Insights, Lessons and Challenges from A TRANSDISCIPLINAL ASSESSMENT OF CLIMATE CHANGE – RELATED VULNERABILITY

Building Capacity to Adapt to Climate Change in Southeast Asia

MARIA EMILINDA T. MENDOZA
Assistant Professor
University of the Philippines Los Baños

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Outline

I. Introduction
II. Project Research Goal and Objectives
III. The Approach
IV. The Methods
V. Significant Findings
VI. Insights, Lessons and Challenges
VII. Recommendations
Introduction: The Impetus

- We are confronted by the negative impacts of extreme climate events
  - Loss in lives, livelihood and property
  - Disruptions in everyday life
  - Health problems
  - Damage in our natural resources and biodiversity
- Differentials in resilience and capacities to adapt to these impacts
- The Philippines as one of the most vulnerable in the region to the impacts of climate change
Introduction: Project Brief

“Building Capacity to Adapt to Climate Change in Southeast Asia”
### Table 3. Total number of districts and barangays/ commune included in the vulnerability assessment

<table>
<thead>
<tr>
<th>Study site</th>
<th>Number of districts/municipalities</th>
<th>Number of barangays/communes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kampong Speu, Cambodia</td>
<td>7</td>
<td>82</td>
</tr>
<tr>
<td>Laguna, Philippines (3 watersheds)</td>
<td>12</td>
<td>194</td>
</tr>
<tr>
<td>Thua Thien Hue, Vietnam</td>
<td>9</td>
<td>152</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>428</td>
</tr>
</tbody>
</table>
The Study Site

Province of Laguna
- 30 municipalities
- 676 barangays
- 1,760 km$^2$
- 2007 Population: 2,473,530

Laguna Lake:
- largest living lake in Southeast Asia
- 90,000 ha
- serves as a catchment basin for 21 major tributaries with a total catchment area of 45,000 km$^2$
- Seventeen of the tributaries draining to the lake are within Laguna
- has only a single outlet into Manila Bay through the Napindan Channel

The Study Site
- 12 municipalities
- 274 → 194 barangays
- 568 km$^2$
- 2007 population: 568,690 (23% share)

- Watershed approach
- proposed watershed includes municipalities that have experienced flooding and heavy typhoon damages in recent years
- chosen watershed will include the agricultural area of Laguna
Why Laguna?

The selection of Laguna as the project area of this study is based on two key reasons:

1) Its being among the top ten provinces vulnerable to climate change hazards;

2) The province having made headway in responding to the expected risks of climate change through its development, adoption and implementation of a Disaster Risk Reduction Management (DRRM) program.

Despite this program and initiative, however, the Province still experience huge damages from flooding, heavy rains and strong typhoons.
Project Goal and Objectives

Goal:
□ To build local capacities to adapt to climate change, especially in the area of vulnerability assessment and adaptation analysis

Main objectives of the studies conducted:
1) to assess the vulnerability of Laguna covered by the three watersheds of Mabacan, Sta. Cruz and Balanac; and,
2) To identify and subsequently subject to economic analysis, adaptation options given the site’s major vulnerability
Project Goal and Objectives

Specific Objectives:

- To measure the extent communities and HHs are vulnerable to climate change;
- To produce maps of each community’s relative vulnerability to climate change; and,
- To analyze the social vulnerability of local communities in terms of gender, geographic location, and socio-cultural, demographic and political-economic variables.
Disciplinary approach:

Disciplinarity refers to the specialization and fragmentation of academic disciplines especially since the 19th century.

Each discipline has its own concepts, definitions, and methodological protocols for the study of its precisely defined domain of

- Biology
- Chemistry
- Economics
- Geography
- Sociology
Multidisciplinary approach:

- Multi-disciplinary refers to an additive research agenda in which each researcher remains within his or her discipline and applies its concepts and methods without necessarily sharing a common goal with other researchers.

Climate Change Research Agenda

- Biology
- Forestry
- Geography
- Sociology
- Engineering
- Economics
Interdisciplinary approach:

Interdisciplinary studies are those in which concerted action and integration are accepted by researchers in different disciplines as a means to achieve a shared goal that usually is a common subject of study.
Transdisciplinary approach:

- Transdisciplinary contributions incorporate a combination of concepts and knowledge not only used by academics and researchers but also other actors in civic society, including representatives of the private sector, public administrators, and the public.
Where we were..

**Year 1**
- VULNERABILITY ASSESSMENT

**Year 2**
- ECONOMIC ANALYSIS OF ADAPTATION

**Year 3**
- ADAPTATION PROPOSAL WRITING

**TRAINING AND RESEARCH**
- Barangay Vulnerability Index
- HH Vulnerability Analysis
- Vulnerability Maps

**TRAINING**
- Cost-effectiveness Analysis
- Benefit-Cost Analysis
- Multi-criteria Analysis

**Social and Gender**
- Participation from local officials, communities and stakeholders
- LGU point persons

**Sharing and Dissemination of Project Results**
Conceptual Framework

- **Vulnerability** = (Exposure, Sensitivities, and Adaptive Capacity)

- E, S and AC have a socio-political and cultural character

- **Social vulnerability**
  - focuses on demographic and socioeconomic factors that increase or alleviate the impacts of hazard events on local populations (Tierney et al., 2001)

(Adger et al. 2007; Yusuf and Francisco, 2009)
The Approach

- Identification of the Vulnerability Determinants and their Indicators
- Exposure
  - Commune & household surveys
  - Data Collection
  - FGDs, KILs, in-depth HH interviews
- Sensitivity
- Adaptive Capacity

Assessment
- Exposure
- Sensitivity
- Adaptive Capacity

Vulnerability index, map, and explanation

Participation from Local Officials, Communities, and other Stakeholders
The Methods

Identification of indicators and assignment of weights
- ROL
- FGDs
- KII

Household Vulnerability
- Survey: 600 HHs
- Indicator Approach
- Vulnerability as Expected Poverty (VEP)

Barangay Vulnerability
- Survey: 94 barangays
- Indicator Approach

Social Vulnerability
- + 30 In-depth study
- +11 Case studies
- +6 FGDs
**Conceptual Framework**

- **Vulnerability** = *(Exposure, Sensitivities, and Adaptive Capacity)*

- Exposure / Hazard
  - Typhoon
  - Flood

- Sensitivity
  - Natural
  - Human
  - Infrastructure
  - Livelihood

- Adaptive Capacity
  - Economic
  - Technology
  - Social
  - Human

Adger, 2006
Indicators of Barangay Vulnerability

**Hazard Exposure**

- **Typhoon**
  - No. of typhoons
  - No. of typhoons classified as Signal #2 or stronger

- **Flood**
  - Average flood level
  - No. of days (duration)
Indicators of Barangay Vulnerability

- **Sensitivity**
  - **Natural**
  - **Human**
  - **Infrastructure**
  - **Livelihood**

- **% Forest Area**
- **% Protected Forest Area**
- **% steep slopes**
- **% low-lying area**
- **Population Density**
- **Poverty rate**
- **% women-headed HHs**
- **% solely elderly-headed HHs**
- **Malnutrition rate**
- **% water from lake**
- **% water from wells**
- **% of HHs engaged in agriculture**
Indicators of Barangay Vulnerability

Adaptive capacity
- Infrastructure
  - % Irrigated land
  - % paved roads
  - HHs w/ tap water
    - % permanent houses
    - % 2-storey houses
  - No of doctors in health station
- Economic
  - Income per capita
  - % off-farm income
  - Economic growth
- Technology
  - Loudspeaker
  - Radio
  - Phone
  - TV
  - Internet shops
- Social
  - Bachelor’s degree holder in staff
- Human
  - Budget for development projects
  - Projects undertaken by mass organization
  - No. of training courses
  - Doctors per 1000 population
  - Hospital beds per 1000 population
Indicators of HH Vulnerability

Hazard Exposure

- Typhoon
  - No. of typhoons
  - No. of typhoons classified as Signal #3 or stronger

- Flood
  - No. of floods
  - Highest flood level
  - Longest duration

- Drought
  - No. of droughts

- Landslide
  - No. of landslides

- Flash flood
  - No. of flash floods
Indicators Used

- **Sensitivity**
  - Human
    - Dependence ratio (ratio of dependent person to HH size)
  - Livelihood
    - % of HH income from AFF sector
  - Infrastructure
    - Ratio of HH size to weak house
  - Financial
    - Distance to nearest body of water
    - % of Income to Total Debt
Indicators Used

Adaptive Capacity

Infrastructure
- Ave. area of permanent dwelling per capita

Economic
- Income per capita
- Remittance
- No. of TVs, radios
- No. of line phones/ cellphones
- No. of vehicles

Technology
- No. of contacts (financial help)

Social Capital
- No. of working members

Human
- Education of HH Head
Barangay Vulnerability Index

Vulnerable barangays are those within this range.
## HH Vulnerability Analysis

<table>
<thead>
<tr>
<th>HH Category</th>
<th>VI/VEP Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not vulnerable</td>
<td>0.00 – 0.49</td>
</tr>
<tr>
<td>Moderately vulnerable</td>
<td>0.50 – 0.79</td>
</tr>
<tr>
<td>Highly vulnerable</td>
<td>0.80 – 1.00</td>
</tr>
</tbody>
</table>
Findings: Barangay Vulnerability

<table>
<thead>
<tr>
<th>Determinants</th>
<th>No. of Vulnerable Municipalities</th>
<th>No. of Vulnerable Barangays</th>
<th>Most Vulnerable Barangay</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXPOSURE</td>
<td>5</td>
<td>10</td>
<td>San Pablo Norte, Sta. Cruz</td>
</tr>
<tr>
<td>SENSITIVITY</td>
<td>12</td>
<td>60</td>
<td>Pinagbayananan, Pila</td>
</tr>
<tr>
<td>ADAPTIVE CAPACITY</td>
<td>12</td>
<td>131</td>
<td>Ilayang Atingay, Magdalena</td>
</tr>
<tr>
<td>OVERALL</td>
<td>11</td>
<td>37</td>
<td>San Pablo Norte of Sta. Cruz</td>
</tr>
</tbody>
</table>
Who are vulnerable?

Barangay/ Community vulnerability in the province of Laguna is obviously a function of exposure of varying human ecosystems to typhoons and floods, with coastal barangays having a higher exposure to flooding and prolonged inundation.

However, it is also significant to note that human, social and economic sensitivity to these hazards also has major contributions to overall vulnerability.
For instance…

- 8 barangays within the study site were not found to be highly exposed yet they are among the 20 most vulnerable barangays.
  - Anibong in Pagsanjan (7<sup>th</sup>)
  - Masapang and Nanhaya in Victoria (10<sup>th</sup> and 15<sup>th</sup>)
  - San Isidro and Masiit in Calauan (12<sup>th</sup> and 20<sup>th</sup>)
  - Bukal and Pinagbayanan in Pila (14<sup>th</sup> and 18<sup>th</sup>)
  - and Ibabang Butnong in Magdalena (17<sup>th</sup>)

- The examination of their vulnerability indicates that their high vulnerability can be attributed more either to human, social and economic indicators of sensitivity and/or low adaptive capacity of the communities.
Barangay Pinagbayan in the municipality of Victoria ranked highest in terms of sensitivity but slides to 79th in terms of exposure (ranks 18th in overall).

Its vulnerability is clearly a function of its sensitivity as indicated by its sensitivity in terms of infrastructure and human indicators, poverty, as well as its significant number of women and elderly-headed households. It is also a predominantly agriculture-based community.
For instance...

- Barangay Dayap in the municipality of Calauan is equally exposed to typhoons, although relatively low in flooding, but which registered high in overall vulnerability.

- A closer look of other indicators of vulnerability showed that, Barangay Dayap is one of the highest in malnutrition rates which is indicative of high sensitivity to the impact of climate change – led threats; it also has low adaptive capacity as a result of low scores on technological, social and human indicators.
For instance...

- Barangay San Isidro also in Calauan

  vulnerability of which is due to high sensitivity as a result of having many women-headed households in a predominantly agricultural community.
Findings: Who are vulnerable?

- Households with high incidence of poverty
  - Large HHs
  - Low income
  - Livelihood activities affected by climate-related hazards and disasters
  - Agriculture-based (including rice farmers, vegetable /cash crop farmers; duck raisers)
  - Contractual labor / underemployed / seasonal laborers
- Agricultural Sector
- Informal Settlers
- Residents on / near lakeshore and rivers
Who are vulnerable? (HH Vulnerability)

- About **36%** of the household respondents in Laguna can be considered vulnerable.
- A large percentage of the vulnerable households do not have knowledge about climate change and its impacts, hence it is important to conduct information dissemination and education activities.
- Majority of the vulnerable HH are headed by those working in the commercial & services sector and agriculture sector, hence it is strategic to focus interventions toward this sector and consider livelihood programs that can augment the income of the vulnerable HH in Laguna.
Findings: Who are vulnerable?

- Communities / sectors vulnerable to floods and typhoons
  - Residents on / near lakeshore and rivers
  - Households with high incidence of poverty
    - Low income
    - Livelihoods affected by climate-related hazards and disasters
      - Agriculture-based
      - Contractual labor / underemployed / seasonal laborers
  - Women-headed HHs
  - Elderly-headed HHs
  - Agricultural sector
  - Informal settlers
  - Large households
  - Children
## HH Livelihood and Vulnerability

<table>
<thead>
<tr>
<th>Livelihood</th>
<th>VI</th>
<th>VEP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Farming</td>
<td>42</td>
<td>6</td>
</tr>
<tr>
<td>Fishing</td>
<td>63</td>
<td>13</td>
</tr>
<tr>
<td>Government</td>
<td>10</td>
<td>-</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>18</td>
<td>-</td>
</tr>
<tr>
<td>Commercial/</td>
<td>25</td>
<td>1</td>
</tr>
<tr>
<td>Services</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

- Livelihoods with the highest vulnerability incidence:
  - VI: Fishing, Farming, Services
  - VEP: Fishing, Manufacturing, Services
# Level of exposure, sensitivity and adaptive capacity and overall vulnerability

<table>
<thead>
<tr>
<th>Sector / Group</th>
<th>Exposure</th>
<th>Sensitivity</th>
<th>Adaptive Capacity *</th>
<th>Overall Vulnerability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elderly and elderly-headed HHs</td>
<td>1.71</td>
<td>1.75</td>
<td>2.38</td>
<td>1.95</td>
</tr>
<tr>
<td>Children</td>
<td>1.71</td>
<td>1.50</td>
<td>2.50</td>
<td>1.90</td>
</tr>
<tr>
<td>Women-headed HHs</td>
<td>1.71</td>
<td>2.00</td>
<td>2.38</td>
<td>2.03</td>
</tr>
<tr>
<td>Residents on/ near lakeshore and rivers</td>
<td>2.36</td>
<td>2.50</td>
<td>2.13</td>
<td>2.33</td>
</tr>
<tr>
<td>Poor households</td>
<td>2.00</td>
<td>3.00</td>
<td>2.75</td>
<td>2.58</td>
</tr>
<tr>
<td>Large families/ HHs</td>
<td>1.71</td>
<td>2.50</td>
<td>2.00</td>
<td>2.07</td>
</tr>
<tr>
<td>Agriculture-based HHs (including fishing, livestock and duckraising raising)</td>
<td>2.29</td>
<td>2.50</td>
<td>2.25</td>
<td>2.35</td>
</tr>
<tr>
<td>Informal settlers</td>
<td>2.00</td>
<td>2.75</td>
<td>2.25</td>
<td>2.33</td>
</tr>
</tbody>
</table>
Findings: Why are they vulnerable?

- Poor households
  - Low income
  - Low disaster preparedness
  - Usually into livelihood activities affected by climate-related hazards and disasters
  - Agriculture-based
  - Contractual labor / underemployed / seasonal laborers
  - With residences easily effected by typhoons and floods
- Location – near waterways
- Materials – light materials

Disaster responses for HH limit their income activities.
# Assistance Needed by Households

<table>
<thead>
<tr>
<th>Assistance/Interventions Needed</th>
<th>% of all HH</th>
<th>Rank</th>
<th>% of vulnerable HH (VI)</th>
<th>Rank</th>
<th>% of vulnerable HH (VEP)</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial assistance</td>
<td>47</td>
<td>1</td>
<td>42</td>
<td>1</td>
<td>47</td>
<td>1</td>
</tr>
<tr>
<td>Relief goods</td>
<td>31</td>
<td>2</td>
<td>8</td>
<td>5</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Information</td>
<td>17</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Medical assistance</td>
<td>15</td>
<td>4</td>
<td>11</td>
<td>3</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Infrastructures</td>
<td>11</td>
<td>5</td>
<td>30</td>
<td>2</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Insurance</td>
<td>6</td>
<td>6</td>
<td>4</td>
<td>7</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Shelter/Relocation</td>
<td>5</td>
<td>7</td>
<td>1</td>
<td>9</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Emergency evacuation and shelter</td>
<td>4</td>
<td>8</td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Construction materials</td>
<td>4</td>
<td>9</td>
<td>-</td>
<td>10</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>Provide livelihood assistance</td>
<td>2</td>
<td>10</td>
<td>9</td>
<td>4</td>
<td>16</td>
<td>3</td>
</tr>
<tr>
<td>Proper waste management</td>
<td>2</td>
<td>11</td>
<td>1</td>
<td>9</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Inputs for production</td>
<td>1</td>
<td>12</td>
<td>2</td>
<td>8</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>Trainings</td>
<td>0</td>
<td>13</td>
<td>4</td>
<td>7</td>
<td>7</td>
<td>6</td>
</tr>
</tbody>
</table>
Findings: Why are they vulnerable?

- **Agricultural Sector**
  - including rice farmers, vegetable /cash crop farmers; duck raisers
  - damage to agricultural crops and livestock/poultry/ducks during typhoons and flooding
  - the immediate effect of decrease in farmers’/raisers’ yield
  - Lower prices for lower yields
Findings: Why are they vulnerable?

- **Agricultural Sector**
  - Costs for inputs increases after disasters
  - Disaster response is double burden: living conditions + source of livelihood
  - Time and energy is divided and affects level of productivity
  - Available resources to cope is divided into productive and domestic use

- In terms of hazards, typhoons were discussed as more damaging since even high value crops in areas which do not suffer from inundation are affected.
Findings: Why are they vulnerable?

✔ **Informal Settlers**
  - Less resources for preparedness
  - Vulnerable livelihoods
  - Light materials of houses
  - Location of residence: lakeshore and waterways
  - Cannot access DRRM services
  - Less access to credit
  - Less access to information

✔ **Residents on / near lakeshore and rivers**
Experience of HH on Climate-related Hazards

• Typhoons and floods have the widest impact in terms of the number of households exposed to the hazard

<table>
<thead>
<tr>
<th>Hazard Indicators</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of HH who experienced typhoons in the last 10 years</td>
<td>98</td>
</tr>
<tr>
<td>% of HH who experienced typhoons with Signal No. 3 or higher in the last 10 years</td>
<td>86</td>
</tr>
<tr>
<td>% of HH who experienced floods in the last 10 years</td>
<td>57</td>
</tr>
<tr>
<td>% of HH who experienced droughts in the last 10 years</td>
<td>49</td>
</tr>
<tr>
<td>% of HH who experienced landslides in the last 10 years</td>
<td>4</td>
</tr>
<tr>
<td>% of HH who experienced flashfloods in the last 10 years</td>
<td>8</td>
</tr>
</tbody>
</table>
## Mean HH Vulnerability Estimates

<table>
<thead>
<tr>
<th></th>
<th>VI</th>
<th>VEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard</td>
<td>0.08</td>
<td>-</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>0.26</td>
<td>-</td>
</tr>
<tr>
<td>Adaptive Capacity</td>
<td>0.17</td>
<td>-</td>
</tr>
<tr>
<td><strong>OVERALL VULNERABILITY</strong></td>
<td><strong>0.43</strong></td>
<td><strong>0.37</strong></td>
</tr>
</tbody>
</table>
Distribution of Households according to Vulnerability Level

<table>
<thead>
<tr>
<th>Percentage of Households</th>
<th>VI</th>
<th>VEP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Vulnerable</td>
<td>Not Vulnerable</td>
</tr>
<tr>
<td></td>
<td>71</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>
A high proportion of vulnerable households have no information/knowledge about climate change issues (56%, VI)
Findings: Gender and Vulnerability

<table>
<thead>
<tr>
<th>Approach</th>
<th>Vulnerability Level</th>
<th>Incidence in Male-headed Households</th>
<th>Incidence in Female-headed Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>VI</td>
<td>Moderate</td>
<td>27</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>All Vulnerable</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>VEP</td>
<td>Moderate</td>
<td>13</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>20</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>All Vulnerable</td>
<td>33</td>
<td>51</td>
</tr>
</tbody>
</table>

- Based on VEP estimates, there is a higher incidence of vulnerability in female-headed households than in male headed households.
Findings: Gender and Vulnerability

- Gendered division of labor during and after disasters show overrepresentation of women.
- This is usually most apparent in agriculture and among informal settlers. In agriculture-based households, the indepth interviews indicated that although husbands and sons also tend to contribute more work in production, harvesting and marketing activities as a result of climate-related hazards and disasters, the same was reflected for women.
  - Men → rebuilding; women → marketing
  - Women engaged in vulnerable livelihood activities
    - Duckraisers
    - Informal livelihood sector
Findings: Gender and Vulnerability

- Non-productive work such as household chores and many care-giving tasks, such as caring for the children, sick, elderly, the home and assets increases for women, but not so much for men.
- Women focused on the effects of disasters at the household level: how they were not able to wash their clothes, and iron them because of power outages.
- At the community level, they are also very particular to services and resources that should be present in a barangay health center, because these health centers often provide services to pregnant women and children.
Conclusions

- Cross-cutting of spatially-based and sectoral-based sensitivity
  - Lakeshore
  - Riverbanks
  - Irrigation canals
  - Informal settlers; the poor
- Variation in sensitivity and adaptive capacities of communities and sectors / groups
  - Based on indicators
  - Social capital
Conclusions

- Residents on/near lakeshore, coastal and riverbanks more vulnerable to the impacts of CC-related hazards
  - Livelihood
  - Poor
  - High sensitivity based on physical characteristic of houses
- Social and cultural nature of CC vulnerability
  - Social and livelihood systems
  - Population age and sex structure aside from size and density
  - Knowledge-based adaptive capacities
Conclusions

- Vulnerable groups and sectors
  - Must be looked closely in terms of adaptation options
  - **The poor**: less access to resources
  - **The agriculture sector**
  - **Residents in lakeshores, along rivers and other waterways**
  - **Informal settlers**
  - Elderly; solitary elderly; elderly-headed HHs
  - Handicapped
  - Women; women-headed HHs; women in difficult circumstances
Conclusions

- Vulnerability of the agriculture sector
  - Variation based on specific livelihood activity, knowledge and past adaptations
- Gender: women more vulnerable than men
  - Productive work + domestic roles
  - Sensitivity to health and sanitation
  - Less access to off-farm livelihood options
  - Physical demands of coping with hazards
- Social capital
  - Strengthening of bridging and linking social capital
Lessons: Some policy implications

- Vulnerability is more than exposure; it is importantly due to the sensitivities and level of adaptive capacity of various sectors of our society.
- Collaborative work is necessary in vulnerability assessments.
  - Complex issues must be dealt with in an atmosphere of cooperation and openness to a variety of solutions.
  - A transdisciplinary approach necessarily embraces the possible contributions of various disciplines as well as the contributions from people and sectors beyond academic and disciplinal contexts.
Lessons: Some Policy Implication

- When dealing with complex subjects, such as climate change vulnerability and CCA, it is necessary to shift from mono-disciplinary to interdisciplinary and transdisciplinary concepts and methods.

- In order to be effective, this shift should be founded on a clarification of definitions, goals, and methods.

- These contributions enable the cross-fertilisation of knowledge and experiences from diverse groups of people that can promote an enlarged vision of a subject, as well as new explanatory theories.

- Rather than being an end in itself, this kind of research is a way of achieving innovative goals.
Challenges:

- Arriving at common understanding beyond disciplinal boundaries.
  - Concepts
  - Methodology
- Engaging local government within the frame of the academe and research institutions.
- Adjusting to the frame of the LGUs and local communities.
References:


- Technical Reports (2011; 2012). Developing Capacity to Adapt to Climate Change in Southeast Asia, IDRC-funded Project.
Thank you.

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