How Vulnerabilities inform Responses? Key Messages from Lao PDR & Myanmar

On behalf of The Team

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JAIF ASEAN Project on Disaster risk Reduction by Integrating Climate Change Projection into Flood and Landslide Risk Assessment

Multiple Approaches to Disaster Risk Reduction

Risk-based approaches

e.g. a dyke

Vulnerability-based approaches

e.g. vaccination

Capacity-based approaches

e.g. institutional support, financing etc.

VCA Methodologies: Tools

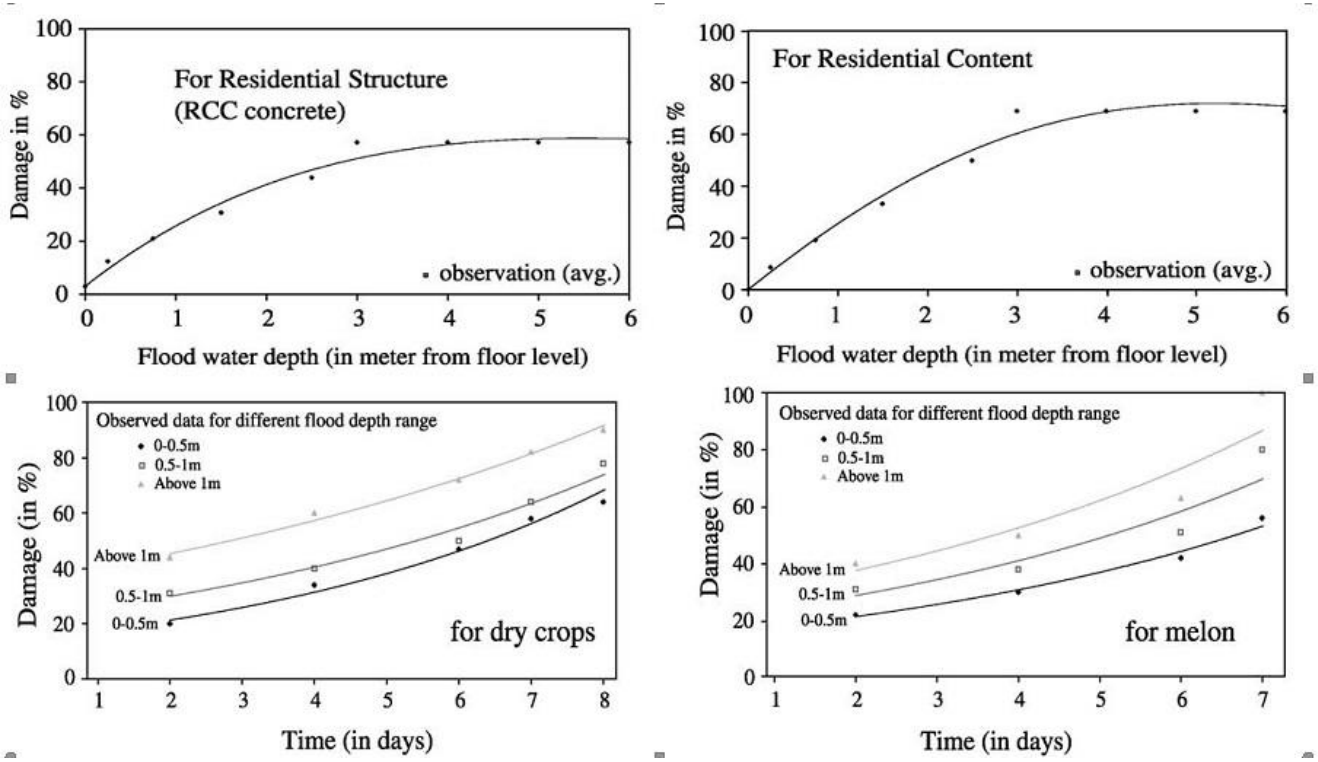
Frameworks and Tools	Vulnerability	Exposure				Sensitivity				Capacity			
	Vulnerability as function of S, E, & C	Current climate trends	Climate-induced events	Climate projections	Community based and scientific data	Current hazard trends	Biophysical impacts	Livelihood impacts	Hazard prioritization	Coping strategies	Livelihood assets	Awareness/knowledge	Capacity to plan and effect change
A framework for social adaptation to climate change, IUCN	✓	✓	0	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Climate vulnerability and capacity analysis, Care	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	0	✓
CVAAA, SPREP & CIDA	✓	✓	✓	✓	✓	✓						✓	
Vulnerability to resilience, Practical Action	✓	✓	✓	✓	0	✓	✓	✓	✓	✓	✓	✓	0
Participatory tools for assessing climate change impacts and exploring adaptation options, LFP & UKAID	Not clear	0	✓	0	✓	✓	✓	✓	✓	✓	✓	0	0
Adaptation toolkit, Christian Aid	Not clear	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	0	✓
CRiSTAL, IISD			✓			✓		✓		✓	✓		
CEDRA, Tearfund		✓	✓	✓	✓	✓	✓	✓	✓	✓			✓
CBA, IIED	Broad	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

5 Design Elements of Vulnerability Assessment Methodology

1. Followed the vulnerability as a **function of exposure, sensitivity and capacity**
2. A **mixed methods** approach was adopted where qualitative and quantitative vulnerability assessments were conducted
3. **Employed indicators** for capturing the exposure, sensitivity and capacity factors both qualitatively and quantitatively
4. Have **robust anchoring** in the secondary data from the published official records on demographic and socio-economic indicators
5. Primary data was collected used **participatory approaches** including focused group discussions, and **stakeholder consultations,** to understand narratives of vulnerabilities

Damage Functions/Vulnerability Functions

- Empirical relationship between flood characteristics and physical damages/exposure element characteristics
- Crucial for dynamic models to estimate the risk



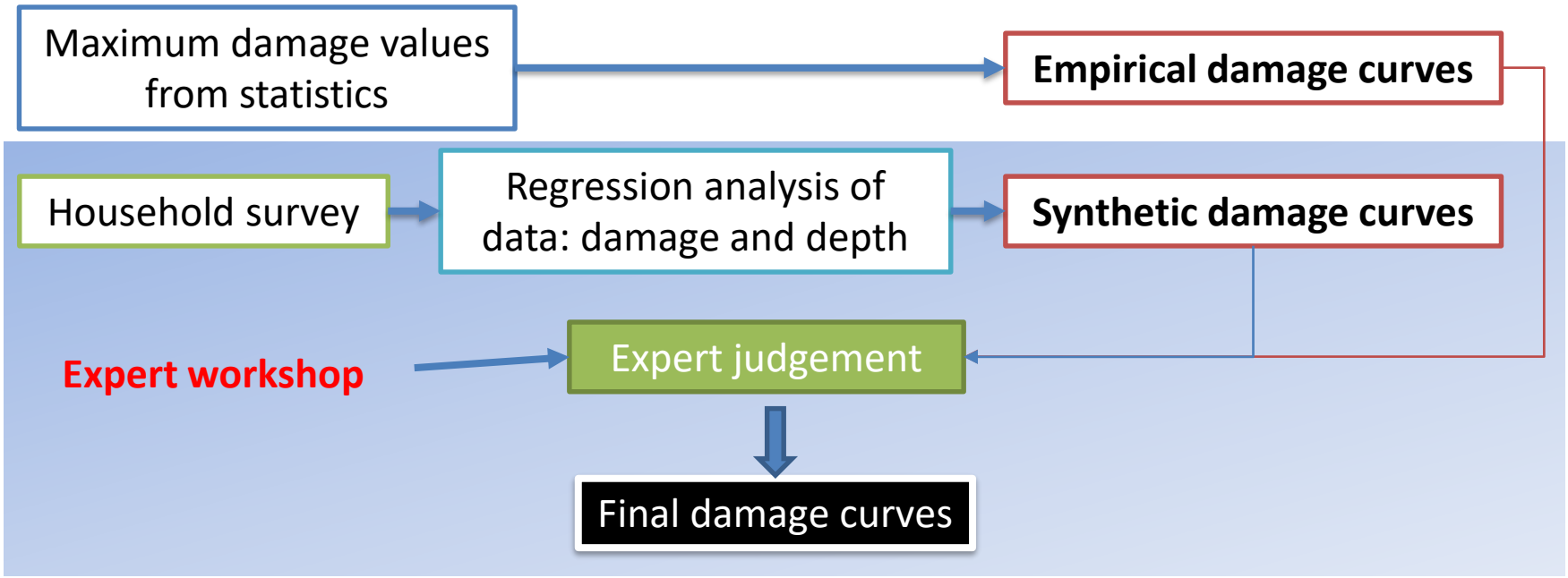
(Dutta et al.,2003)

Damage Functions have Space and Time Dimensions

- Buildings age over the period
- New construction standards and materials are used all the time
- New flood response and ealy-warning measures are taken up
- Nature of usage of building stock can change over the years depending the type and pace of the economic activities
- Change in the density of physical space and its interaction with humans change over the time

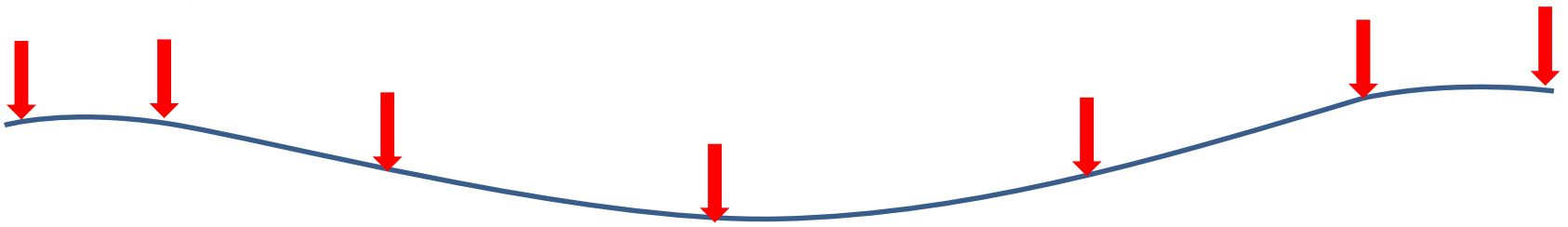
Developing Damage Function Curves

- **Sample surveys** were conducted to collect local flood characteristics and household damage data
- **Literature reviews** were conducted to cross-check the damage data with the past experiences



Robust Sampling Design

- A 20% sample rate was used for sampling.
- Selected sampling in **different flood inundation zones** identified based on digital elevation data and suggestions from the local government
  - No of locations was determined based on the area of target flood zone to be covered for detailed risk assessment (i.e. covering the center, middle and periphery of the flood basin as much as possible taking the above points into consideration).
- Determined based on the **diversity of exposure elements** to be covered (e.g. types of buildings, age group of affected people, landholding size etc.).
- Administrative constraints such as number of days, human resources and finances also determined the final survey sample size.



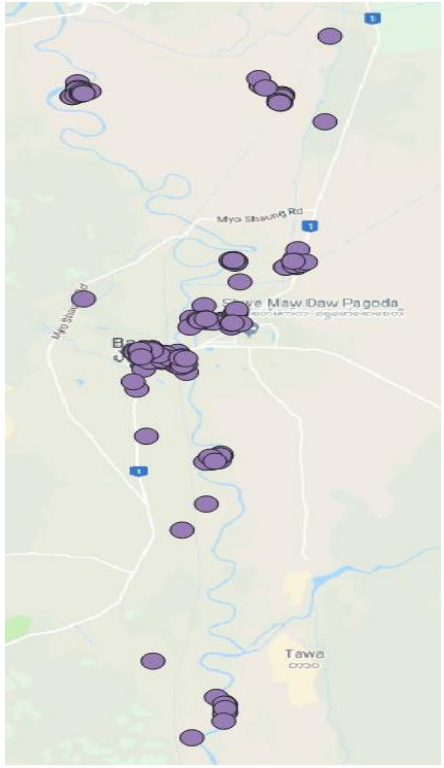
Exposure Elements Considered

- Physical elements: Residential buildings
- Socio-economic elements:
  - Livelihoods: Arable crops (paddy)
  - Human & animal health

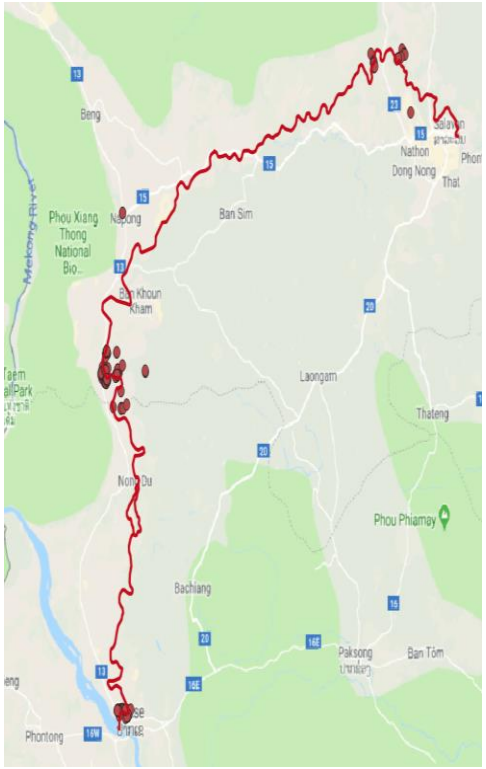
Demographic Metadata

Floods

Myanmar



Lao PDR



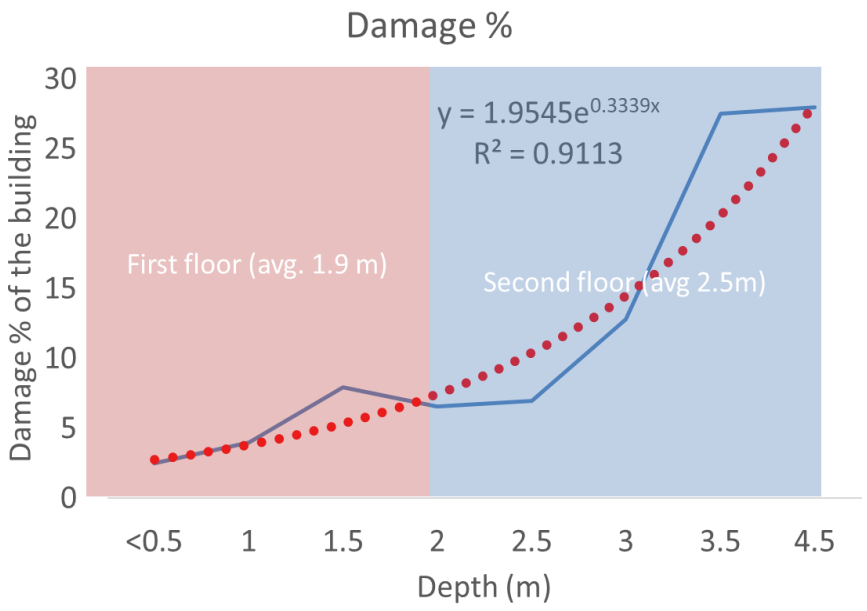
	Myanmar	Lao PDR
No of samples	198	194
Total sampled population	995	1186
Age	38	51
Size of household	5	6
Sex ratio	0.86	0.92
Poverty head count (%)	12	10
Composition of houses (%)		
Wooden stilts	85	74
RC beams	11	21
No stilts	4	5

Important Messages from Vulnerability Assessment

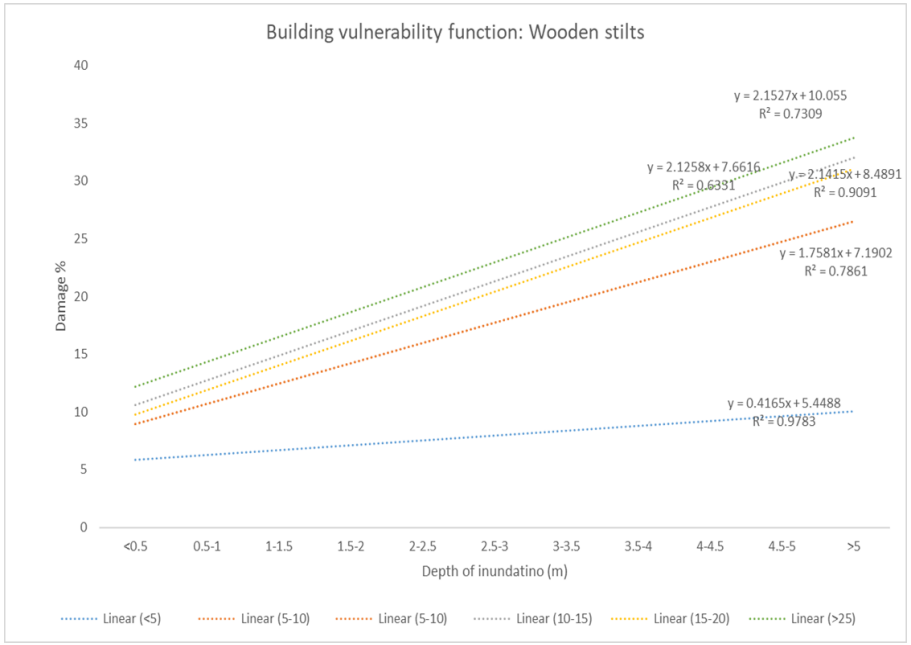
1. Stilted houses are the backbone of flood resilience
2. Design of early warning should take into consideration the mobility of humans, assets and health facilities
3. Flood resilience of rice crop determines the agricultural income
4. Crop income loss reflects the economic resilience better than the crop yield loss
5. Livelihood diversification should be the integral part of flood resilience building
6. A single flood year can double the poverty head count and flood relief operations has high opportunity to buffer the poverty impacts
7. Strengthen the health facilities based on the vulnerable groups and the depth and duration of flood events
8. Poultry is highly vulnerable to floods compared to other animal husbandry options

Message 1. Stilted Houses are the Backbone of Flood Resilience

Myanmar



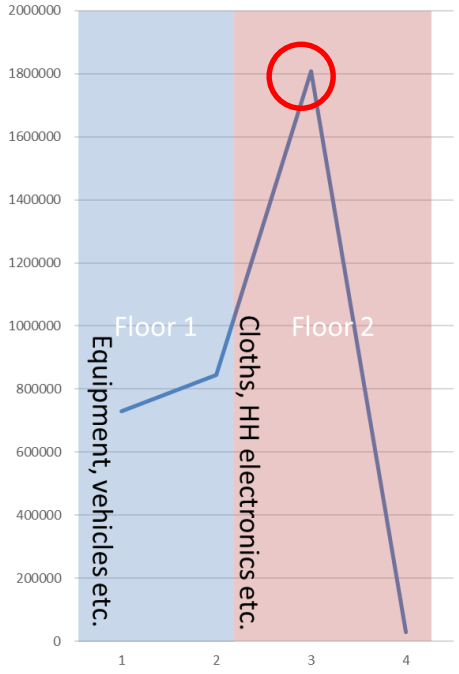
Lao PDR



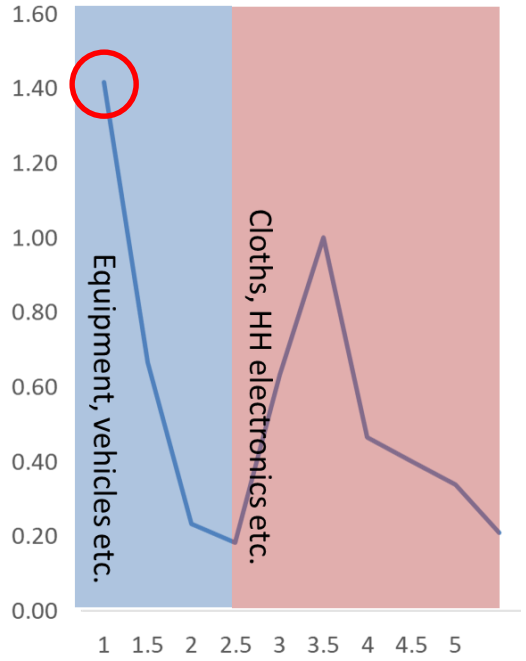
- Wooden stilted houses represent 85% of the total building stock in the survey location in Myanmar and 74% in Lao PDR.

M2: Design of Early Warning & The Mobility of People & High-value Assets

Myanmar



Lao PDR

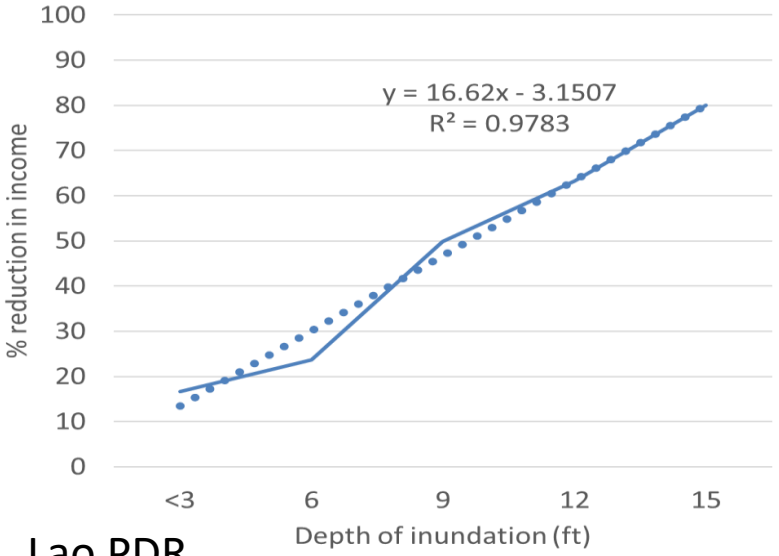


- Damage to assets show a complex relationship with the depth of flooding.
- Highest damage occurred when the depth of flooding is at **3m in Myanmar** and at **1.4m in Lao PDR**
- 59% of HHs reported some kind of asset damage in Myanmar (13% in Lao PDR)
- Average loss of assets was at 1.6 million MMK per household (1.4 million LKP in Lao PDR)

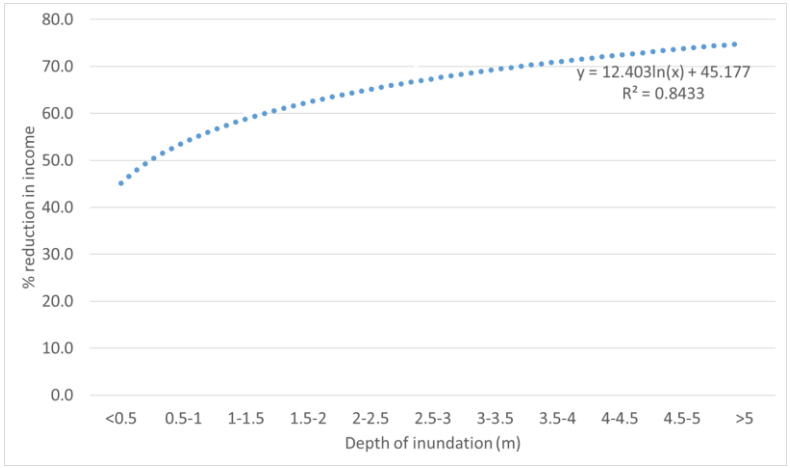
- MMR: Most reported type of assets are electronics (44%), cloths (16%), and vehicles (14%)
- Lao: Most reported type of assets are agricultural equipment (45%), cloths (35%), and furniture (12%)
- Communities are evacuating the valuables for a severe floods of longer duration and higher depths

M3. Flood Resilient Rice Varieties are Needed

Myanmar

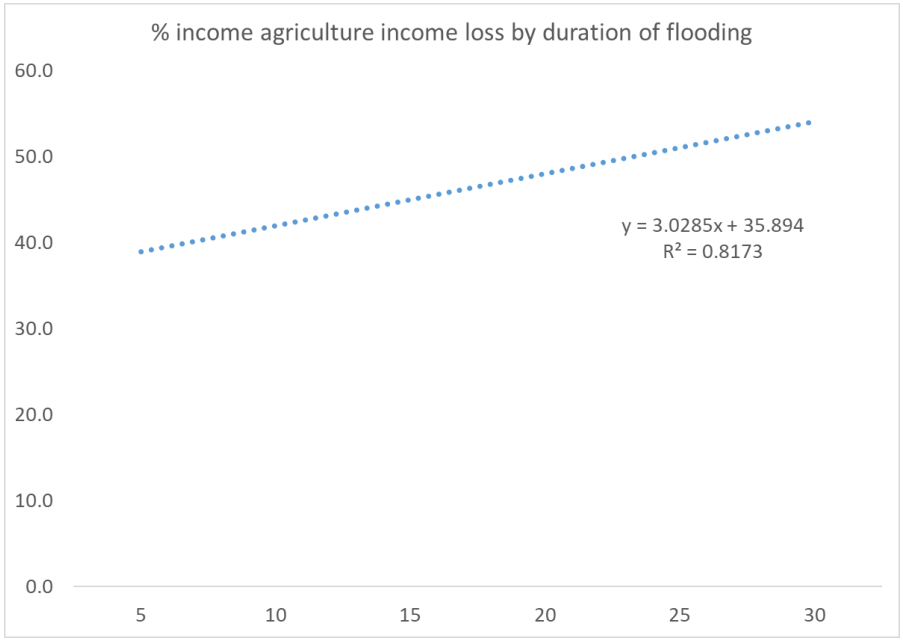


Lao PDR



- Rice yields showed strong relationship only with the depth of inundation. The impact of duration is not clear for the most flood heights.
- In Myanmar, the crop showed a **moderate** **resilience** to flooding as the crop yields declined only by **24%** for a rise to 6 ft.
- However, the damage below 3ft inundation was also high (17%)
- In Lao PDR, the crop showed a **low** **resilience** to flooding: 40% yield decline.
- However, the damage below 0.5m inundation was very high (45%)

M4. Measuring income loss is better than yield loss during floods

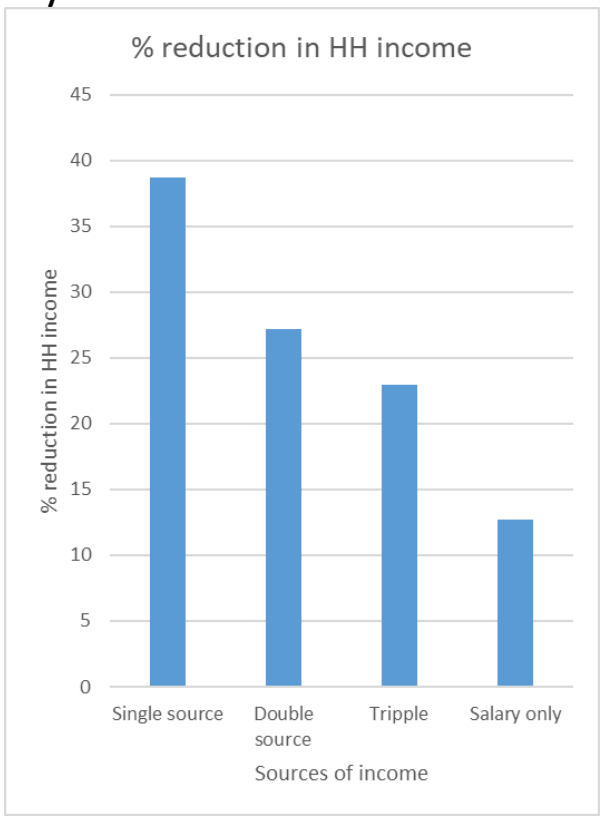


- Linear relationship between the duration of flooding and crop income loss
- Whereas, the relationship between the income loss and depth of flooding was exponential
- The interaction between depth and duration was not significant

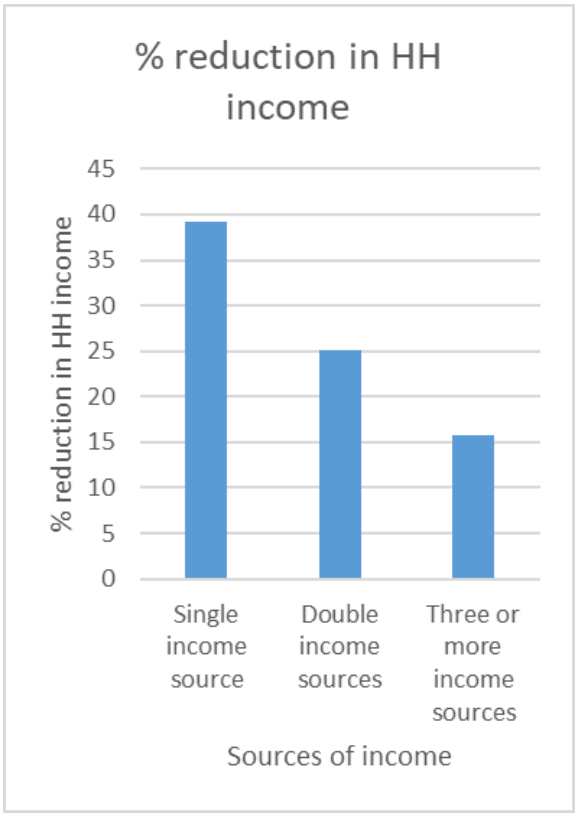
- Agricultural yields provide **independent evaluation** of losses from the institutional and market (demand and supply) conditions. However, it may not completely reflect the actual economic impact on the households.
- Agricultural income during flood years inform better on the impact of flood on family wellbeing
- Agricultural commodities can fetch higher income during flood year than normal year on per kg basis due to higher demand and lower supply in the market.

M5: Livelihood diversification is the key to flood resilience

Myanmar



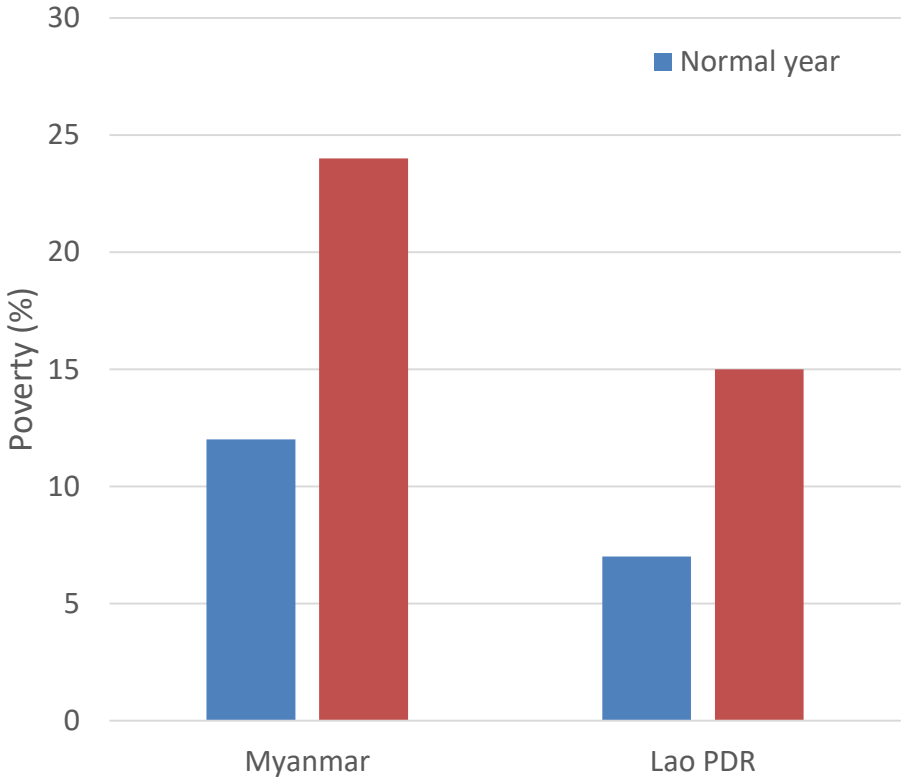
Lao PDR



- The reduction in agricultural income **was 38% in Myanmar and** 43.4% in Lao PDR.
- In comparison, the **non-agricultural income** of households experienced an average **26%** reduction.

- **Farmers are highly likely to have** more than one income source than business people
- Households with a salaried job have least reduction in their income (13% in Myanmar and 16.4% in Lao PDR).

M6: A Single Flood Year can Double the Poverty & Flood Relief Measures can Buffer Poverty Impacts



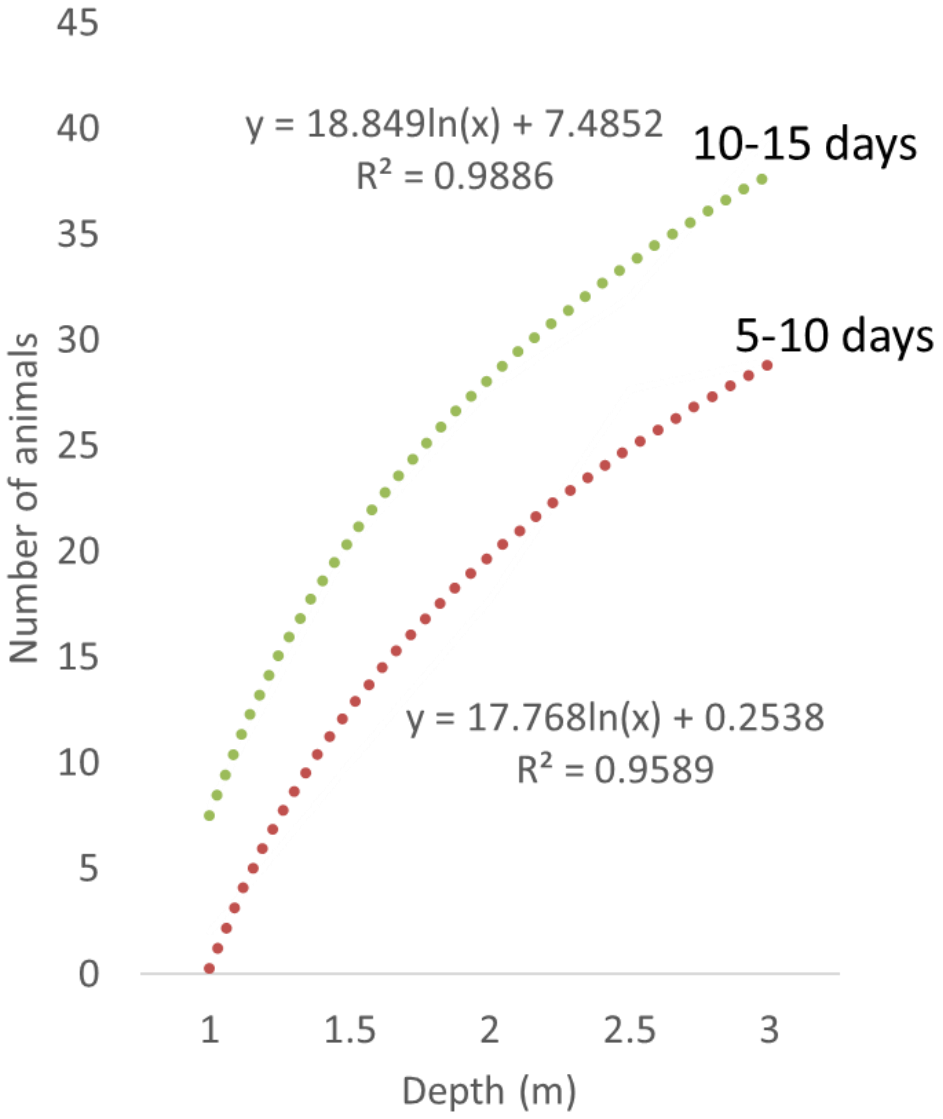
- The poverty levels have doubled in one flood year in both the river basins when only income is considered.
- However, when consumption is taken into consideration, factors such as government and non-governmental relief measures have significantly buffered the poverty impacts.

M7: Strengthen Health Facilities based on Vulnerable Groups and Depth and Duration of Floods

- 38% men, 35% children (52% in Lao), 22% women (26% in Lao) and 5% elderly (22% in Lao) were affected in Myanmar.
- In Myanmar flood duration of **8 days,** and **6 ft of flood height** have caused **85%** of total human health costs.
- No discernable trends were observed between the depth, and duration of flooding and number of people affected.
- No deaths in any of the villages surveyed
- 43% of the surveyed HHs (198) were affected by some kind of health problem in Myanmar (7% in Lao PDR)
- Per capita increase in health expenditure is 12% in Myanmar
  - Per capita health expenditure and loss of income: 0.37 million MMK, **263 USD** (1.76 million LKP, **200 USD in Lao**)
- Per capita work days lost: 13 (19 days in Lao)

M8: Poultry are highly vulnerable to most flood events

- Poultry is most predominantly affected followed by cattle and pigs.
- Highest animal mortality happened at **1.5m depth of flooding for a 15-20** days duration.
- If possible, poultry farming may be discouraged in chronic flood zones.



Conclusions

- The differences in vulnerabilities between two river basins can be attributed to the developmental conditions.
- In terms of livelihoods, there is a clear role of livelihood diversification in flood resilience.
- Wooden stilts played a major role in mitigating the flood impacts. Early evacuation of valuable assets and storing calorie rich food is the key before floods.
- Poverty implications of floods were clearly demonstrated, floods resulted in doubling of poverty.
- More detailed survey measures are required to accurately capture the damage functions and for reliable risk assessments.

Thank You!

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