

Explaining multiple outcomes on forest commons: Livelihoods, carbon, & biodiversity

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Professor

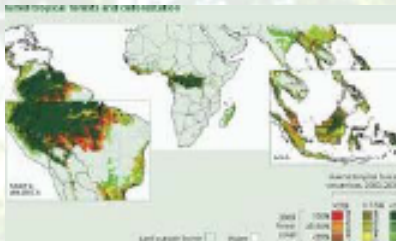
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The narrative

- The world is full of social *and* ecological processes that produce multiple outcomes
- Yet, we as analysts of social outcomes project a multi-consequentialist world on a mono-consequentialist screen: biodiversity, growth, equity, efficiency, productivity, rights, participation...
- AS IF, other outcomes do not matter, even when at some level we recognize THEY DO MATTER



Major presentation goals

- Three objectives
 - Conceptual/theoretical
 - Empirical illustration/directions
 - Practical significance
- Focus on social-ecological systems (forest commons)
 - Provide benefits to hundreds of millions of households
 - reservoirs of biological diversity
 - store massive amounts of carbon
- Methodologically, an hypothesis building and testing approach to analyze *any number* of multiple outcomes for *any* social or socio-ecological process



Why does the analysis of multiple outcomes matter?

- Social sciences dismissed monocausalism many decades ago as inadequate (although a focus on identifying single cause-effect relations is resurgent)
- But mono-consequentialism reigns across the social sciences – take a look at the disciplinary preoccupations as evident in nearly all major social science discipline journals
- Patently unsatisfactory – if the same social/ social-ecological/ institutional factors and processes influence multiple outcomes of interest, focusing on one leaves one ignorant about impacts on other outcomes;
- Actions to improve one outcome, similarly, may have adverse effects on other desired outcomes – without analysis of multiple outcomes, we will simply not know!

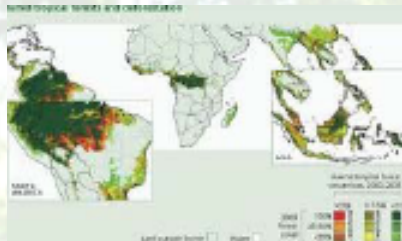


How do multiple outcomes matter?

- To say that multiple outcomes occur is not to say that all outcomes matter
- Plethora vs. focus
- Focus on three – diversity, biomass/ carbon, livelihoods in the context of forest commons
- Choice of goals inevitably subjective, but in a context that permeates the subject



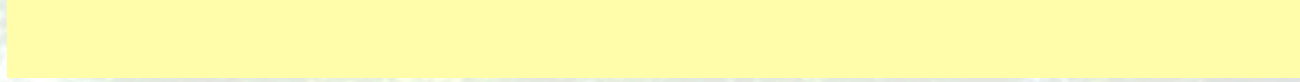
What do we know about multiple outcomes in social-ecological systems (forest commons)?



Existing literature on multiple outcomes on forest commons (Biomass, diversity, livelihoods)?

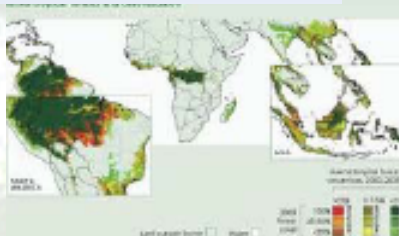
Very little!

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Sehr wenig
Hampir tidak
Très peu
Nesten ingenting
कुछ नहीं
mycket lite

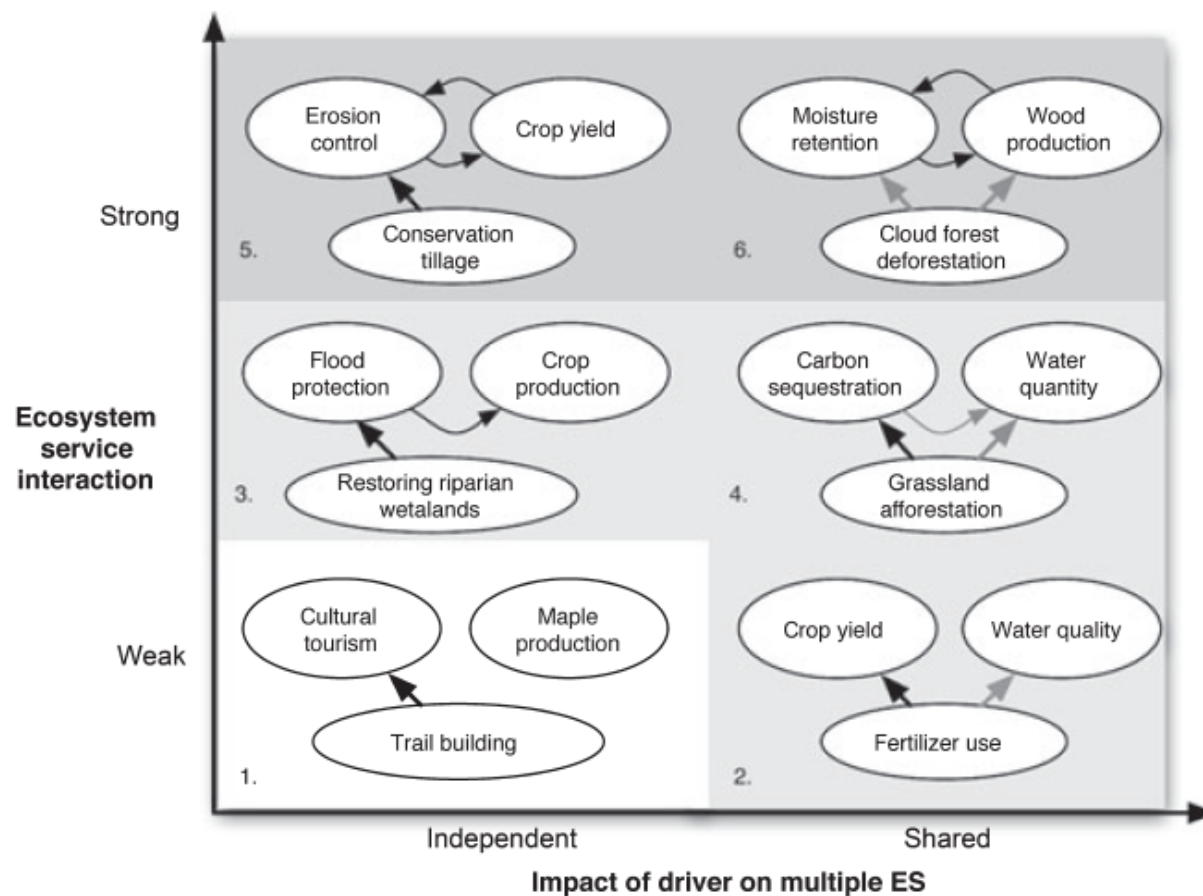


	Empirical	Other	Totals
Explicit measures and analysis	5	3	8
Measures of outcomes and recognition of tradeoffs limited or absent	359	144	503
Total	364	147	511

Looked at 511 published papers since 1980



Ecosystem services...

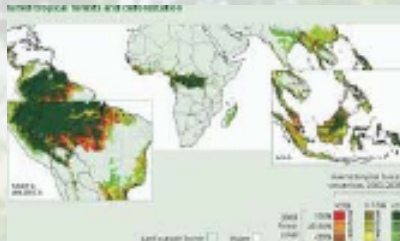


- Basic questions of causality still treated illustratively; analyses of patterns in multiple outcomes and their drivers only starting



Other Signifiers

- Growth/equity relationship in Economics (Kuznet's curve)
- Unintended consequences
- Livelihoods/ development vs ecology/ conservation (tradeoffs and synergies)
- What is missing: Theoretically driven predictions of outcome relationships and methodological approaches to help analyze outcomes and drivers



Relationships among multiple outcomes?

Tradeoffs: (Tradeoff situation – where it is not possible to Improve one outcome without making at least another Worse)

Assertions of inevitability without evidence

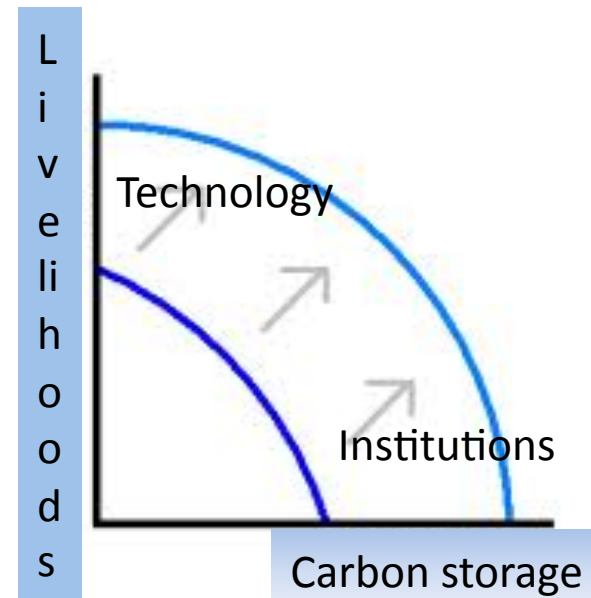
Win-Wins: (Win-Win situation – where it is possible to improve at least one outcome (preferably multiple outcomes) without making any other outcome worse)

Optimistic possibilism with little careful analysis

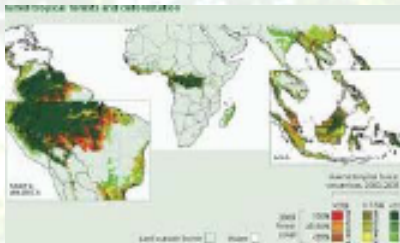


But both occur empirically!

New technologies, new institutional relationships, changing social/biophysical context can all move the frontier of outcome relationships outward



The task is threefold...



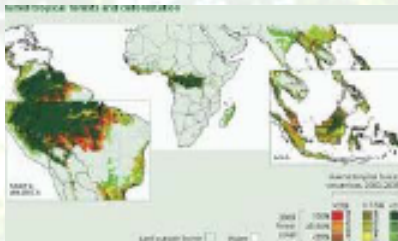
The task is threefold...

- Identify patterns in outcome relationships
- Examine the processes that lead to observed patterns and identify relevant analytical approaches
- Analyze drivers of observed patterns



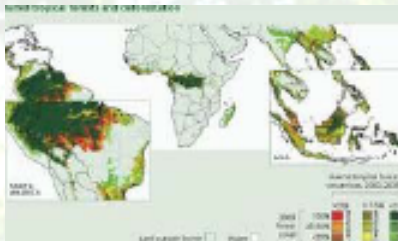
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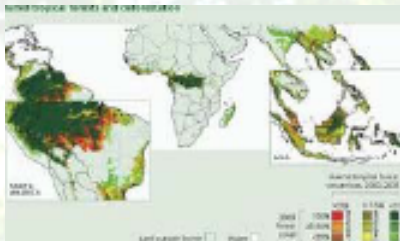
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Why focus on forest commons?

- Why forests? Evidently produce multiple outcomes: all three outcomes critically important in forests
- Forest commons an instance where no specific outcome is highlighted - as in biofuel or commercial plantations, national parks, and logging concessions
- A unique dataset provides the empirical basis for illustrating the argument



A photograph of four men standing in a lush, green forest. The man on the far left is wearing a dark t-shirt and a light-colored cap. The man next to him is wearing a white t-shirt and a red cap. The man in the center is wearing a blue t-shirt and a blue cap. The man on the far right is wearing a light-colored, long-sleeved shirt. They are all smiling and looking towards the camera. The background is filled with dense green foliage and trees.

The IFRI research program and community forests

Huanger Avila

What is IFRI?

A unique, interdisciplinary, international research network on local forest governance.

Established in 1992, currently has 11 Collaborating Research Centers as members in 10 countries (approximately 40 researchers)

A growing international database of cross-national, time-series information on forests, people, and institutions.



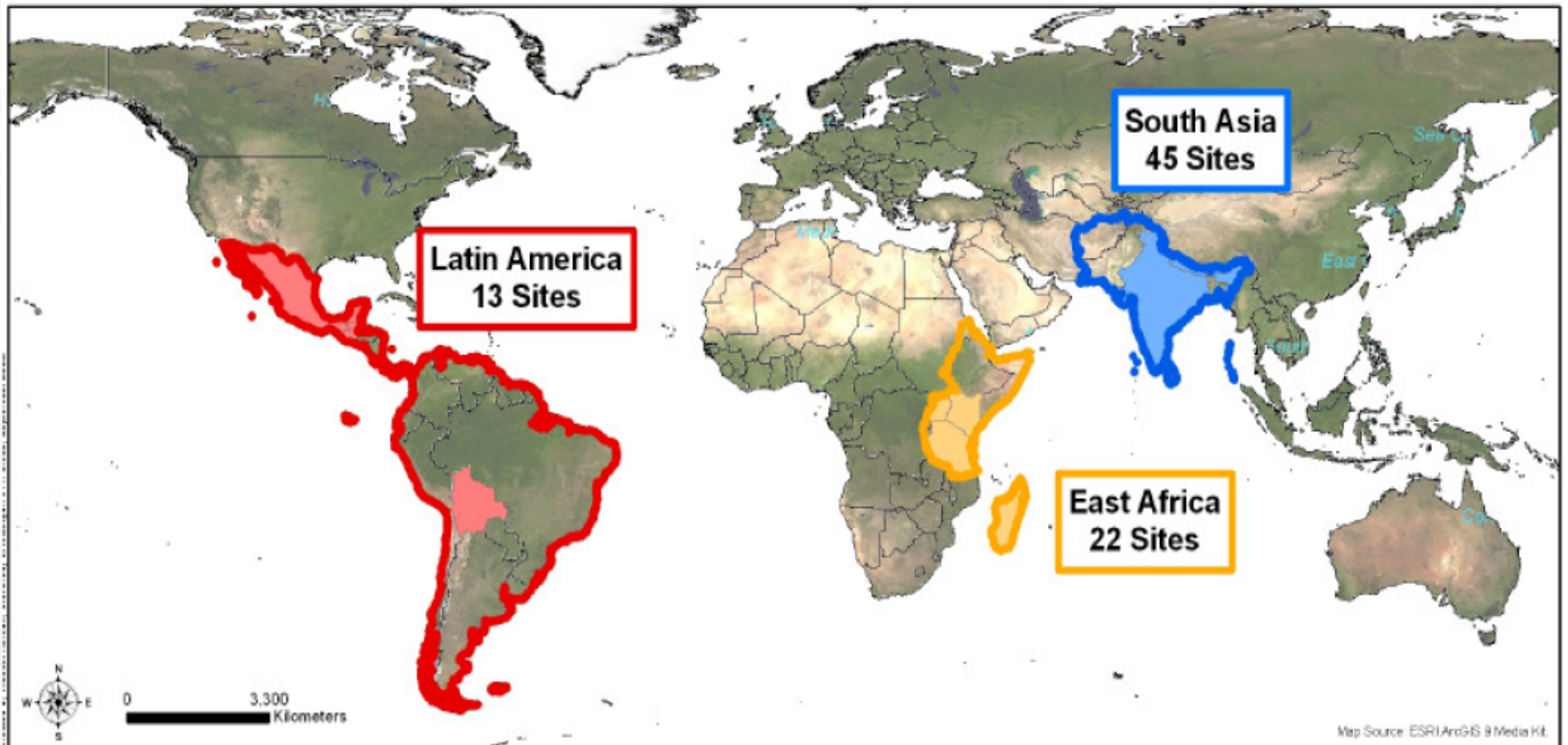
Recent photograph of IFRI researchers in Bogor, Indonesia (2006)

Why is IFRI data useful for analyzing patterns and drivers or multiple outcomes?

- Multiple countries across continents
- Multiple outcomes – Biomass, Livelihoods (biodiversity)
- Associated factors – socio-political, economic, institutional, biophysical
- At present, cross-sectional rather than over-time data



Distribution of Studied Cases



Latin America:
Bolivia, Guatemala, Mexico

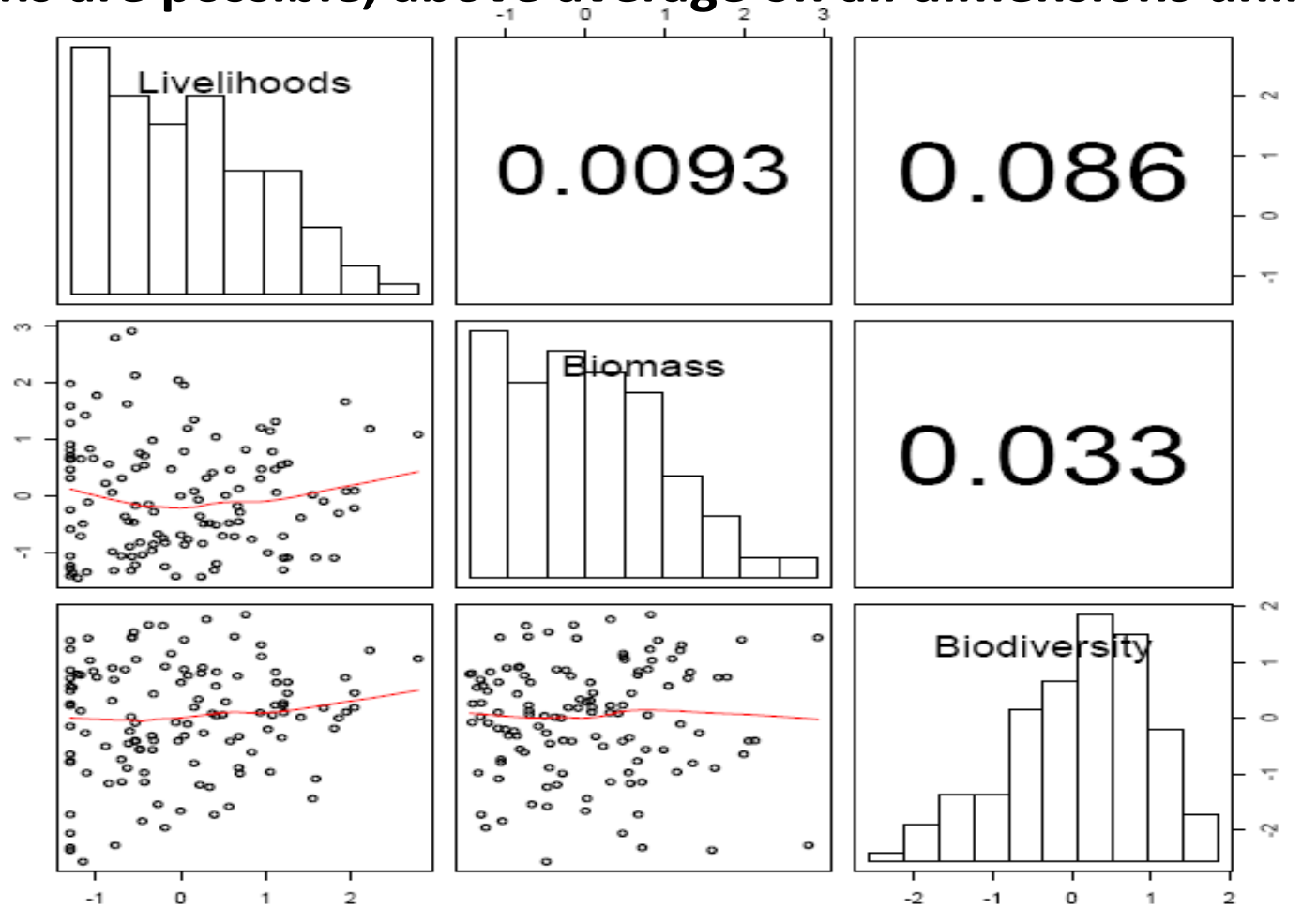
East Africa:
Kenya, Madagascar, Tanzania, Uganda

South Asia:
Bhutan, India, Nepal:

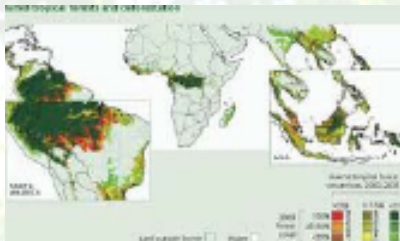
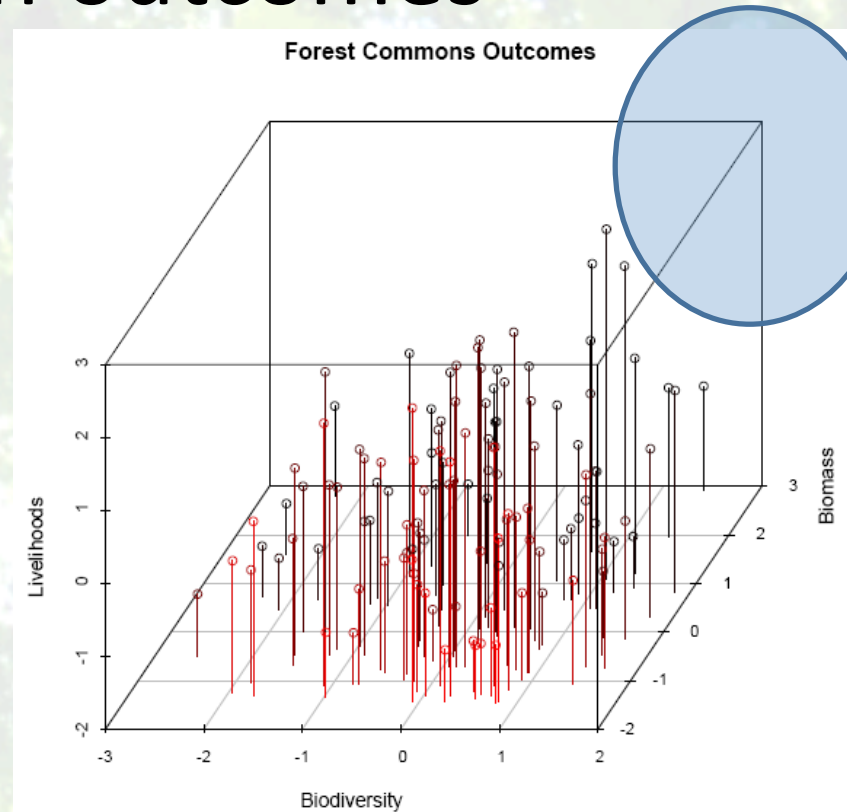
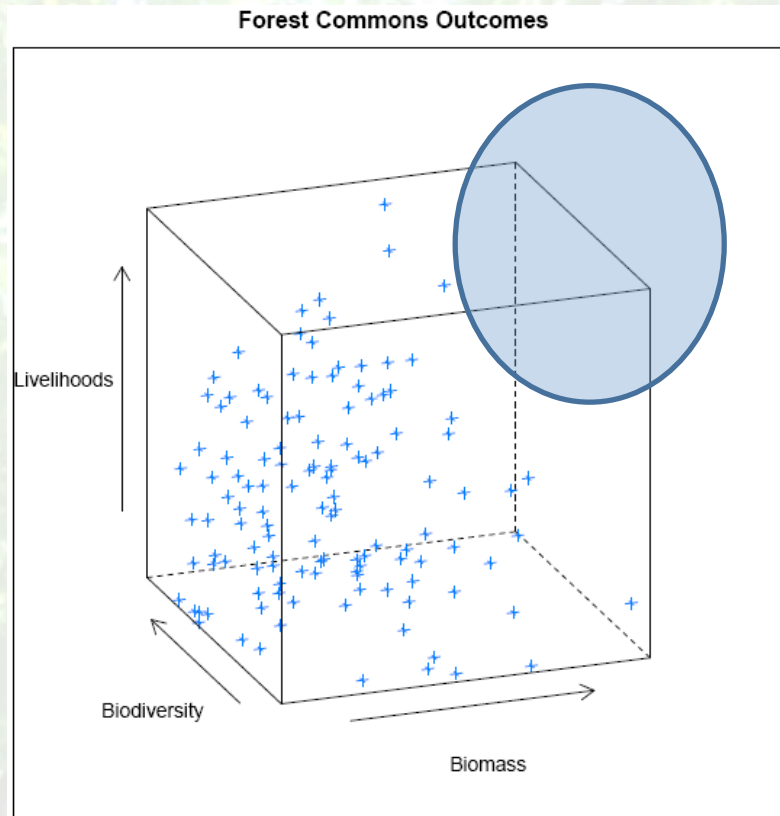


Result 1: Almost no observed correlation among three outcome measures (livelihoods, biomass, diversity)

Implication: Tradeoffs as well as above average outcomes on two dimensions are possible, above average on all dimensions unlikely



Indeed, few examples of win-win-win outcomes

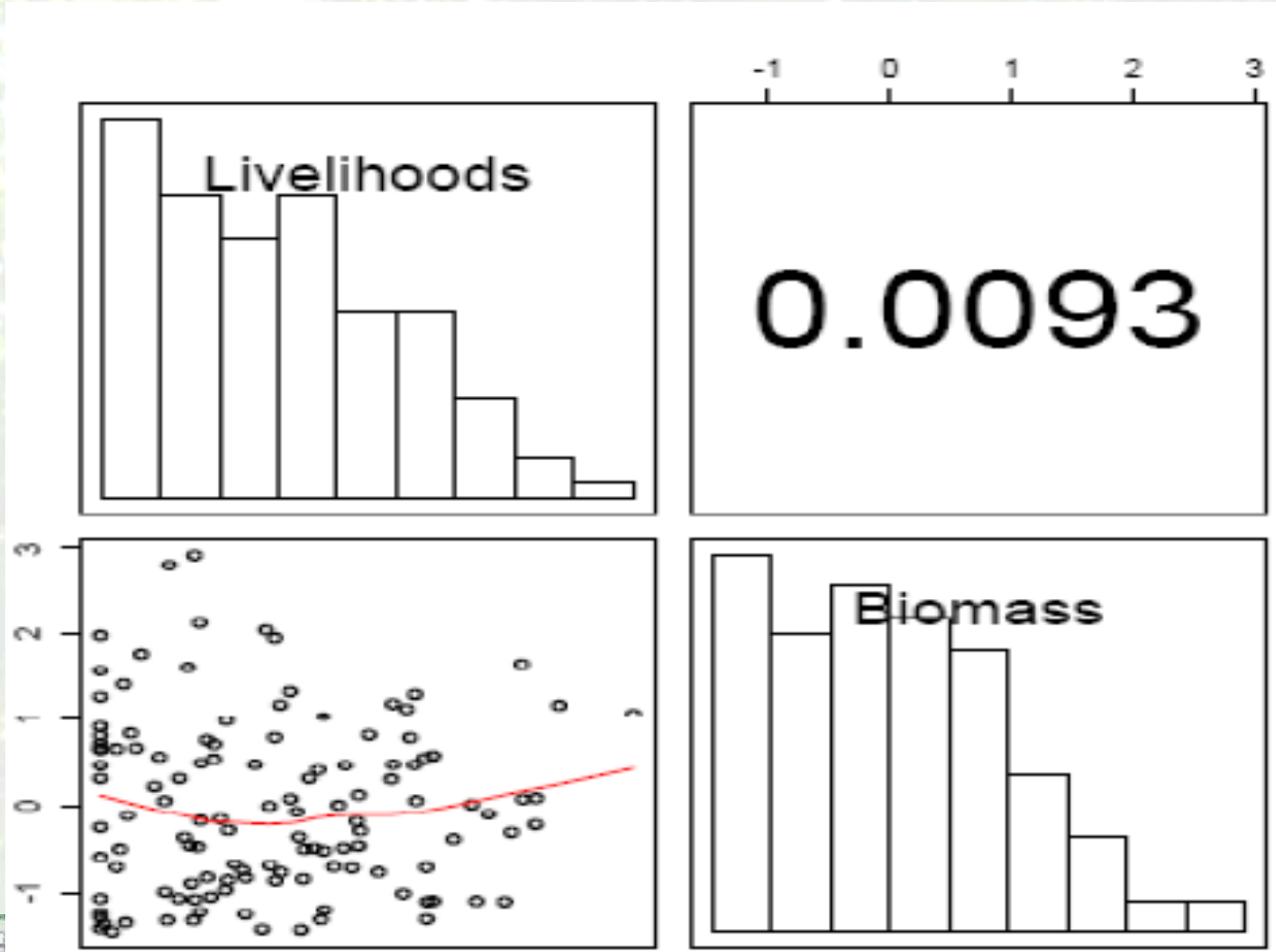


Examining two outcomes together

- Example 1: Livelihoods dependency and carbon storage



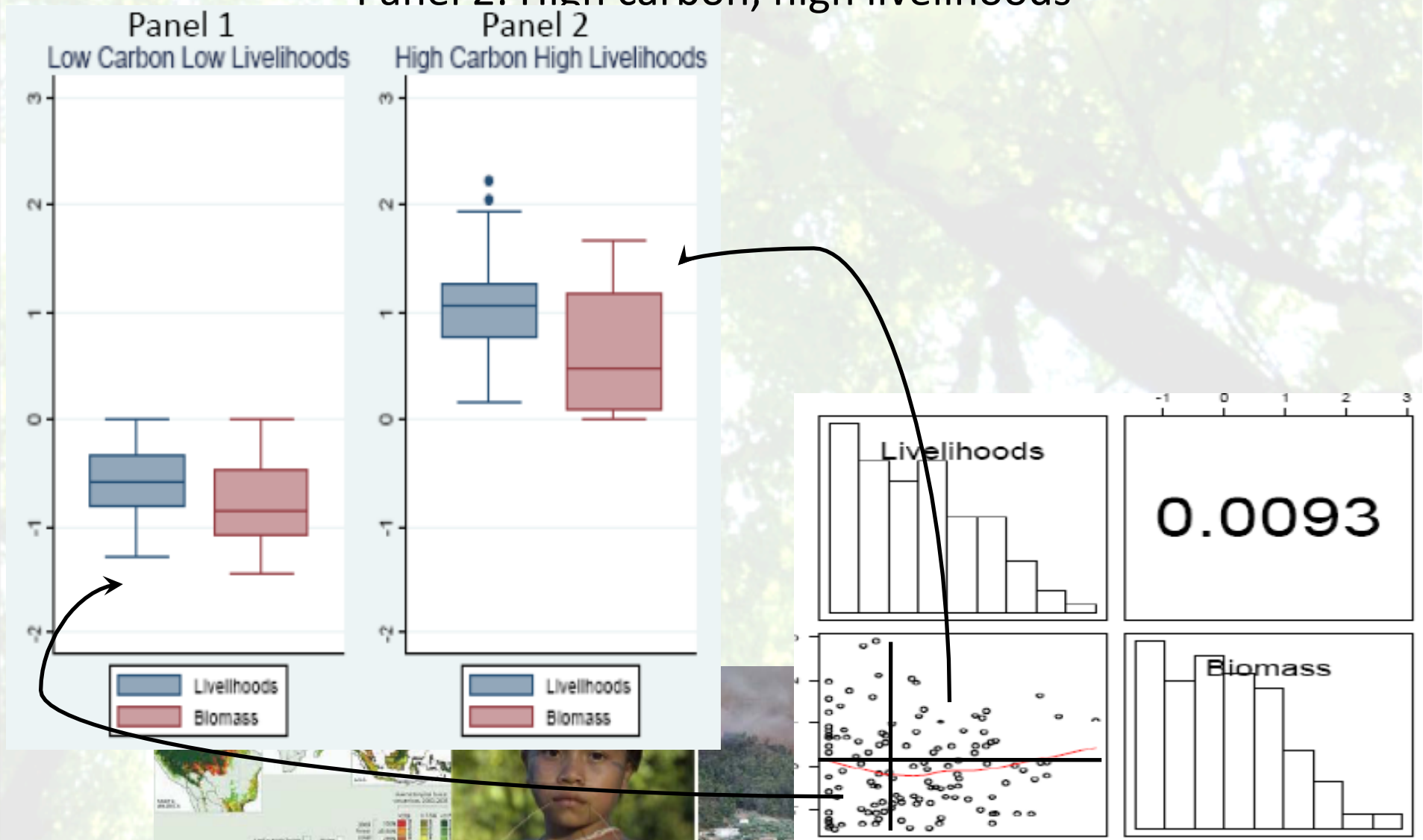
Focus: Look at livelihoods and biomass



Two sets of outcomes with on carbon and livelihoods with a conceptually synergistic relationship

Panel 1 Low carbon, low livelihoods

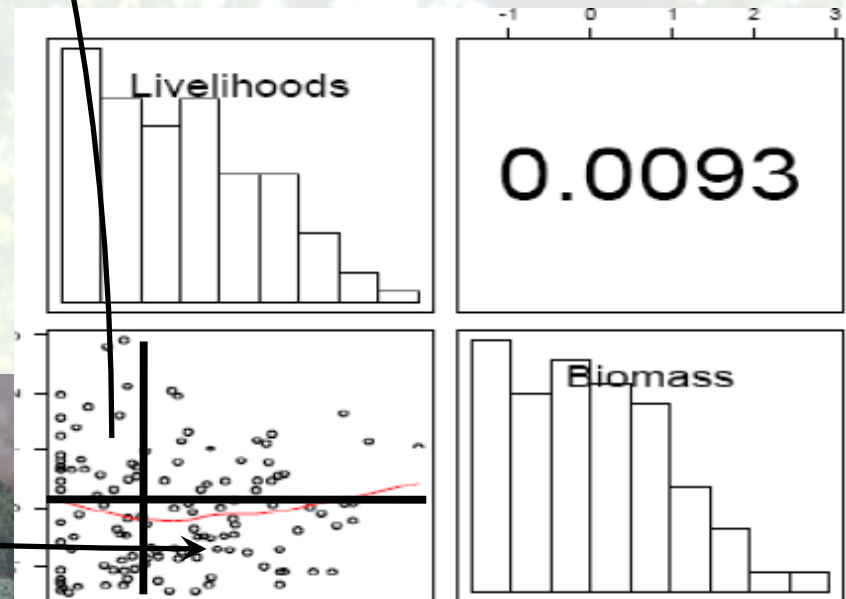
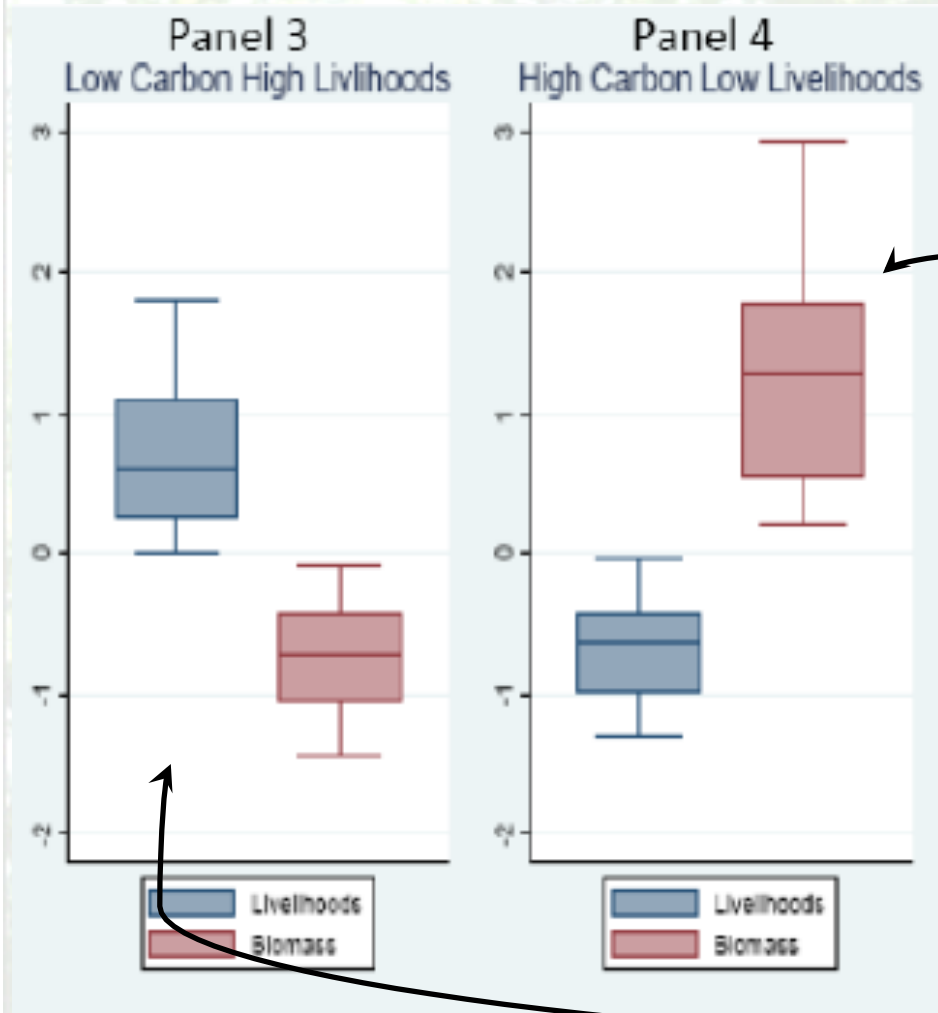
Panel 2: High carbon, high livelihoods



Two tradeoff outcomes on carbon and livelihoods

Panel 3 Low carbon, high livelihoods

Panel 4: High carbon, low livelihoods



Analysis of data (Mlogit estimation)
Findings relate to role of the following in
likelihood of win-win/lose-lose or tradeoffs for
carbon and livelihoods :

- 1) community forest size,
- 2) community autonomy in forest
management
- 3) Community forest land ownership

**Essentially hypotheses to inform
future, better data-based studies**

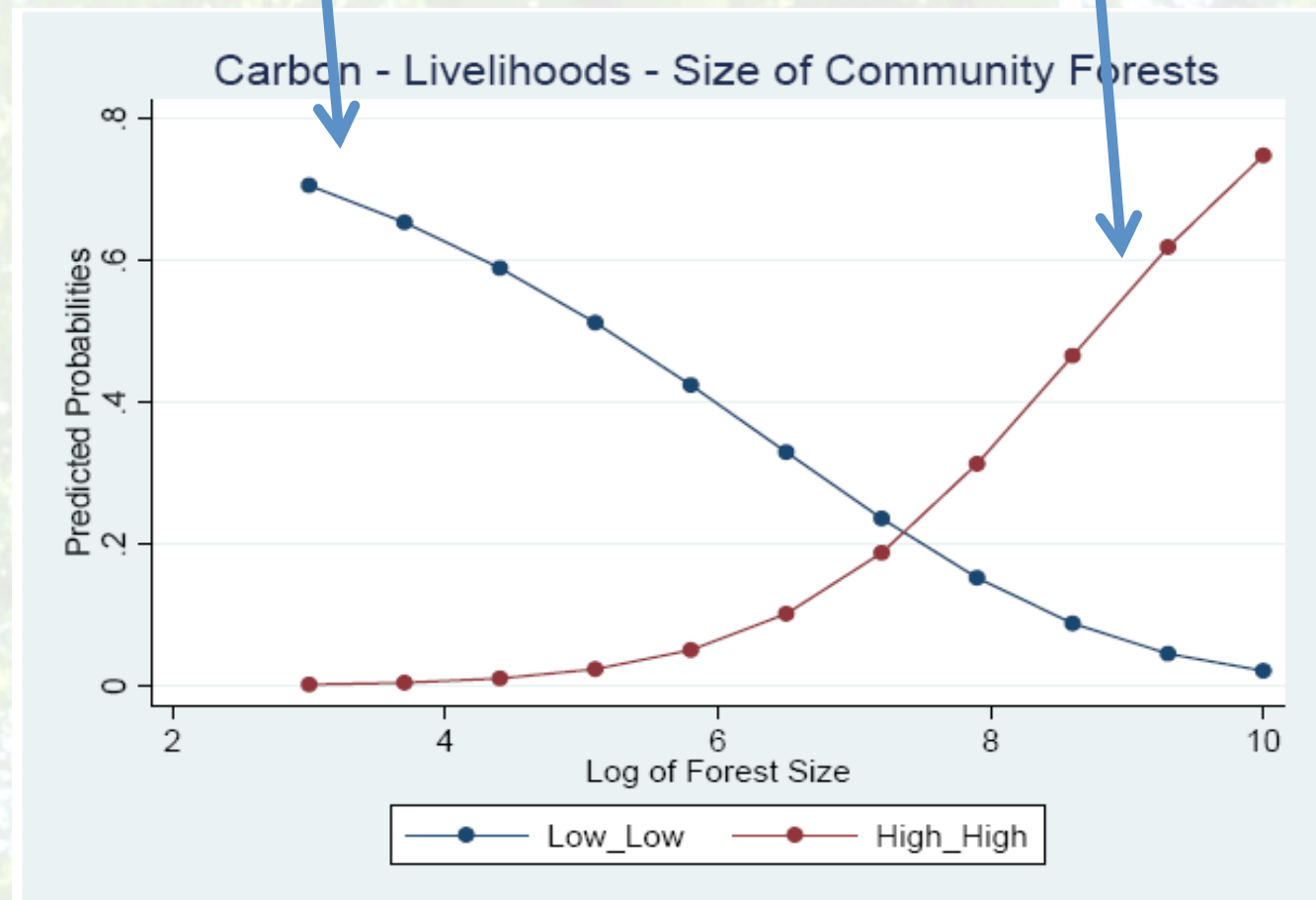


Finding 1: Controlling for effects of other factors, as size of community forests increases:

the likelihood of below average outcomes on carbon and livelihoods becomes lower,

likelihoods of above average outcomes becomes greater.

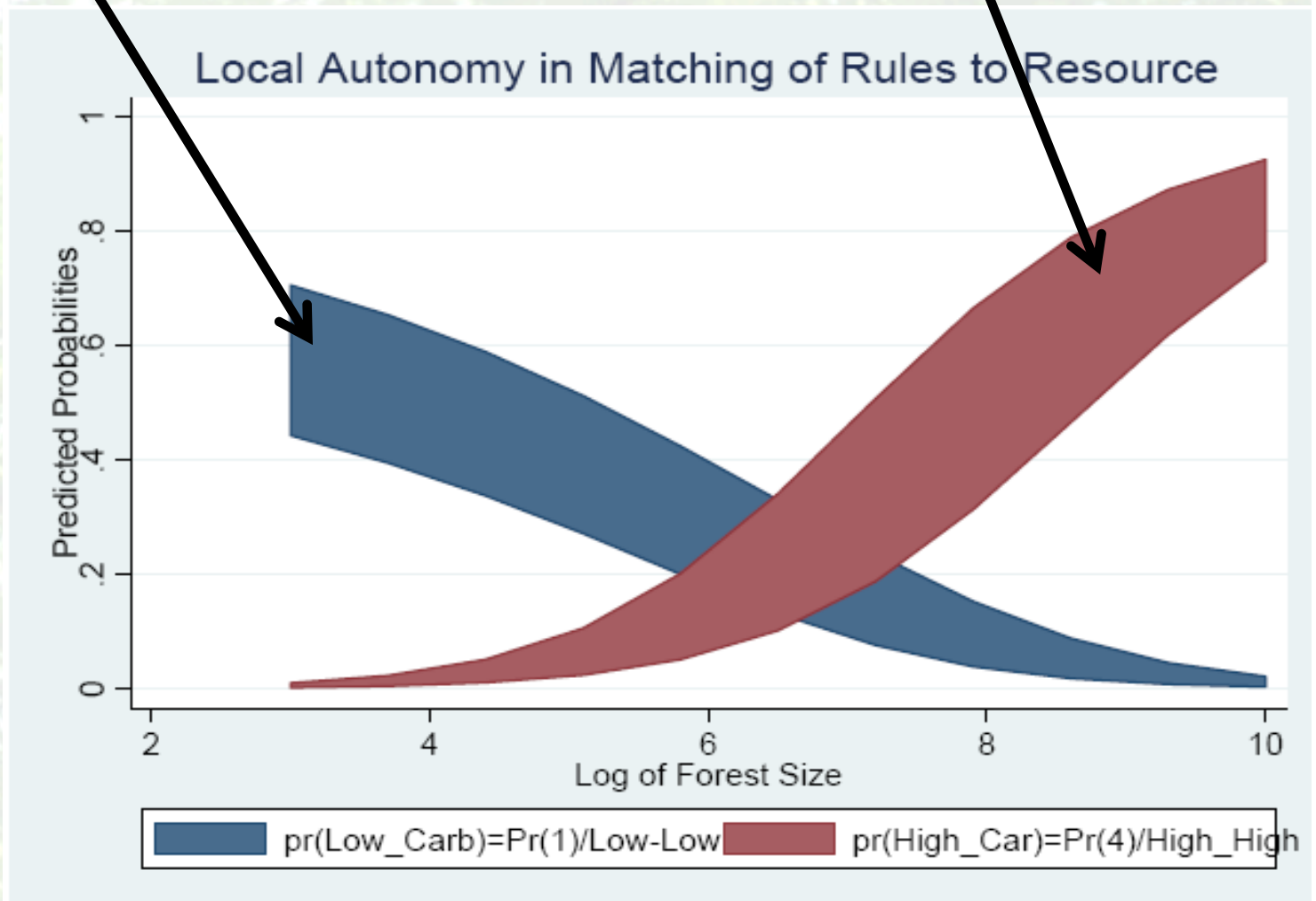
Implication – Recognition of community rights over larger forest areas is likely to lead to win-win outcomes for carbon and livelihoods



Finding 2: Controlling for effects of other factors, as communities have greater autonomy in managing their forests, below average outcomes on carbon and livelihoods less likely, and above average outcomes more likely.

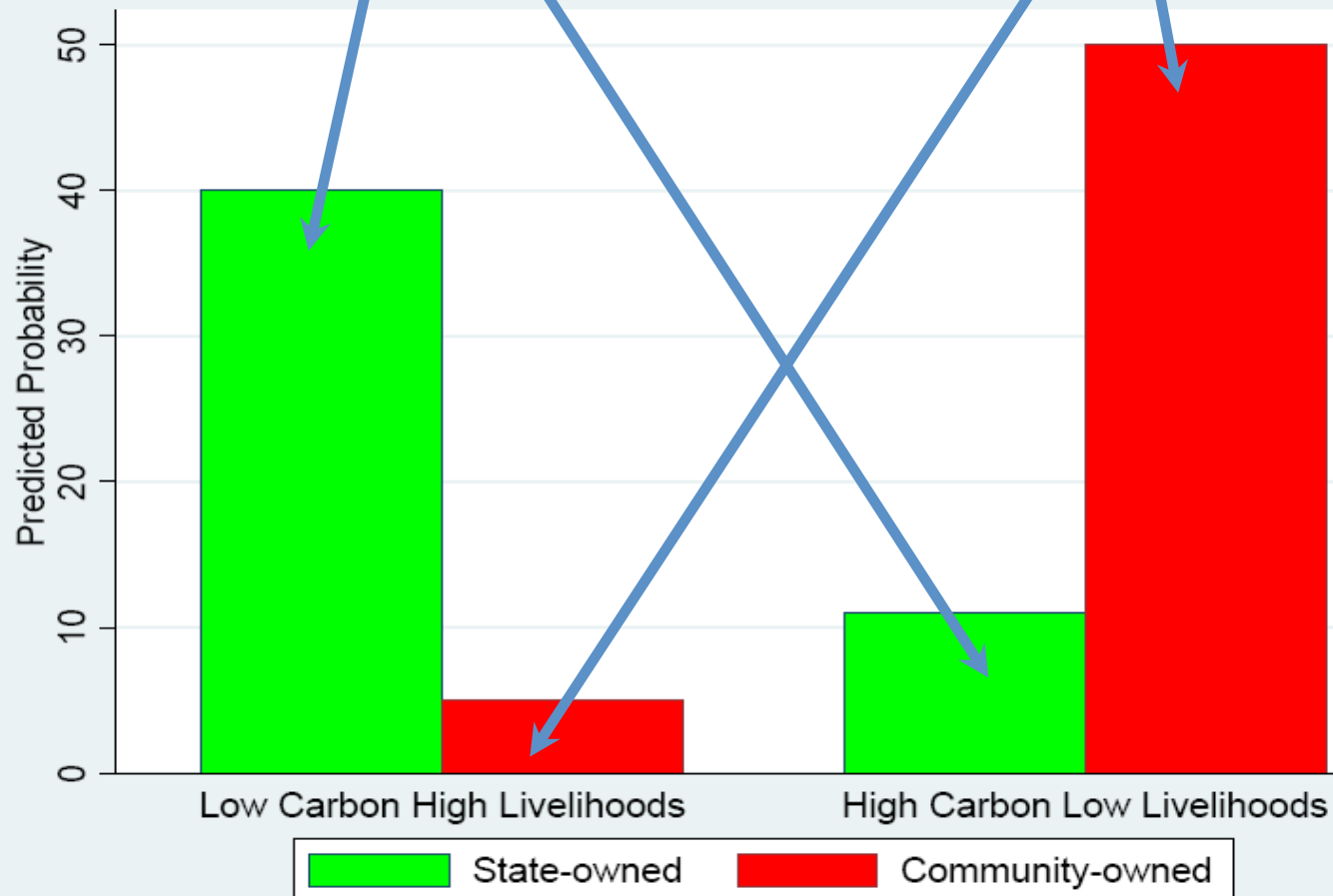
The area under the blue and red curves is the area of win-win that greater local autonomy produces

Implication – policies giving more autonomy to communities likely to yield Win-Win outcomes on carbon and livelihoods



Finding 3a: when community forest land is owned by the state, communities overuse

Finding 3b: When community forest land is owned by communities, communities conserve (and increase carbon sequestration)



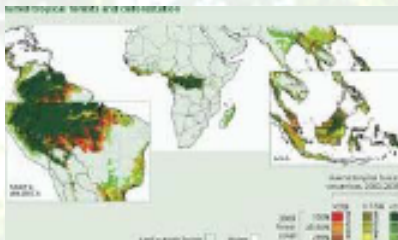
Speculation:
New institutional design will be needed to compensate communities for reducing use of state-owned forests and create incentives to conserve the biomass and carbon on such forests – Revisit incentive design.

stat. sig. at .01 level



Implications for climate emissions and livelihoods

- Little available research for both outcomes across multiple countries with systematic data
- Communities with rights to larger forests more likely to have positive carbon and livelihoods outcomes
- Communities with more autonomy likely to improve both carbon and livelihood outcomes
- Win-win outcomes are possible!!!



Examining two outcomes together

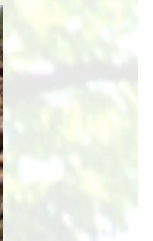
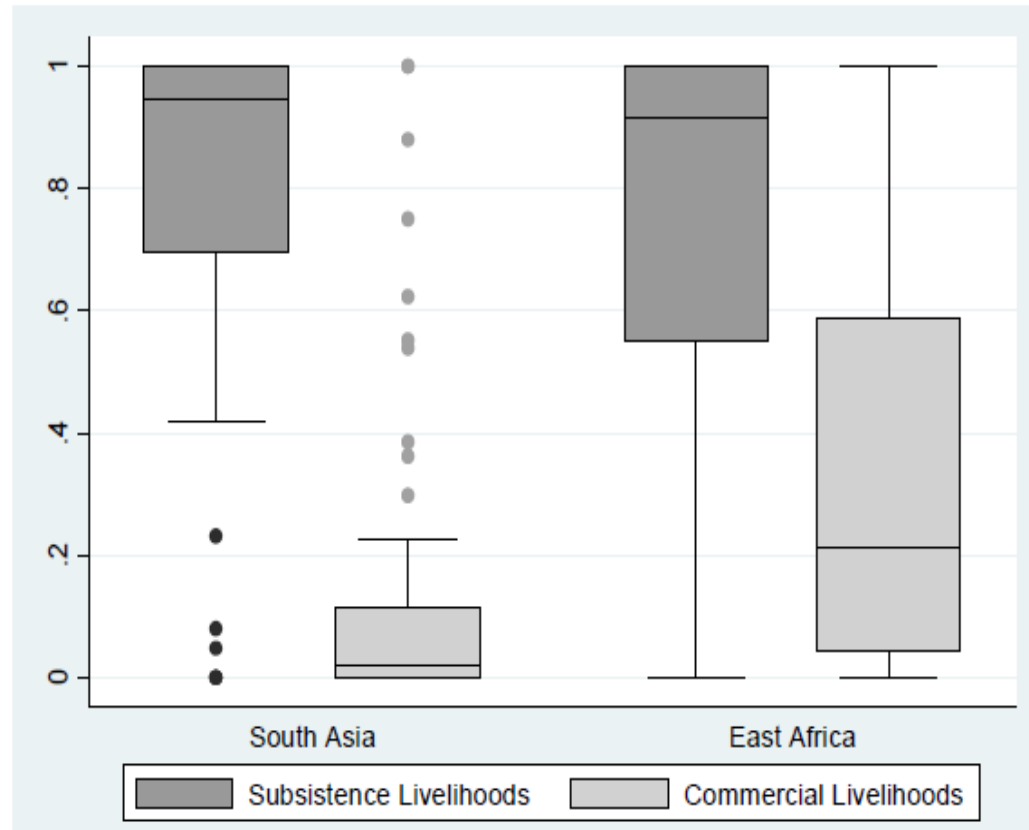
- Example 2: livelihoods and diversity



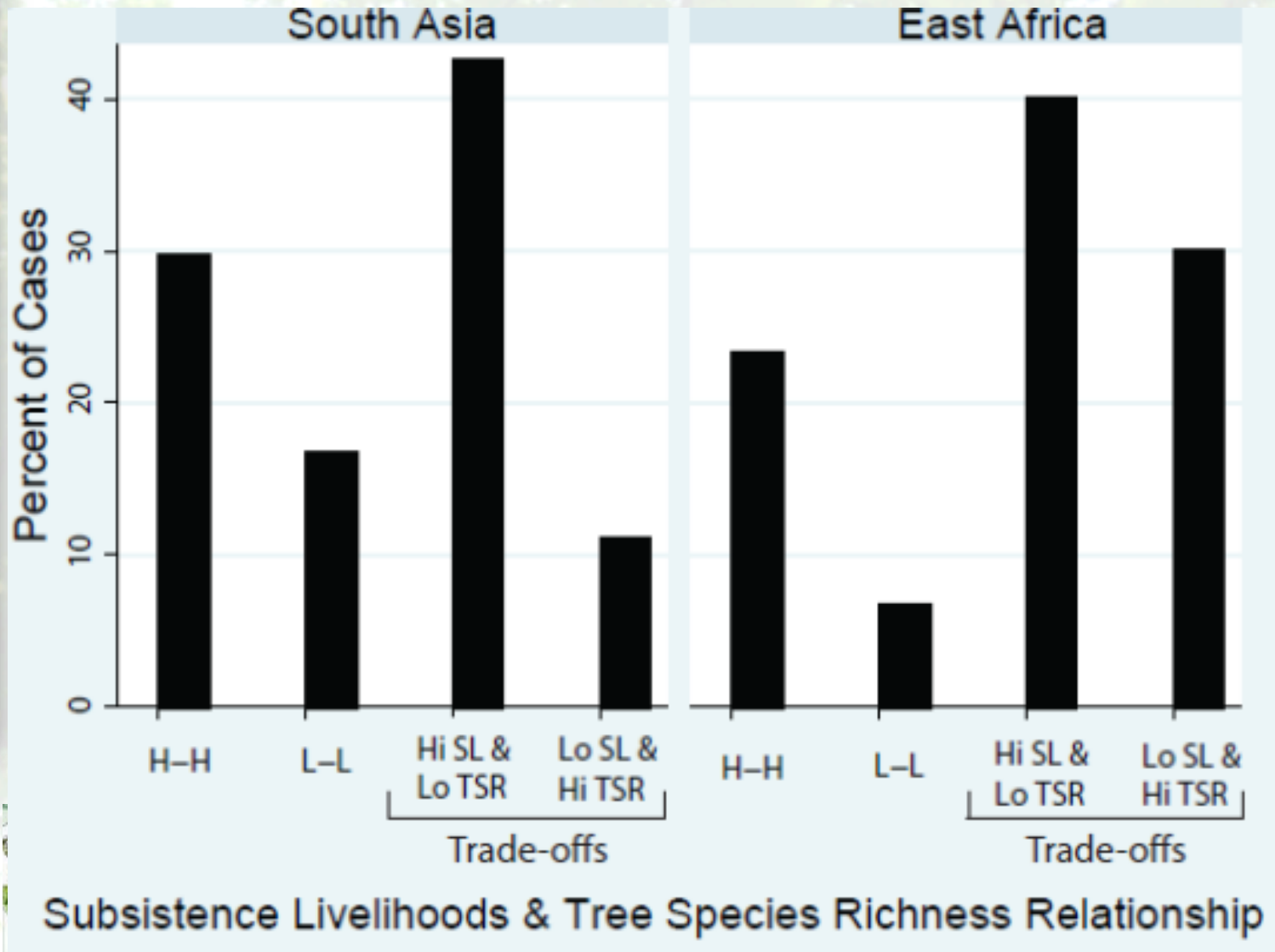
Examining diversity and livelihoods

- 84 cases of forest commons from 6 countries in South Asia and East Africa
- Broadly similar; somewhat larger forests in E. Africa, somewhat greater population density in S. Asia; lower dependence in S. Asia for commercial benefits

Figure S2. Distribution of household dependence on forest products for a significant contribution to subsistence and commercial livelihoods, across South Asia ($n = 54$) and East Africa ($n = 30$) cases.



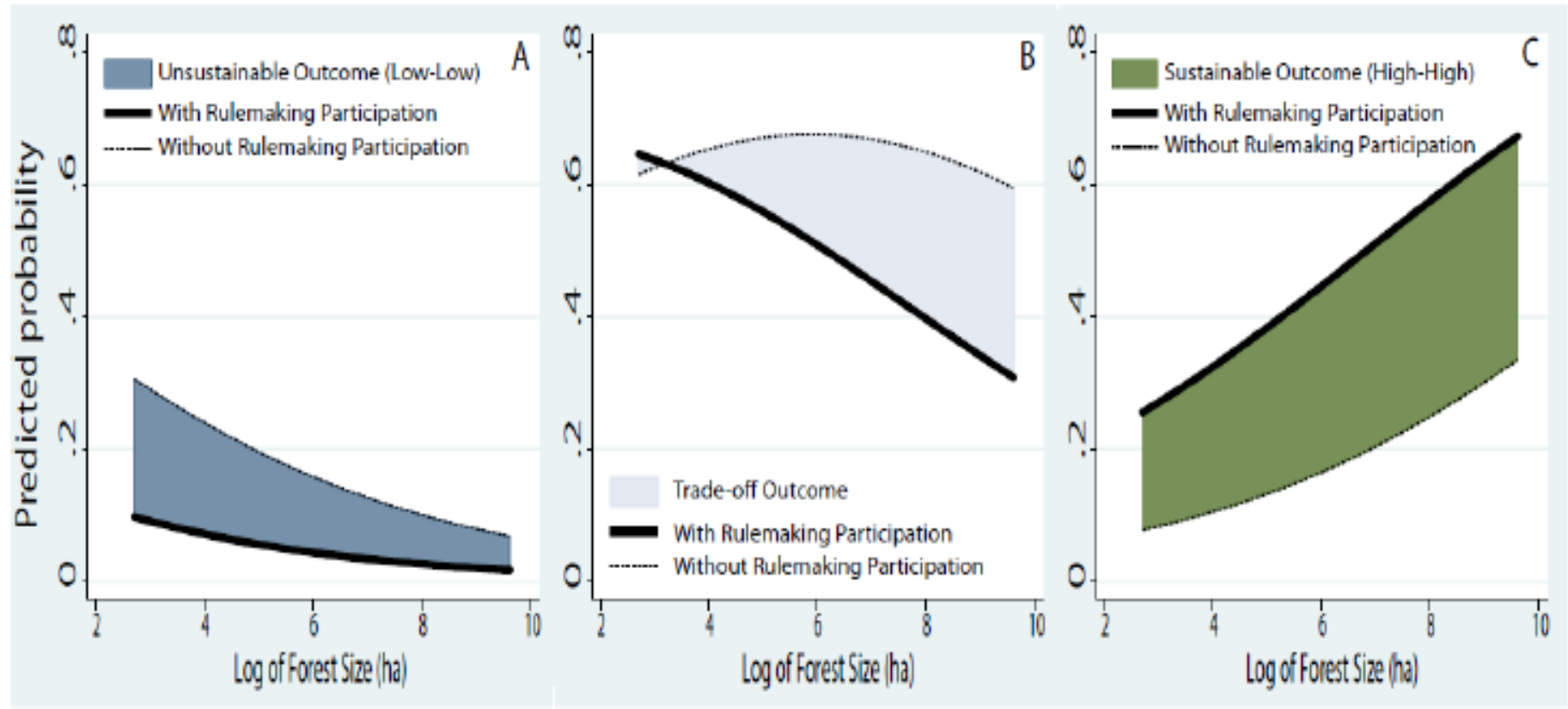
Relationship between livelihoods and tree species richness: 3 outcome categories



Subsistence Livelihoods & Tree Species Richness Relationship

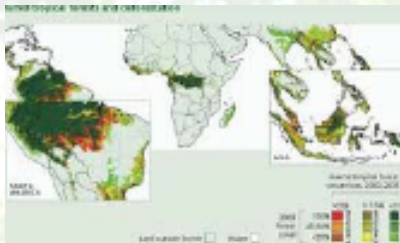


Participation, livelihoods, and diversity (gologit estimation)



Examining three outcomes together

- The 2X2 approach does not have sufficient traction on many outcome and many levels/categories
- One possible approach: employ cluster analysis to identify groups of outcomes where similar cases are placed in the same category, and cross-category differences are maximized

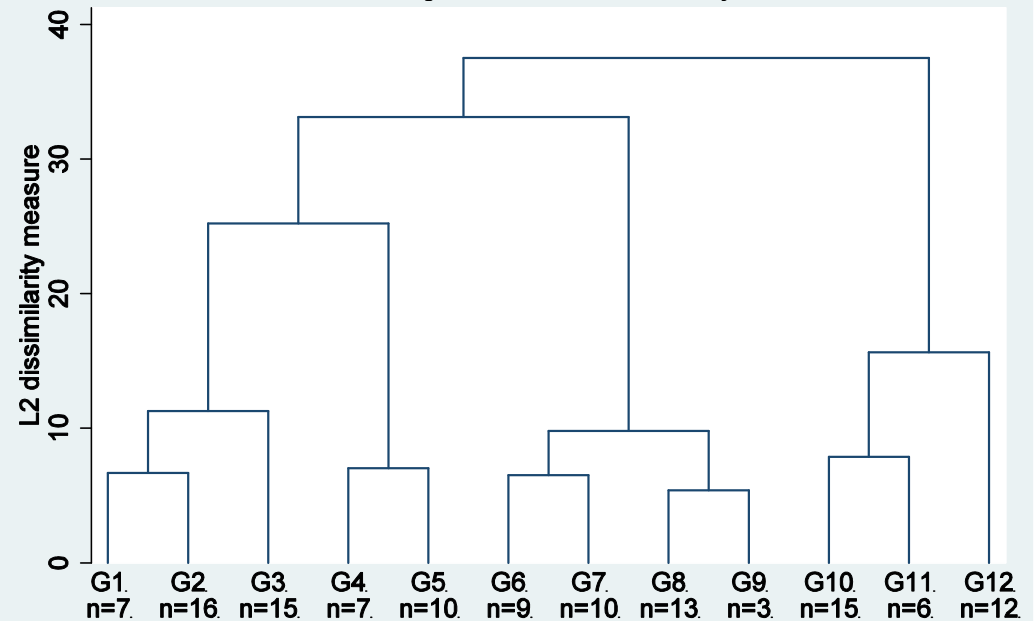


Cluster analysis of the three outcome dimensions

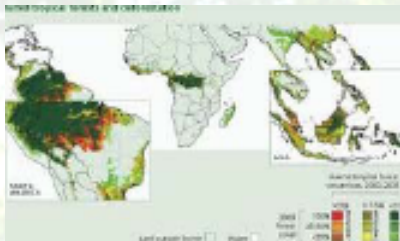


- Multivariate Analysis of Variance of Biomass, Biodiversity, and Livelihoods on four clusters is highly statistically significant
- Suggests a clear demarcation of clusters

Forest Commons Outcomes
Dendrogram after Cluster Analysis



Wilks' lambda = 0.0761, F = 59.56, Prob>F = 0.0000; Lawley-Hotelling trace = 4.523, F = 58.13, Prob>F = 0.0000

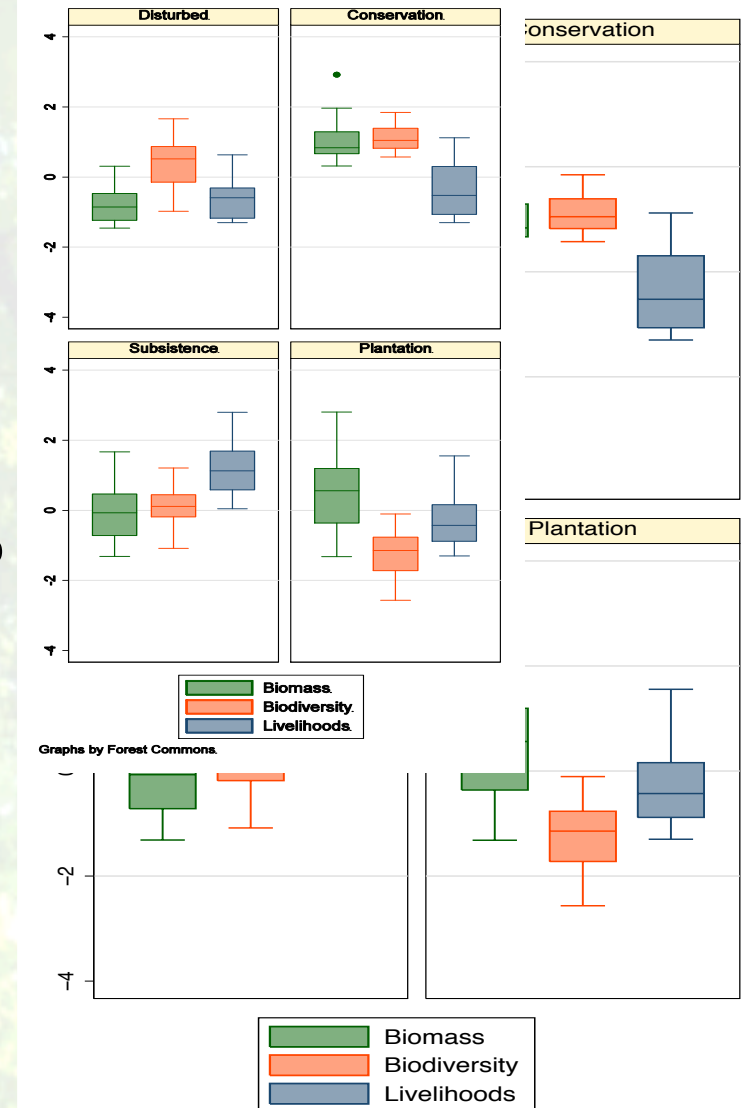


Characteristics of forest commons

clusters

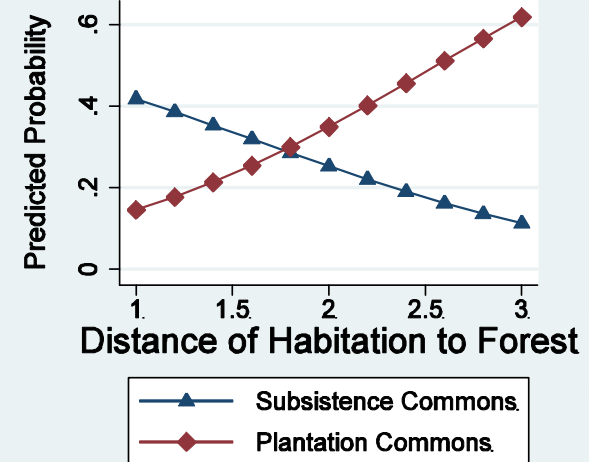
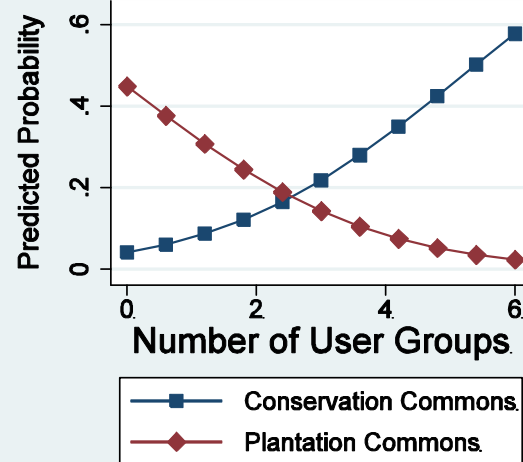
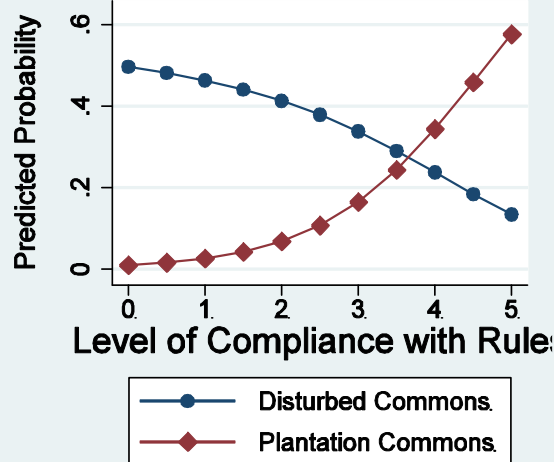
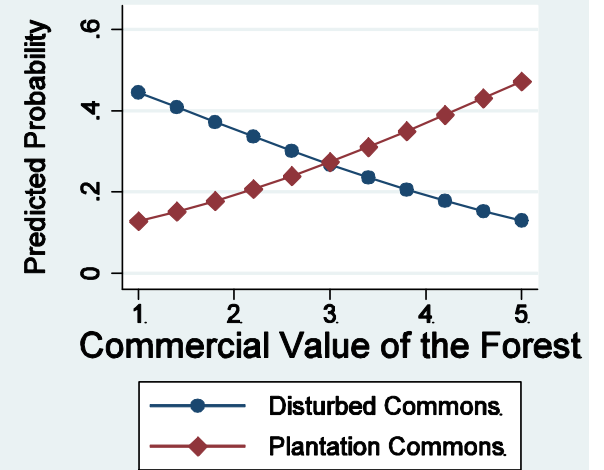
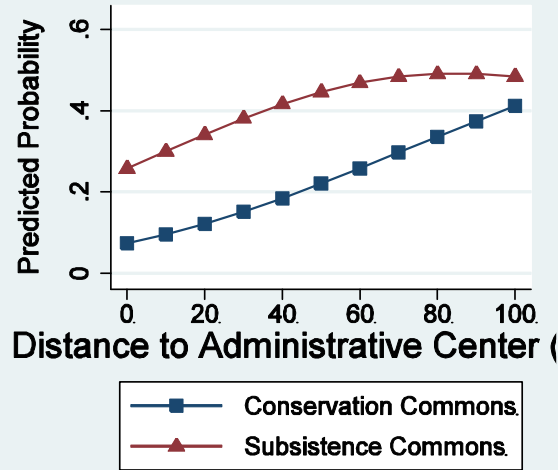
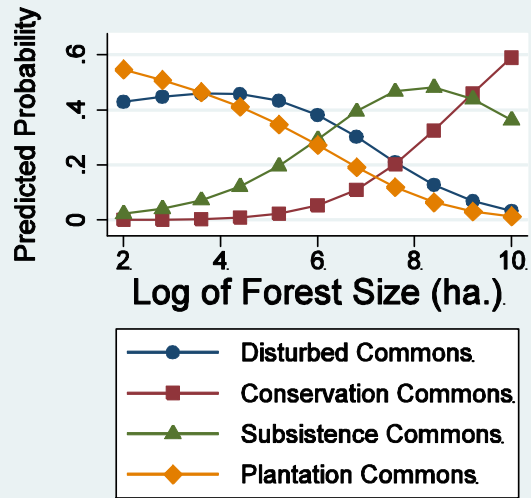
Subjective Classification

- **Disturbed Commons** have low biomass and contribute little to livelihoods, but have higher than average tree diversity.
- **Conservation Commons** make small contributions to rural livelihoods, but make higher than average contributions to biomass and diversity.
- **Subsistence Commons** provide high contributions to livelihoods, and have average biomass and biodiversity.
- **Plantation Commons** have high biomass on average but low diversity, and provide below average livelihoods benefits.



Box plots of Livelihoods, Biomass, and Biodiversity benefits in the four clusters

Bivariate associations with cluster membership



Conclusions

- Possible and necessary to examine multiple outcomes together when investigating social ecological systems
- Debates over tradeoffs and win-win relationships are sterile and need to be jettisoned
- Because multiple outcomes exist all around us, it is more important to analyze the drivers of outcome relationships and develop better data, methods, and theories of such relationships
- A vast, underexplored continent of scholarly research, insights, and new findings awaits those willing to undertake this necessary and important task – I welcome you to it



THANK YOU

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