Module I: An Introduction

Vulnerability and adaptation: An Introduction

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Presentation Outline

1. Why assess vulnerability and adaptation?
2. How to define vulnerability and adaptation
3. What are the key elements of an assessment?
4. How to move from vulnerability to adaptation
5. How to choose the framework and methods?
6. How to choose the appropriate tools?
7. Practical implications
1. Why assess vulnerability and adaptation?

– To identify the extent and location of short-term and long-term threats
– To respond to the impacts of natural disasters and climate change
– To improve early warning systems and climate change adaptation measures
– To understand the underlying vulnerability and the adaptive capacity
– To assist in the identification and prioritization of current and future adaptation needs
– To guide and support appropriate response measures
2. How to define vulnerability and adaptation?

There are a number of different ways to define, interpret and use the terms ‘vulnerability’ and ‘adaptation.’ These differences have social, political, economic and environmental implications.

– **Vulnerability**
The degree to which a system is susceptible to (or incapable of) dealing with the negative impacts of climate change (including climate variability and extreme events).

– **Adaptation**
Adjustment of a system to respond to new conditions or changes in its environment.
3. What are the key elements of an assessment?

Prior to beginning an assessment, one should take into consideration the following:

– Needs and concerns of the clients and users
– Temporal and spatial dimensions of the assessment
– Social and political importance of the assessment
– Scales, resources, issues and target sectors
– Needs of the actors and partners
– Resources (human and financial) available
– Need to produce information relevant for decision-making
Example:

Asymmetry in the needs/concerns of scientists/decision-makers

Technical and scientific community
Problems = Greenhouse effect, contamination
Focus = Climate science
Methods = GCM scenarios, etc..
Perspective = Top-down
Vulnerability = Climate impacts
Adaptation = Future
Goal = Adaptation measures
Assessment = Global, regional

Decision-makers
Problems = Budget, poverty
Focus = Prioritization of issues
Methods = Development aid strategies
Perspective = Bottom-up
Vulnerability = Current and future
Adaptation = Current
Goal = Policies and actions
Assessment = National, local, projects

Example:
The theory and reality of using information

In theory, it is necessary to use a lot of data to produce a little information that will be pertinent to decision-making.

In reality, a lot of data is produced but only a small amount of information is used to actually make decisions.

To change this reality, one must transform data into information and information into concrete actions.
4. How to move from vulnerability to adaptation? 
In theory…

Vulnerability Assessment

- Risks
- Conditions
- Target Area
- Vulnerability

Adaptation Assessment

- Future Vulnerability
- Options
- Strategies & Priorities
- Adaptation

Monitoring
4. How to move from vulnerability to adaptation?
In practice...

Assessment, policies, strategic planning, and implementation cycle
4. How to move from vulnerability to adaptation?

Definition of adaptive measures...

<table>
<thead>
<tr>
<th>Natural systems</th>
<th>Anticipatory</th>
<th>Reactive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public</td>
<td>• Crop diversification</td>
<td>• Changes in ecosystem composition and location</td>
</tr>
<tr>
<td></td>
<td>• Insurance</td>
<td>• Species migration</td>
</tr>
<tr>
<td></td>
<td>• Housing design</td>
<td></td>
</tr>
<tr>
<td>Private</td>
<td>• Early warning</td>
<td>• Agricultural development</td>
</tr>
<tr>
<td></td>
<td>• Building codes</td>
<td>• Reconstruction</td>
</tr>
<tr>
<td></td>
<td>• Infrastructure</td>
<td>• Relocation of activities</td>
</tr>
</tbody>
</table>

Source: Smith, 2001 [www.ipcc.ch/present/COP65/barriysmit.ppt](http://www.ipcc.ch/present/COP65/barriysmit.ppt)
5. How to choose the framework and methods?

Elements to consider:

– Identification of problems and issues, awareness raising, improving the level of knowledge and policy development

– Strategic planning, objective setting, programme development and implementation of projects

– Implementation, monitoring and evaluation of projects, programmes, and policies

– International, regional and national context, specifically the interplay of conventions, agreements and processes at these different levels (e.g. UNFCCC, IPCC, NAPA, UNFCCC National Communications, etc.)
Different levels and needs of an assessment

- **Livelihoods:** Basic needs, sustainable activities, and goods and services …
- **Impacts**
- **Communities**
- **Households**
- **Target groups**

- **NAPA** (LDCs)
- **Projects**
- **Urgent and immediate needs**

- **Countries**

- **APF**

- **Resources/ Sectors:** Agriculture, Water Forests, Health, Infrastructure…

- **Global**
  - **IPCC**
  - **Biophysical and socio-economic**
  - **Climate Change**

- **National**
  - **Measures & projects**
  - **Political strategies**

- **Local**
  - **Impacts**
  - **Scientific perspective**

- **International Conventions** (CCD, CBD, UNFCCC)

- **Scientific assessment**
Example: Use of reference methods according to different levels

Regional and global scientific assessments

Climate variability

Climate change

Source: www.grida.no/climate/vitalafrica
Example: Use of reference methods according to different levels

National and regional scientific assessments
Socio-economic impacts

Bio-physical and socio-economic Impacts

Climate Variability
Climate Change

Hydric stress and lack of freshwater by 2025

Source: www.grida.no/climate/vitalafrica
Example: Use of reference methods according to different levels

National and regional policies and strategies

Sectoral impacts (water and agriculture) of climate variability

Resources/Sectors:
Agriculture, Water, Biodiversity, Health, Infrastructure...

National

Bio-physical and socio-economic Impacts

Global

Climate Variability

Climate Change

Source: www.grida.no/climate/vitalafrica
Example: Use of reference methods according different levels

Livelihoods: Basic needs, sustainable activities, goods and services...

Resources/Sectors: Agriculture, Water, Biodiversity, Health, Infrastructure...

Bio-physical and socio-economic Impacts

Climate Variability
Climate Change

Local and national measures

Impacts of climate variability on livelihoods

Food insecurity in Uganda, 2003

Impacts of climate change on livelihoods

Source: www.grida.no/climate/vitalafrica
6. How to choose the appropriate tools?

Tools selection must be a function of the desired level of analysis:

<table>
<thead>
<tr>
<th>“Resources” Scale</th>
<th>“Decision” levels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>International Agreements</td>
</tr>
<tr>
<td>Ecosystem</td>
<td>Regional Agreements</td>
</tr>
<tr>
<td>Watershed</td>
<td>Governments</td>
</tr>
<tr>
<td>Landscape</td>
<td>Communities</td>
</tr>
<tr>
<td>Farm</td>
<td>Families</td>
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</tbody>
</table>
6. How to choose the right tools?

Some examples:

– **Macro-scale/level**
  – A set of relationships characterizing the society-environment interactions that have similar structures and problems
  – Scenario analysis to assess and explore the potential impacts of various adaptation strategies
  – Multi-criteria analysis to compare adaptation options using monetary or non-monetary values

– **Micro-scale/level**
  – Livelihood indicators to identify and analyze the typologies and characteristics of the most vulnerable groups
  – Multi-agent simulations to assist the development of adaptation strategies and to assess the differential impacts on stakeholders groups
  – Oral histories and focus groups to elicit the different perceptions of the stakeholders

– **Multi-scale/level**
  – Vulnerability indicators and mapping to quantify and characterize risks and vulnerability
  – Coupled land use models and multi-agent simulations to analyze dependencies and interrelations between the different scales and levels
Important:
The tools presented in the slides that follow are examples and do not represent an exhaustive list. Some of the tools can be used at a variety of scales and levels, e.g. participatory GIS, scenario analysis, vulnerability indicators and multi-agent models.
Examples of tools

Scales

- Global
- Regional
- National
- Local

Vulnerability Assessment

- Vulnerability Profiles
- Syndromes
- Risk Analysis
- Delphi techniques
- Institutional Analysis
- Participatory modeling and GIS
- Oral Histories
- Checklists
- Livelihood indicators
- Brainstorming

Adaptation Assessment

- Scenario Analysis
- ESE
- Expert judgment
- Multi-criteria Analysis
- Bayesian Analysis
- Decision Tree
- Cognitive Cartography
- Focus Groups
- Role play

Status of the assessment over time

7. Practical implications: Difference between vulnerability to (current) climate ‘variability’ and vulnerability to (future) climate ‘change’...

Vulnerability to climate ‘variability’

Adapted from Fussel and Klein, 2002.
www.pik-potsdam.de/~fuessel/download/undp02_final.pdf
Climate ‘Change’ Vulnerability

Adapted from Fussel and Klein, 2002.

www.pik-potsdam.de/~fuessel/download/undp02_final.pdf
Practical implications: The difference between options geared towards reducing vulnerability to climate ‘variability’ and those aimed at reducing vulnerability to climate ‘change’

Adapted from Fussel et Klein, 2002.

www.pik-potsdam.de/~fuessel/download/undp02_final.pdf
Adaptation

From Fussel et Klein, 2002.
www.pik-potsdam.de/~fuessel/download/undp02_final.pdf
Reduction of other stress factors

Adapted from Fussel et Klein, 2002.

www.pik-potsdam.de/~fuessel/download/undp02_final.pdf
Increasing the adaptive capacity

Adapted from Fussel et Klein, 2002.

www.pik-potsdam.de/~fuessel/download/undp02_final.pdf
In summary

– The choice of terms, concepts, methods and tools is not crucial
  – The important thing is to use those selected in a way so as to produce information that will be relevant for the clients, users, partners and stakeholders

– Vulnerability and adaptation assessments are multi-scale and multi-level processes
  – Impacts will be distributed in a heterogeneous manner as a function of the different spatial and temporal scales
  – The necessary strategies/policies/measures will be defined as a function of the level considered (global, regional, national or local)

– Spatial entities (landscapes, watersheds) should be linked to social entities (families, villages, individuals) in order to take in account the realities of the situation
– One must ensure that **realities in the field** (institutional limitations, technical capacities, stakeholders’ and partners’ needs) are coherent with the selected methods and tools

– Information produced must be **politically relevant, socially acceptable and technically reliable** to avoid anecdotic or ephemeral elements in the assessments

– Scientific knowledge about vulnerability, climate impacts and adaptation options needs to be translated into **a language that decision-makers understand** and converted to **timescales appropriate for the decision-making process**
Political ownership and credibility of the information on vulnerability and adaptation must be achieved in order to:

- Have them viewed as investments and not one-off costs;
- Move from implementing reactive measures to implementing proactive measures, namely planning and adapting to the potential impacts and mitigating the direct and indirect causes of vulnerability.

To overcome the challenge of developing sustainably, one must: increase adaptive capacity, build resilience, and identify and capitalize on any advantages resultant from the consequences of climate change.