

FOR-247 Methods and Tools in Tropical Forestry

Livelihoods and landscape change – risks, vulnerability, resilience, and adaptation

Markku Kanninen
29.9.2022 & 6.10.2022



Primary data collection

- **Village/community/landscape level**
 - Key Informant Interviews (KII)
 - Village leaders, government forestry officers, etc.
 - Focus Group Discussions (FGD)
 - History of village
 - Most important changes (time line)
 - Village map & change map
 - Seasonal calendar
 - Biophysical data collected (forest inventory, biodiversity, land use, maps etc.)
 - Secondary data (climatic data, census and other village-level data)
- **Household level**
 - Hh interviews/surveys
 - Livelihoods and changes in the village and in livelihoods
 - Changes in access & availability of main forest products
 - Risks and coping strategies and adaptation examples

Contents

- Introduction
- The Sustainable Livelihoods Framework (SLA)
- Analysis of rural livelihoods
 - Role of forests in livelihoods
- The IPCC approach to climate risks and adaptation
 - Hazard, exposure, and vulnerability
- Cases and examples
 - Increasing exposure of people and assets
 - Vulnerability of ecosystem services
 - Resilience, coping, and adaptation – role of forests
- Measuring and analyzing landscape change, risks, vulnerability and adaptation actions
 - Examples from Laos
- Detecting environmental change – challenges



Participatory mapping in Tat Ing Hang, Laos (M. Kanninen 2017)

Landscapes & livelihoods

Lowlands – agricultural land, villages



Ban Kouay, Vientiane, Laos

Highlands – agriculture, shifting cultivation, forest, NTFPs



Vienghingsoung, Luang Prabang, Laos

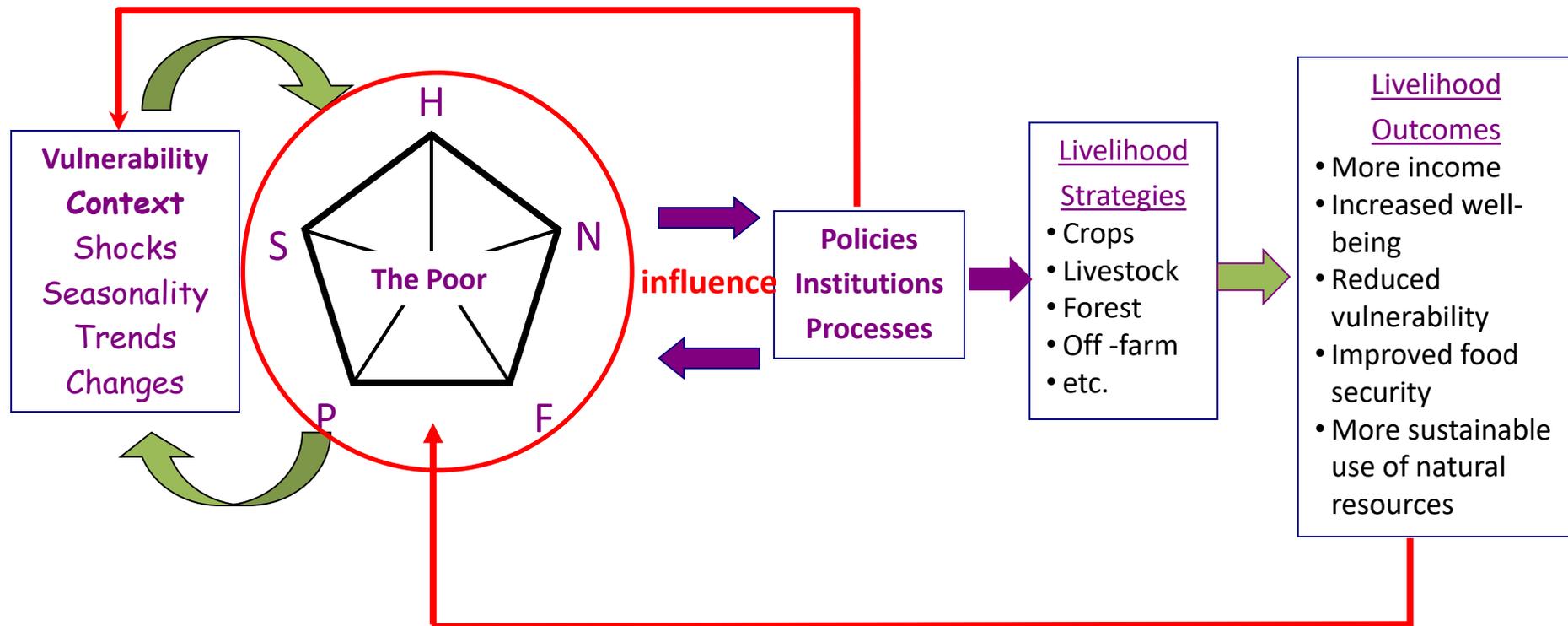


List of forest and farm products in three villages in Lao PDR

No	List of Natural resources	Scientific name	Cash/Non-Cash		Village name			Where/place						
			Cash	Non-cash	Napo	Kouay	That ing-hang	Forest	Rice field	Shifting cultivation	Livestock	Homegarden	Fish pond	
1	Wood/Bamboo/Grass													
1	Mai lai	<i>Gigantochloa albociliata</i>	✓	✓	✓	✓	✓	✓	✓			✓		
2	Mai Xangphai	<i>Dendrocalamus brandisii</i>	✓	✓	✓	✓	✓	✓			✓			
3	Mai Phang	<i>Dendrocalamus lonoifimbriatus</i>	✓	✓	✓	✓		✓			✓	✓		
4	Mai Phai	<i>Cephalostachyum pergracile</i>	✓	✓	✓	✓	✓	✓	✓		✓			
5	Mai Hia	<i>Schizostachyum blumei</i>	✓	✓	✓			✓	✓		✓	✓		
6	Mai Sot	<i>Oxytenanthera parviflora</i>		✓	✓			✓			✓			
7	Mai Bak	<i>Anisptera robusta</i>		✓			✓	✓			✓			
8	Mai Bok	<i>Iringia mayalana</i>		✓		✓		✓			✓			
9	Mai Doo	<i>Pterocarpus macrocarpus</i> Kurz.		✓	✓			✓			✓			
10	Mai Khene Hin	<i>Hopea odorata</i>		✓	✓						✓			
11	Mai Thong	<i>Sandoricum koetjape</i>		✓		✓		✓			✓	✓		
12	Mai Tiew	<i>Cratogeomys formosum</i>		✓	✓	✓	✓	✓			✓	✓		
13	Mai Kor	<i>Diospyros species</i>		✓	✓						✓			
14	Mai Sii	<i>Vetiva hamandiana</i>		✓			✓	✓			✓			
15	Mai Kharm	<i>Tamarindus indica</i>		✓	✓	✓		✓			✓	✓		
16	Mai Kha Young	<i>Delbergia cochinchinensis pierre</i>		✓		✓					✓			
17	Mai Sako	<i>Anthocophalus chinensis</i>		✓	✓			✓			✓			
18	Grass			✓	✓	✓	✓	✓	✓		✓			
19	Fire wood			✓	✓	✓	✓	✓	✓		✓	✓		

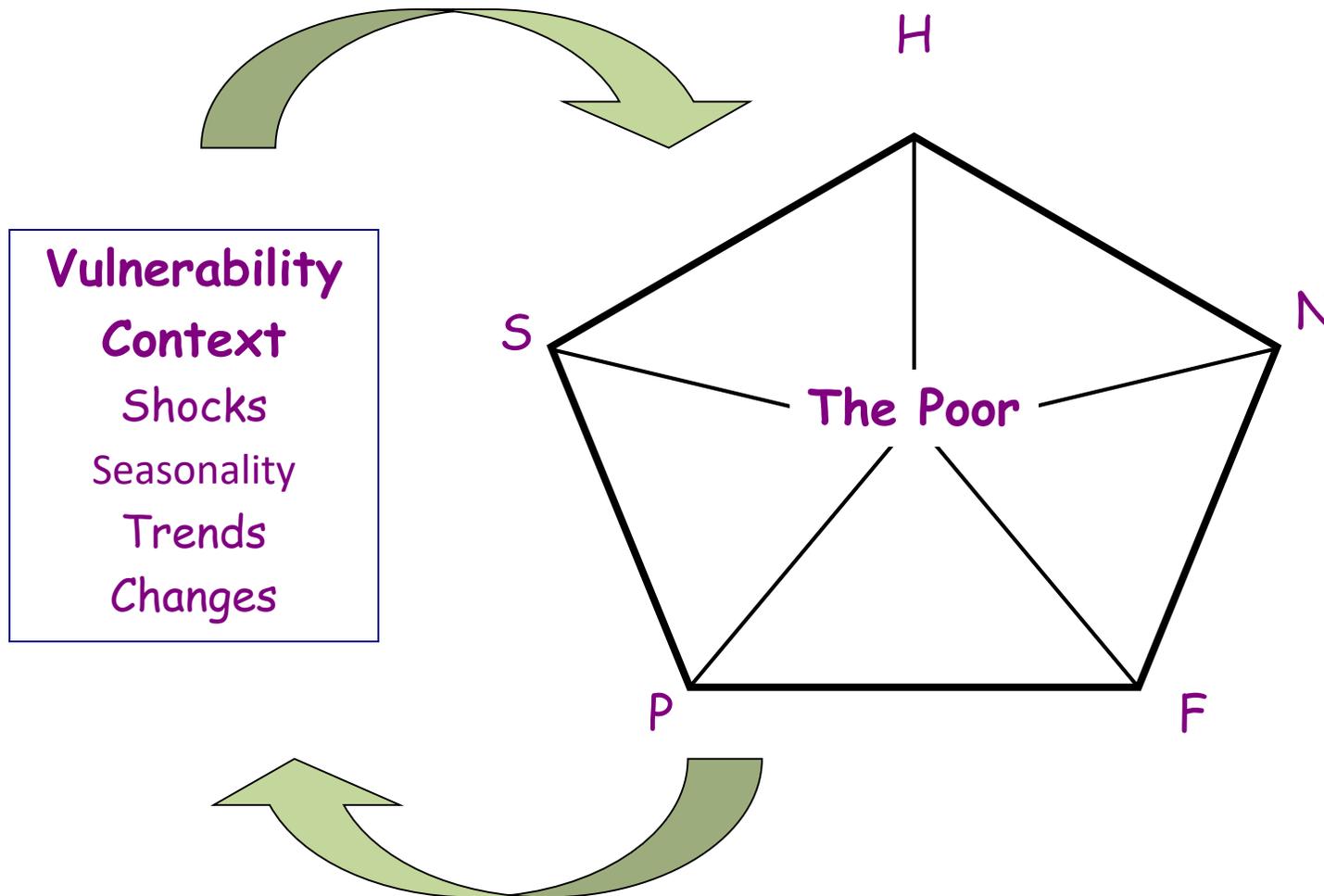
Where/place					
Forest	Rice field	Shifting cultivation	Livestock	Homegarden	Fish pond

The Sustainable Livelihoods Framework (SLA)





Vulnerability - Context



The livelihood assets

The five “capitals”

H = Human capital

N = Natural capital

F = Financial capital

P = Physical capital

S = Social capital



Importance of forests





Forests & livelihoods - Global importance

- 1.6 billion people directly 'dependent' to some degree on forests for their livelihoods
- ~90% of the world's 1.2 billion extreme poor depend on forest resources for all or part of their livelihoods



Source: World Bank 2004

Forests and energy

- 50% of all wood logged globally goes to energy – 9% of total energy from wood
- Wood-based fuels represent 90% of all energy produced in Africa (28% in Finland)
- Globally, 27-34% of traditional biomass use is unsustainable
 - Hot spots in Africa and in Asia



Wood market in Negele & forests in Etiopiassa

Forest and water



Angostura reservoir, Costa Rica

Photo: M. Kanninen

- Access to clean water will be one of the major challenges in the future in many countries
- Forests and trees in catchments play a crucial role in water quality and quantity
- Water will be one of the most important ecosystem services of forests
- Multifunctional forests integrated into rural economies

Forests, industry and jobs



Furniture factory in Jepara, Java, Indonesia

- In many countries, forests are important in creating rural enterprises and job opportunities
- Different forms of public-private partners have been developed to promote forest-based development



Building, shelter - Global importance

~1.3 billion people (~20% global population) depend on forest products for shelter

- including a large portion of NTFPs; - bamboo, rattan, palm fibre, palm leaves/grasses etc. for roofing material



Guangxi, China



West Kalimantan, Indonesia

Source: FAO 2014



Food security, nutrition, medicine



- Plants: Fruits, seeds, leaves, stems, bark, resins, roots, flowers, branches
- Animals: meat, hides/skin, fur/hair, horns, hooves, feathers, & many other parts
- Medicinal plants & herbs: forest can be the closest “pharmacy” to millions of people



Agroforestry system)
in Burkina Faso

Medicinal plants
(Burkina Faso & Brasilia)



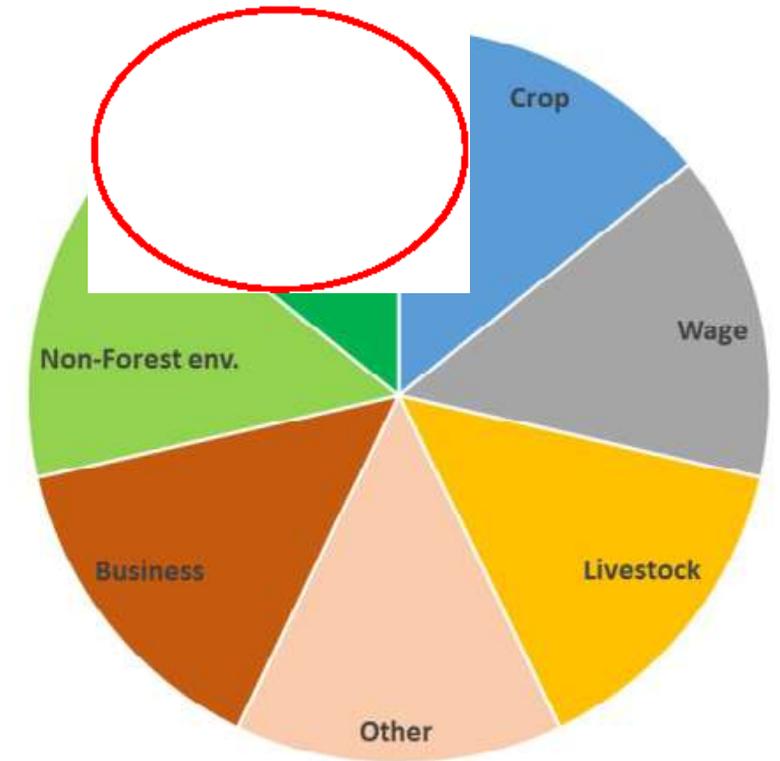
Rural livelihoods: A diverse bundle of activities & outcomes

Mixed portfolio of livelihood assets, activities & income sources:

- Minimize risk & vulnerability: resilience
- Income spread, gap-filling
- Improve living standards
- By necessity, limited business options

Specialization

- Increasingly common (off-farm income, cash crops, urbanization, economic transitions)
- High risk, high return
- “All eggs in one basket”





Forest 'dependence'?

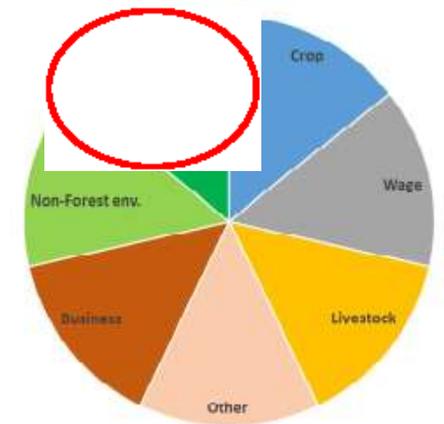
People who rely on forests for their livelihoods (to some extent) can be considered 'forest dependent'

- People who rely on forest but with no (or limited) alternatives, no choice
- People who use forest products or engage in forest-related economic activities but also have alternatives

Measurement

The relative contribution/importance of forest use (income) compared to all other livelihood activities or income

i.e. $\text{Forest income} / \text{Total income} \times 100 =$
% share of forest income (forest income dependency)

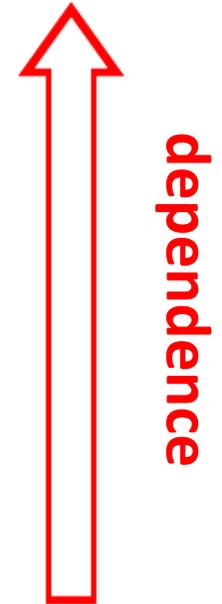




Forest/environmental dependence

Three broad types of people-forest relationships:

1. 'Forest-people', hunter-gatherers or shifting cultivators, heavily dependent on forests for livelihoods, primarily subsistence, often indigenous from minority ethnic groups
2. People who live near forests, usually involved in agriculture, regularly use forest products partly for subsistence & partly for income generation
3. People involved in commercial activities such as collecting NTFPs, or logging, but depend on income from forest labor rather than from direct use



High dependence on natural resource extraction (for subsistence) is often associated with asset poverty & lack of access to key markets



Livelihoods analysis - Research objectives & questions

Overarching objective:

What is the role of forests and other environmental resources in rural livelihoods?

- What are the most important livelihood activities and forest & natural resource related products?
- How does the accessibility to closest market affect the usage of forest & environmental products?
- What are the most important land types of forest & environmental resources ?

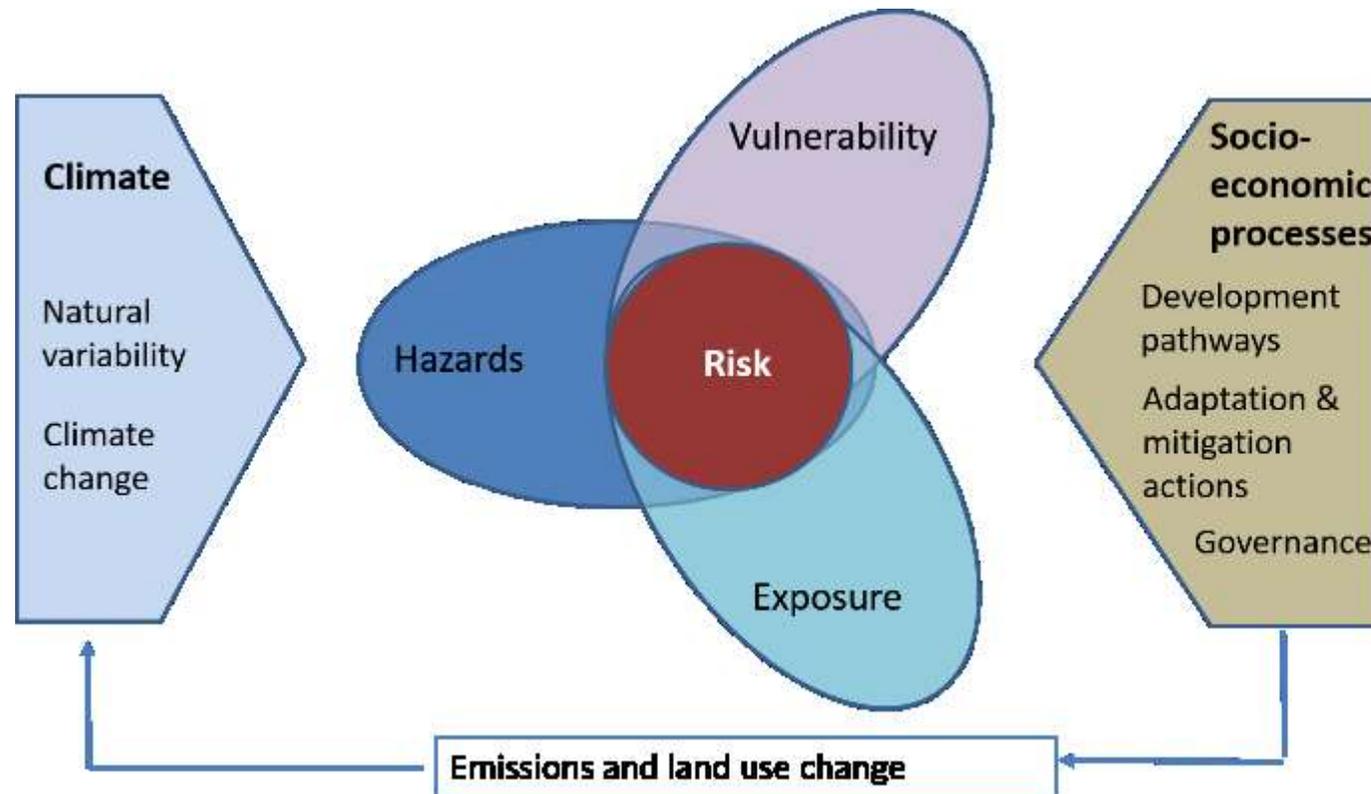


Vulnerability - Context

- Shocks
 - Floods, droughts, cyclones
 - > (climate variability and change)
 - Deaths in the family
 - Markets, e.g. prices
 - Violence or civil unrest
- Seasonality
- Trends and changes
 - Population
 - Environmental change, e.g. deforestation & land use change
 - Technology & infrastructure (access by roads, electricity etc.)
 - Markets and trade
 - Globalization of value chains etc.

The IPCC approach to climate risk and its components

Climate risk as a result of interaction of socioeconomic development, climate variability and climate change



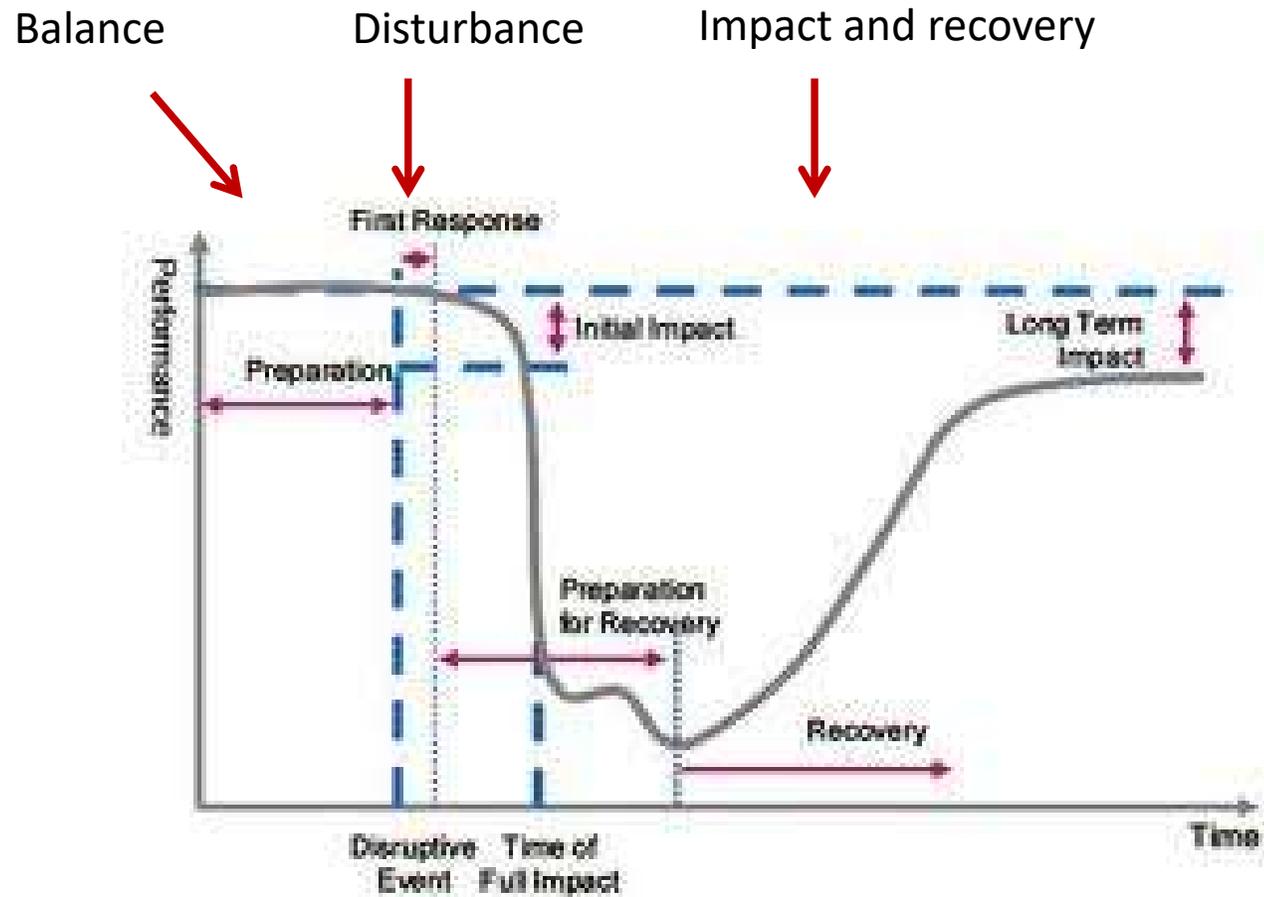


Definitions (IPCC 2012)

- **Hazard** - The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources
- **Exposure** - The presence of people; livelihoods; environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected
- **Vulnerability** - The propensity or predisposition to be adversely affected
- **Resilience** - The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions

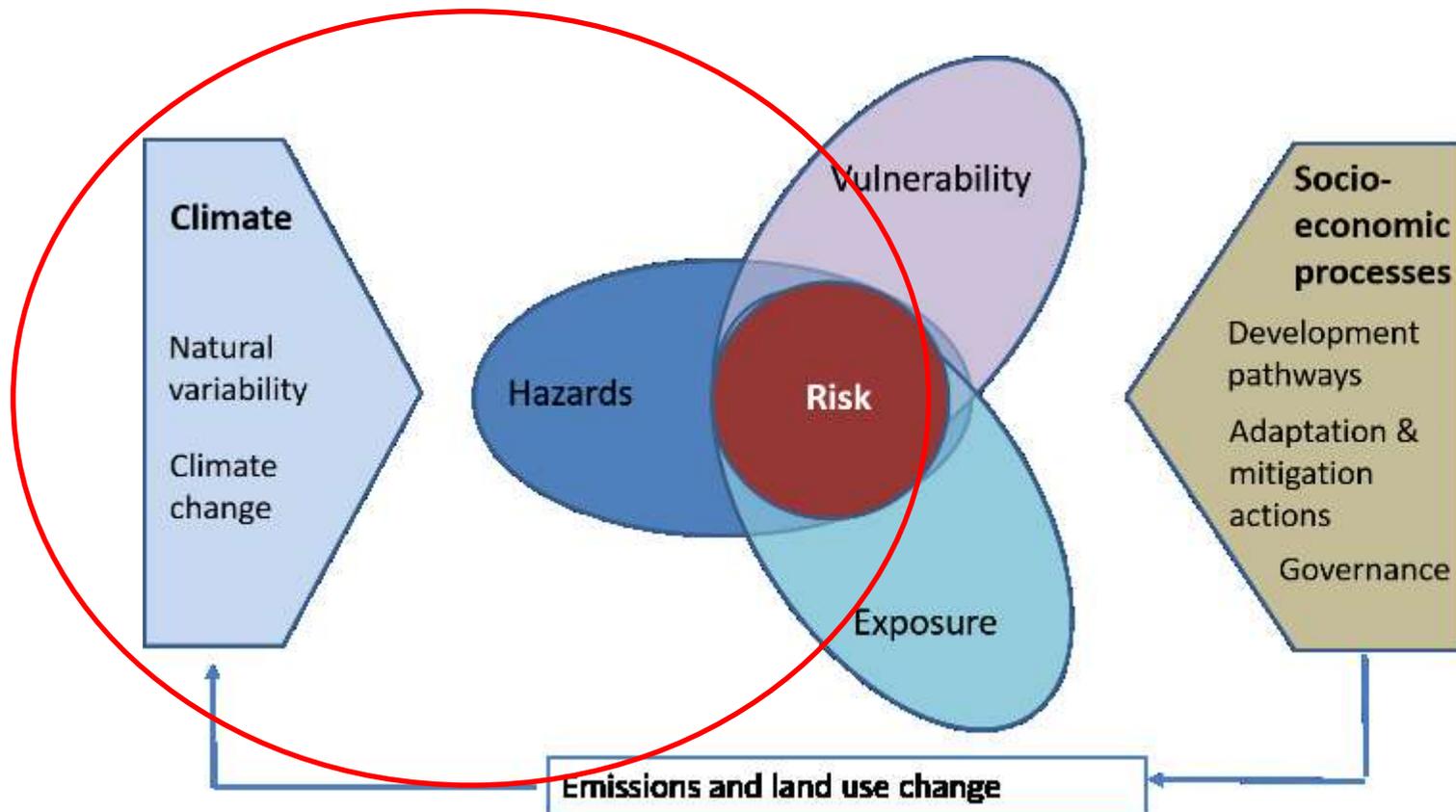


Resilience



The IPCC approach to climate risk and its components

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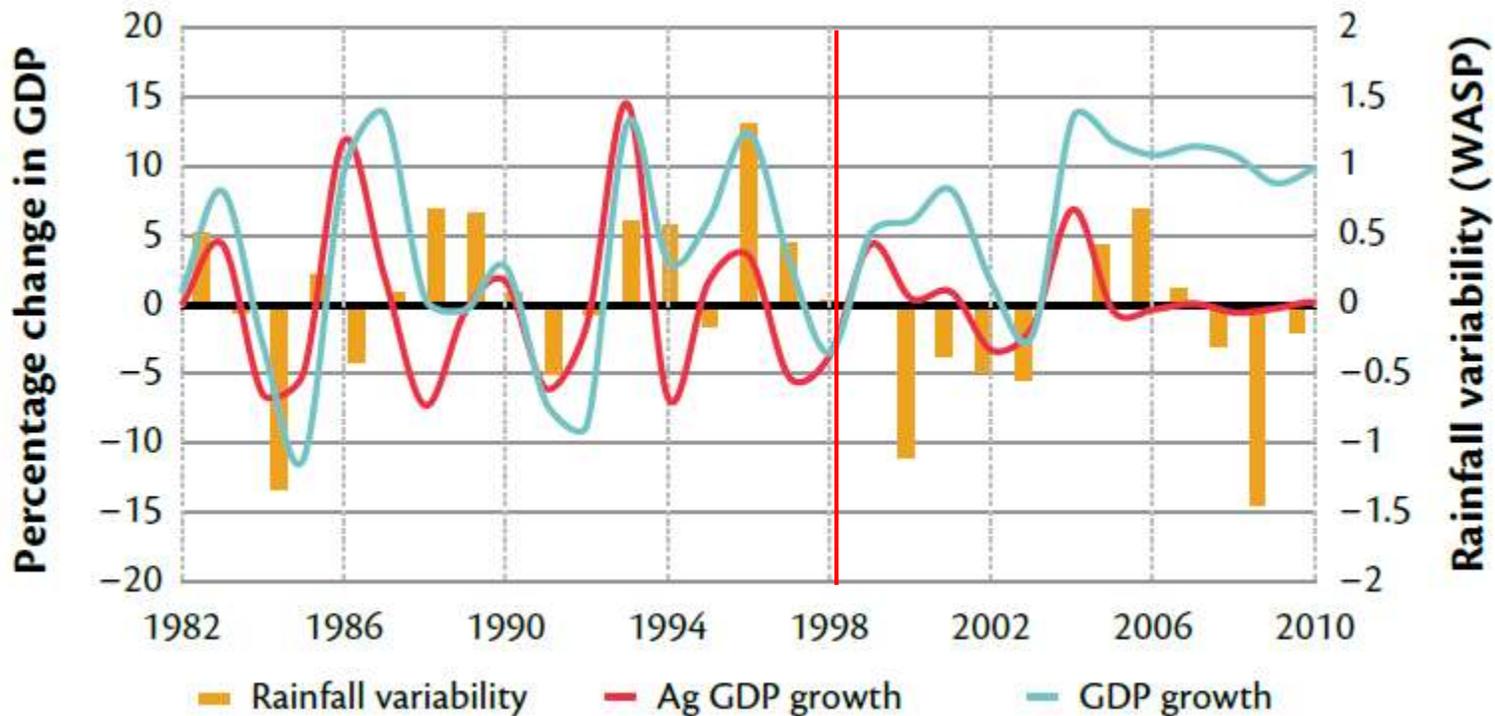


IPCC 2012



Role environmental factors in socioeconomic development

Ethiopia: Rainfall variability and changes in GDP and agricultural GDP 1982-2010

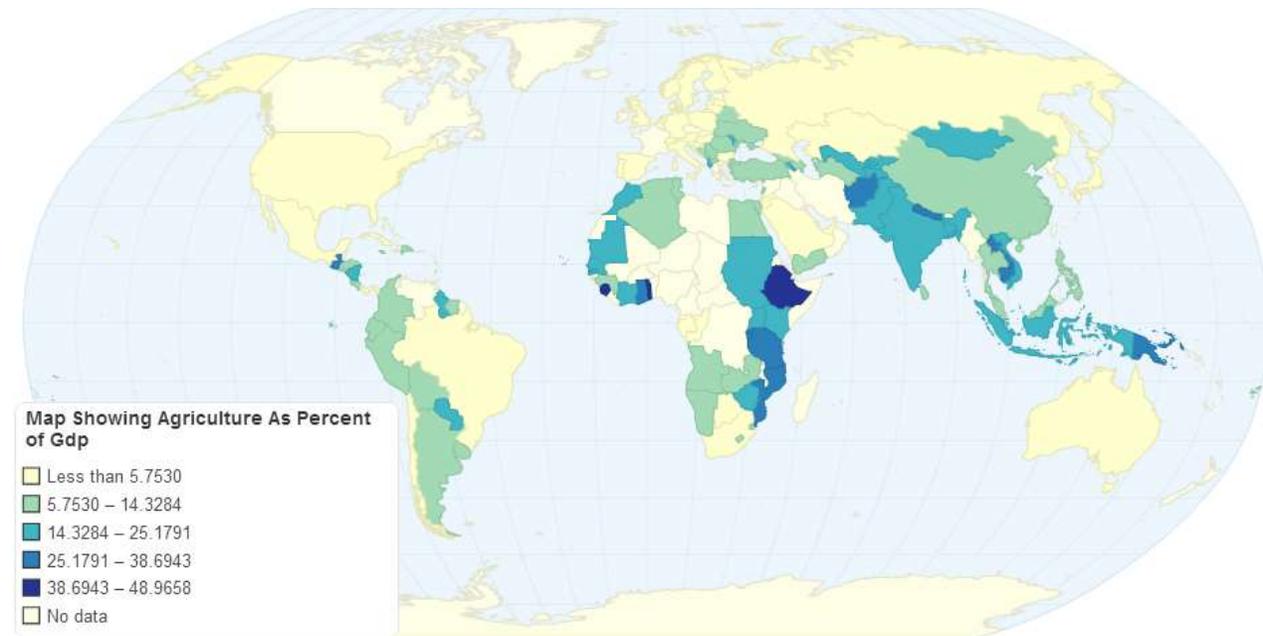
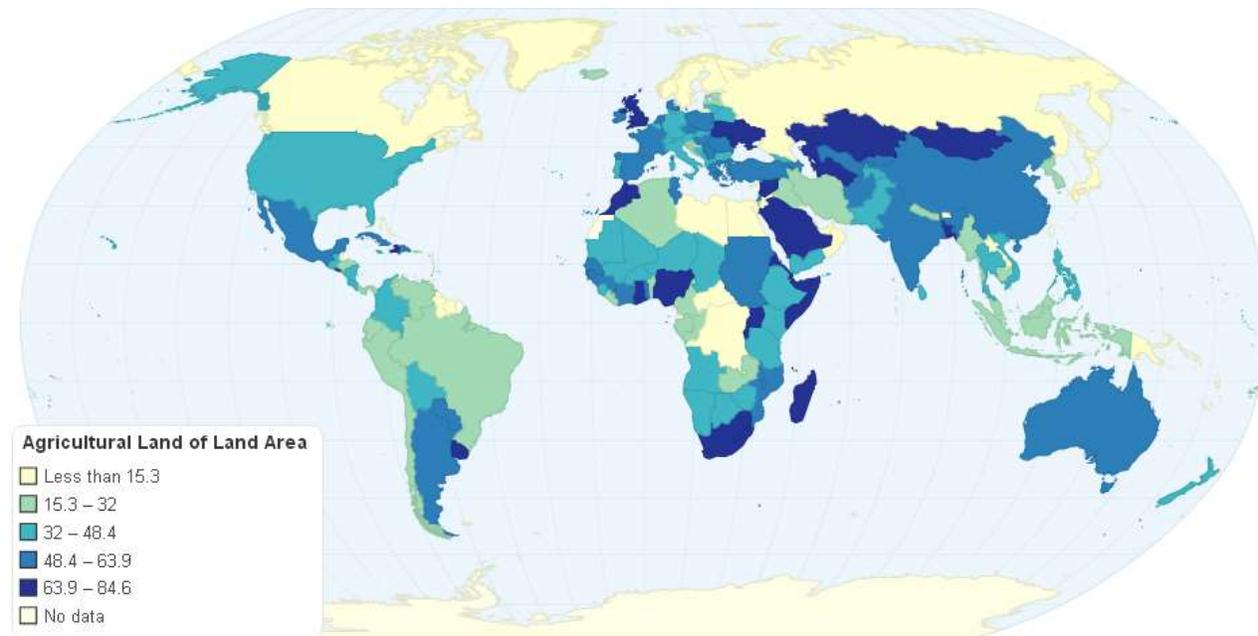


WASP = 12-month Weighted Anomaly of Standardized Precipitation

Importance of agriculture in national economies

Agricultural land of land area (%)

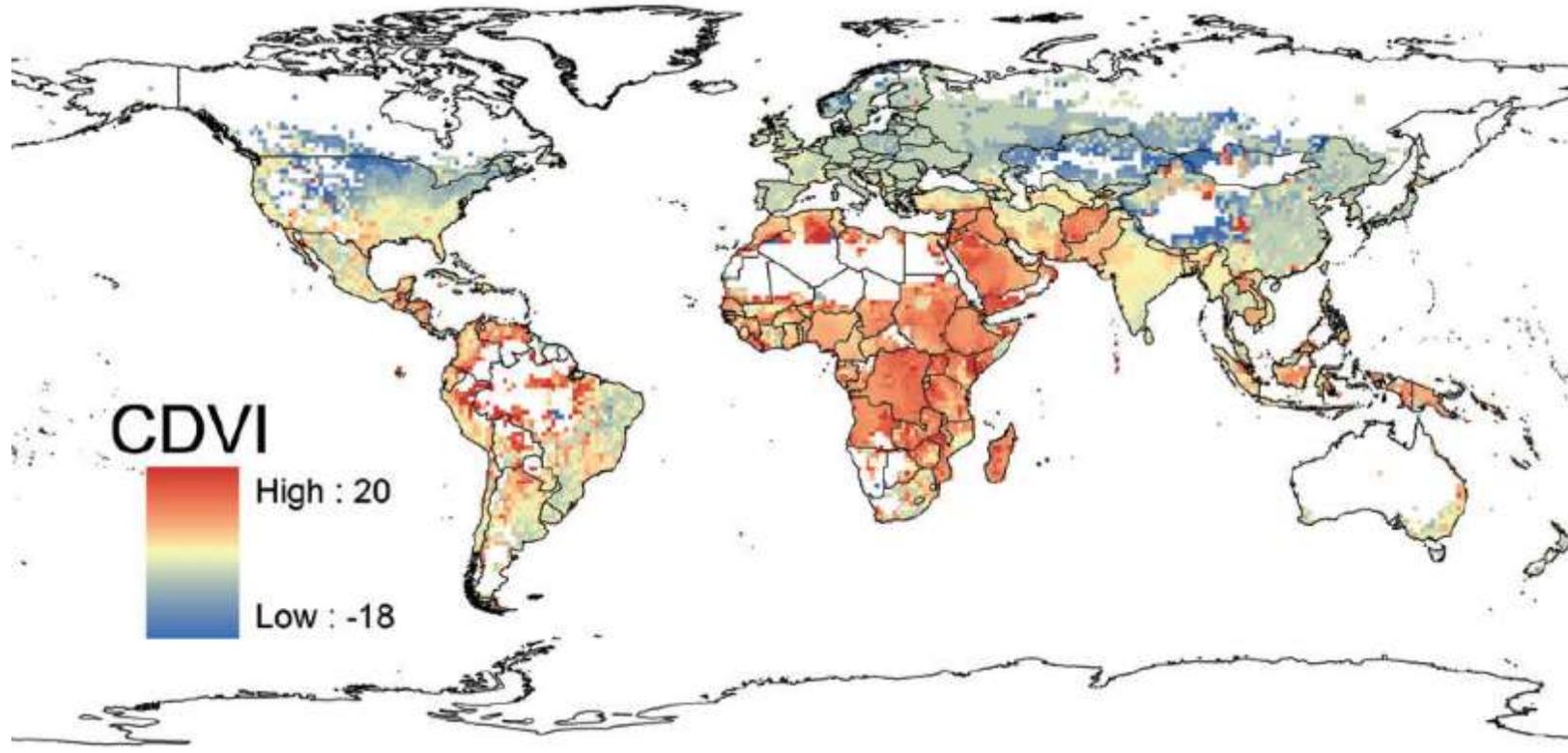
Share of agriculture (%) of GDP





Vulnerability indices take population dynamics into consideration

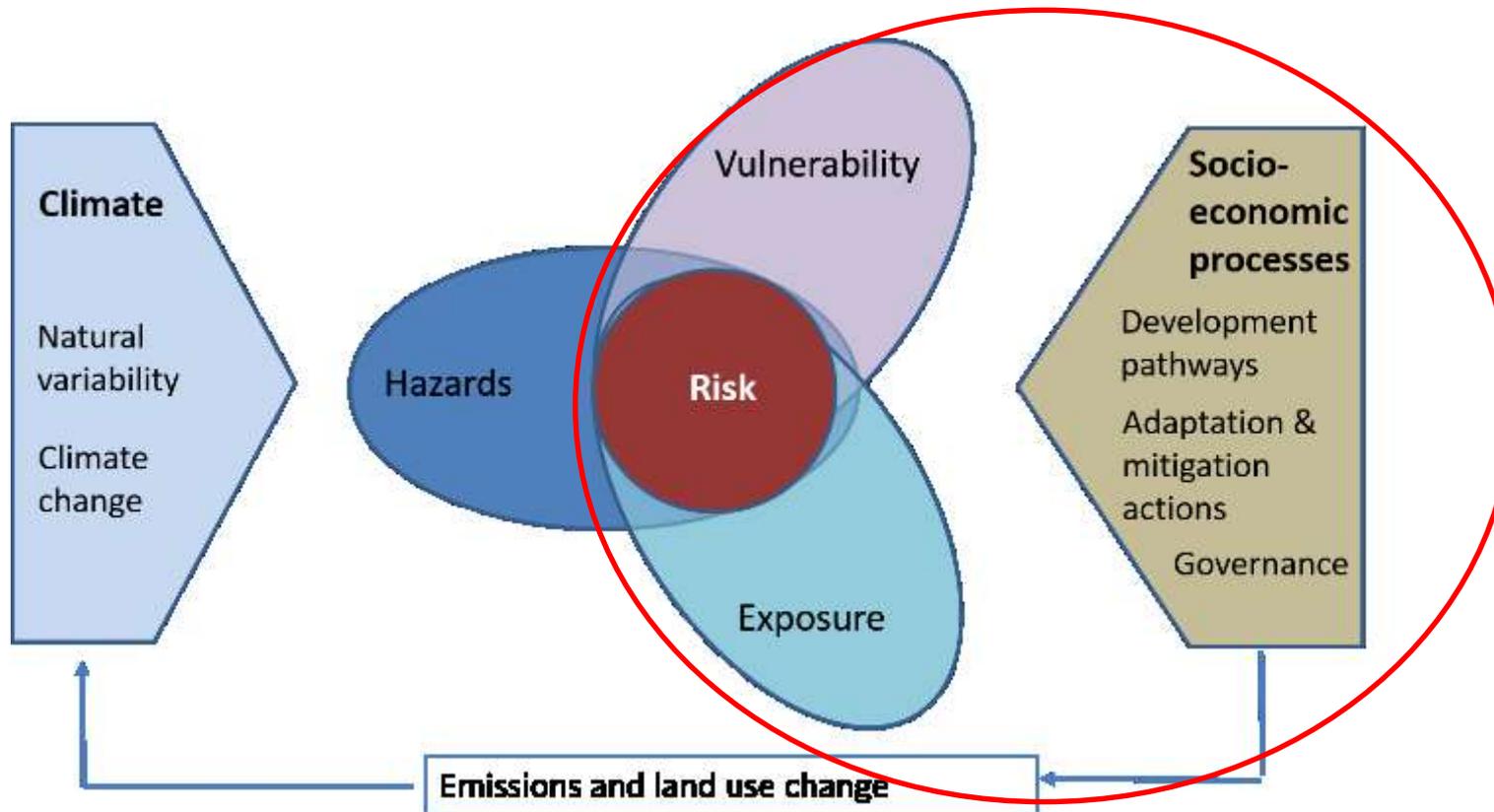
Global climate–demography vulnerability index (CDVI)



Samson et al. 2011

The IPCC approach to climate risk and its components

Climate risk as a result of interaction of socioeconomic development, climate variability and climate change



Socio-economic processes:

- Increase exposure and vulnerability
- Influence climate through emissions and land use change

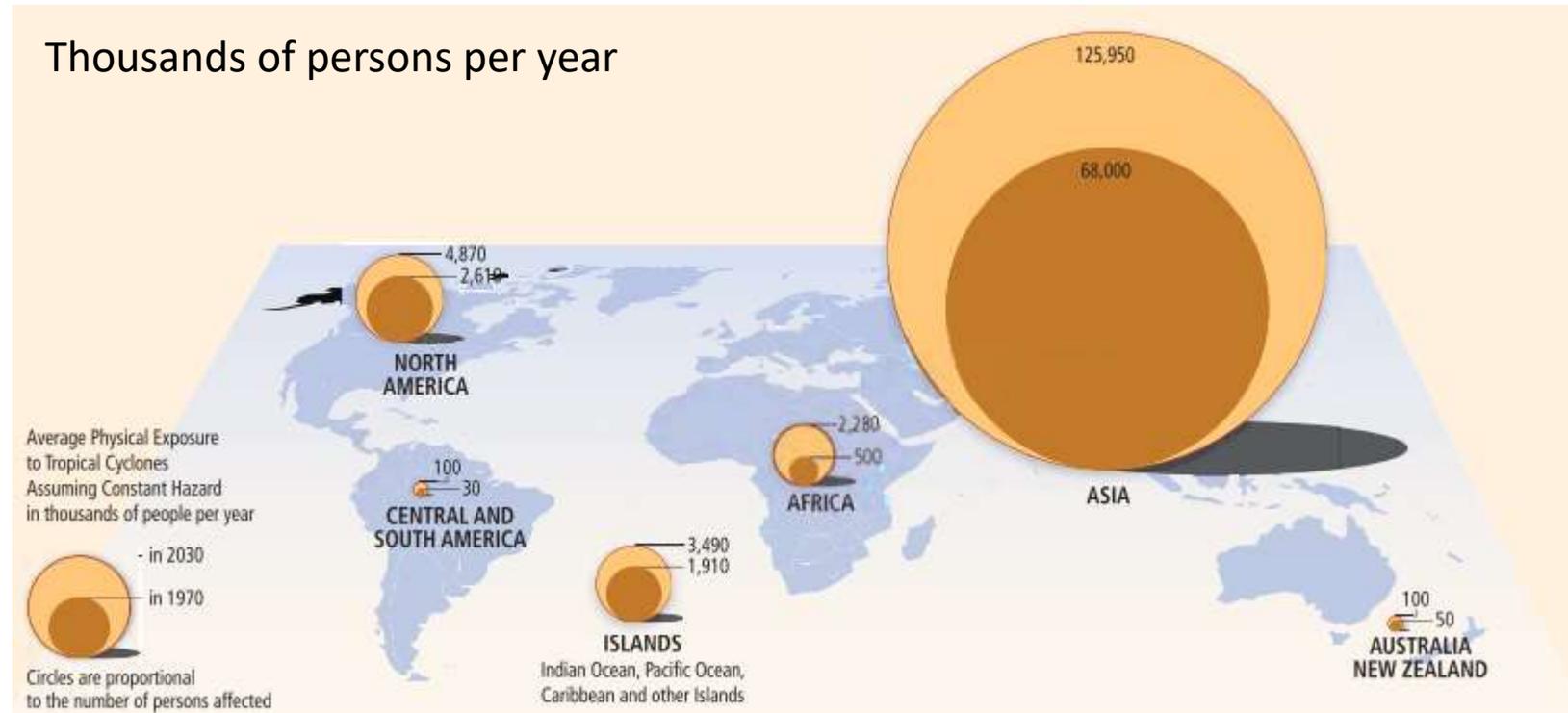
Increasing exposure of people and assets



Jakarta floods 2015



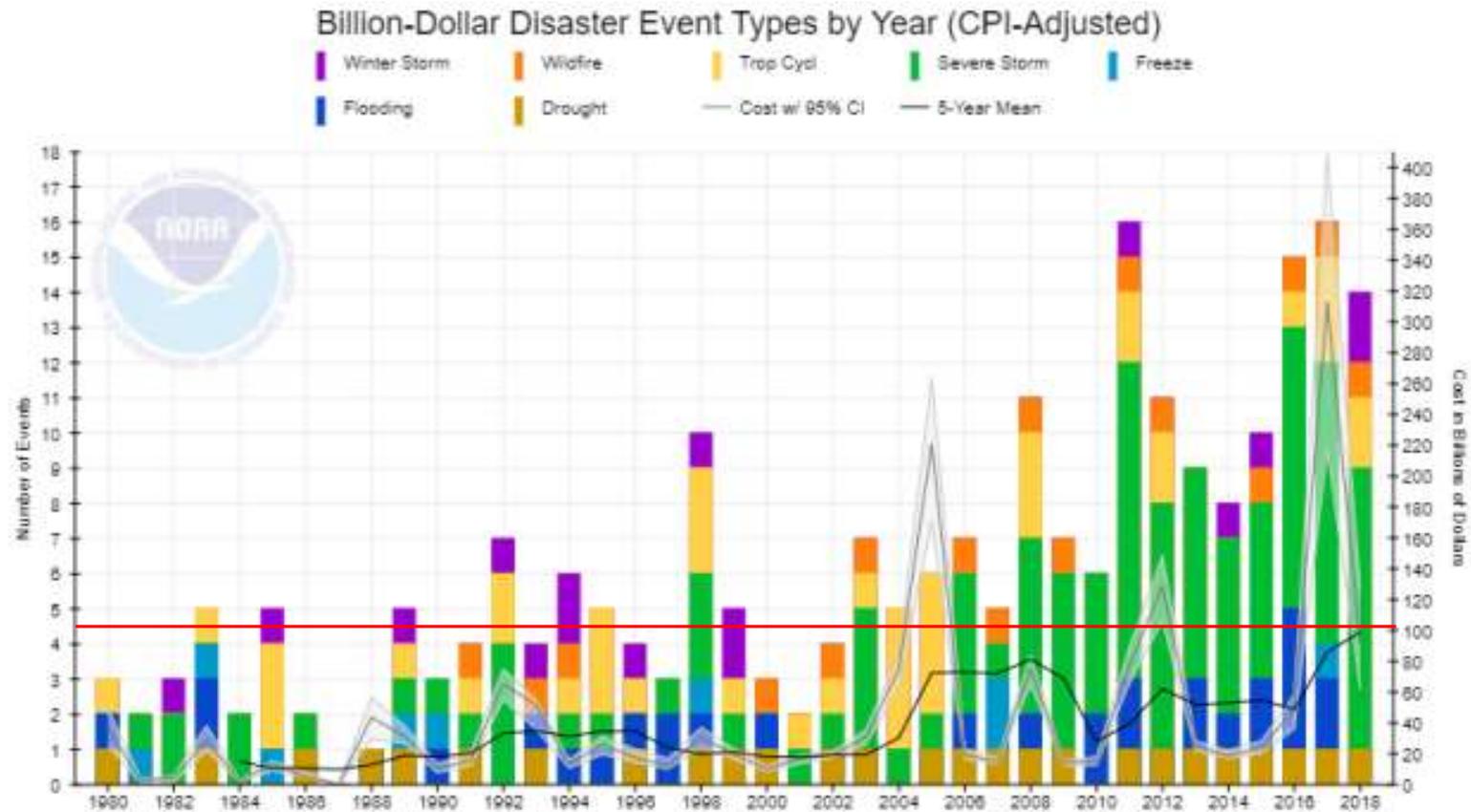
Physical exposure to tropical cyclones in 1970 and 2030



1970 = 73 Million people
2030 = 137 Million people



Billion-dollar disaster events by type in the US 1990-2018



<https://www.climate.gov/news-features/blogs/beyond-data/2018s-billion-dollar-disasters-context>

Increasing exposure of people and assets

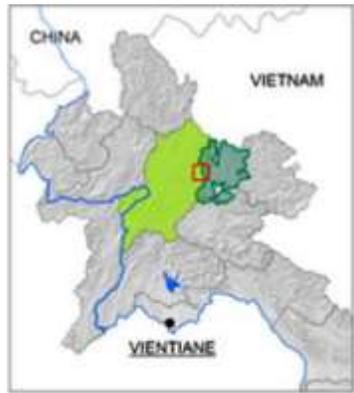


Road to Vienghinsoung village, Laos



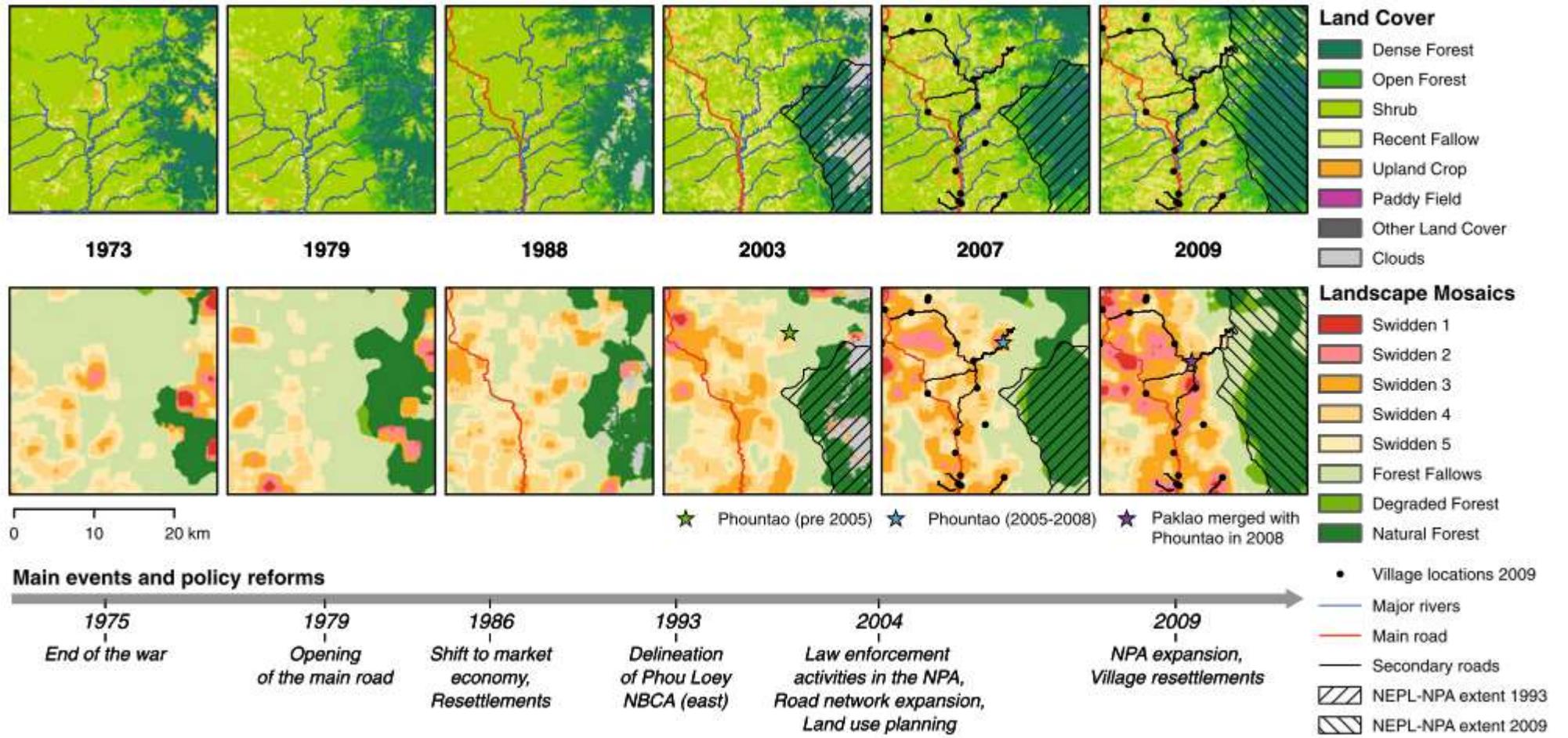
Deforestation and rubber plantation in Ban Kouy, Laos

Land cover and land use change in Viengkham District of Luang Prabang, Laos

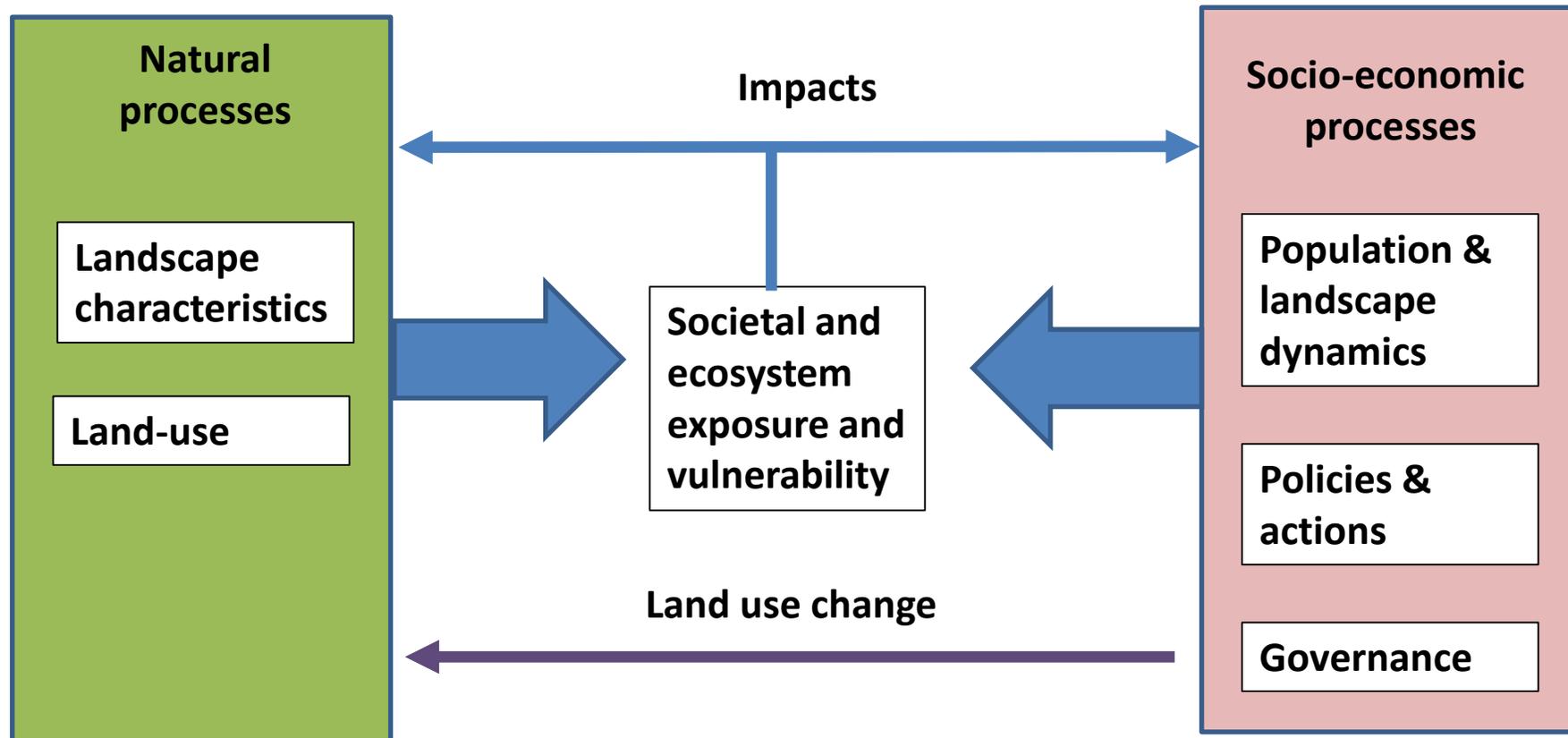


Legend Overview Map

- Landscape window
- Nam Et-Phou Loey NPA 2009
- Luang Prabang Province
- Province boundaries



Vulnerability and land use



Modified after IPCC 2014



Vulnerability of ecosystem services

Ecosystems are threatened by various human-induced pressures

- These pressures include land use change, landscape fragmentation, degradation of habitats, over-extraction of resources, pollution, nitrogen deposition and invasive species
- Climate change will increase these pressures over the coming decades
 - > Ecosystem-based adaptation to climate change
 - > Role of forests and land use in climate change mitigation



Vulnerability of ecosystem services

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 - > Ecosystem-based adaptation to climate change
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Ecosystem degradation as a trigger

- Ecosystem degradation triggers more disasters and reduces nature's and societies' resilience against climate change impacts and disasters
 - This can lead to the collapse of the ecosystem
- The degradation process reduces the capacity of the ecosystem to buffer the impacts of climate change
- Biodiversity loss from ecosystem degradation could cause the breakdown of food chains
- Ecosystem degradation also increases the vulnerability of natural and human systems to the impacts of disasters such as floods, landslides and storm surges



How do people cope with risks?

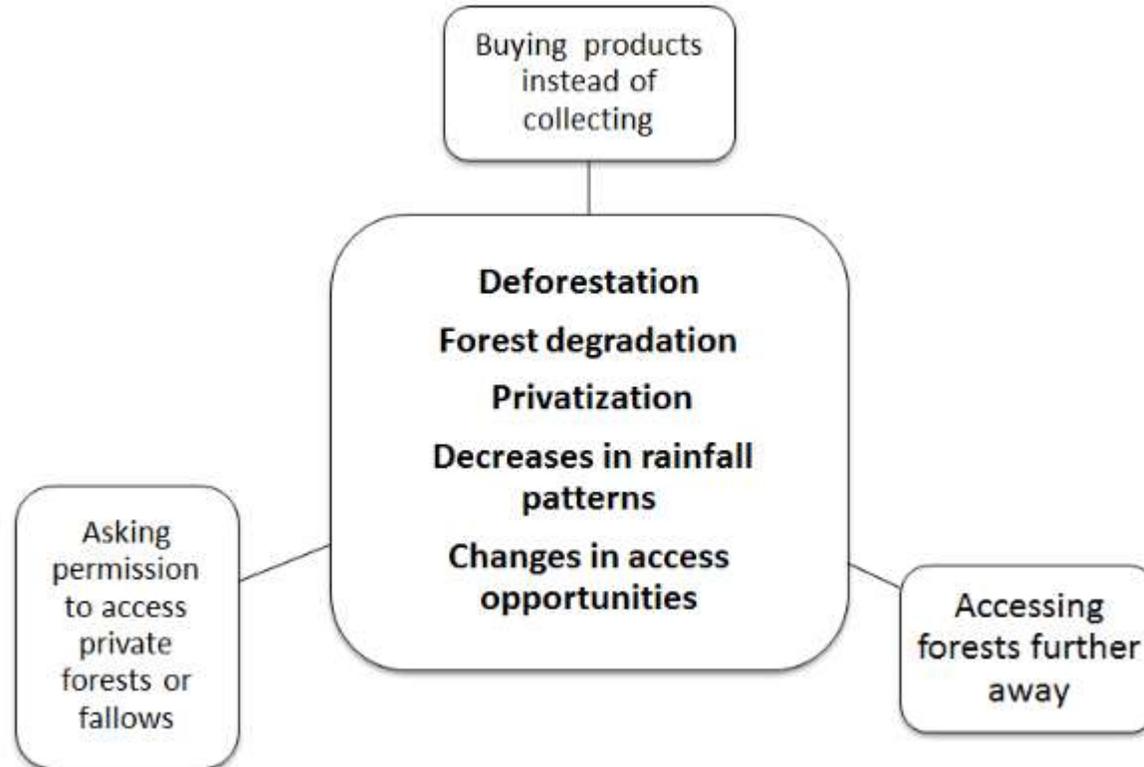
- **Coping strategies**
 - Modify behavior and assets, e.g. sell livestock for purchasing food
 - Temporary migration to other areas and e.g. to paid jobs
- **Adaptation**
 - The process of reducing vulnerability and/or exposure
 - In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities
 - In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected/anticipated climate

Coping - The use of available skills, resources, and opportunities to address, manage, and overcome adverse conditions, with the aim of achieving basic functioning in the short to medium term

Adaptation – The process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities

Example – field course 2017

Coping strategies related to decreasing NTFPs, with causes of change in the center box and coping strategies in the outside boxes





Measuring and analyzing livelihoods, landscape change, risks, vulnerability and adaptation actions

Elements of a research plan



Focus group discussion with women in Ban Tat Ing Ham, Laos 2017

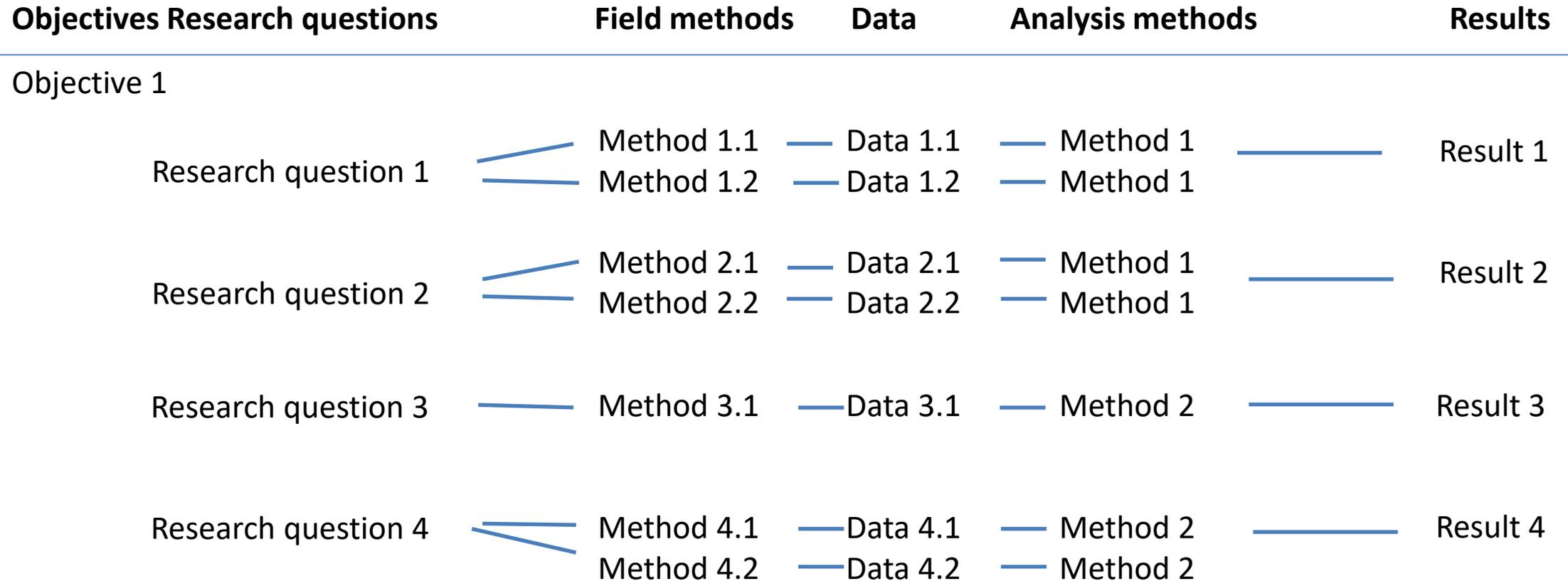


Elements of a research plan (generic)

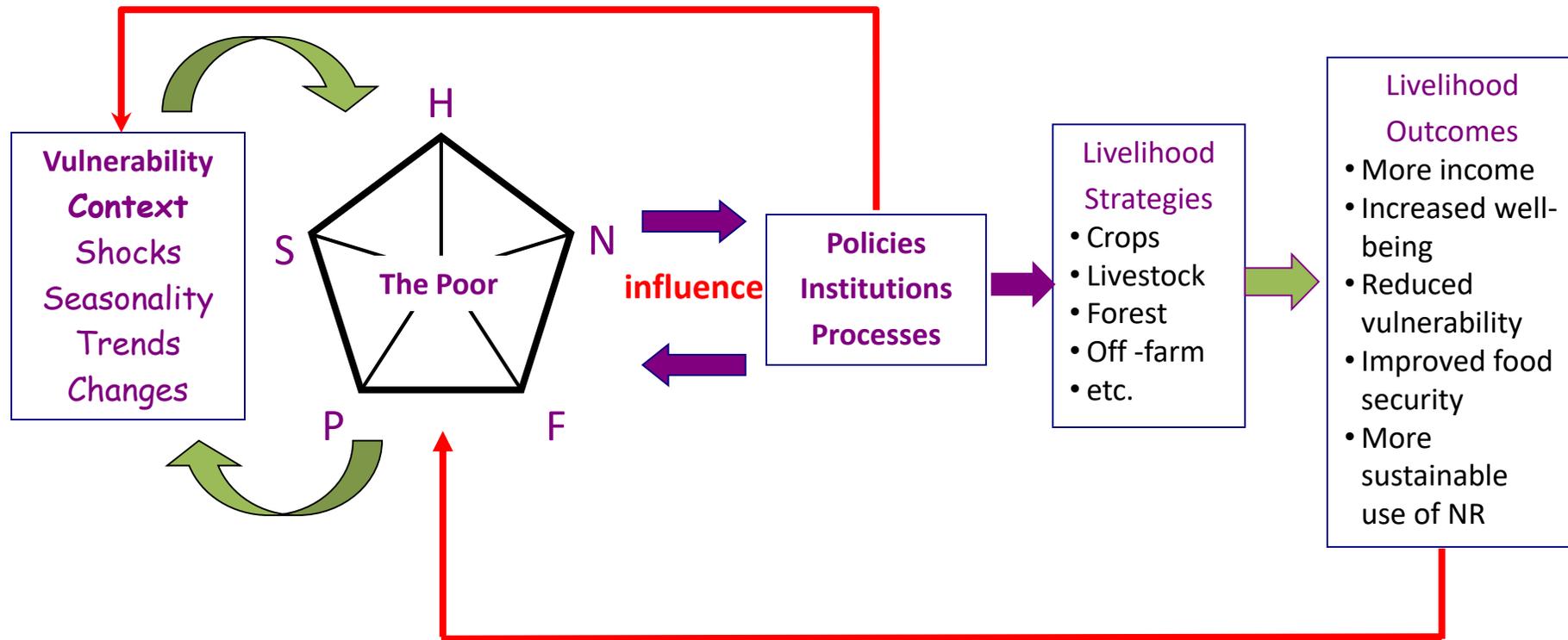
- Problem description (what, where, who?)
- Justification (why?)
- Objectives (what is our aim?)
- Research questions (what do we want to find out?)
- Methods
 - Primary & secondary data, sampling scheme, collection methods
 - Data analysis methods
- Results
- Discussion - recommendations



Research logic



The Sustainable Livelihoods Framework (SLA)





Research objectives & research questions

Livelihoods

Environmental change

Research objectives 1 & 2	Research objectives 3 & 4
1) To understand the most important livelihood activities and the role of forest & natural resource related products in livelihoods	3) To understand the changes, shocks and crises that has happened in village and surrounding areas during the recent past
2) To understand how does the accessibility to closest market affect the usage of forest & environmental products	4) To understand the reasons and coping strategies regarding these changes, and what has been the role of forests and their ecosystem services in this

Discuss and define the key research questions for each research objective

Discussion in small groups





Research objectives & research questions (2)

Research objectives	Research questions
1) To understand the most important livelihood activities and the role of forest & natural resource related products in livelihoods	<ol style="list-style-type: none">1. What are the three most important forest & environmental products/income sources, & their purpose in terms of subsistence/cash?2. Who are involved in livelihood activities?3. Are there any other income sources from own business & other off-farm incomes?
2) To understand how does the accessibility to closest market affect the usage of forest & environmental products	<ol style="list-style-type: none">1. What is the distance to markets?2. What is the condition of the road and other infrastructure?3. Are there any seasonal shocks affecting the accessibility to the market?



Research objectives & research questions (3)

Research objectives	Research questions
3) To understand the changes, shocks and crises that has happened in village and surrounding areas during the recent past	<ol style="list-style-type: none">1. During the last year has your family faced a situation when you did not have enough food to feed your household?2. During the last year has your family experienced any of these events – a) floods, b) drought, c) loss of animals....3. During the last 10 years have you experienced changes in precipitation, temperature....
4) To understand the reasons and coping strategies regarding these changes, and what has been the role of forests and their ecosystem services in this	<ol style="list-style-type: none">1. Hunger (from above). If yes, how did you cope with it?2. Questions 1 and 2 from above. If yes, did you collect more forest or wild products for selling or for own use?3. Question 3 from above. If yes, how did you cope with the situation?

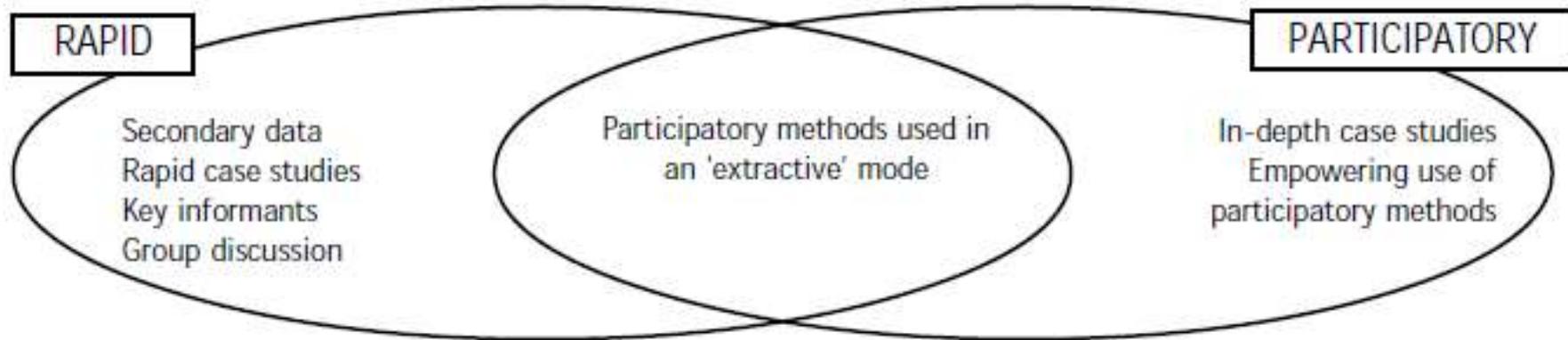


Data types & collection methods

- Primary data & secondary data
- Quantitative & qualitative data
- Rapid appraisals vs. in-depth participatory research
- Cross-sectional & longitudinal data

..... So many -> How to choose?

Rapid or participatory?



- Depends of the objectives and scope of the study
 - Rapid – a quick overview of the situation, usually a part of something else
 - Participatory – profound understanding of the situation, aiming at triggering the change process



Rapid assessment - challenges

Secondary data

- Information and statistics that are already available when the study begins, including:
 - reports by NGOs, donors or government agencies, etc.
- Data can be uneven in coverage, availability and accessibility
- It may focus only on part of the livelihood strategies or characteristics
- It can be unreliable



Livelihoods, landscape change, risks, vulnerability, adaptation: Research approach and data collection

Primary data

- Data collected in field campaigns
- Sampling plan
 - Where, when, with whom?
- Data collected in
 - Interviews
 - Surveys, mapping etc.
 - Field measurements

Secondary data

- Information & statistics that are already available
- Generic data sets (available almost everywhere)
 - Climatic data (web, national met offices)
 - Human development data (e.g. World Bank)
- Country/location specific data
 - Census, village Hh data sets etc.
 - Land use maps (time series)
 - National reports e.g. to UNFCCC

Village household registry used in sampling design

Data used in the research



Primary data collection

- **Village/community/landscape level**
 - Key Informant Interviews (KII)
 - Village leaders, government forestry officers, etc.
 - Focus Group Discussions (FGD)
 - History of village
 - Most important changes (time line)
 - Village map & change map
 - Seasonal calendar
 - Biophysical data collected (forest inventory, biodiversity, land use, maps etc.)
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- **Household level**
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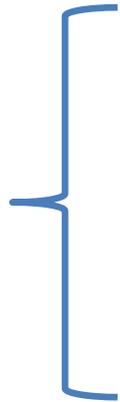


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Dipjoy will explain these in value-chain lecture

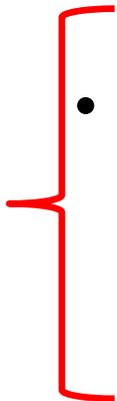


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- **Household level**

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This lecture & next week & individual task





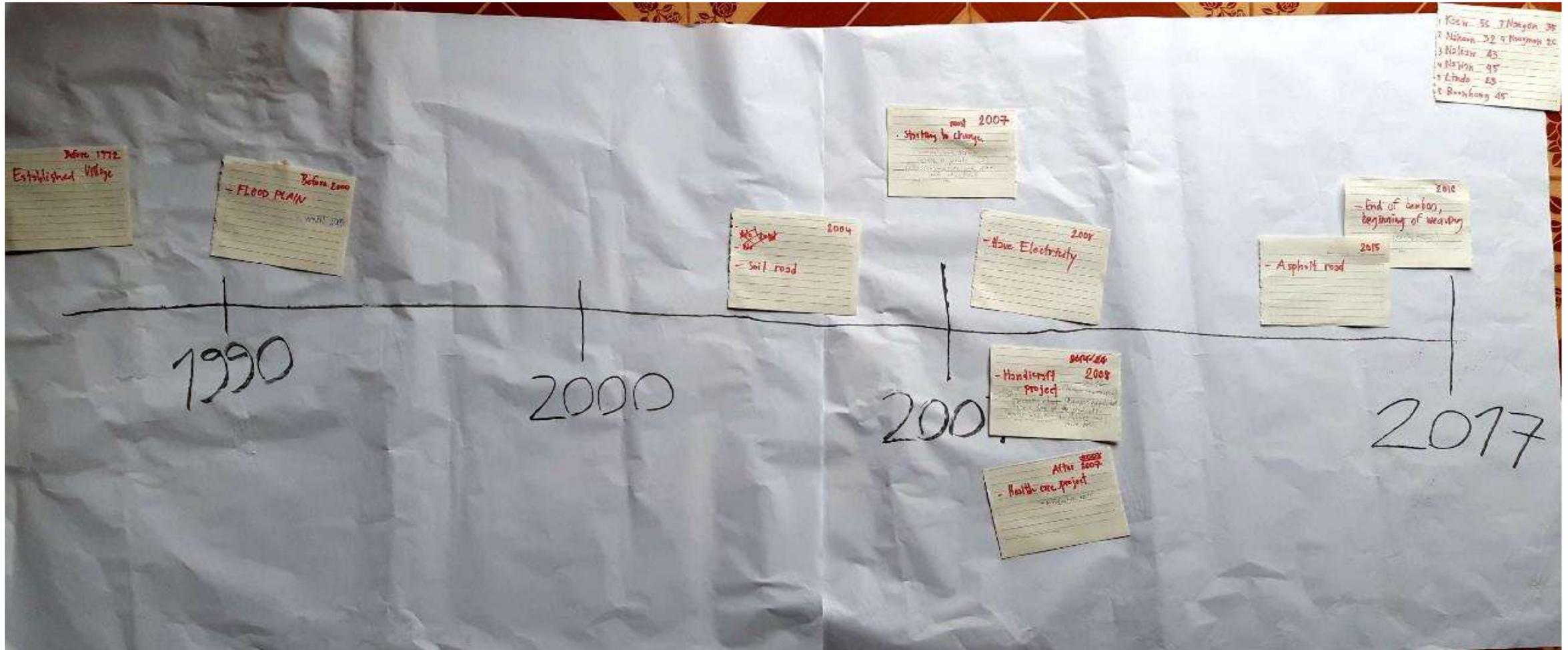
Field course 2019: Methods and data

- Focus group discussions (FGDs)
 - Participatory methods e.g. 1) historical timeline, 2) seasonal calendar, and 3) participatory mapping
 - Men and women separately (3 villages x 2 = 6 FGDs)
- Household interviews (56 interviews in total)
 - Randomly selected households
 - Livelihoods (assets, income) and role of forest in livelihoods
 - What changes have been the most important to the people
 - How the changes have affected different families
 - How the people are coping with the changes
- Secondary data
 - Climatic data
 - Census data of villages



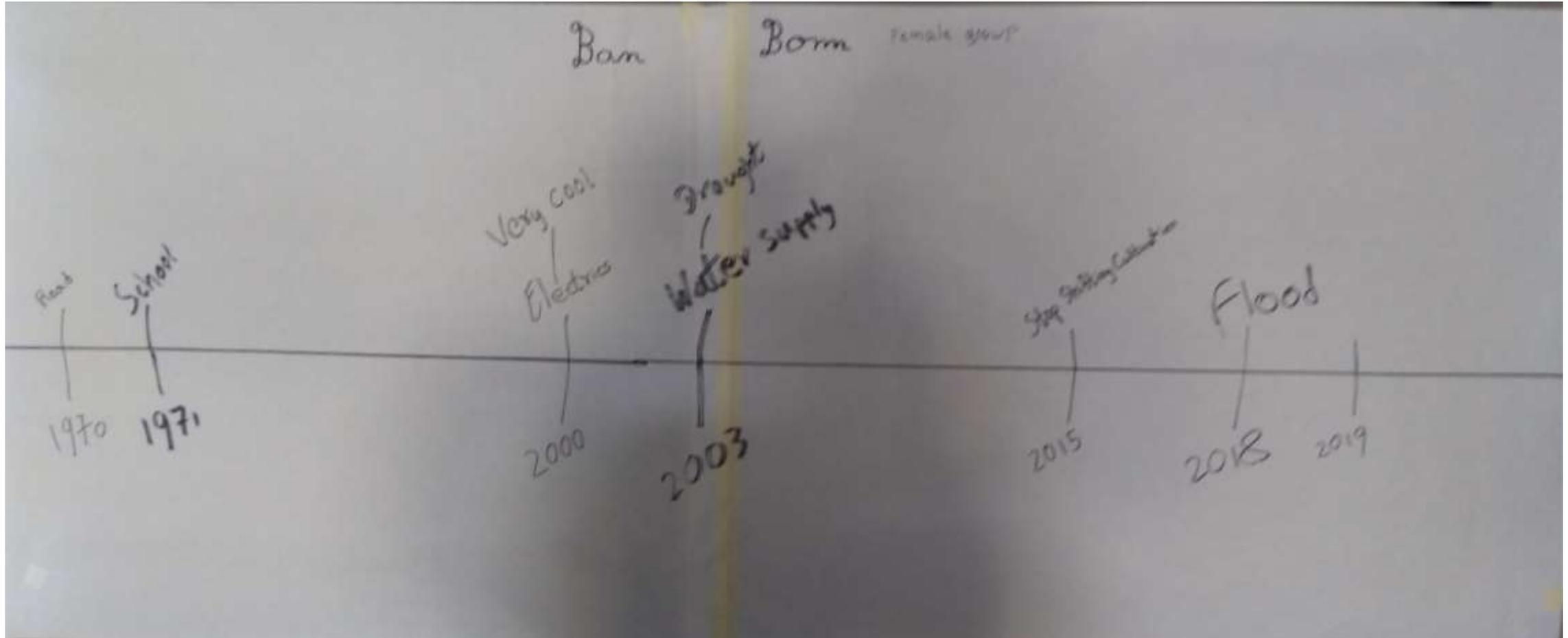


Time line from focus group discussion in Ban Kouay, Laos 2017

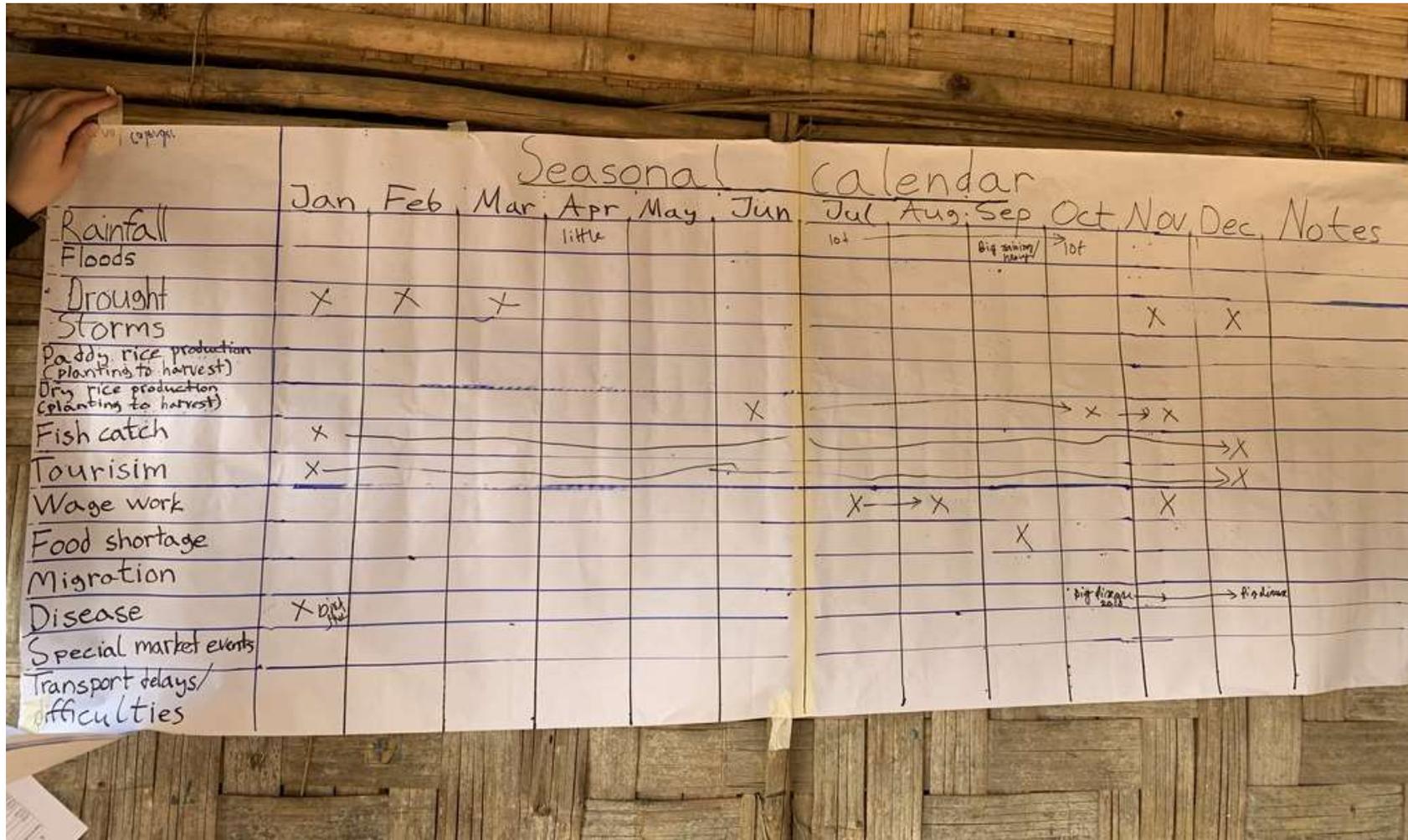




Time line from women focus group discussion in Ban Bom, Laos 2019



Seasonal Calendar



Seasonal Calendar, Female FGD in Vieng Hin Song village, 2019



Rapid assessment - challenges

Key informants

- Key informants are individuals who are approached for their views on livelihood issues
 - Not necessarily in particular positions of prestige or power
 - Those chosen should be diverse (different stakeholder groups)
- This might be the most cost-efficient way of getting quick understanding on the situation in a particular place: spend three days in the area and talk to key informants
- Use a semi-structured list of questions
- Caveats & problems
 - Potential dominance of certain groups or interests (the “noisy” ones) - make sure that the viewpoints of ‘silent’ groups are included



FAO, CIFOR, IFRI, World Bank. 2016. **National socioeconomic surveys in forestry: guidance and survey modules for measuring the multiple roles of forests in household welfare and livelihoods**, by R.K. Bakkegaard, A. Agrawal, I. Animon, N. Hogarth, D. Miller, L. Persha, E. Rametsteiner, S. Wunder and A. Zezza. 172 p.

<http://www.fao.org/publications/card/en/c/I6206E/>



Food and Agriculture
Organization of the
United Nations

National socioeconomic surveys in forestry

Guidance and survey modules for measuring the multiple roles
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FAO
FORESTRY
PAPER

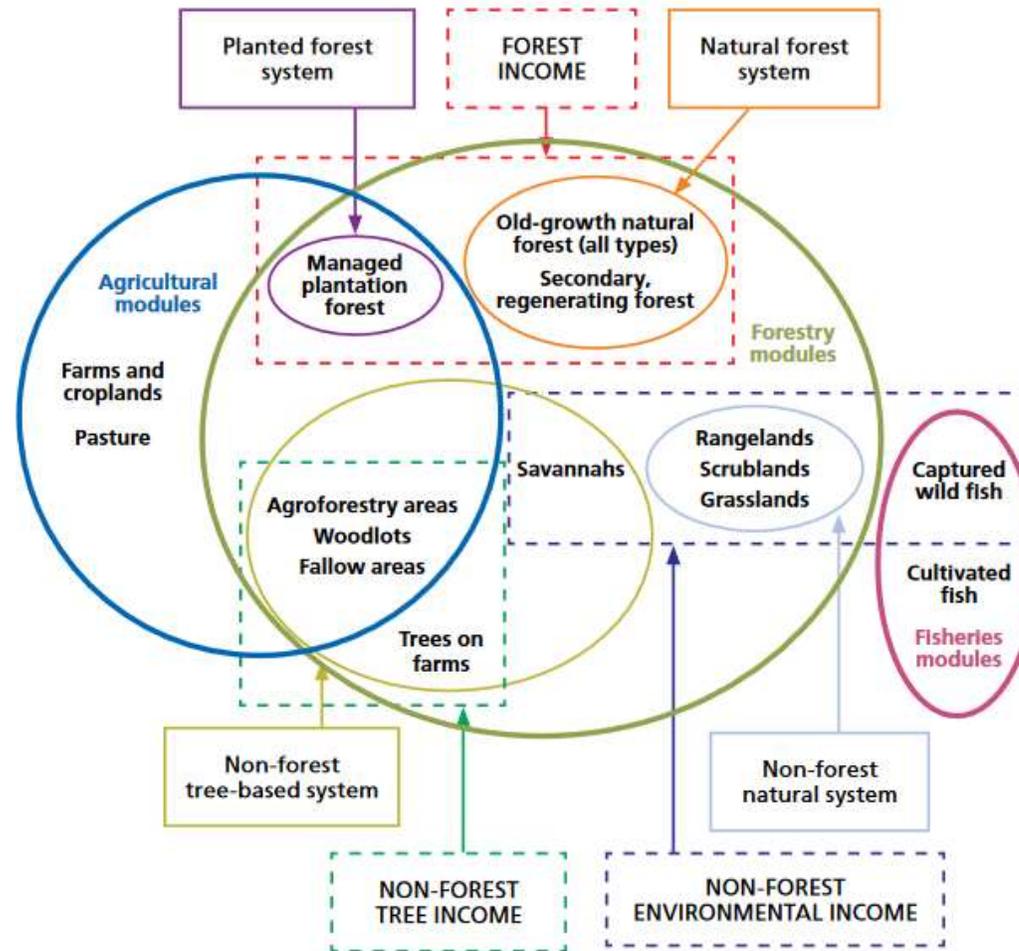
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FAO survey instrument - forestry modules and other LSMS-ISA modules: Coverage of **forest, tree and environmental incomes** and their origin

Other income sources:

- Agriculture (crops, cattle etc.)
- Businesses
- Wages
- Remittances
- Other





FAO Forestry Modules

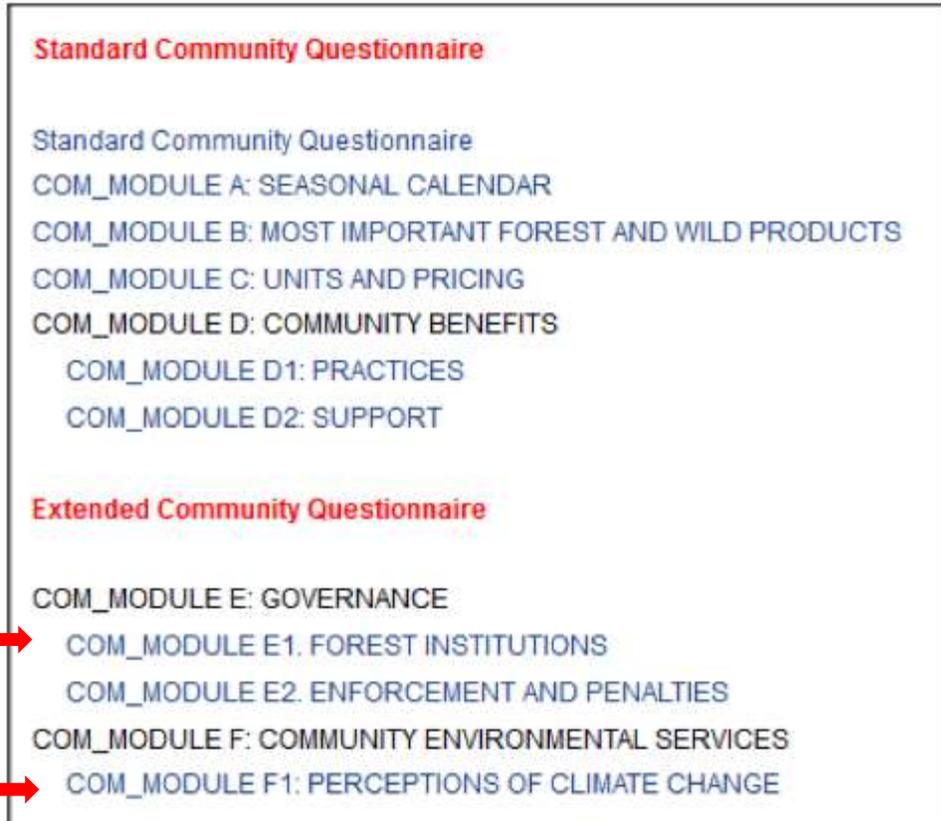


Livelihoods

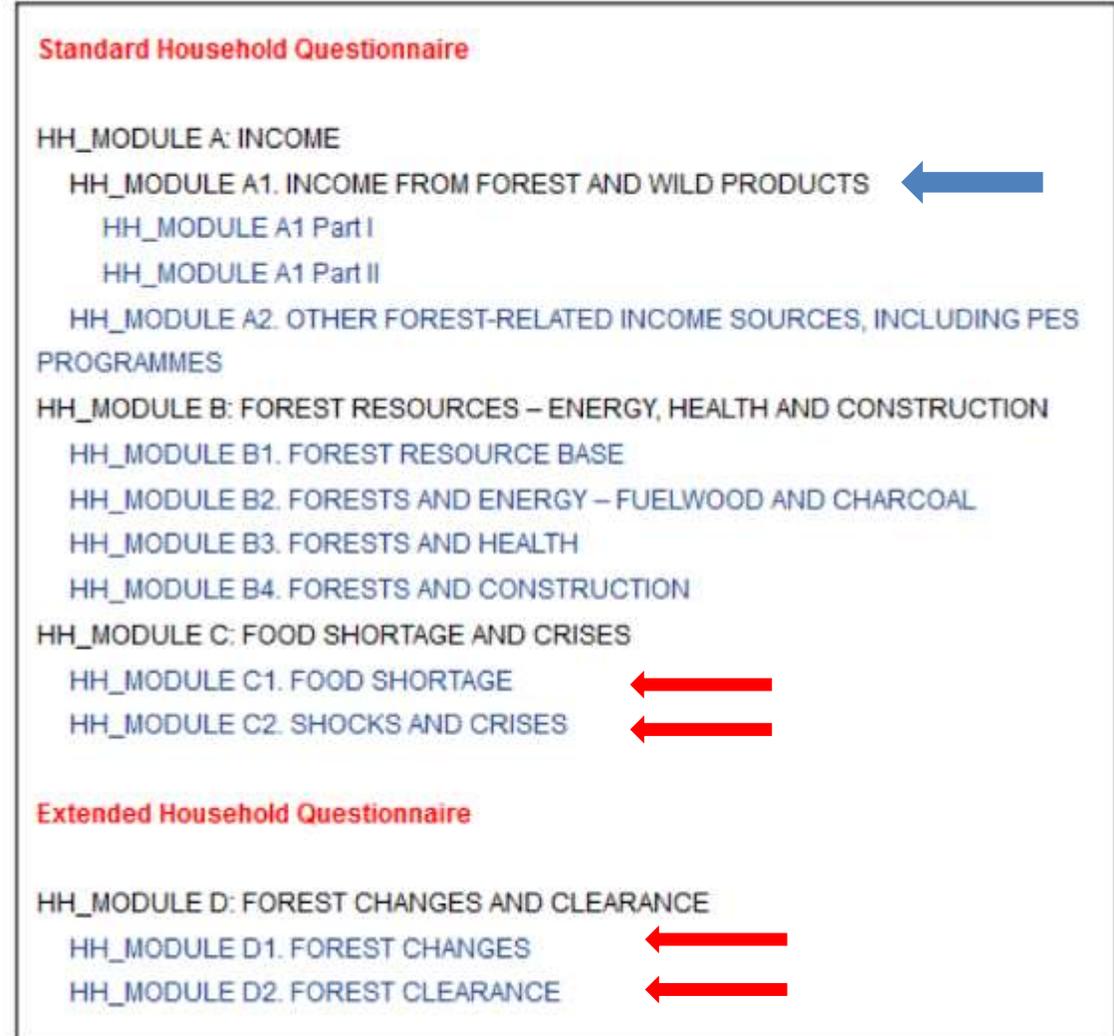


Changes, Risks, Adaptation

Groups – Focus Groups



Families – Households





Assessing wealth and income – ownership of land

3. Assets

3.1. Household land ownership or rented/shared land

Land use types	Lao Name	No. of plots	Total area (ha)	Notes
1. Residential/ construction land	Din pouk sarng (ດິນປູກສ້າງ)			
2. Agriculture Land	Thi din ka si kum (ດິນກະສິກຳ)			
3. Paddy land	Din na (ດິນນາ)			
4. Pasture land	Kang lieng sud (ຄັງລິງສັດ)			
5. Shifting land currently with crop	Din hai kao (ດິນໄຮກຳ)			
6. Fallow shifting land	1. Pate Re Tu (?) 2. Pate Reng Kenyon (?) 3. Pate Reng Ke (?)			
7. Production/utilization forest	Par pha lid (ປ່າຊົມໃຊ້)			
8. Pond	Nong par (?)			
9. Other reserved land (but not used)	Din jhub ihorng (?)			
10. Other land use	Din num sai eun eun (?)			

The livelihood assets

The five “capitals”

- H = Human capital
- N = Natural capital
- F = Financial capital
- P = Physical capital
- S = Social capital

Additional questions on assets:

- Equipment and tools
- House construction
- Running water
- Electricity
- Etc.

Assessing wealth and income - housing

The livelihood assets

The five “capitals”

H = Human capital

N = Natural capital

F = Financial capital

P = Physical capital

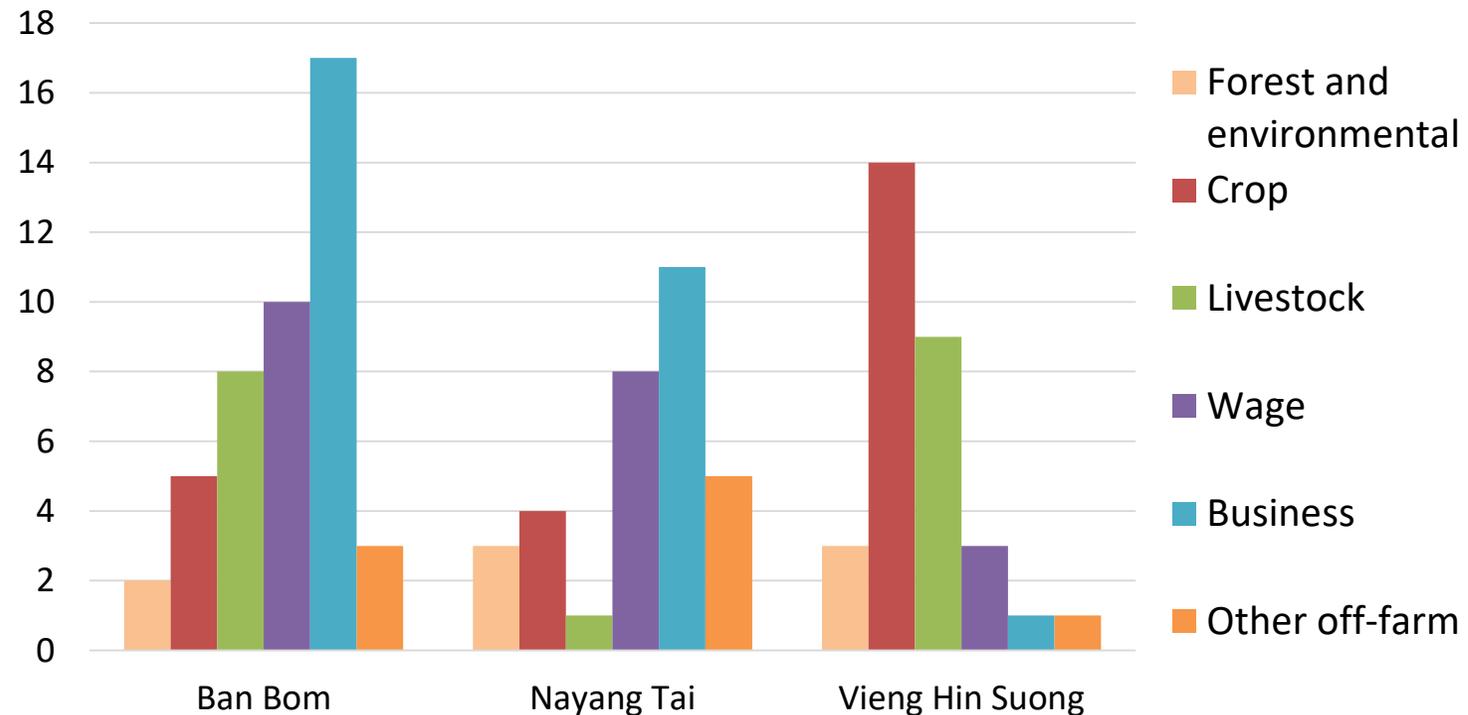
S = Social capital





Assessing wealth and income – income sources

1st and 2nd most important cash income sources in three villages in Northern Laos (2019 field course)





Food security

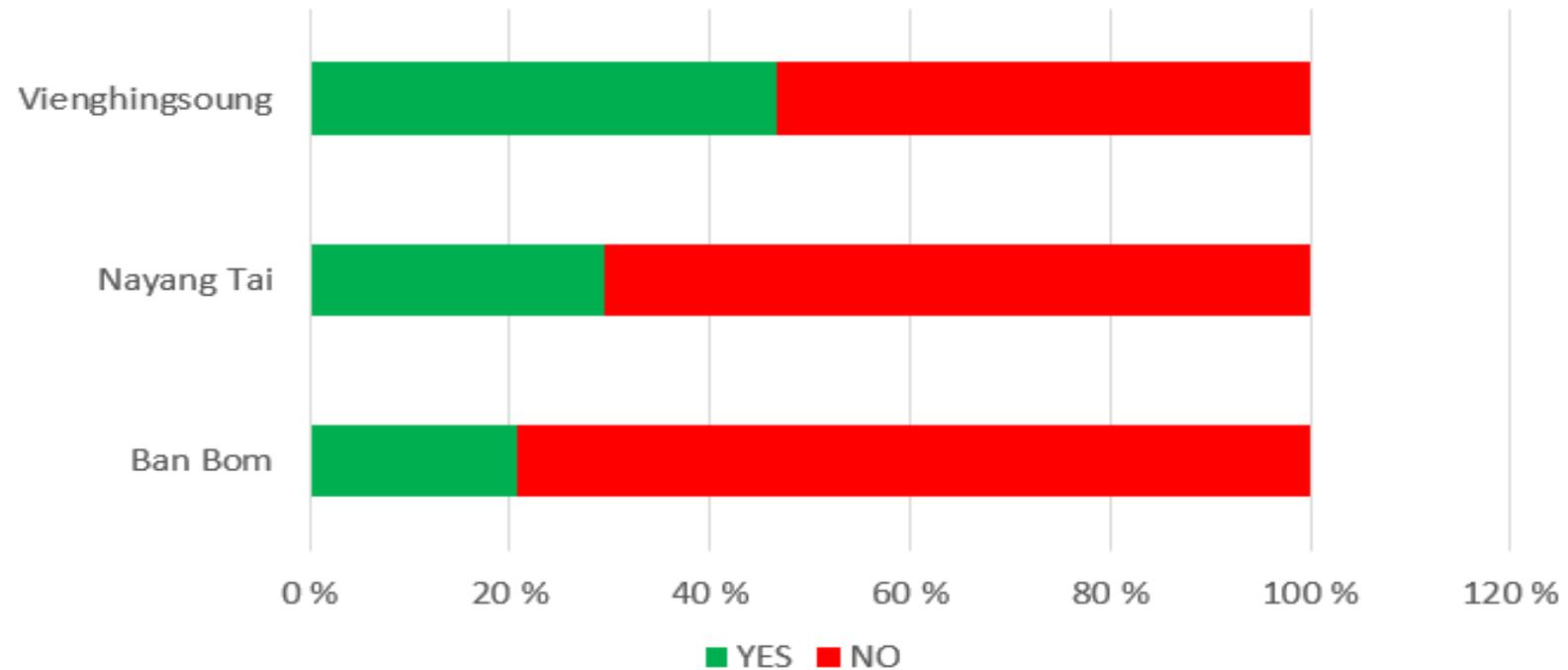
5. Food security (FAO p. 108)

HH_MODULE C1. FOOD SHORTAGE		
1.1 In the last 12 months, have you been faced with a situation when you did not have enough food to feed the household? CODES: 1 = yes 2 = no >> [NEXT MODULE]		
1.2 How many months in the past 12 months did you not have enough food to feed the household?		months
1.3 During the critical months when you did not have enough food to feed the household, did your household consume or use forest or wild products to meet food needs? CODES: 1 = yes 2 = no >> [NEXT MODULE]		
1.4 How important were forest or wild products in helping your household through the critical months, compared with other resources your household relied on to overcome food shortage, (for example, drawing on agricultural stocks, borrowing from friends and family, or finding work)? CODES: 1 = very important, we rely primarily on forest products to overcome food shortage 2 = somewhat important, but we also rely on other resources to overcome food shortage 3 = no more or less important than other resources we rely on to overcome food shortage 4 = somewhat unimportant (we generally rely on other resources to overcome food shortage) 5 = very unimportant (we only rely on forest products when no other options are available)		
1.1 Please indicate up to 3 forest and wild products that were used during the months when there was not enough food: CODE PRODUCT	Product 1.	
	Product 2.	
	Product 3.	
1.2 How did your household (primarily) obtain each of these forest or wild products? CODES: 1 = bought, 2 = collected, 3 = charity/donation, 4 = combination of these	Product 1.	
	Product 2.	



Food security (data from 2019)

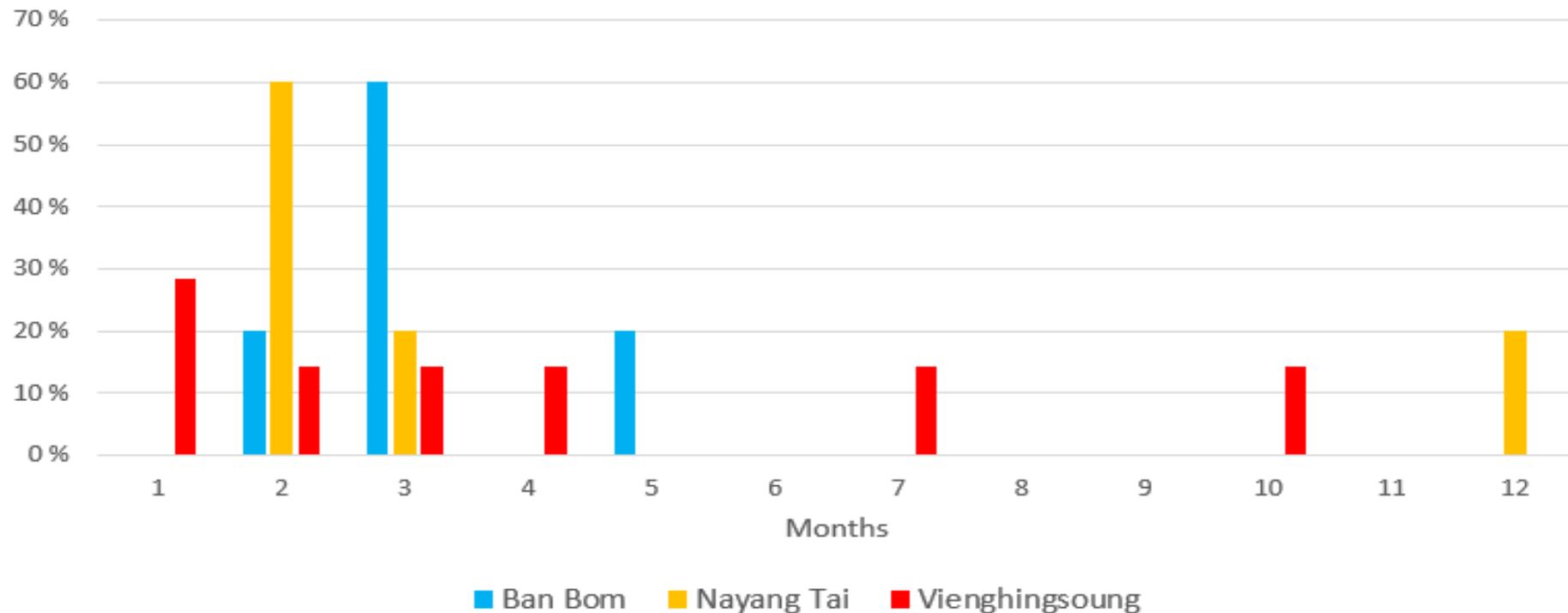
- In the last 12 months, have you been faced with a situation where you did not have enough food to feed the household?





Food security (data from 2019)

- How many months in the last 12 months did you not have enough food to feed the household?





Food security – coping strategies (data from 2019)

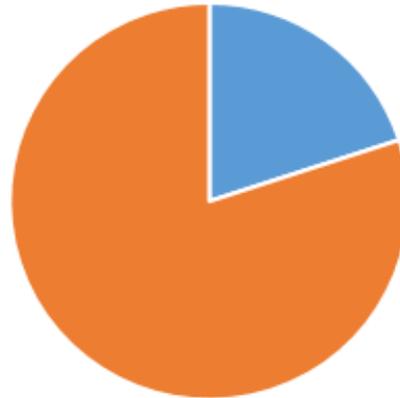
- During the critical months when you did not have enough food to feed the household, how did your household cope?

Ban Bom



- Barter/trade with friends or relatives
- Buying food
- Collecting forest products for eating
- Other

Nayang Tai



- Barter/trade with friends or relatives
- Buying food

Vienghingsoung



- Barter/trade with friends or relatives
- Buying food
- Collecting forest or wild products for eating
- Collecting forest or wild products for selling



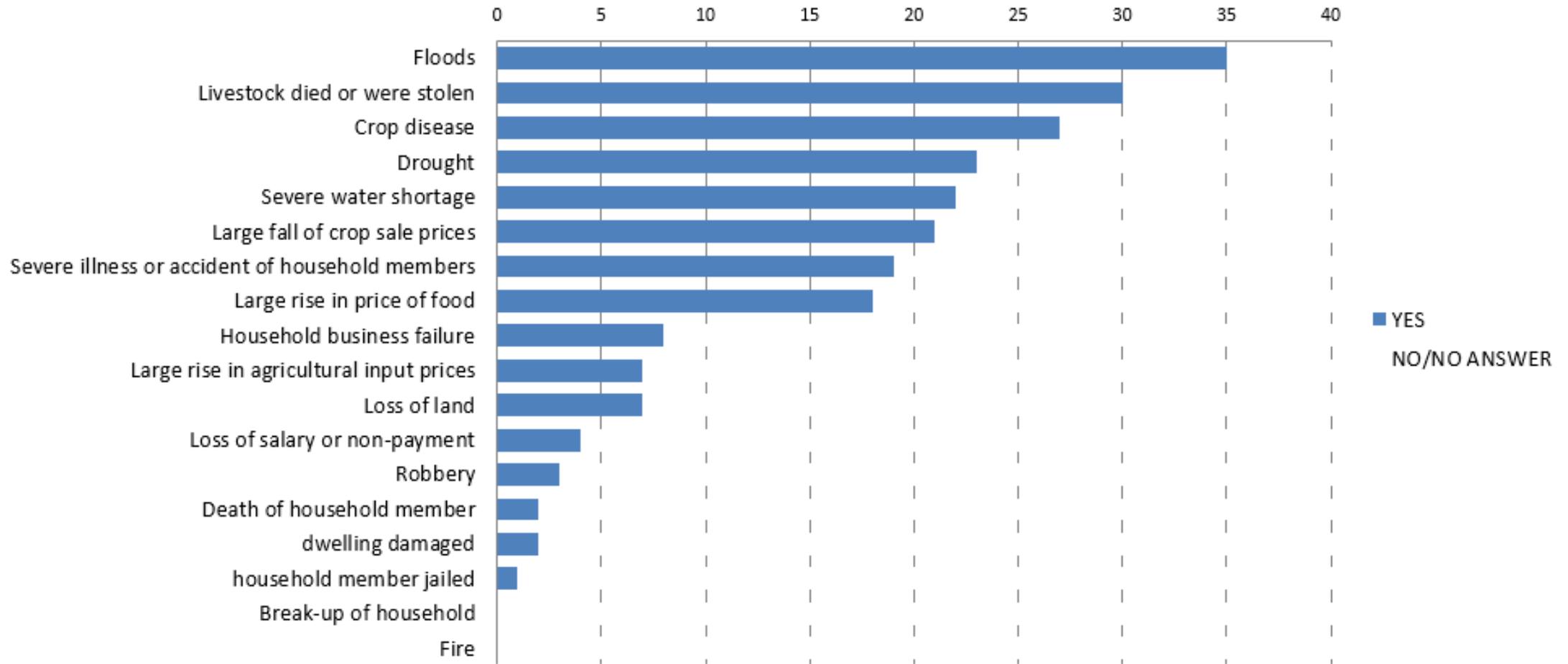
Shocks and crises

6. Shocks and crises (modified from FAO p. 108)

2.1 During the past 12 months, has your household been severely negatively affected by any of the following events?			2.2 Rank the three most significant shocks you experienced	2.3 Did your household collect or use any forest products to help recover from this [EVENT]?	2.4. Other coping and adaptation mechanisms	2.5 When (year/month) the event happened?
1 = yes 2 = no >> [NEXT EVENT]. If no to all >> [NEXT MODULE] THIS MODULE IS LINKED TO THE LSMS HOUSEHOLD SURVEY			1 = most severe 2 = second most severe 3 = third most severe	1 = yes 2 = no >> [NEXT EVENT]		
SHOCK CODE	EVENT	CODE	CODE FOR 3 BIGGEST SHOCKS	CODE	OTHER COPING AND ADAPTATION MECHANISMS	WHEN (YEAR/MONTH) THE EVENT HAPPENED?
101	drought					
101	floods					
102	crop disease or crop pests					
103	livestock died or were stolen					

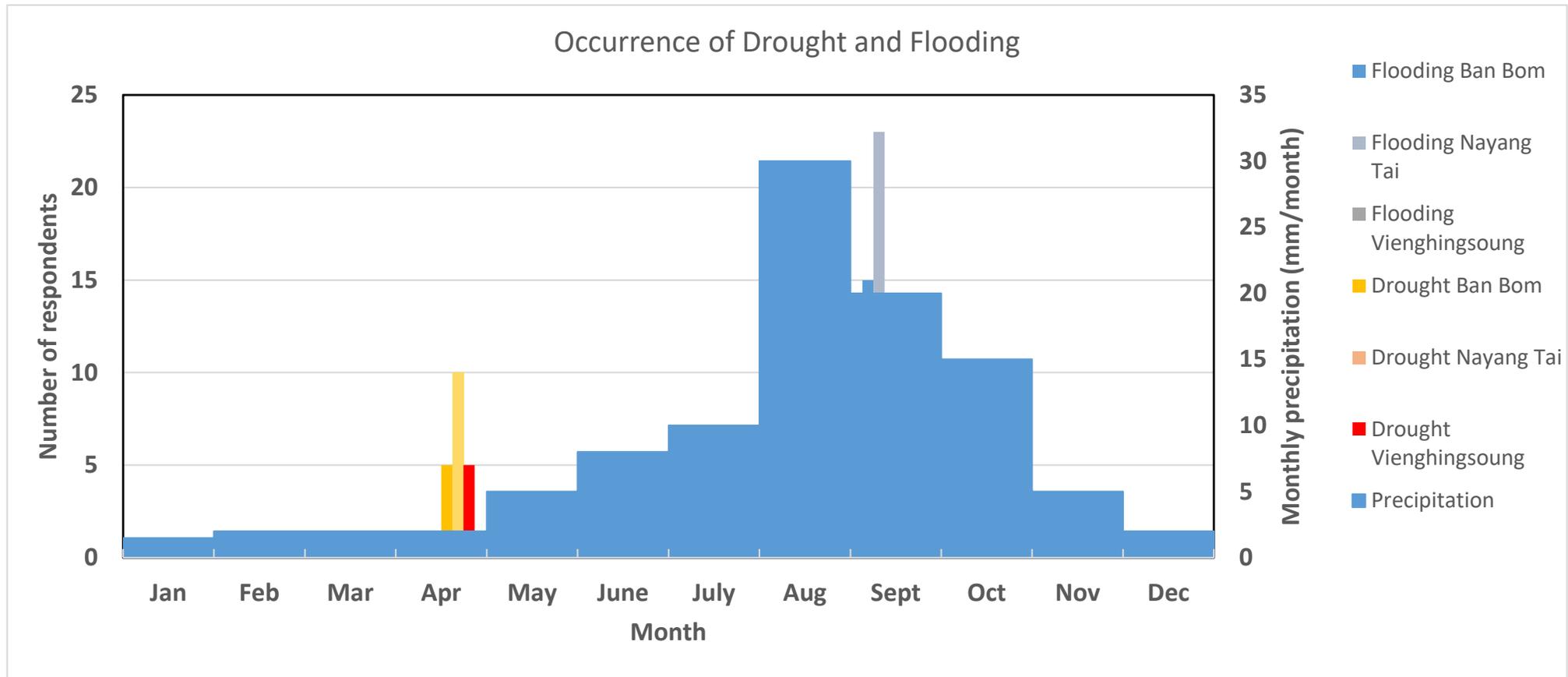


Shocks and crises – general (data from 2019)





Shocks and crises - drought, floods and precipitation (data from 2019)





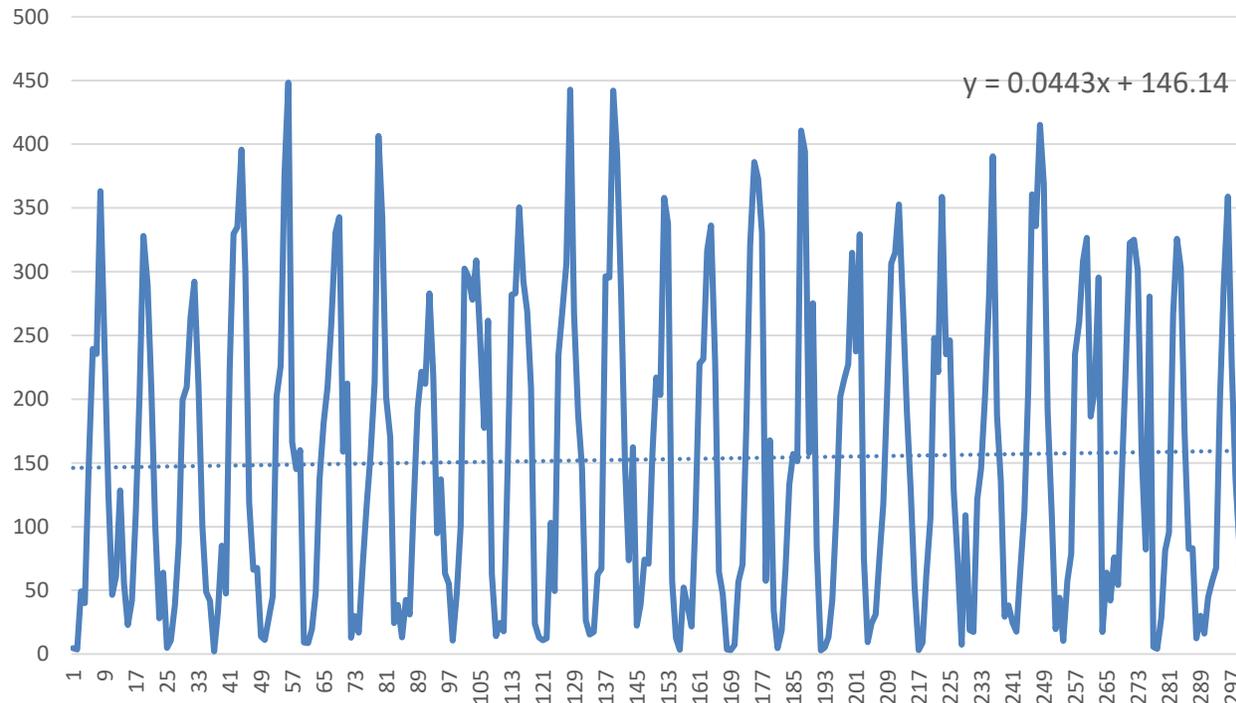
Secondary data

- Information & statistics that are already available
- Reports by NGOs, donors or government agencies
- Main data types
 - Existing land use and land use change maps
 - Climatic data
- The case of Laos
 - Country reports to UNFCCC
 - National adaptation plans
 - Research reports



Vientiane monthly precipitation data 1991-2015

Monthly precipitation (mm), Vientiane 1991-2015



Data:

World Bank Climate Change Knowledge Portal

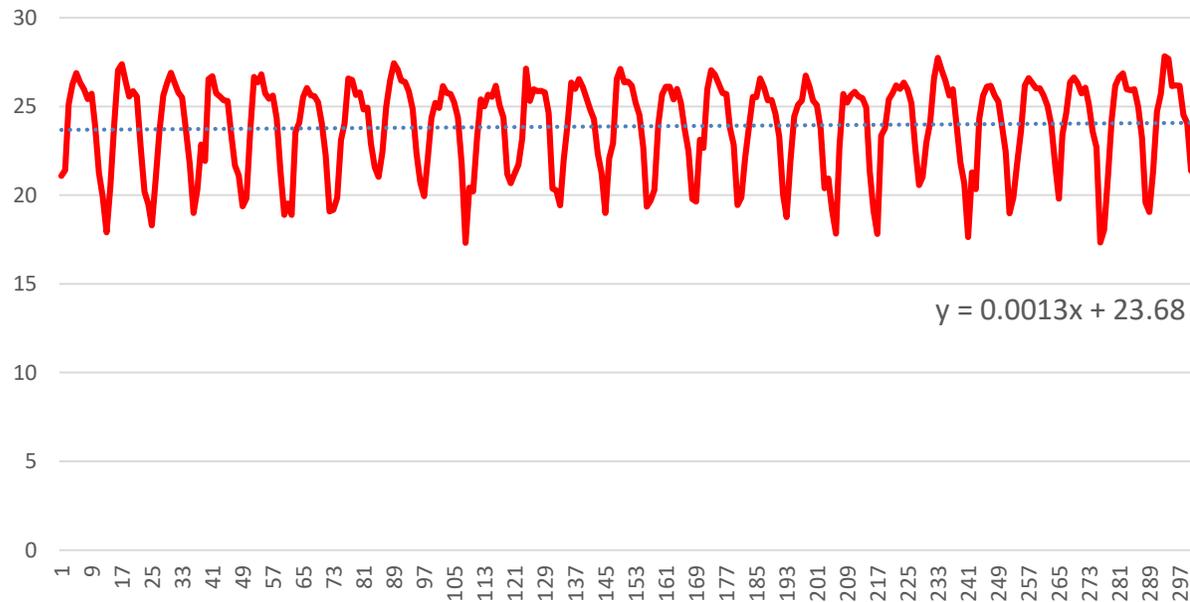
<https://climateknowledgeportal.worldbank.org/>

<https://climateknowledgeportal.worldbank.org/country/laos/climate-data-historical>



Vientiane monthly mean temperature data 1991-2015

Monthly mean temperature (C), Vientiane 1991-2015



Data:

World Bank Climate Change Knowledge Portal

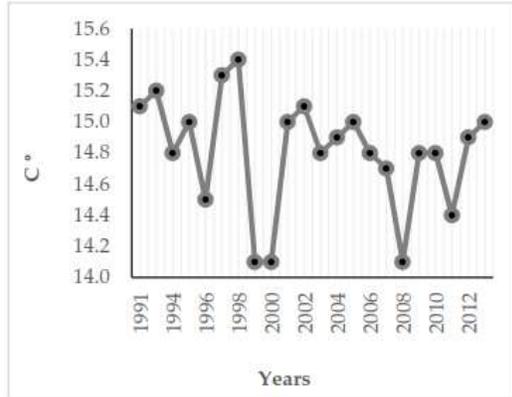
<https://climateknowledgeportal.worldbank.org/>



Analysis of trends in data

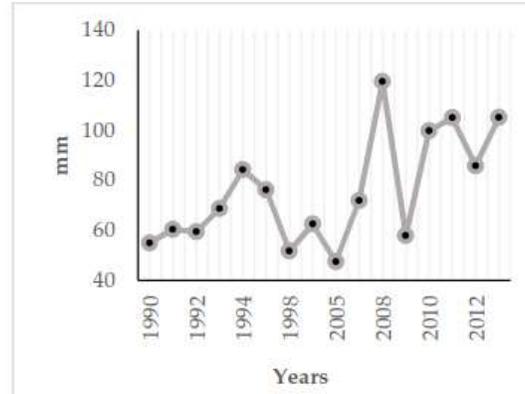
Data

Temperature



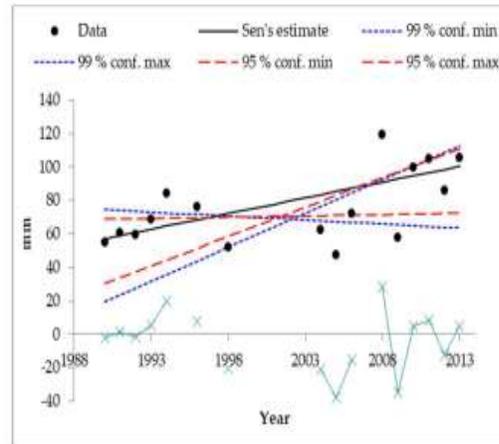
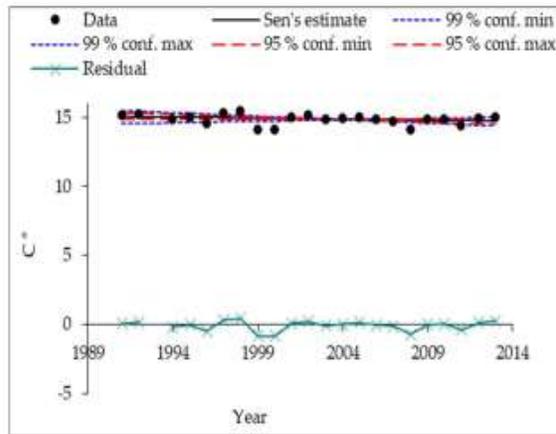
(a)

Precipitation



(a)

Trend analysis



DETECTING TRENDS OF ANNUAL VALUES OF ATMOSPHERIC POLLUTANTS BY THE MANN-KENDALL TEST AND SEN'S SLOPE ESTIMATES -THE EXCEL TEMPLATE APPLICATION MAKESENS

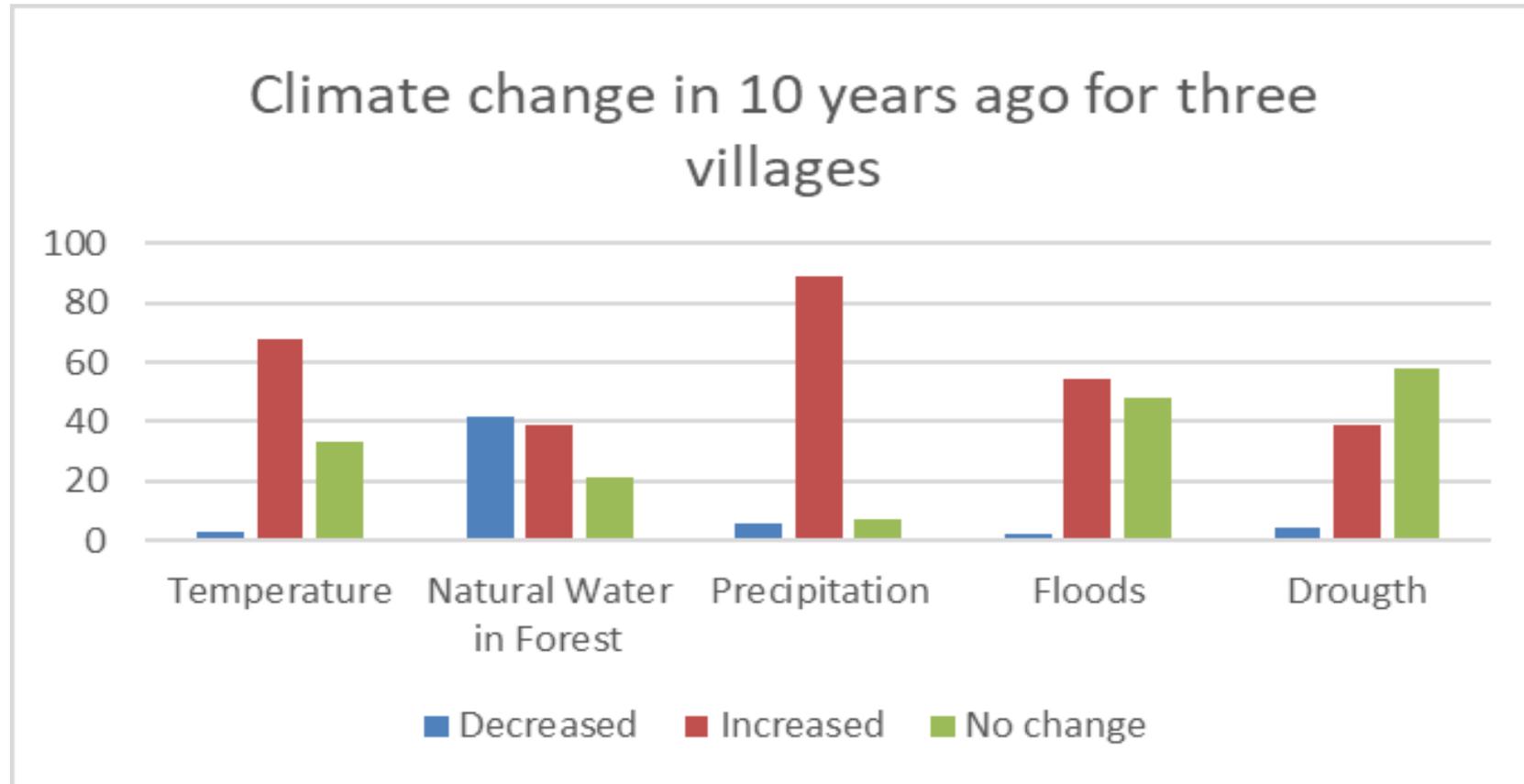
Timo Salmi
Anu Määttä
Pia Anttila
Tuija Ruoho-Airola
Toni Amnell

Salmi, T., Määttä, A., Anttila, P., Ruoho-Airola, T., Amnell, T. 2002. Detecting Trends of Annual Values of Atmospheric Pollutants by the Mann-Kendall Test and Sen's Solpe Estimates the Excel Template Application MAKESENS. Finnish Meteorological Institute, Publications on Air Quality No. 31. 35 p.



Climate change and variability (data from 2019)

- In the past 10 years, have you observed any changes in your village?





Detecting environmental change – challenges 1

Understanding/perception of environmental change

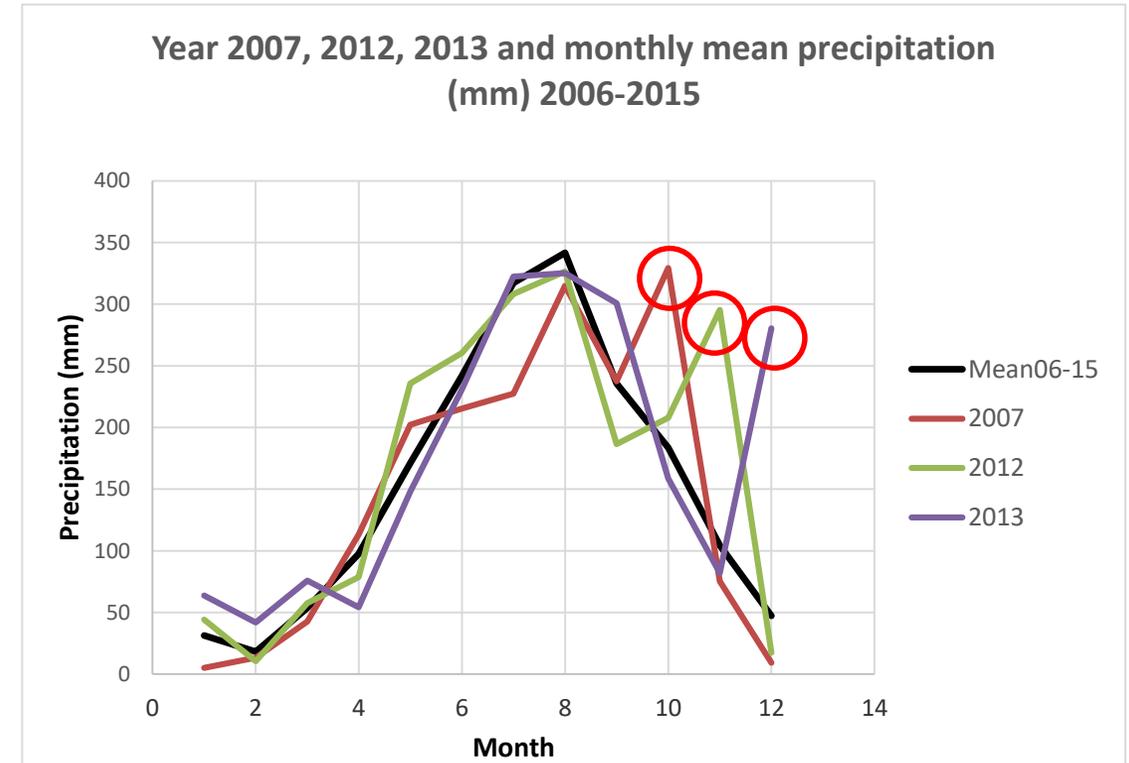
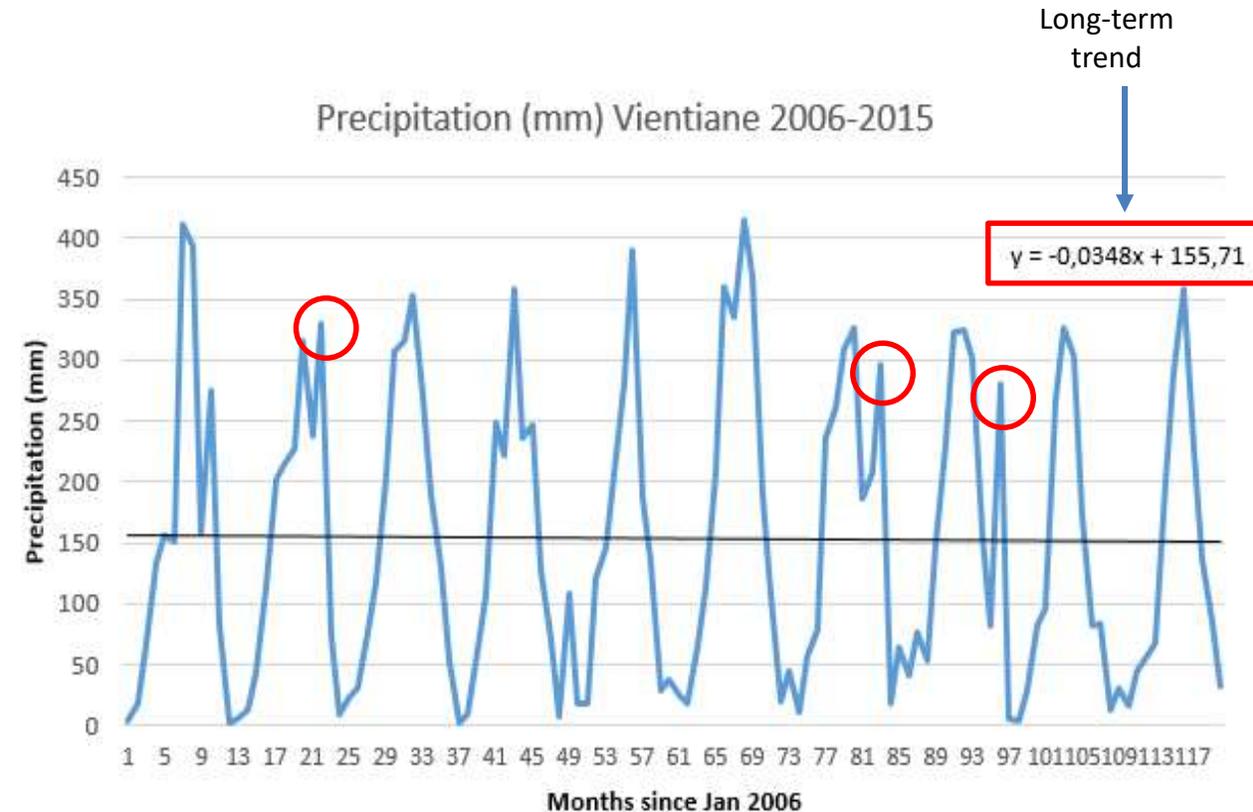
- Perception/understanding of “environmental change” of villagers may be different from that of the interviewers/researchers

Example:

- Villagers say that they have perceived/experienced “increased rains” i.e. “increased precipitation” in their village
- This can be understood as
 - a) Trend in annual or monthly precipitation = Increasing precipitation over time
 - b) Changes in the seasonality = “off-season” rains, e.g. more precipitation in the “dry season”
- Analysis of climatic data needed to confirm/reject these hypotheses



Climate change - precipitation



Long-term trend: slightly decreasing annual precipitation levels since 2006

Red circles: an illustration of off-season precipitation peaks in 2007, 2012, and 2013



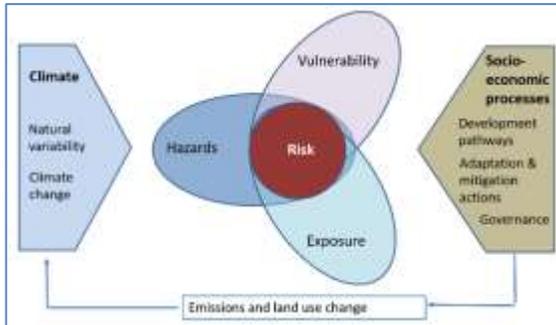
Detecting environmental change – challenges 2

Role of socio-economic change and non-climatic factors

- In many cases, climate-related risk increases because of human-induced increase in exposure and/or vulnerability
- These changes can outweigh hazards (=climatic change)

Example:

- Villagers say that they have lost their crops because of floods “caused by climate change”
- This can be explained by
 - a) Increased exposure: Majority of the rice paddies in the village are currently located close to rivers: a) water is available for irrigation, but 2) exposure to flooding is high. In the past, these areas were frequently flooded and thus not cultivated or with low crop yields
 - b) Increased vulnerability: Changes of land use and infrastructure in the village have reduced the ability to cope with floods
 - c) Increased hazard: Climatic and land use changes have altered the quantity and seasonal pattern of the monsoons rains in Mekong region



Remember

Methods in FGDs:

- Time line
- Participatory mapping

Secondary data:

- Meso-scale climatic studies in the region



THANK YOU FOR YOUR ATTENTION



FOR-247: Household survey assignment

Context: you are carrying out a study on rural livelihoods and environmental change in Northern Laos. Now, you are designing a questionnaire to be used in household surveys (interviews) in selected villages of the study area.

The **objectives** of your study are:

Livelihoods	Environmental change
Research objectives 1 & 2	Research objectives 3 & 4
1) To understand the most important livelihood activities and the role of forest & natural resource related products in livelihoods	3) To understand the changes, shocks and crises that has happened in village and surrounding areas during the recent past
2) To understand how does the accessibility to closest market affect the usage of forest & environmental products	4) To understand the reasons and coping strategies regarding these changes, and what has been the role of forests and their ecosystem services in this



FOR-247: Household survey assignment

Assignment: Develop a list of detailed questions (maximum 10 questions per topic) to collect data for the following 4 topics (questions). Note: Always define the recall period for your questions (it may not be the same for all the questions)

1. What are the main livelihood activities and income sources in your household?
 - Note: Income includes both cash and non-cash income
2. Food security. Have you been faced with a situation where you did not have enough food to feed the household? How did your household cope with it?
3. What were the main shocks and crises that your household has experienced recently and how did you cope with these shocks?
4. Climate change and variability (temperature, precipitation). In the past, have you observed any changes in climate in your village?



FOR-247: Household survey assignment

Deadline

The deadline for submission of the assignment is 14 October. Submit your assignment as a PDF file . Please name your submission as follows:
FOR247_Task4_LASTNAME_FIRSTNAME.pdf

Reference material

Use the FAO et al. 2016 National socioeconomic surveys in forestry guidebook (available in the course Moodle page) as a reference material for you assignment.

Reference

FAO, CIFOR, IFRI, World Bank. 2016. National socioeconomic surveys in forestry: guidance and survey modules for measuring the multiple roles of forests in household welfare and livelihoods, by R.K. Bakkegaard, A. Agrawal, I. Animon, N. Hogarth, D. Miller, L. Persha, E. Rametsteiner, S. Wunder and A. Zezza. FAO, CIFOR, IFRI and World Bank. 172 p.



THANK YOU FOR YOUR ATTENTION