



FOR-247

## Methods and Tools in Tropical Forestry

### **Welcome**

This course will be team taught by

Prof. Edward Webb

Prof. Markku Kanninen

Dr. Eshetu Yirdaw

Dipjoy Chakma

Adrian Monge

Johanness Jamaludin

### **Who is this course for?**

This course is for anyone who intends to conduct field work in forestry, agroforestry, livelihoods, agriculture or similar human-natural resources interface.

This course is mandatory for those who have signed up for FOR-248, Tropical Forestry field course

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## Methods and Tools in Tropical Forestry



### Learning outcomes of this course

You will learn the basic concepts and techniques for:

Land use and land cover interpretation and basic analysis

Forest inventory, biomass and carbon analysis

Biodiversity analysis in forested landscapes

Value-chain analysis of forest products

Livelihoods and vulnerability analyses of farmers

You will explore issues of organization and logistics of field work



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## Methods and Tools in Tropical Forestry



## Tropical forestry in the 21<sup>st</sup> Century

Tropical forestry has **evolved** from a purely **technical science**:

Surveying: Estimating timber volume

Planning: Tree mapping, skid trail building, landing

Harvesting: Directional felling, winching, hauling

Silviculture: Poison girdling, liana cutting, enrichment planting

Modeling: Estimating future yields

Into a new form of **multi-disciplinary ecosystem management**, which includes:

Non-timber forest product value, yields and use

Agroforestry systems

Biodiversity management and conservation

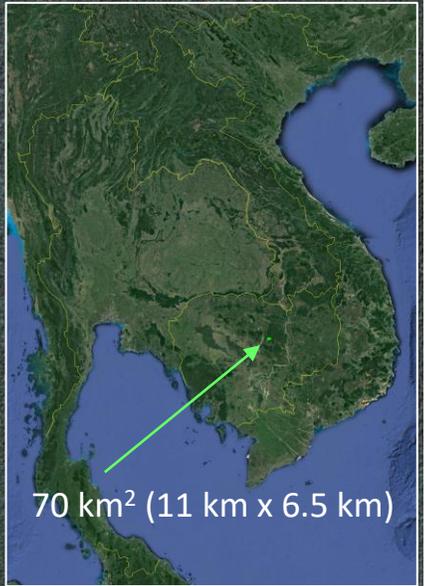
Landscape management and modeling

Livelihoods and vulnerability

Product supply chains and economics

**Why has this evolution in forestry occurred?**

2010



70 km<sup>2</sup> (11 km x 6.5 km)



1 km



2018



1 km



2010



1 km



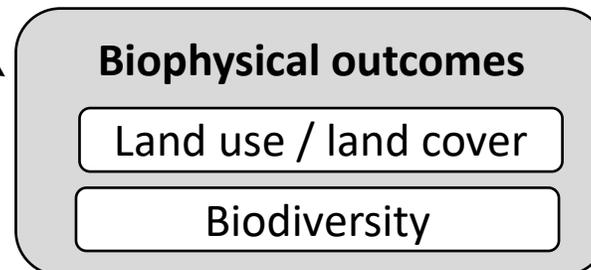
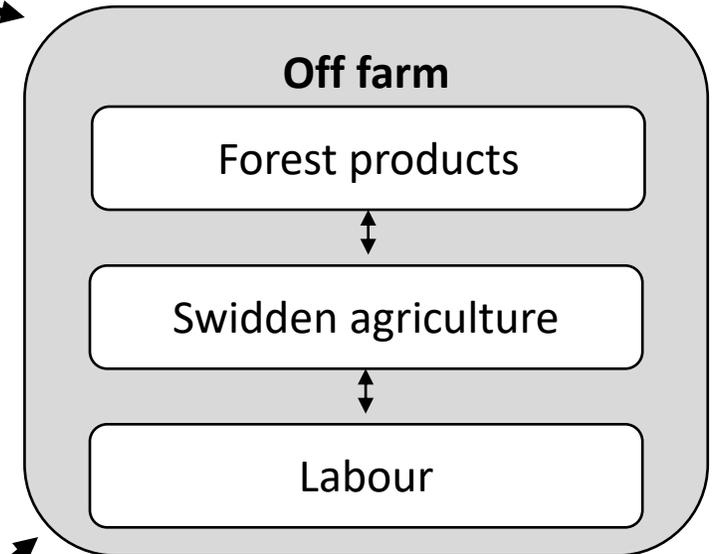
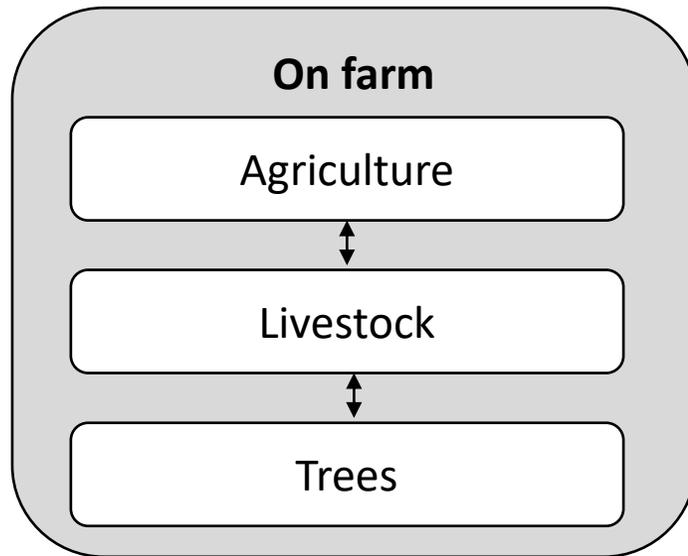
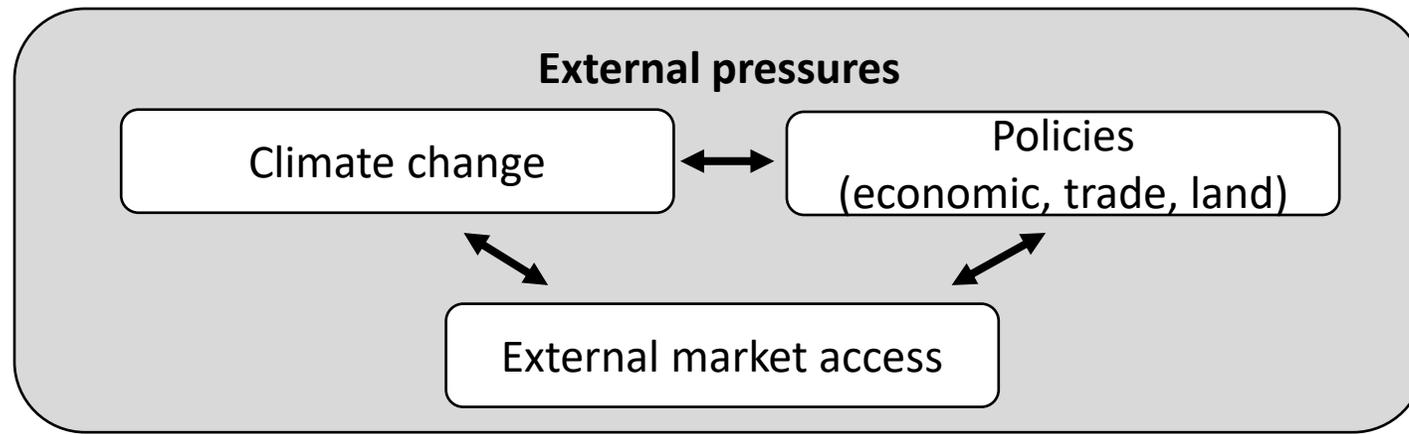
2018



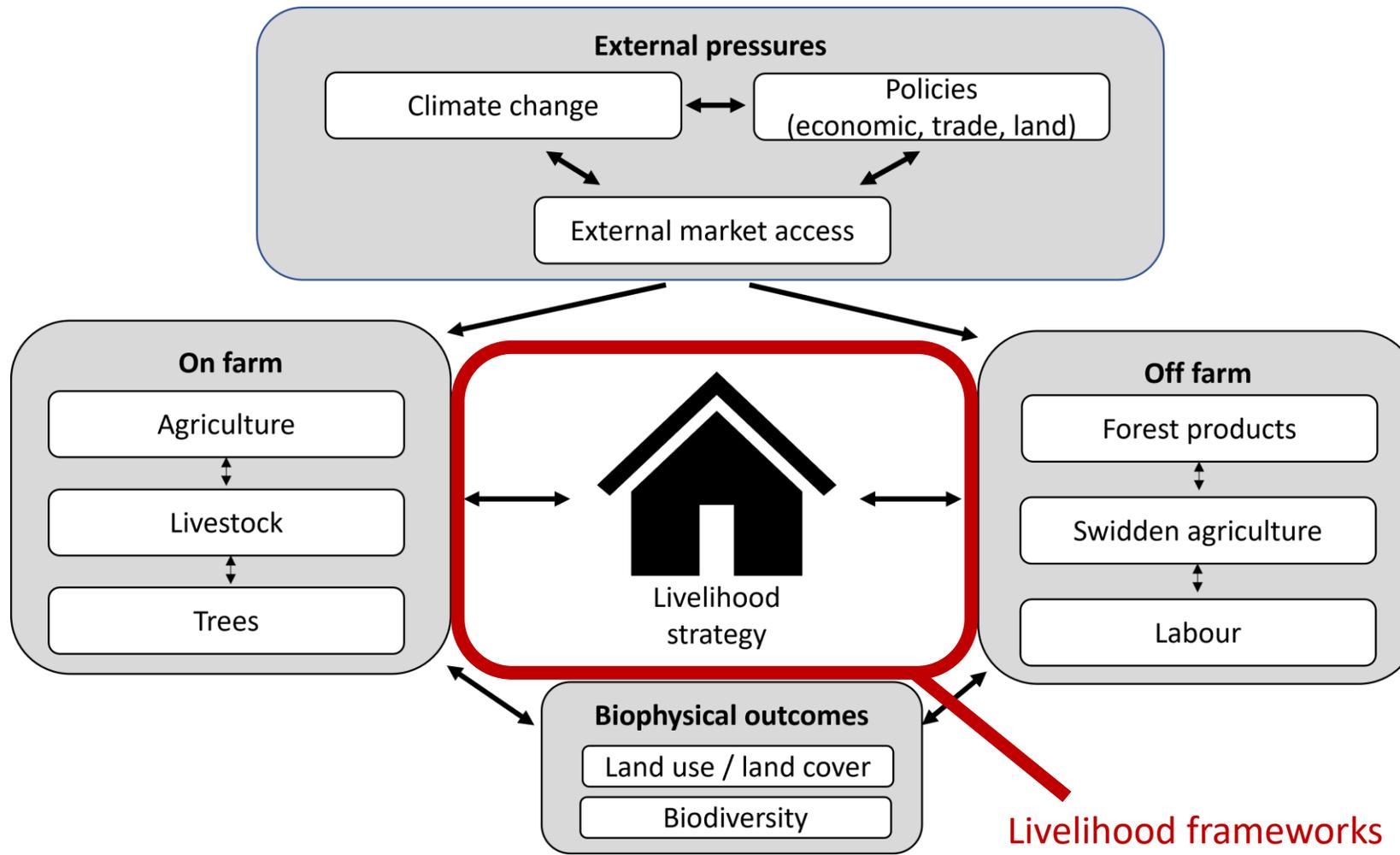
Go to Google Earth Street View

1 km





Tropical forestry research requires tools that can quantify entities and characterize relationships



Livelihood frameworks  
 Quantification of livelihood contributions  
 Assets  
 Behaviour and perceptions: risk, reward  
 Gender roles

# Site history



## Resource mapping

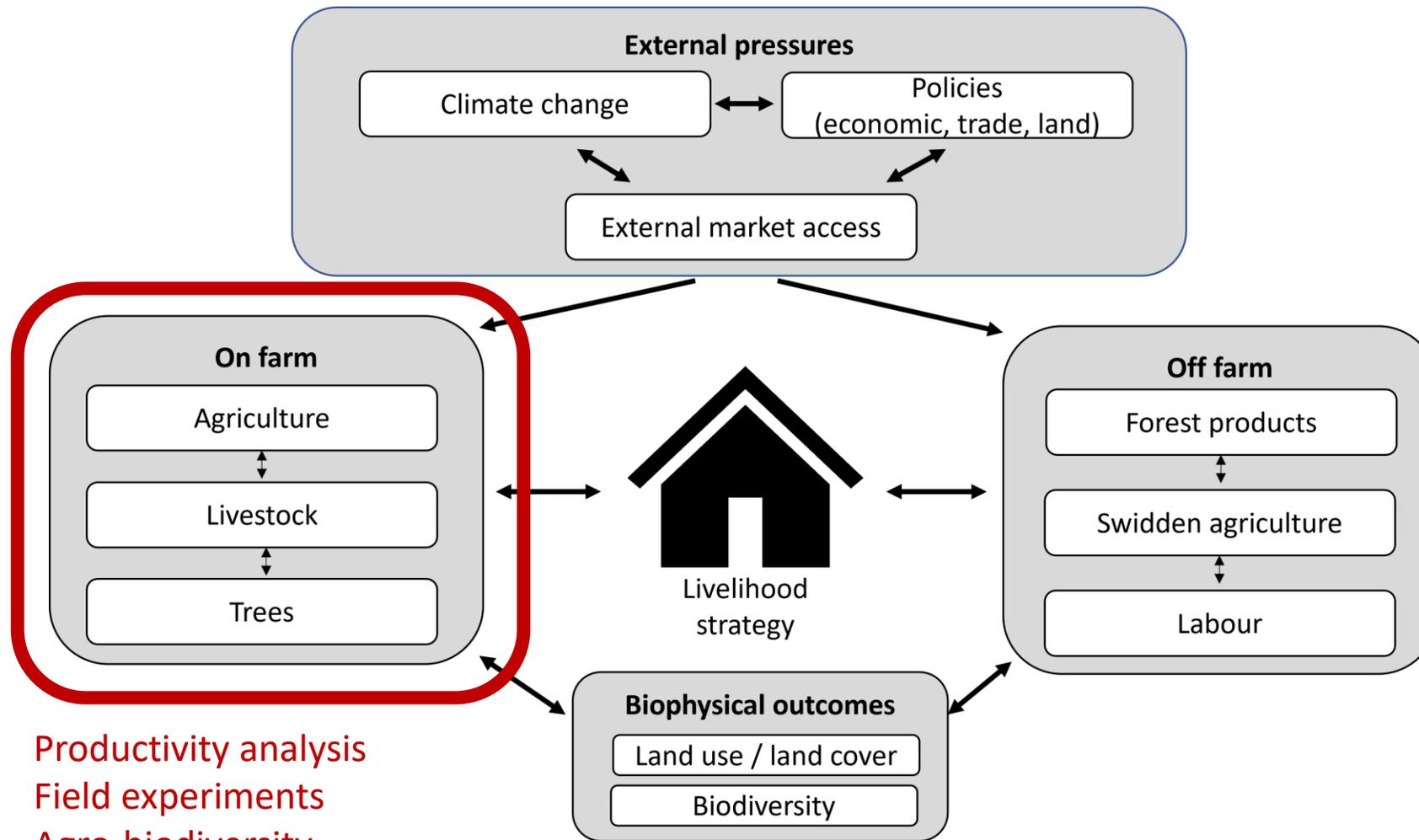


# Focus group discussion

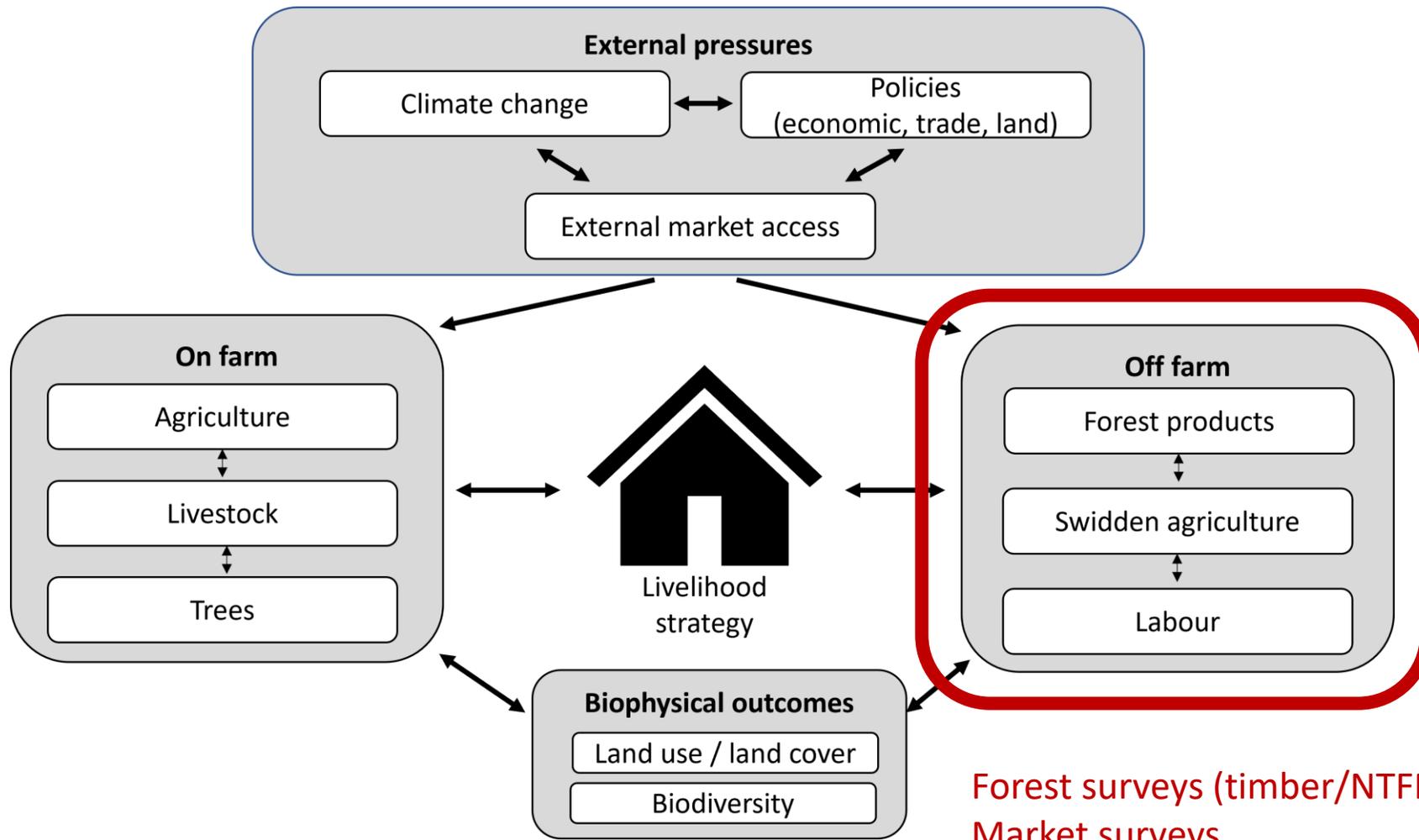


Key informant interviews

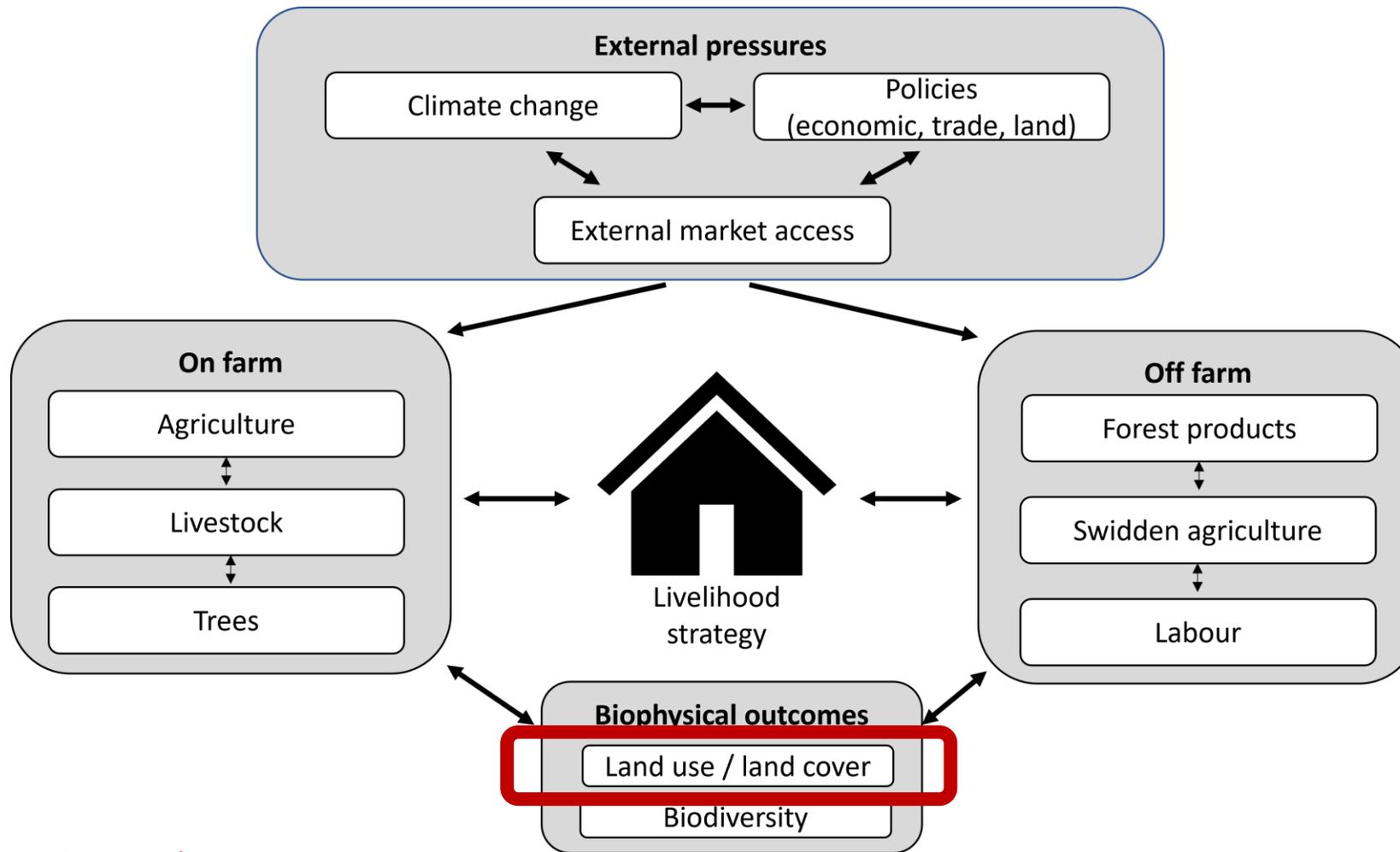




- Productivity analysis
- Field experiments
- Agro-biodiversity
- Cultural practices
- Gender roles
- Socioeconomic variation (e.g. caste)
- Economics (Investment-return)
- Energetics (e.g. input-output)
- Plantation practices

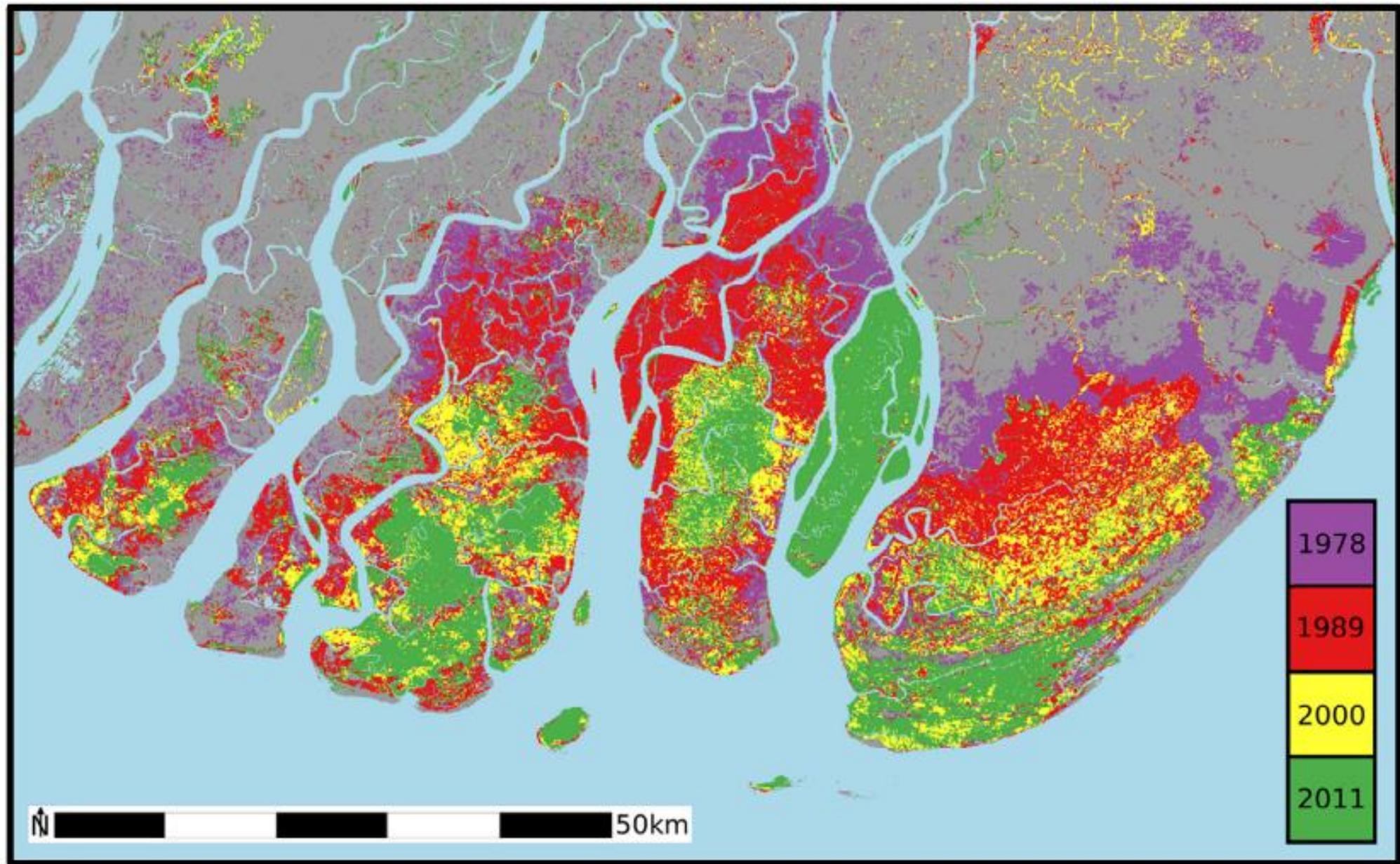


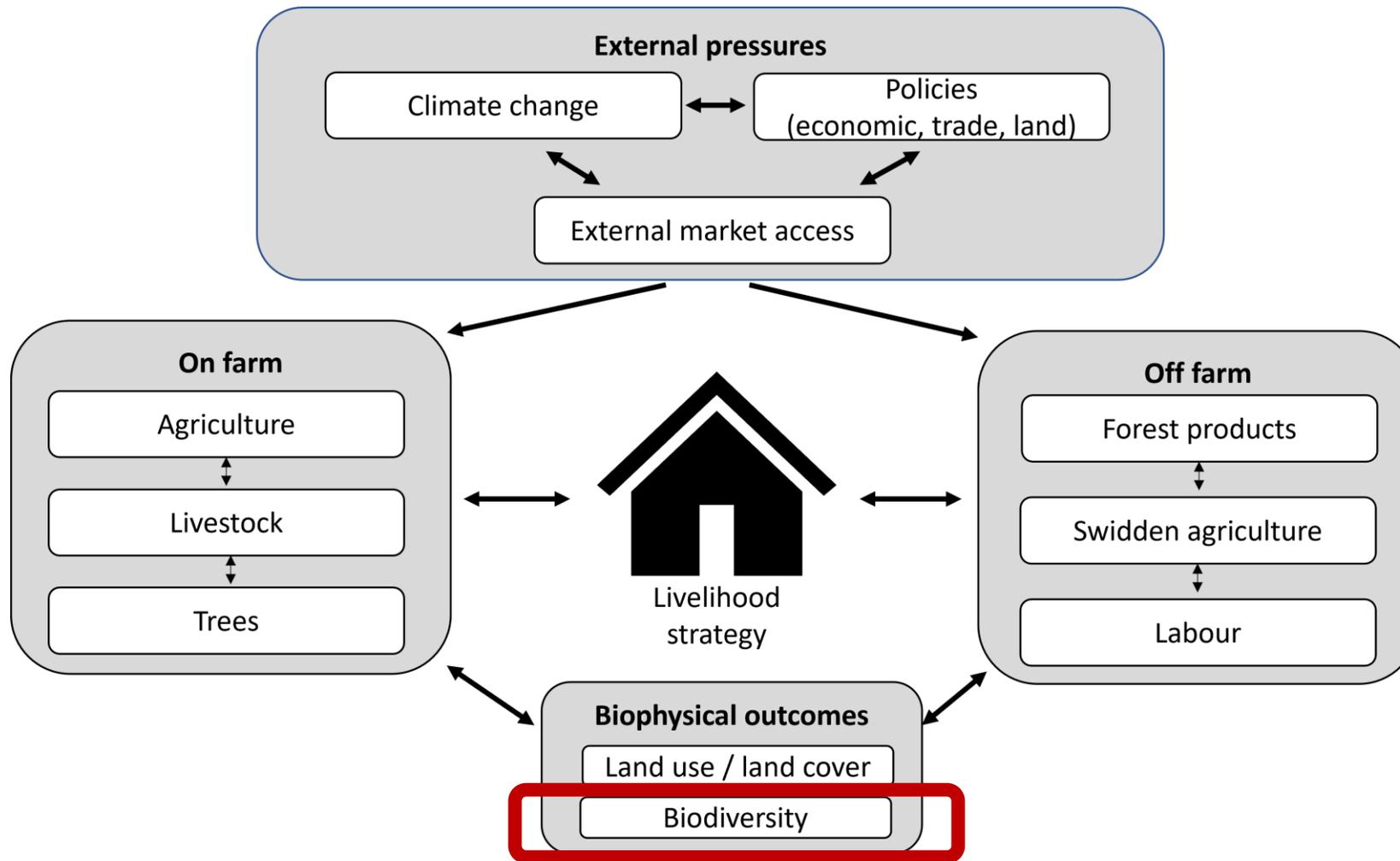
- Forest surveys (timber/NTFP)
- Market surveys
- Culture / traditional practices
- Migration / remittances / economics
- Forest ecology (disturbance, succession)
- Gender and changing women's roles
- Demographics (human geography)



- Remote sensing
- Land use/cover mapping
- Field-based land interpretation
- Spatiotemporal LULC change analysis (modeling)
- Historical transects (site history)







Forest inventories  
Taxon-specific surveys





Photo: Sean Pang

Botanical photography, aka “botanical tourism” (the late J.F. Maxwell)



Thotupola 28/5

1 - *Glochidion pycnocarpum*  
- *Eurya ~~ceylanica~~ (2)* *ceylanica* or  
*chinensis*

1 - *Psychotria zeylanica* / *nigra*

1 - *Neolitsea fuscata*

2 - *Elaeocarpus coreaceus*

- *Plectranthus inflatus*

1 - *Actinodaphne nobochina*

1 - *Cinnamomum ovalifolium*

2 - *Rhododendron arboreum*

2 - *Rhodomyrtus tomentosa*

2 - *Calophyllum*

1 - *Litsea ovalifolia*

2 - *Syzygium sclerophyllum*

2 - *Osbeckia lanata*

1 - *Hedyotis ceylanica*

2 - *Osbeckia aspera*

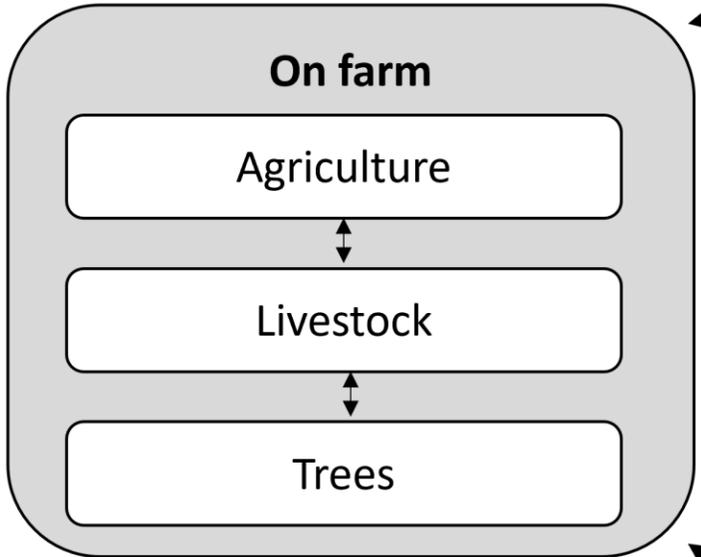
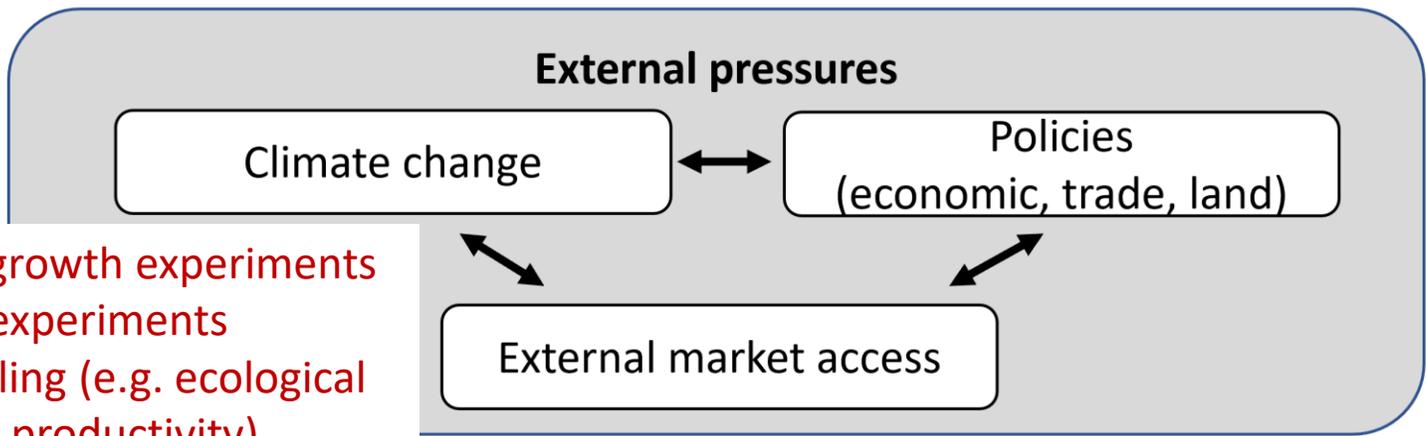
① Rachel - Leena

② Hao Wen - Jia Ying

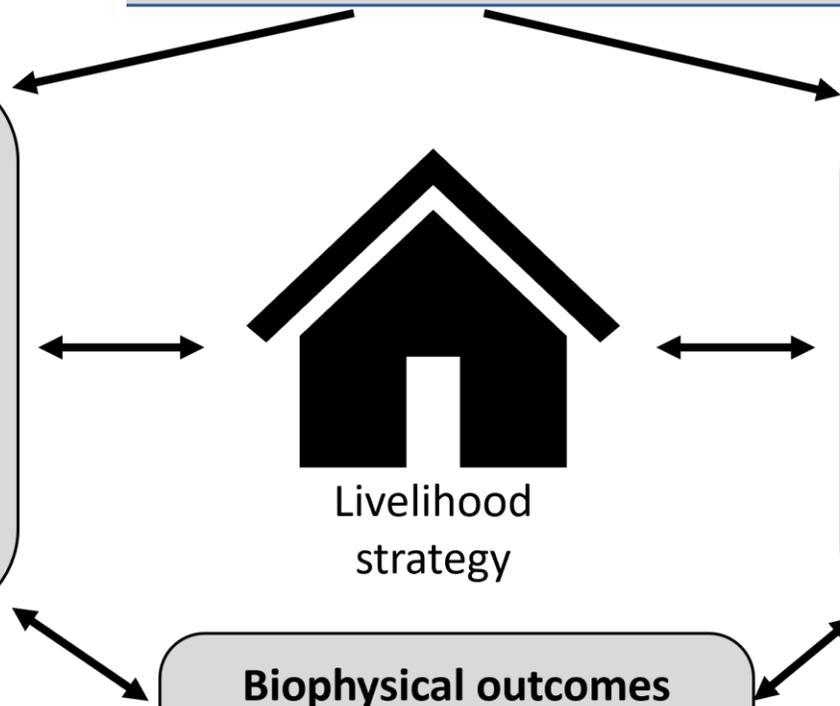
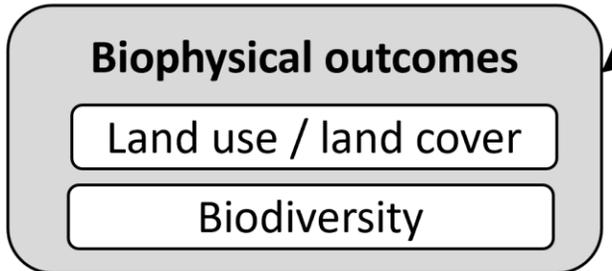
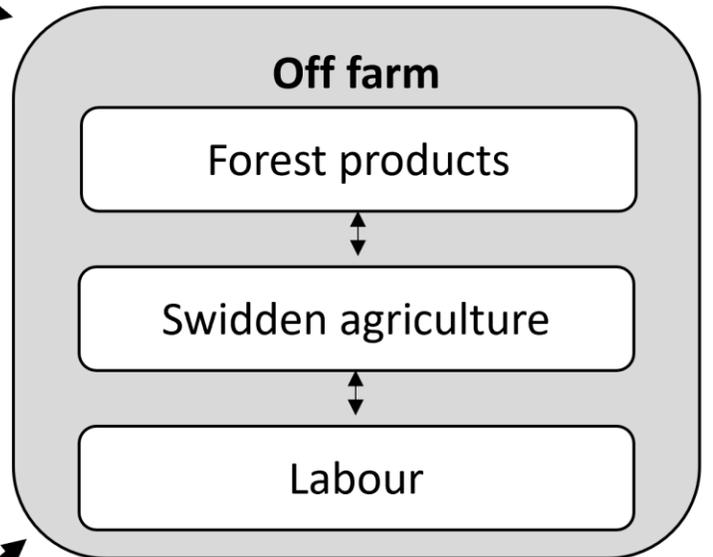




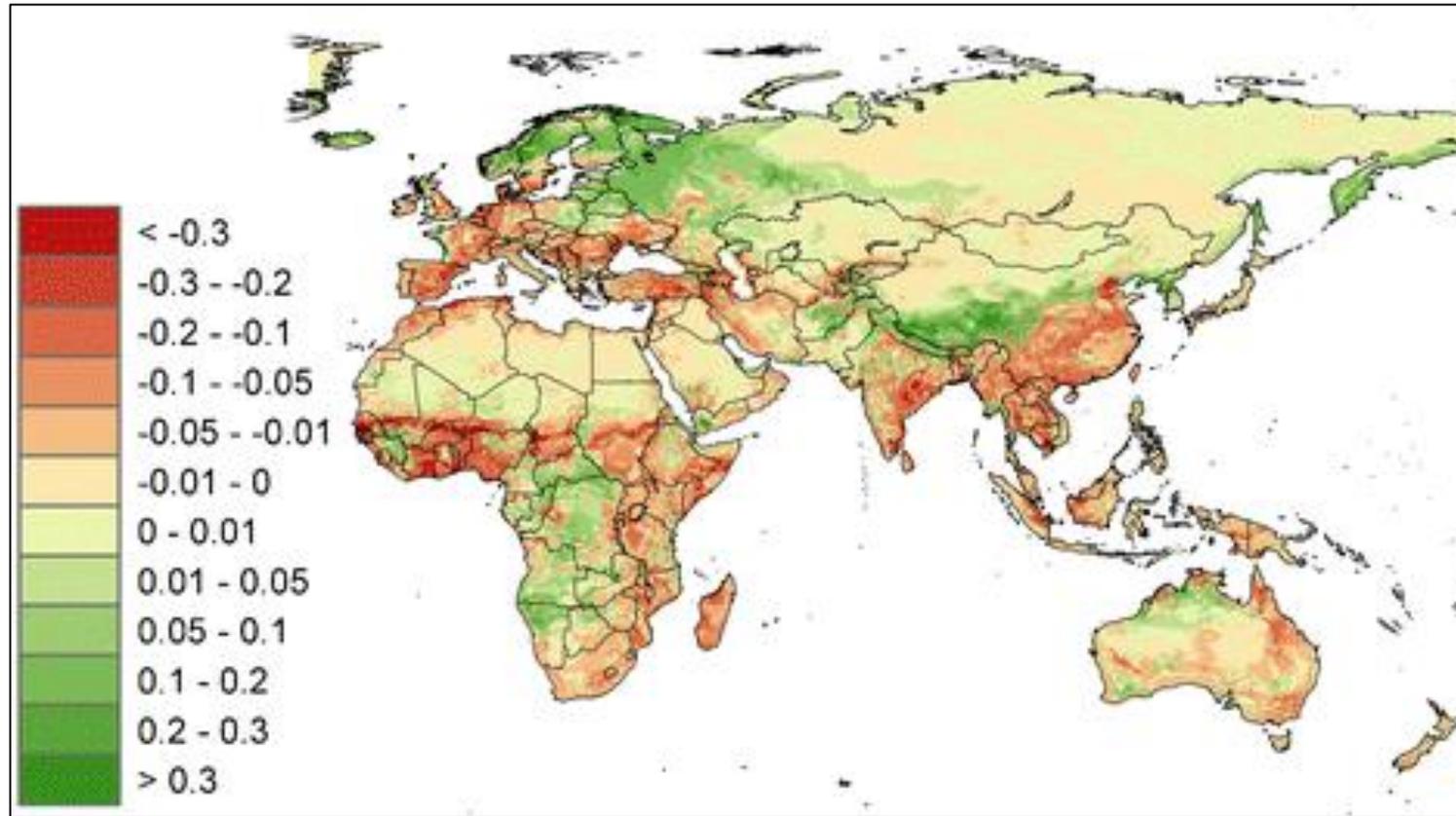
Crop growth experiments  
Field experiments  
Modeling (e.g. ecological  
niche, productivity)



Livelihood  
strategy

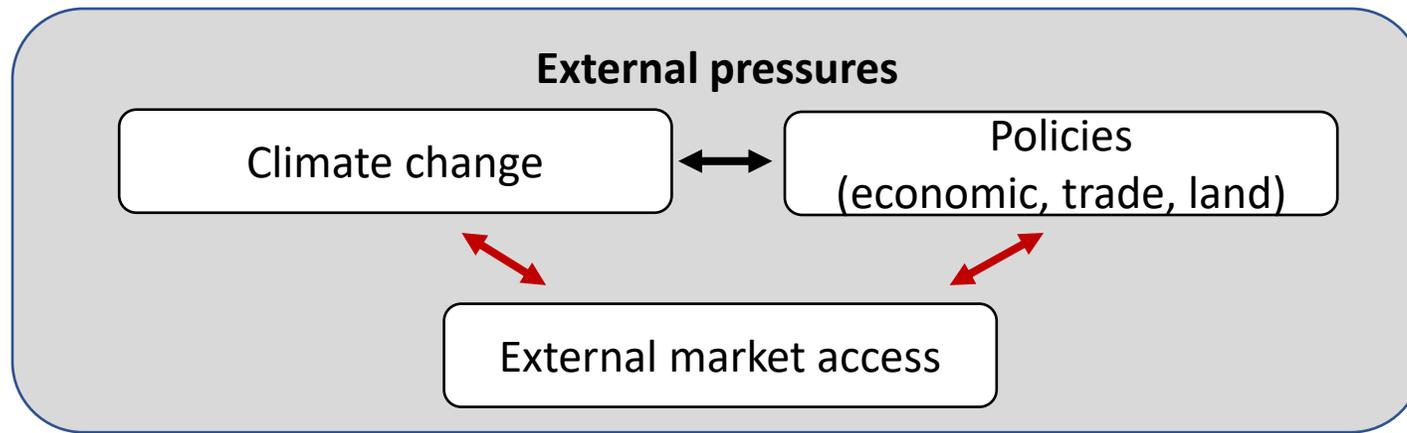


## Global (or regional) assessment of the climate change – agriculture interface: ecological niche modeling



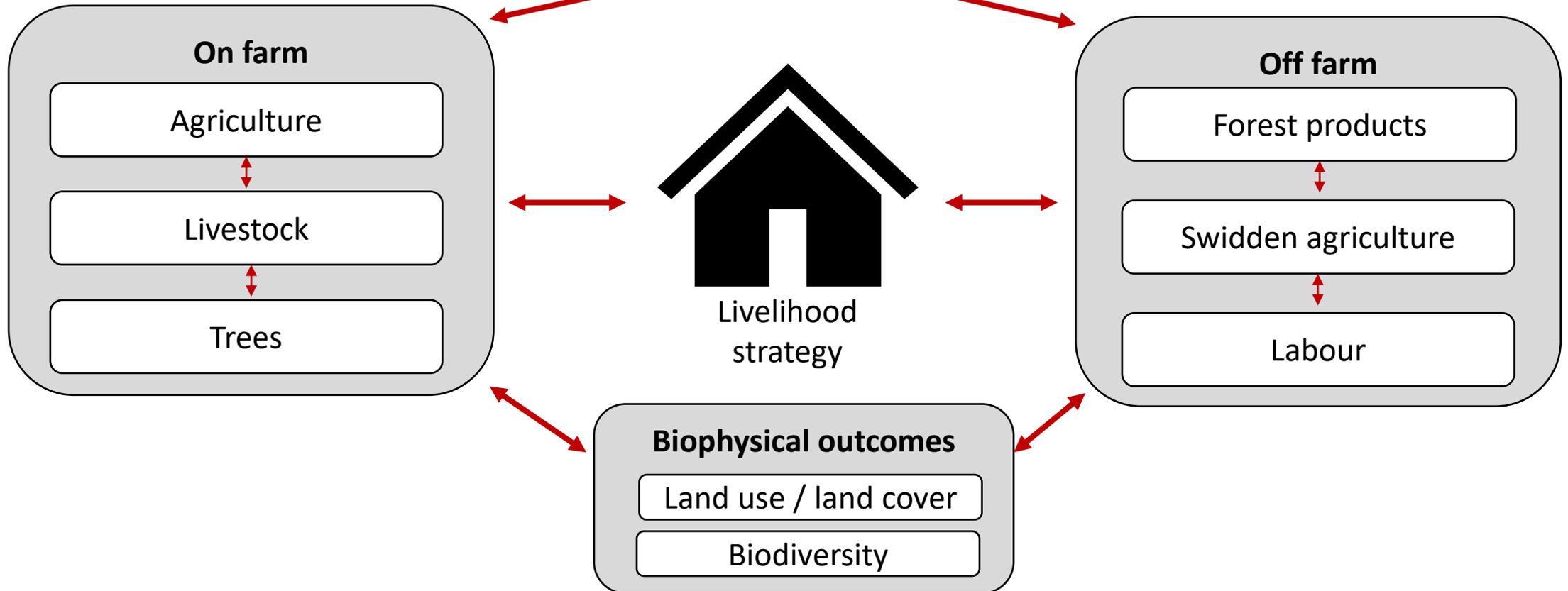
Modeled change in suitability for agriculture under the A2a scenario of climate change for the year 2050 between current and future conditions (i.e.,  $change = future - current$ ). Positive values denote better conditions, negative values indicate worsening.

*Beck 2013*

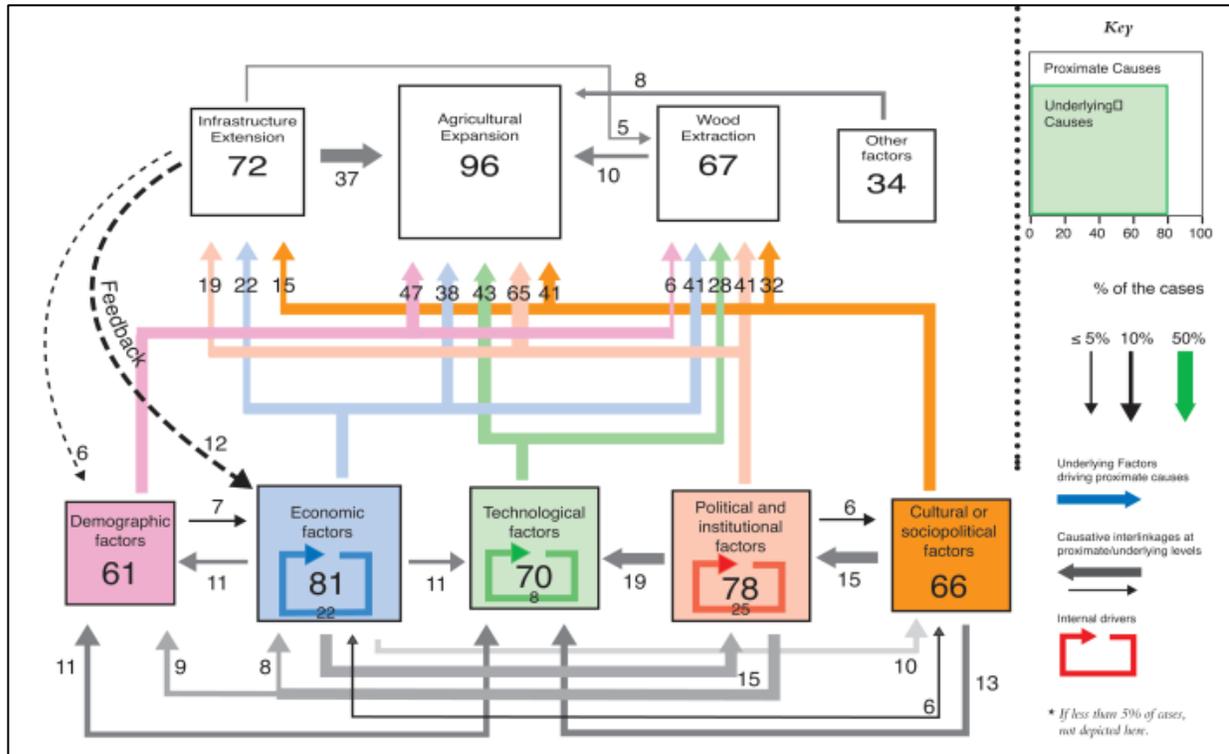


System dynamics

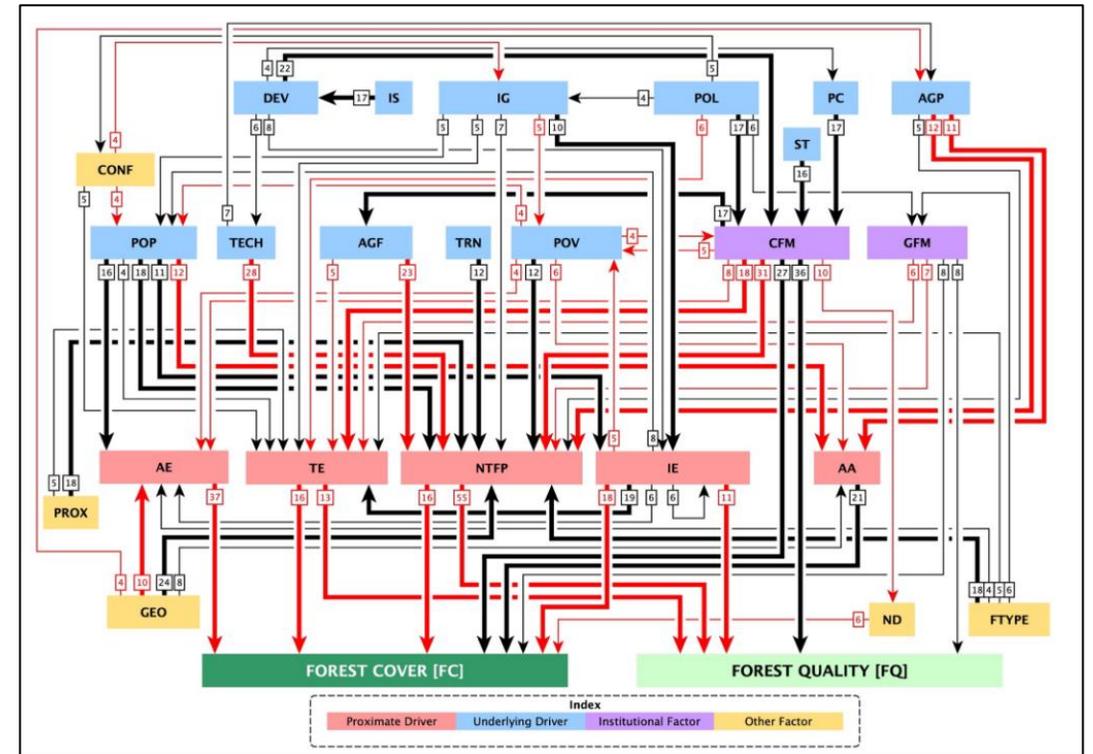
- Causal network
- Stocks and flows



# System dynamics approach to whole-system relationships: causal network analysis



Causative pattern of **tropical deforestation** (n = 152 cases).  
*Geist and Lambin 2002*



Causal network diagram showing the relationships between proximate and underlying drivers, institutional factors, and other factors of **forest change in the Himalayas**.

*Verma et al. 2021*

# Respect for the culture and the lives of people from whom we learn



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## Methods and Tools in Tropical Forestry



### **To come later: the non-glamorous methods and tools**

Organization

Team management

Data handling (university policies)

FPIC

Quality control: error checking and data entry

Open science

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# Methods and Tools in Tropical Forestry



## The rest of the course

Date	Topic	Lecturer
6 Sept	Open	
8 Sept	Introduction	Prof. Edward Webb
13 Sept	Land change	Prof. Edward Webb
15 Sept	Land cover tutorial 1	Johanness Jamaludin
20 Sept	Land cover tutorial 2	Johanness Jamaludin
22 Sept	Inventory	Adrian Monge
27 Sept	Biodiversity	Dr. Eshetu Yirdaw
29 Sept	Livelihoods and resilience mechanisms 1	Prof. Markku Kanninen
4 Oct	Discussion (land cover classification)	Johanness Jamaludin
6 Oct	Livelihoods and resilience mechanisms 2	Prof. Markku Kanninen
11 Oct	Value chains	Dipjoy Chakma
13 Oct	Open	
18 Oct	Field course meeting (only for FOR-248 participants)	All
20 Oct	Open	



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# Methods and Tools in Tropical Forestry

## The rest of the course

Date	Topic	Task (if applicable)
15 Sept	Land cover tutorial 1	Task 1: Basic land cover analysis (due 20 Sept)
20 Sept	Land cover tutorial 2	Task 2: Visual interpretation of land cover (due 27 Sept)
27 Sept	Biodiversity	Task 3: Biodiversity inventory (due date TBD)
29 Sept	Livelihoods and resilience mechanisms 1	Task 4: Livelihood interviews (due 6 Oct)
20 Oct		Task 5: Integrated preliminary assessment for study site

## Evaluation and grading

Task 1: 20%

Task 2: 20%

Task 3: 20%

Task 4: 20%

Task 5: 20%

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**Discussion / questions**