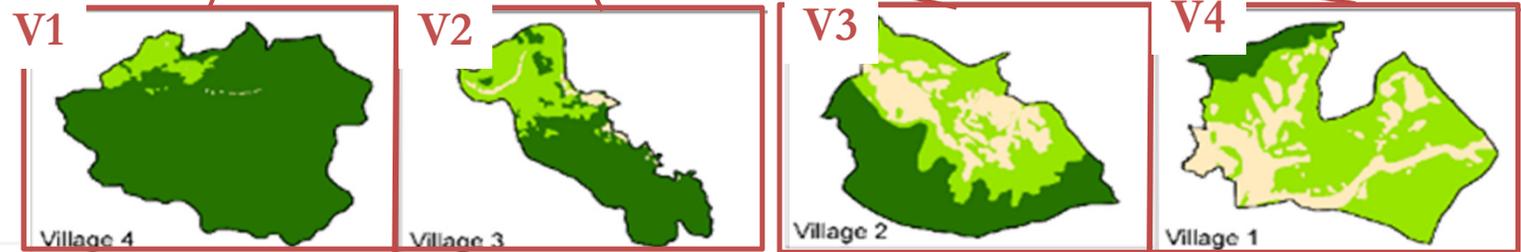


Study sites: 4 villages in Indonesia



Legend:

- Forest
- Plantation
- Non Forest



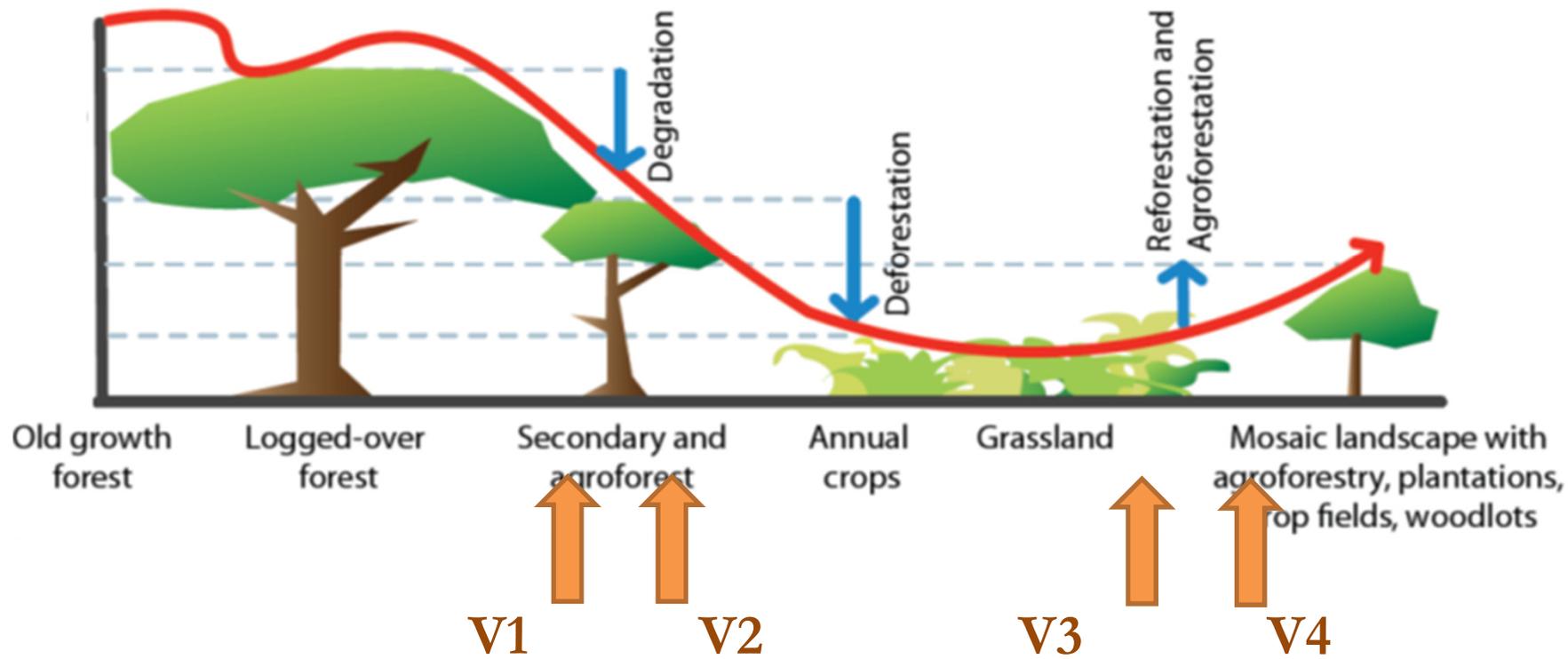
West Kalimantan

Central Java

Study sites: landscapes



Study sites: gradient of anthropization



Forested area/family
[ha forested areas/household]

Plantations

[% village territory]

	V1	V2	V3	V4
Forested area/family	140 ha	14 ha	1.5 ha	1 ha
Plantations	4%	32%	35%	62%

Increased anthropization



Study sites: effects of climate variability



Drought in Central Java site

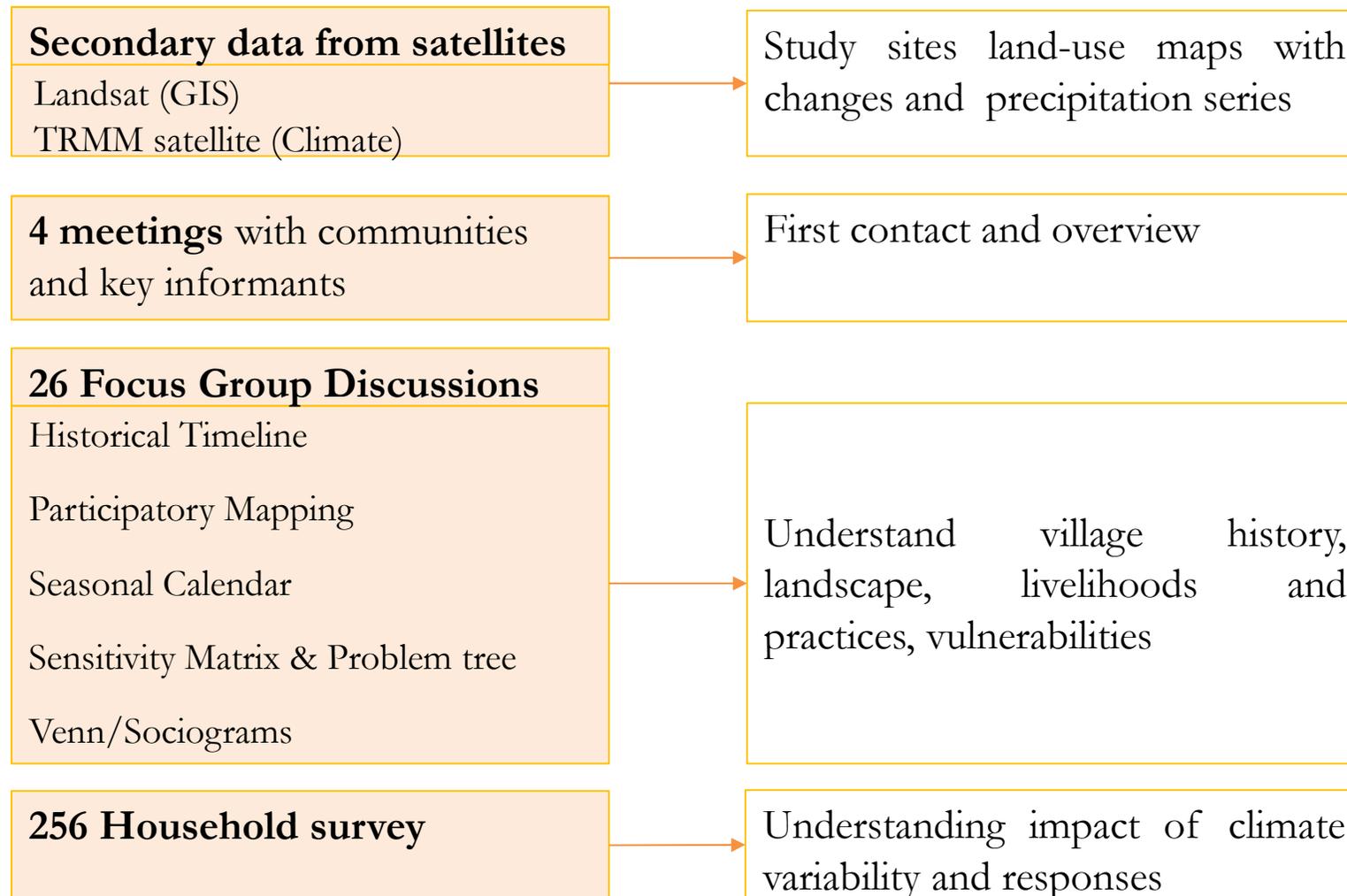


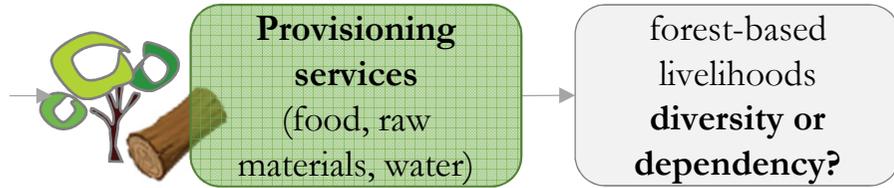
Floods in West Kalimantan site

Research methods

Methods

Objectives





Trees in livelihoods under climate variability

- Forests and trees as **basis for livelihoods diversification**:
 - Replace discontinued productive activities (V1-2)
 - Provide emergency cash (insurance) (V3-4).
 - Alleviate food shortage for animals (V3-4) and people (V1-2).

- Forests and trees-based **livelihoods sensitive to climate**:
 - Floods & droughts affected extraction by disturbing transportation (roads & rivers) (V1-2).
 - Floods & droughts reduced tree products (V1-2)

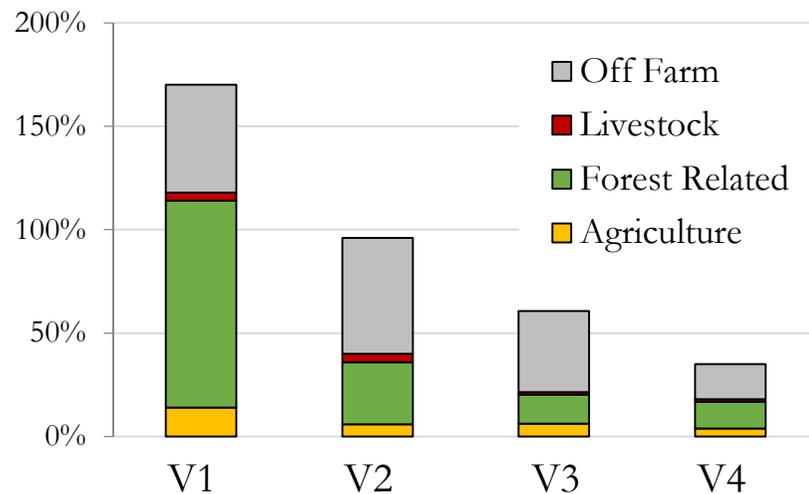




Trees in livelihoods under climate variability (2)

- In less anthropized places (V1-2) forests and trees increase livelihood diversification.
- Limited potential as response strategies because affected by drought and floods (e.g. timber harvest, rubber and NTFP collection).

% of HH engaging in secondary activities



% HH affected by floods

	V1	V2	V3	V4
Forest related				
Timber	21%	4%	0%	0%
NTFPs	20%	22%	0%	0%
Rubber	74%	86%	-	-
Off farm				
Gold	8%	34%	-	-
Labor	-	-	20%	14%

more anthropized →

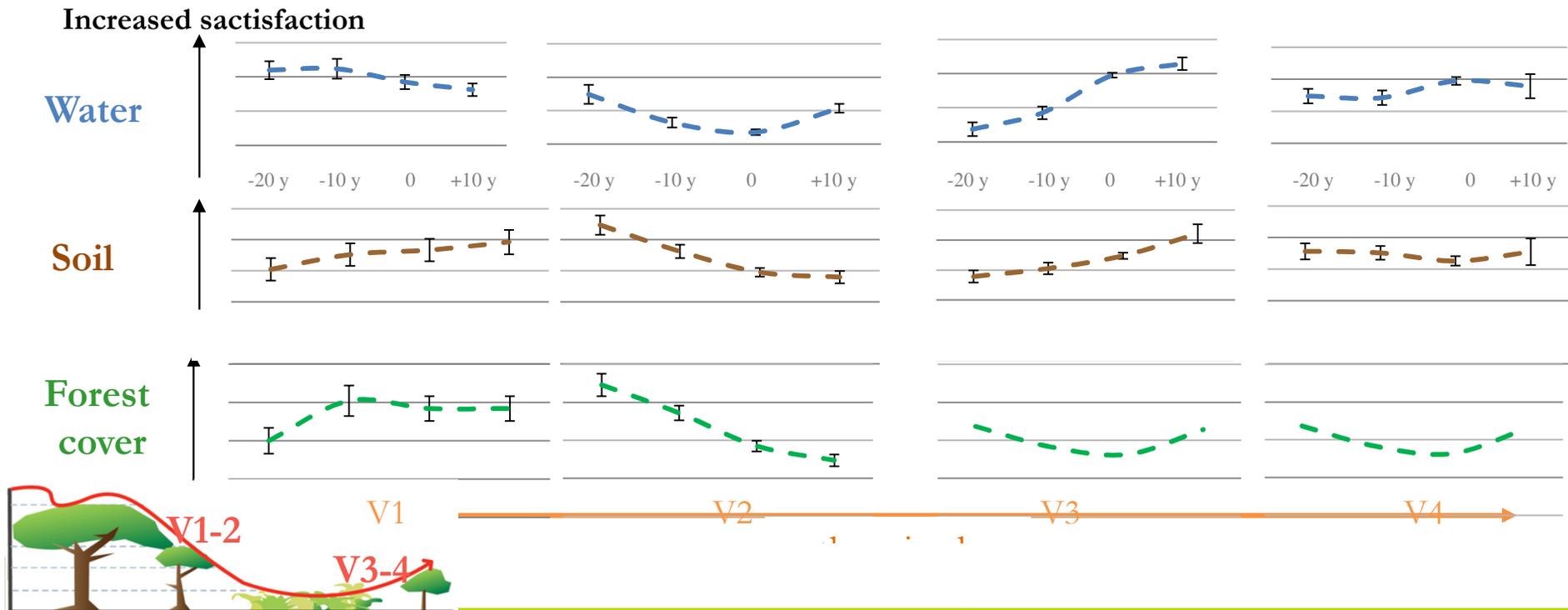
more anthropized →



Trees for soil fertility & moisture

- Forests or tree improved soil fertility, soil moisture, and microclimatic conditions.
- Perceived changes in soil and water conditions well correlated with forest cover trends.

Satisfaction with land conditions over time (-20, -10, 0, +10 years)

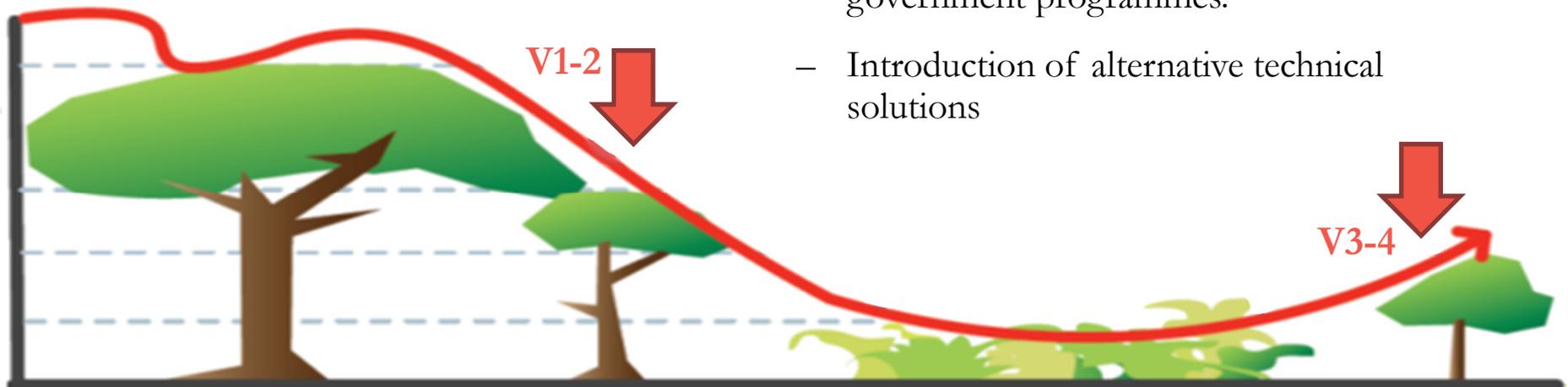




Trees for soil fertility & moisture

➤ People motivated trends in water and soil conditions due to changes in vegetation and technical improvements:

- logging concession activities and timber harvest,
- deforestation due to shifting cultivation.
- lack of alternative technical solutions for water and agriculture,
- changes in forest type and illegal logging in state-owned forests.
- Afforestation activities by local people and government programmes.
- Introduction of alternative technical solutions





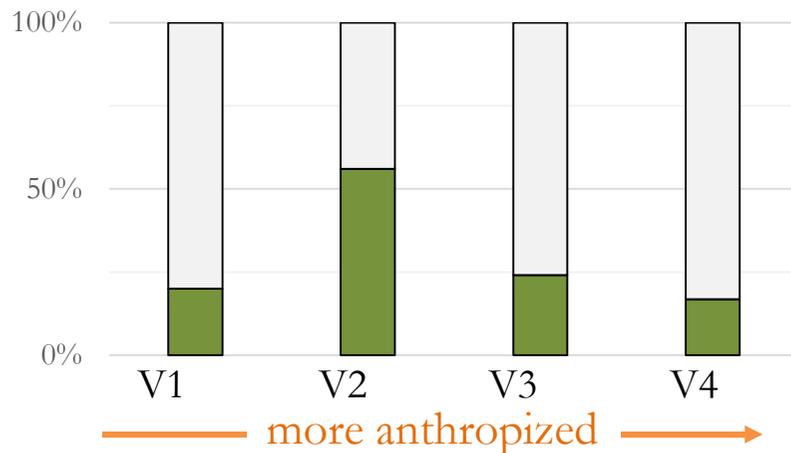
Regulatory services
(water regulation, erosion control)

Barrier & buffer
against extreme events

Trees as barriers & buffers

- Respondents linked the impact of climate-related events to forest degradation & deforestation:
 - reduced capacity to regulate water storage & release in soil (floods/drought).
 - reduced capacity to protect and stabilize soil (landslides & erosions).

What are the causes of climate-related disasters such as floods and drought?



Reasons related to forests & trees:

- **less** trees along rivers or hilltops
- **lack** of trees and bare land on slopes
- **simplification** species/structure

Other reasons:

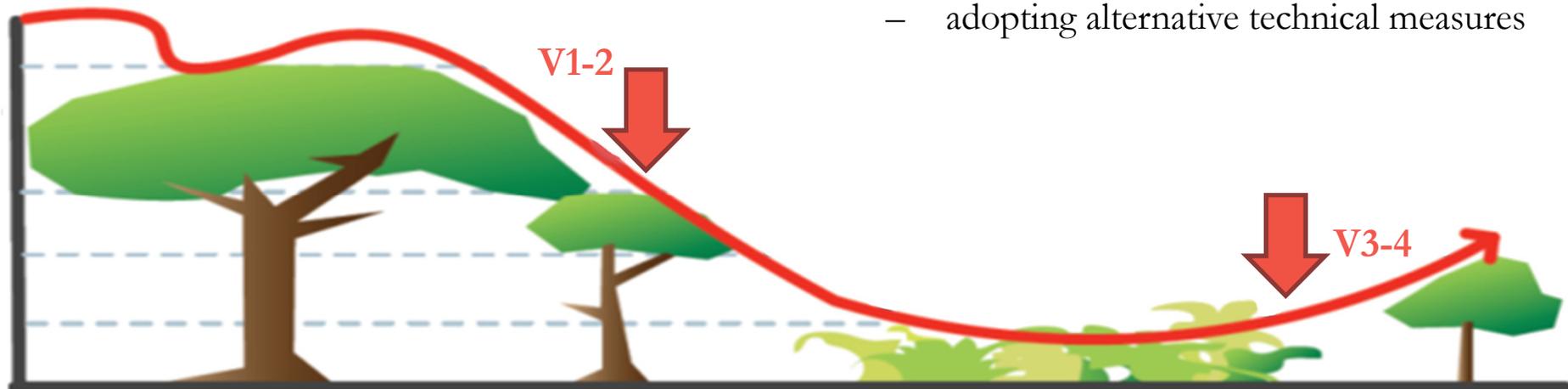
- don't know, destiny or supernatural force
- climate instability
- natural/seasonal phenomena



Trees as barriers & buffers (2)

➤ People maximised protection from trees and forests through management practices, regulations and collective actions:

- maintaining trees (“primary” forest, big/NTFP producing trees) through regulations.
- sporadic revegetation along rivers
- enhancing tree cover through collective planting
- avoiding species considered water demanding,
- adopting alternative technical measures



Key Messages

- **Multiple contributions of forests&trees to shape resilience with negative feedbacks loops:**

- livelihoods diversification and safety nets, but dependencies/sensitivities to climate conditions
- maintenance of soil fertility, but competition for space/water/light
- barriers and buffer against extreme event, but location, space importance/alternative technical solutions

- **Governance of trees & forests for human vulnerabilities:**

- mediate negative feedbacks to human vulnerabilities
- shape forest management practices to be better aligned to development context

- **Ecosystem-based approaches to reduce human vulnerabilities**





Thank you !

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