



**Asia-Pacific  
Economic Cooperation**

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# **Risk Assessment for Community Resilience in Viet Nam**

Submitted by: UNDP



**Workshop on Improving Global Supply Chain  
Resilience: Advancing the Seven APEC  
Principles in Your Organization  
Christchurch, New Zealand  
26-28 March 2014**



# **Risk assessment for community resilience in Vietnam**

*Hazard assessment mapping:  
Comprehensive and sectoral approach*

**Bui Viet Hien, UNDP Vietnam**  
***APEC Workshop on Improving Global Supply Chain Resilience***  
***26-28 March, 2014 - Christchurch, New Zealand***

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## 1 – Context and Rational

## 2 – Hazard mapping Approaches, Procedures, Results

- Integrated/Comprehensive risk assessment
- Sectoral/sub-regional assessment – Rural Infrastructure in Northern Vietnam

## 3 – Discussion

# CONTEXT



Map 1 – pig market baseline map

The market environment, institutions, rules, norms & trends

Government budget allocation process

VET policy (disease control)

Gender roles

**Key:**  
 V= volume  
 P= price  
 N= number of actors  
 — sow and piglet  
 - - - boar semen

The market chain: market sectors and their linkages

Large-scale producer (QBing province) - Private

Trader (QTri province) - Private

Medium-scale producer (district) - Private  
 V= +10

Pig semen producer (district) - Govt.  
 N= 1  
 V=10

Farmers  
 N=25,800

Animal husbandry institute (national) - Govt

P=15 million VND

P=23,000/kg

P=23,000/kg

P=23,000/kg

N=15-17

P= 15/20,000

P=25,000/kg

P= 70/80,000

P=30,000/kg

Key infrastructure, inputs and market-support services

Labour costs

Transport

Animal housing

Pig fodder:  
 - crop fodder  
 - industrial fodder

VET services

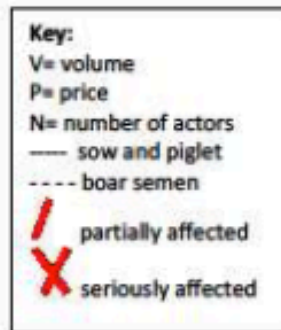
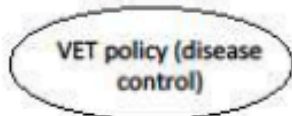
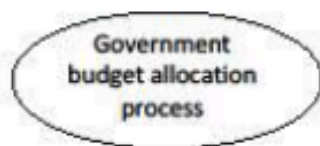
Credit

Pig Market Emergency Market Mapping in Le Thuy District, Quang Binh, **BEFORE** consecutive floods in Oct 2010. UNDP/DMC/Oxfam (2010)

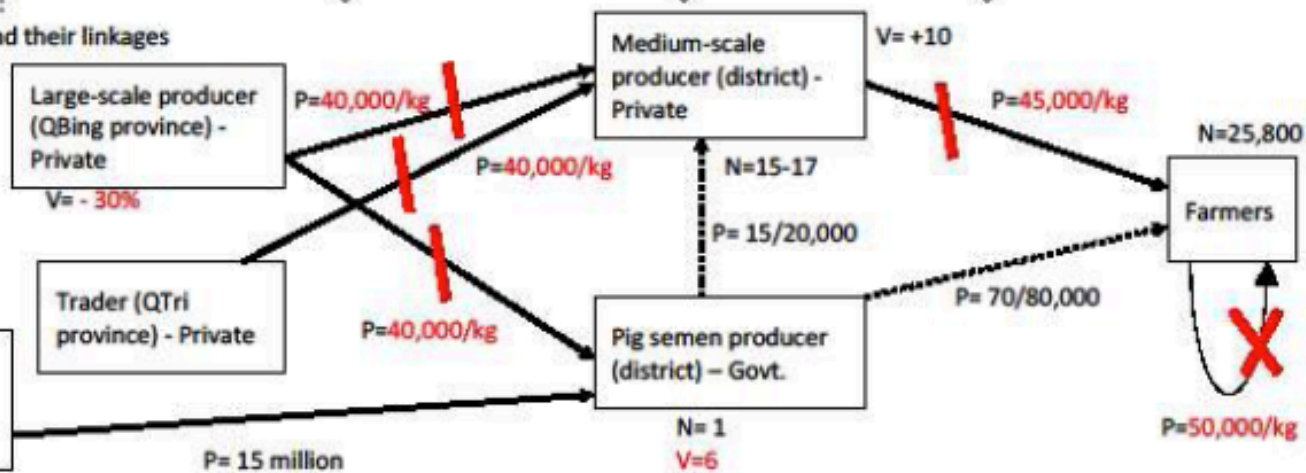
# CONTEXT

Map 2 – pig market emergency map

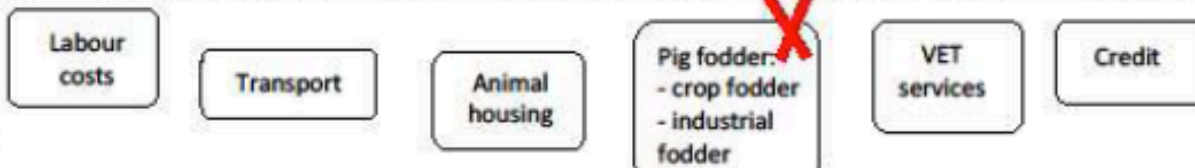
The market environment, institutions, rules, norms & trends



The market chain: market sectors and their linkages



Key infrastructure, inputs and market-support services



Pig Market Emergency Market Mapping in Le Thuy District, Quang Binh, **AFTER** consecutive floods in Oct 2010. UNDP/DMC/Oxfam (2010)

# CONTEXT

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Average of 6-8 typhoons. Extreme rainfalls and floodings likely increase, especially risk of flashfloods/landslides

High cost of annual loss:

- *Annually 445 human casualties.*
- *Average annual GDP (PPP) losses of USD 1.8 b (in PPP) ~ 1.2 % GDP*

Increasing infrastructure exposures to CC as Government emphasis on structural measures

- *Transportation infra. often damaged , e.g. 2001-2005, extreme events cost VND 2,571 b.*
- *Over 10,600km of 6-9m high river dykes ; 2,600km of 3.5-5m high sea dykes*
- *If 1m SLR, 11,000 km of roads submerged. Total domestic highways inundation 695 km (Mekong Delta alone 495 km), without measures taken*

# RATIONAL

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- Detect hazards & CC and disaster risks;
- Understand traditional coping strategies & response mechanisms
- Identify options and logic to responses and adapt to impacts with consciousness of time, resources,
- Long-term than corrective actions
- A systematic, objective, rigorous methodology
- Viable and practical for decision making

# HAZARD Mapping and Risk Assessment

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- **Case 1 - Integrated/Comprehensive**  
*Identify ~ 6,000/11,100 communes at most risks to natural hazards in 63 provinces for Government Program on CBDRM until 2020*
- **Case 2 – Sectoral/Sub-regional**  
*Practical assessment to underpin the policy and decision-making framework for climate resilient infrastructure development in Northern Vietnam*



# Concepts



IPCC 1995, 2001, 2007

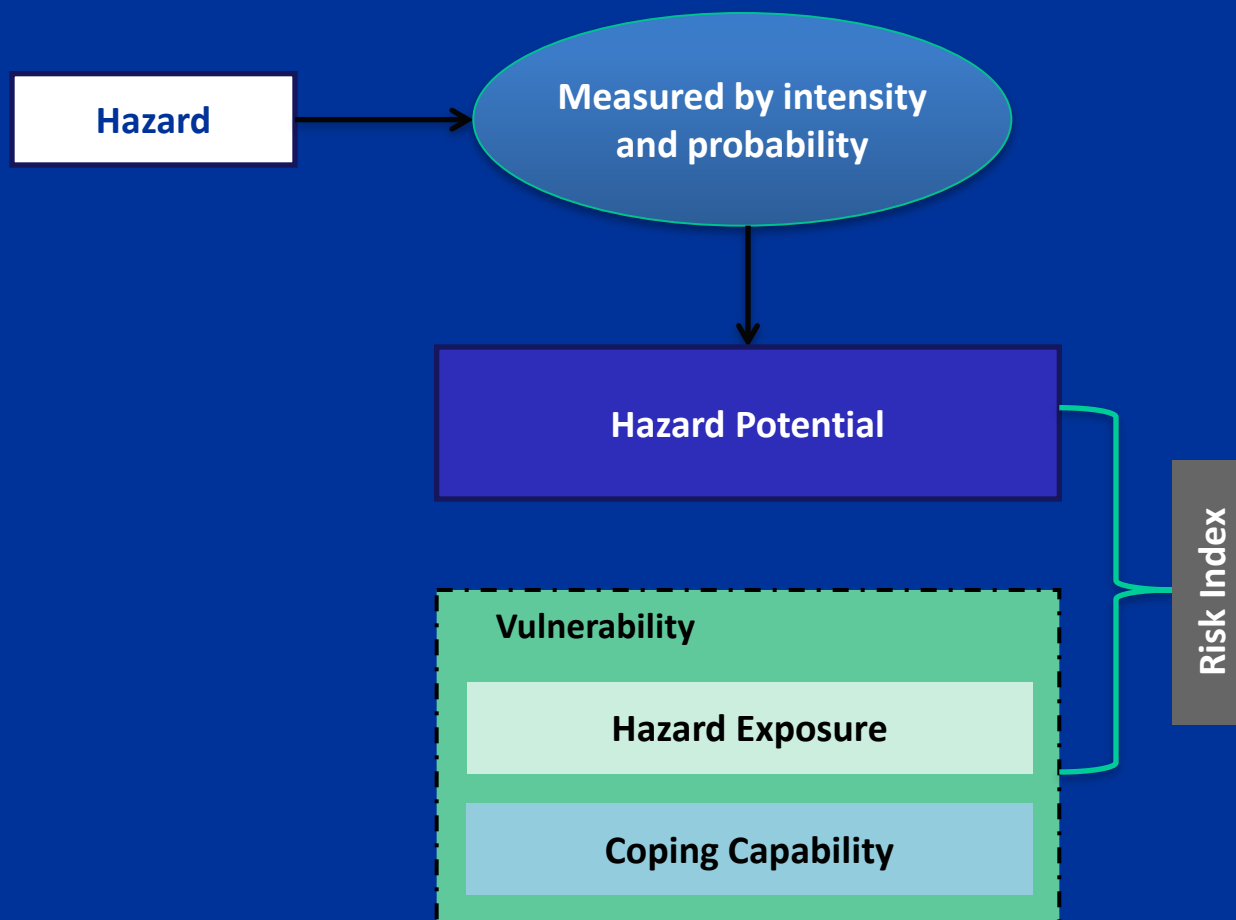
Disaster Risk is f (vulnerability, hazards, exposures)



# Methodology



## Natural Disaster Risk Index suggested by Greiving (2006)



# CASE 1-Select 6000 high disaster risk communes



Indicator	Weight	Sub component	Weight	Risk component	Weight	Overall risk
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Different hazard indicators

- Tropical storms**  
(Wind > 35knot, probability  $0 \leq p \leq 1$ )
- 'Disastrous' rainfall**  
(Daily rainfall > 51mm, probability  $0 \leq p \leq 1$ )
- Drought**  
(Yearly rainfall < 250mm, probability  $0 \leq p \leq 1$ )
- Other hazards**  
(Probability,  $0 \leq p \leq 1$ )

Integrated hazard map

- Population density**  
( $0 \leq \text{value} \leq 1$ )
- Population**  
( $0 \leq \text{value} \leq 1$ )

Hazard exposure

- Asset index**  
( $0 \leq \text{value} \leq 1$ )
- Proportion of temporary houses**  
( $0 \leq \text{value} \leq 1$ )
- Proportion of female population**  
( $0 \leq \text{value} \leq 1$ )
- Dependency ratio**  
( $0 \leq \text{value} \leq 1$ )
- Poverty headcount ratio**  
( $0 \leq \text{value} \leq 1$ )

Coping capacity

Vulnerability map

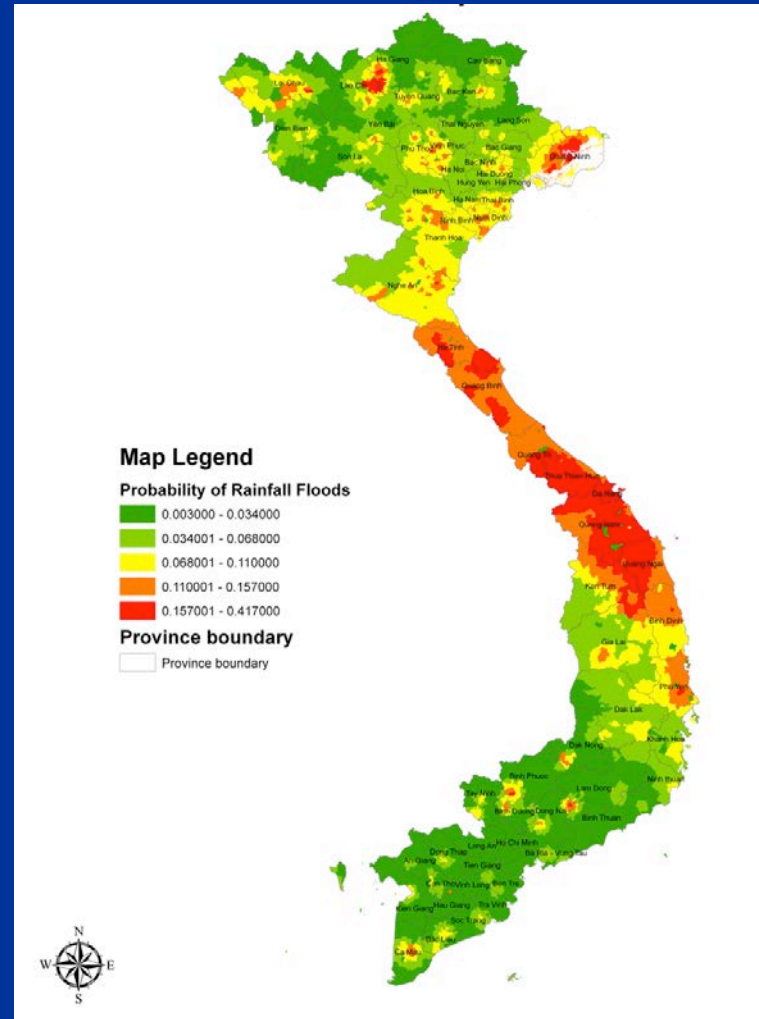
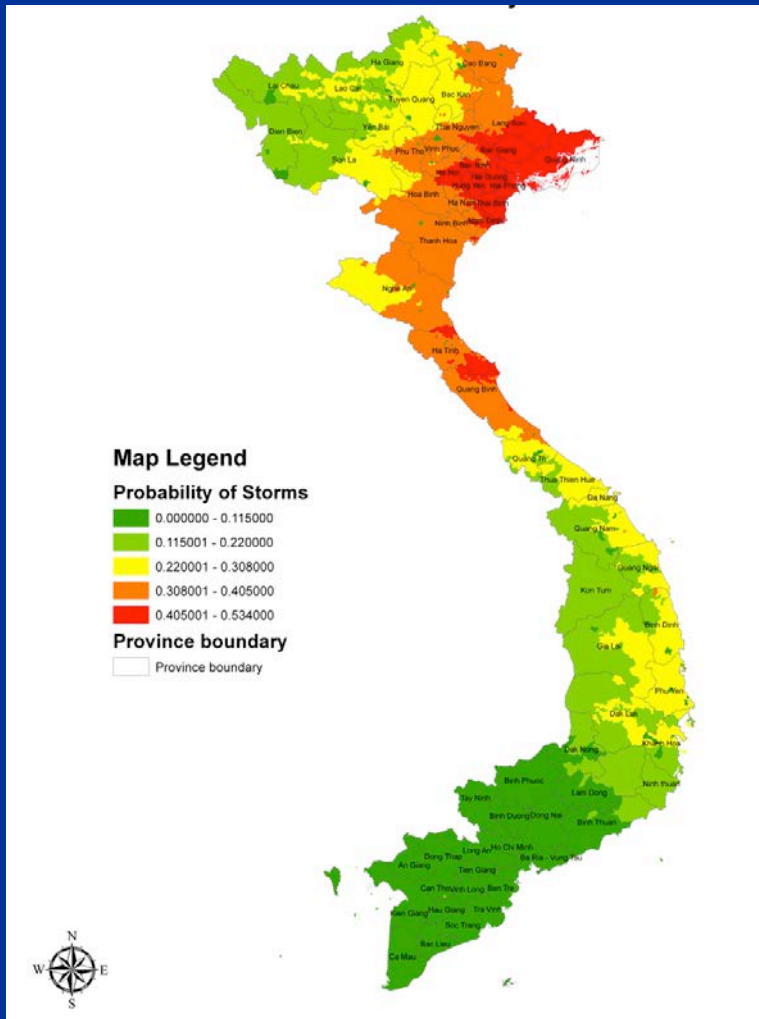
Integrated Risk Index

Framework of Integrated Risk Index (Adopted from Grieving 2006)

# Results

## Probability of Storm

## Probability of Rainfall Flood

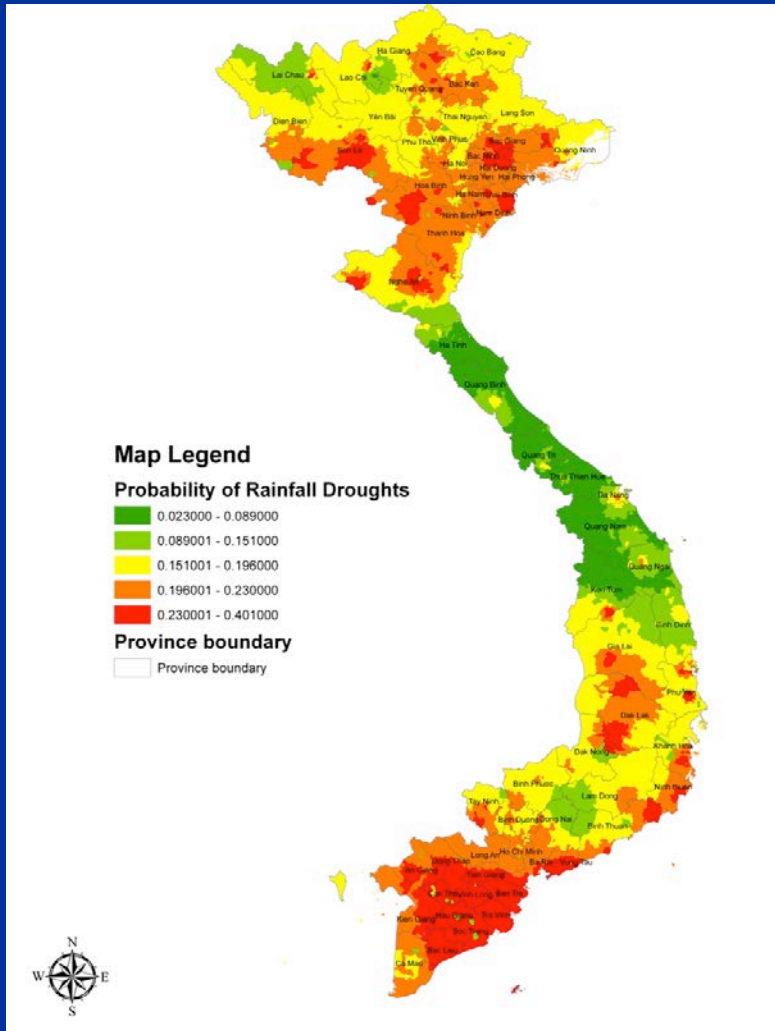


*NB: the map represent the available data only, not the administrative illustration*

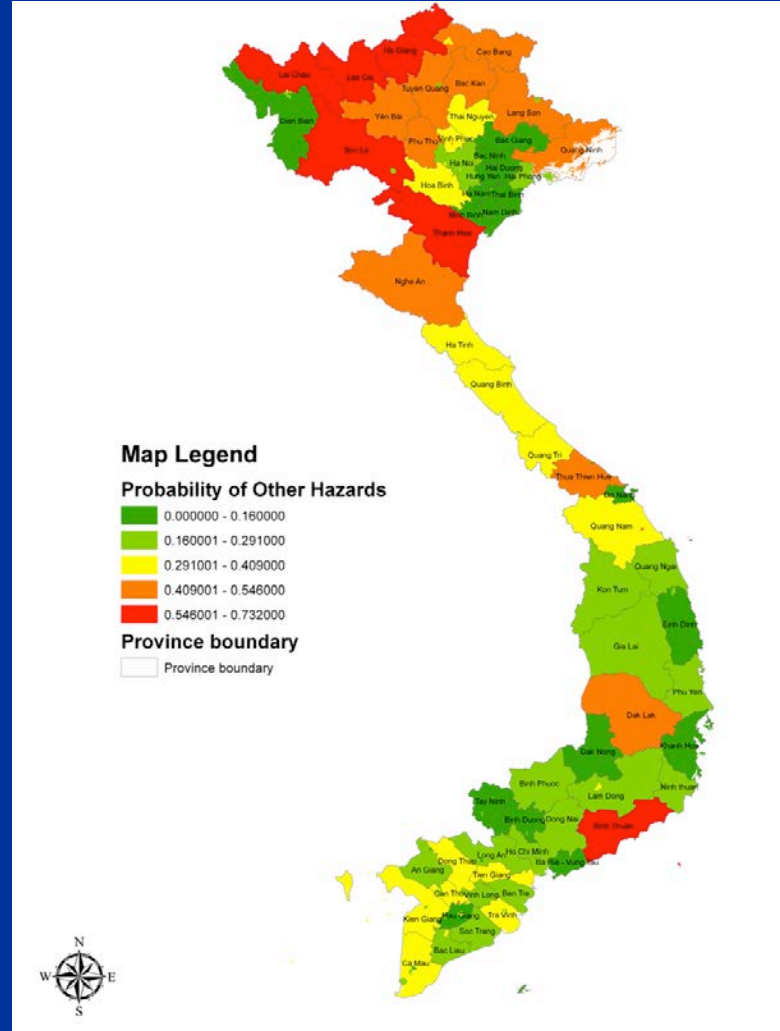
# Results



## Probability of Rainfall Drought



## Probability of other Hazards



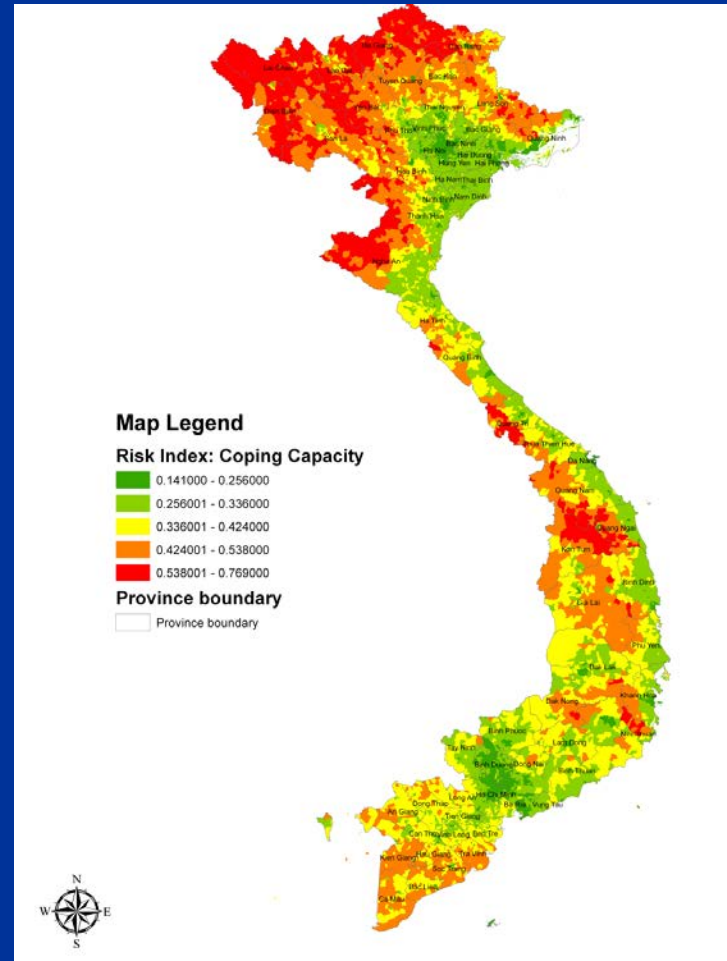
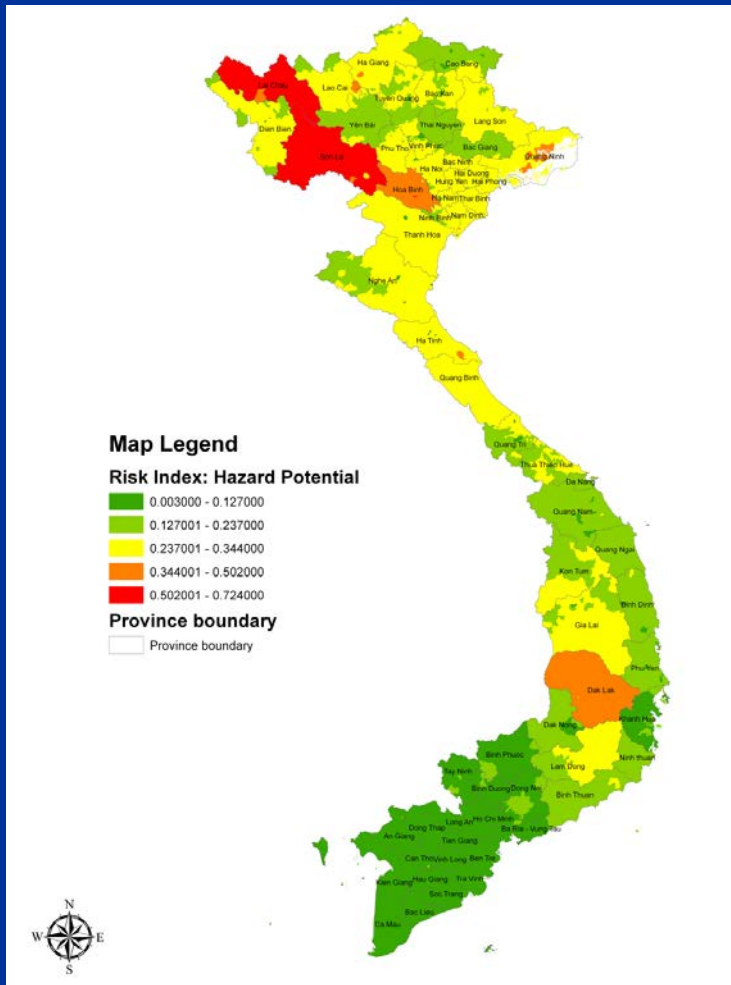
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# Results



## Hazard potential

## Coping Capacity

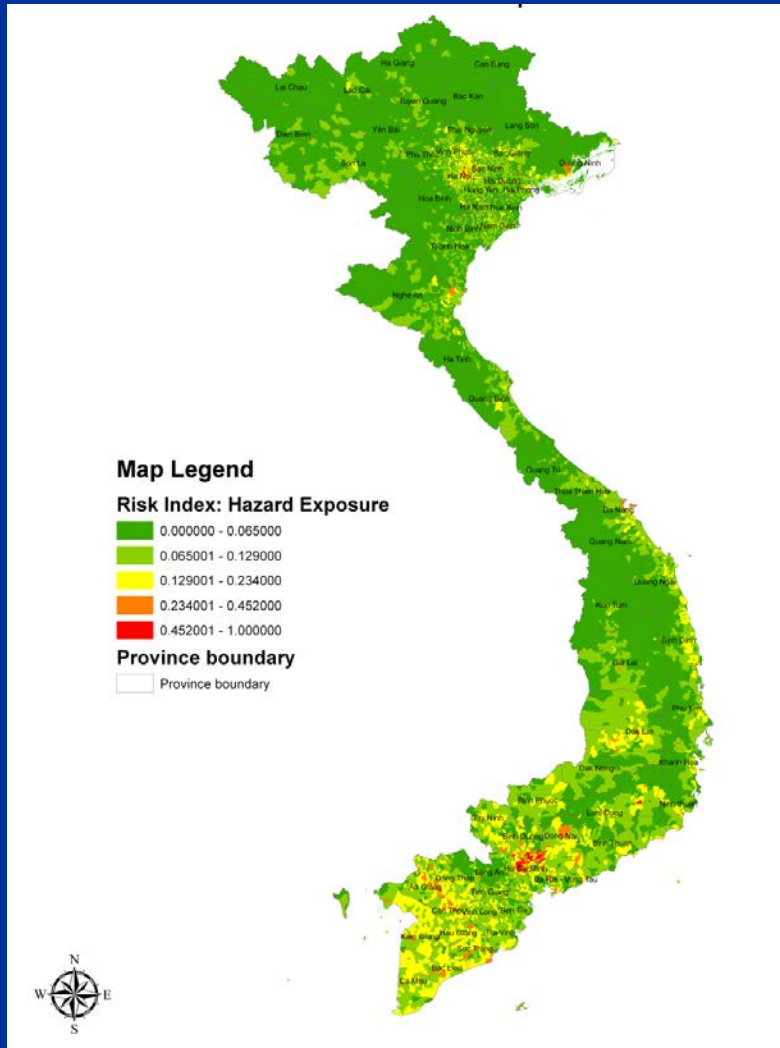


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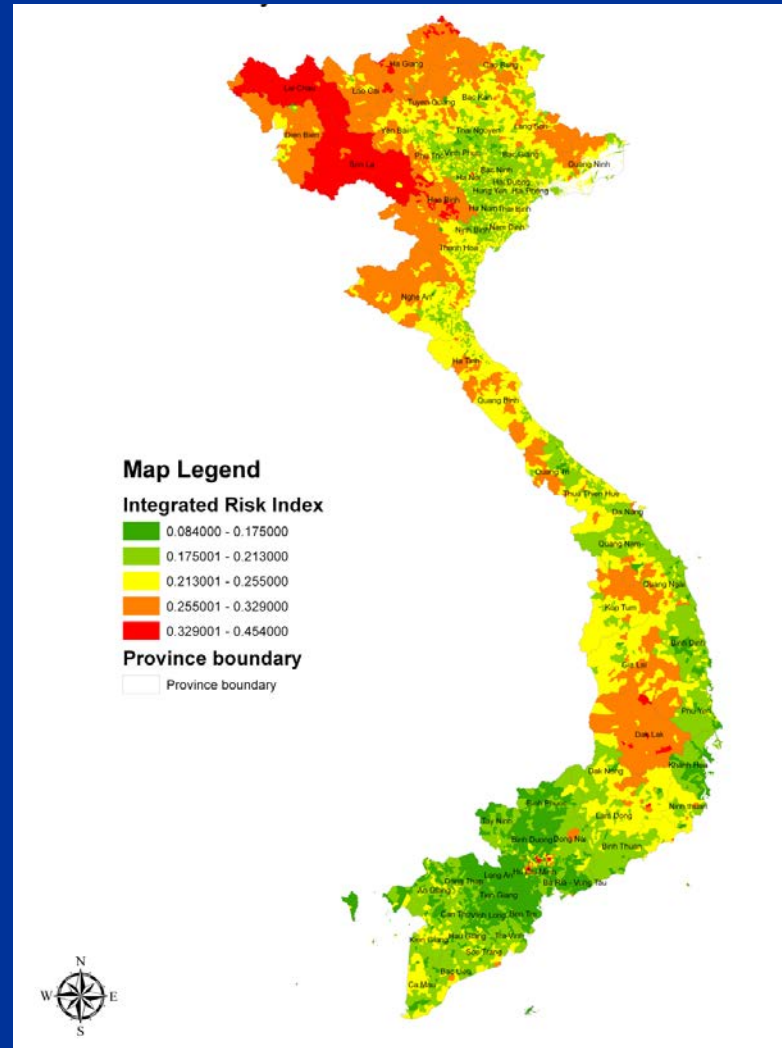
# Results



## Hazard Exposure

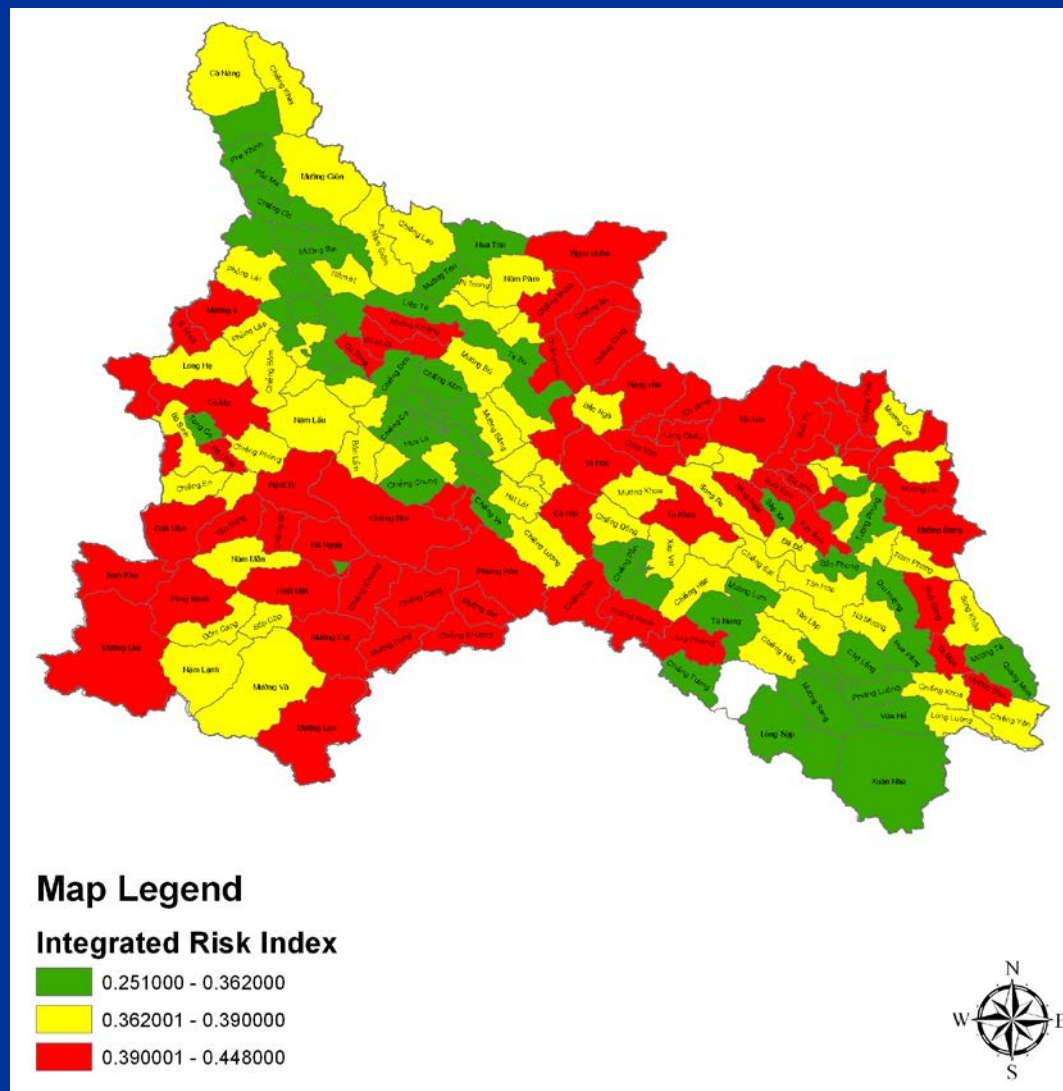


## Integrated Risk Index



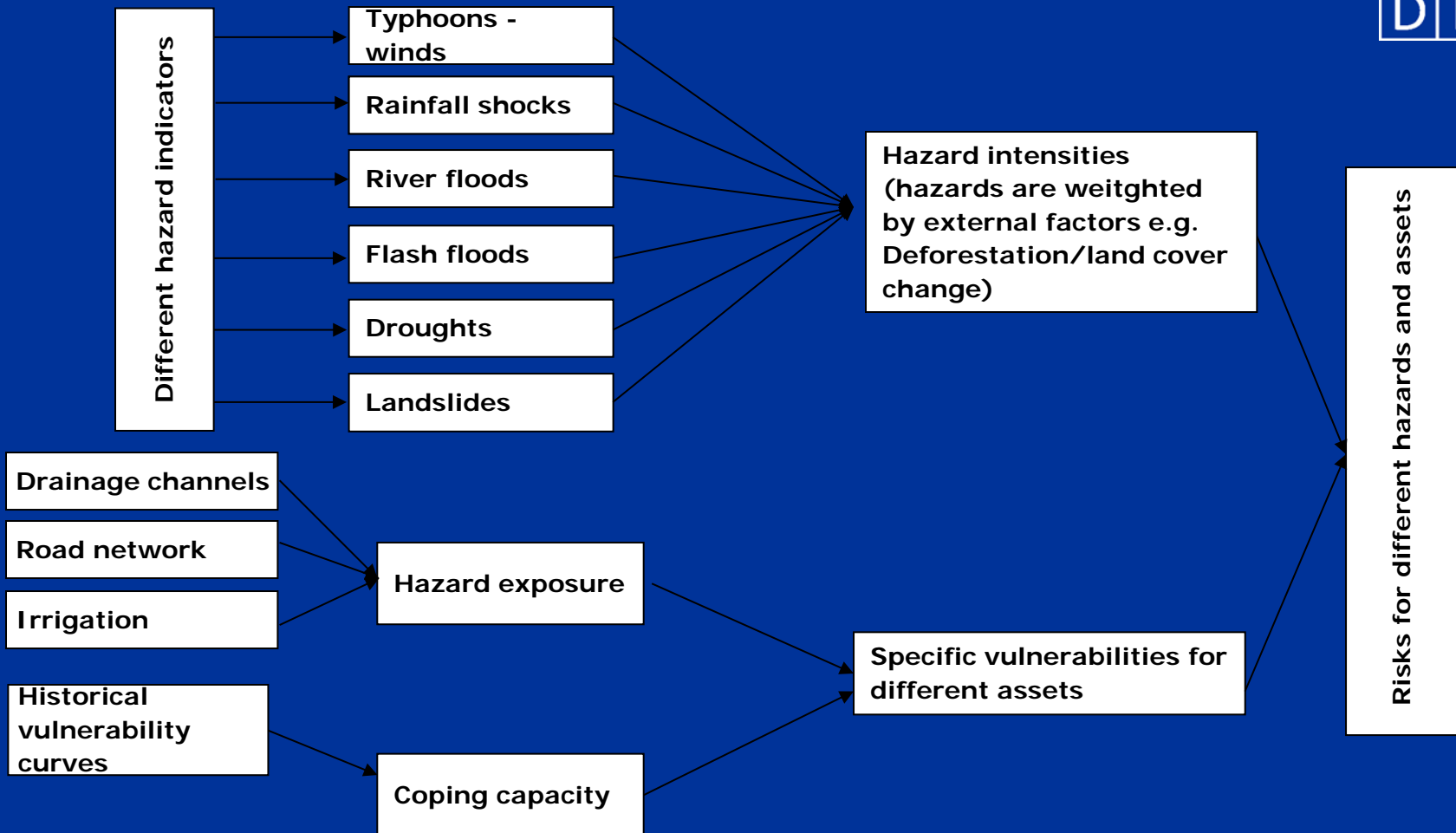
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# Results – Disaster Risk Index in Son La (North Upland)





# Case 2 - Climate risk assessment of rural infrastructures in Northern Vietnam



# PROCEDURE – On-going

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## 1 - Hazard assessment and mapping

- *Focus on landslides, flashfloods, droughts and strong winds,*
- *Considering earthquakes and cyclones if avail*
- *Collect historical hazard: Spatial extent affected by hazards; Duration of impact; estimate intensity and frequency distribution of all hazard*
- *Identify hazards need to be specifically modeled e.g. flashfloods and droughts*

## Expected outputs

- *GIS maps and tables detailing historical events;*
- *GIS-based maps for individual hazards,*
- *Detailing climatological means, model-based estimates, and expected return periods?*

# PROCEDURE – on-going

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## 2 - Exposure assessment:

- *Exposure data related to roads, irrigation systems; consider some other socio-economic assets (project focus)*
- *Collect asset exposure and socio-economic data including attribute data*
- *Collect info. future plan developments of the infrastructures,*
- *Develop exposure information in GIS form in pilot provinces.*
- *Verify data through site visits and/or other secondary*

## 3 - Vulnerability assessment

- *Spatially and statistically combine the hazard and exposure data*
- *Identify those areas most vulnerable to existing hazards.*
- *Can be repeated for future modeled hazards if same format/content*

# Some reflections

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- The assessment framework has potential to apply in practices
- Hazard mapping is only initial step for solutions/options.
- The complementary results of “sector” versus “multi-sectoral” assessment
- Often disaster risks are the concerns of many sector, but in practices, often it fall under one-single sector
- Hazard mapping should equally mindful of who are protected behinds the infrastructure and their adaptive capacities (e.g. company business contingency plan; farmers’ migration in flood seasons; etc.),
- Opportunity for build-back-better than corrective investments – e.g. extreme design figures and built codes



Thank you very much!