



Module II. Concepts, frameworks, methodologies and tools for vulnerability and adaptation assessments

Concepts, frameworks and methodologies for vulnerability and adaptation assessments

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In collaboration with:



Presentation Outline

1. Definition of terms and concepts
2. Framework and method selection
3. Model and methodology selection
4. Practical considerations for vulnerability and adaptation assessments
5. Conclusions
6. Sources for more information

1. Definition of terms and concepts

Defining terms and concepts to use in vulnerability and adaptation assessments is more than a simple question of linguistics. It has implications for the choice of frameworks, methodologies and tools as well as affects the results of the assessment itself.

Cont.

Vulnerability

“Vulnerability” can have a number of meanings:

- In the natural hazards domain, it refers to the degree to which a unit is likely to suffer in response to a disturbance and the capacity (or lack thereof) the unit has to deal with the disturbance (either by returning to its original state, arrive at a new state of equilibrium or perish) (Kasperson *et al.*, 2000)
- Technical literature in this domain refers to vulnerability in terms of ‘degree of loss’ (1 to 100) expected from a potentially catastrophic event (UNOCHA Glossary)
- In contrast development and poverty-oriented literature places emphasis on the current social, economic, political conditions, namely measuring global human wellbeing in a manner that incorporates exposure to potentially harmful social, economic, environmental or political events (Bohle *et al.*, 1994)

Cont.

Vulnerability

- The IPCC’s definition of vulnerability is solely in relation to climate change: “The degree to which a system is susceptible to, or unable to cope with, adverse effects of *climate change*, including *climate variability* and extremes. Vulnerability is a function of the character, magnitude, and rate of climate variation to which a system is exposed, its *sensitivity*, and its *adaptive capacity*.”

www.ipcc.ch/pub/syrgloss.pdf

1. Definition of terms

Vulnerability or vulnerabilities?

Vulnerability can be considered as a function of risk, danger levels, level of exposure or adaptive responses available. One can also distinguish between:

Bio-physical Vulnerability

- Focuses on the ecological processes related to vulnerability, namely the susceptibility and exposure to environmental changes
- Indicators to measure this type of vulnerability include: extended growth period, wet/dry season, risk of flooding, etc.

Social Vulnerability

- Focuses on the political, socio-economic, cultural and institutional aspects of vulnerability
- Indicators to measure this type of vulnerability include: education levels, income, poverty rate, social capital, extent of livelihood diversification, land, etc.

Cont.

Resilience and stability...

- **Ecological resilience:** Degree to which perturbations can be absorbed by the system before it changes from one state to another. **Stability** is defined as a function of the tendency of a system to return to its original equilibrium after a perturbation (Ludwig *et al.*, 2002).
- **Social resilience:** Capacity of groups or communities to adapt to, or learning to handle, stresses and external political, social, economic or environmental perturbations (Adger, 2000).

Cont.

Adaptation or adaptive capacity?

Adaptation:

– Changes in procedures, practices and structures with a view to limiting or eliminating the potential damage from, or capitalizing on the opportunities created by, climate variability and change.

Adaptive capacity:

– Ability of a system, community or individual to adapt to climate change impacts (including climate variability). The level of capacity depends on the economic, social and human resources of the entity.

Cont.

Examples of other important terms...

- Mitigation:
 - Mechanisms or actions implemented to reduce the exposure or susceptibility to perturbations or stresses.
 - Human intervention aimed at reducing the emission of greenhouse gases or enhancing their absorption by sinks.
- Danger: A threat resultant from a perturbation or stress to which a system may be exposed.
- Indicator/Index: Variables selected to convey information on the condition and evolution of a system.
- Risk: Probability of a perturbation or stress occurring in a given region, at a given time, as well as the magnitude of that perturbation/stress.
- Susceptibility: Extent a system, or elements of a system, will suffer loss as a result of a perturbation or stress.

1. Definition of concepts

Assessment or assessments?

Risk assessment

Description: Anatomy (i.e. structures, forms, schemes) of the changes in the environment or society.

Objective: Identify the environmental and social consequences for a given series of perturbations or stresses.

Outputs: Analysis of the multiple effects a single causal factor can produce.

Use: In planning processes and to prepare for emergencies.

Cont.

Assessment or assessments?

Vulnerability and adaptation assessment

Description: Physiology (i.e. functions, dynamics, synergies) of the changes in the environment or society.

Objective: Determine the risk of adverse effects on units, groups or regions exposed to these perturbations or stresses and identify factors that augment/diminish adaptive capacity.

Output: Analysis of specific effects caused by a number of factors.

Use: Strategic policy councils, decision-making processes, defining adaptation measures.

Cont.

Change or variability?

Climate variability: Characteristic inherent to the climate system which relates to the range of climatic activity possible. The degree of variability can be described by the difference between long-term averages of climate parameters (e.g. rain, temperature, humidity, season length) and observed values. Variability can be assessed on a number of temporal or spatial scales.

Climate change: Modifications to the climate system that are directly or indirectly attributed to human activities that alter the composition of the atmosphere. These changes are additional to the natural climate variability that would be expected in a comparable period.

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Current or future vulnerability?

Current vulnerability (based on present climate variability): allows one to assess the known risks and implement measures to reduce or manage those risks.

Future vulnerability (based on climatic changes): allows one to assess the potential and known risks with the goal of estimating the level of danger and identifying the appropriate adaptation measures.

Practical considerations...

How to apply the terms and concepts...

$$\begin{aligned} & \text{Vulnerability} = \\ & \text{Risk (Danger x Exposure)} \\ & \quad +/ - \\ & \text{Adaptation (Responses / Options)} \end{aligned}$$

Where:

Risk = Probability of a given danger occurring

Danger = Current or potential threats to humans and their well-being, and ecosystems and their services

Exposure = Susceptibility to loss

Adaptation = Capacity of a system to adjust to new or changing conditions in its environment

Options = Different possible response measures to the changes

Responses = The mechanisms used or actions taken in response to current and future adverse effects

Practical considerations...

Two ways to use vulnerability and adaptation assessments...

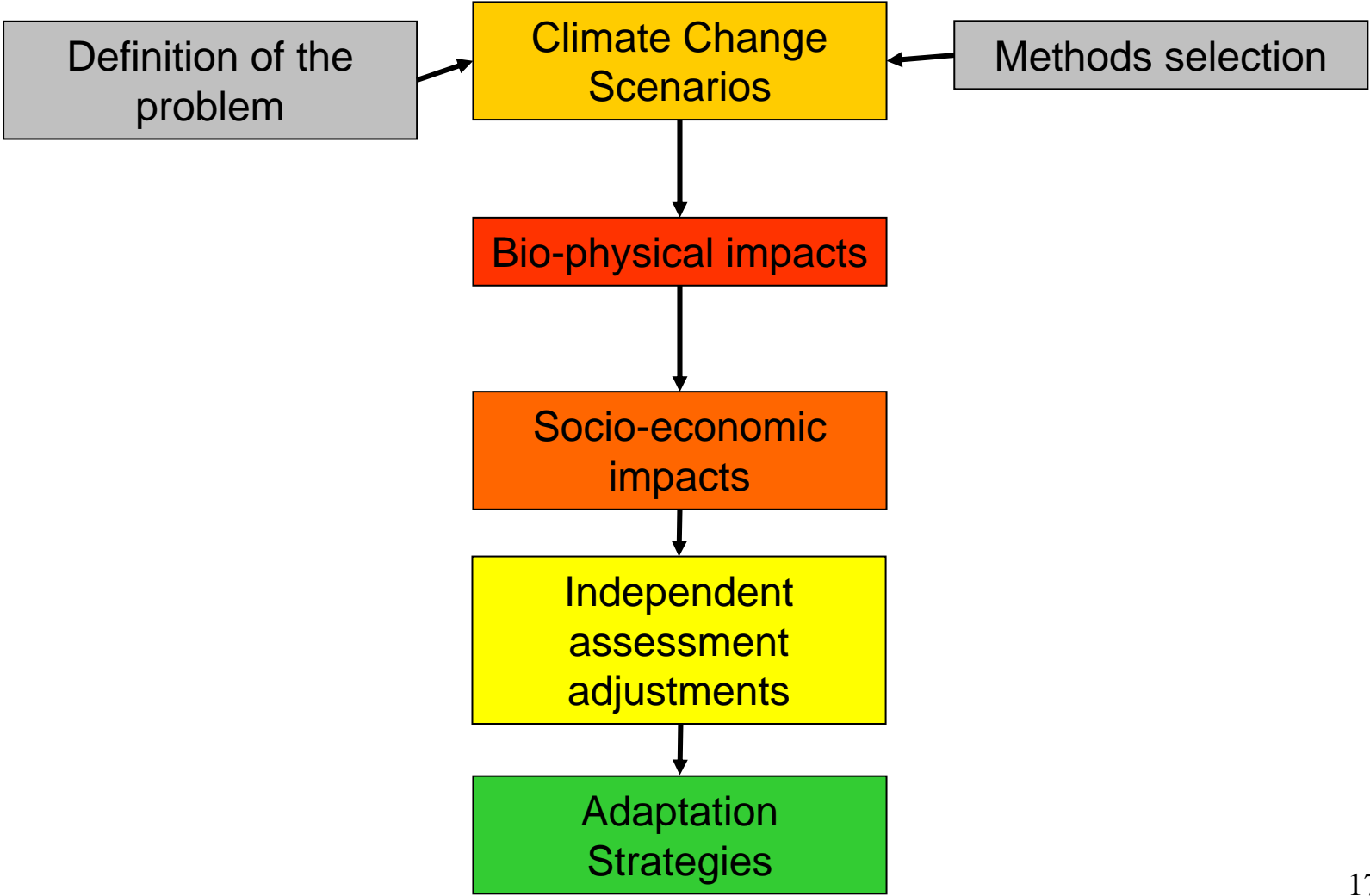
Characteristics of the assessment	Current vulnerability (Climate variability)	Future vulnerability (Climate change)
Origin of the danger	Natural variability	Human influence
Risk reduction objective	Internal vulnerability	Internal and external vulnerability
Development components	Social and economic	Social, economic and environmental
Goal of the analysis	Normative, reactive	Normative, proactive
Reasons for interventions	Voluntary assistance	Obligatory assistance
Time scale	Discrete and short-term	Gradual and long-term
Spatial scale	Local-regional	Regional-global
Level of uncertainty	Low to medium	Medium to high
Type of dangers	Known dangers	New and known dangers
View of the system	Static and reactive	Dynamic and adaptive
Adaptation focus	Emergencies	Trends and emergencies

Other important things to consider...

- Something/someone is vulnerable to the point that he/she/it has no resilience
- From a practical point of view, resiliency (namely the capacity to absorb or adapt to changes) can be considered as the opposite to vulnerable (namely one's susceptibility to suffer losses from perturbations)
- Hence vulnerability and resilience can be considered as two sides of the same coin

2. Framework and method selection

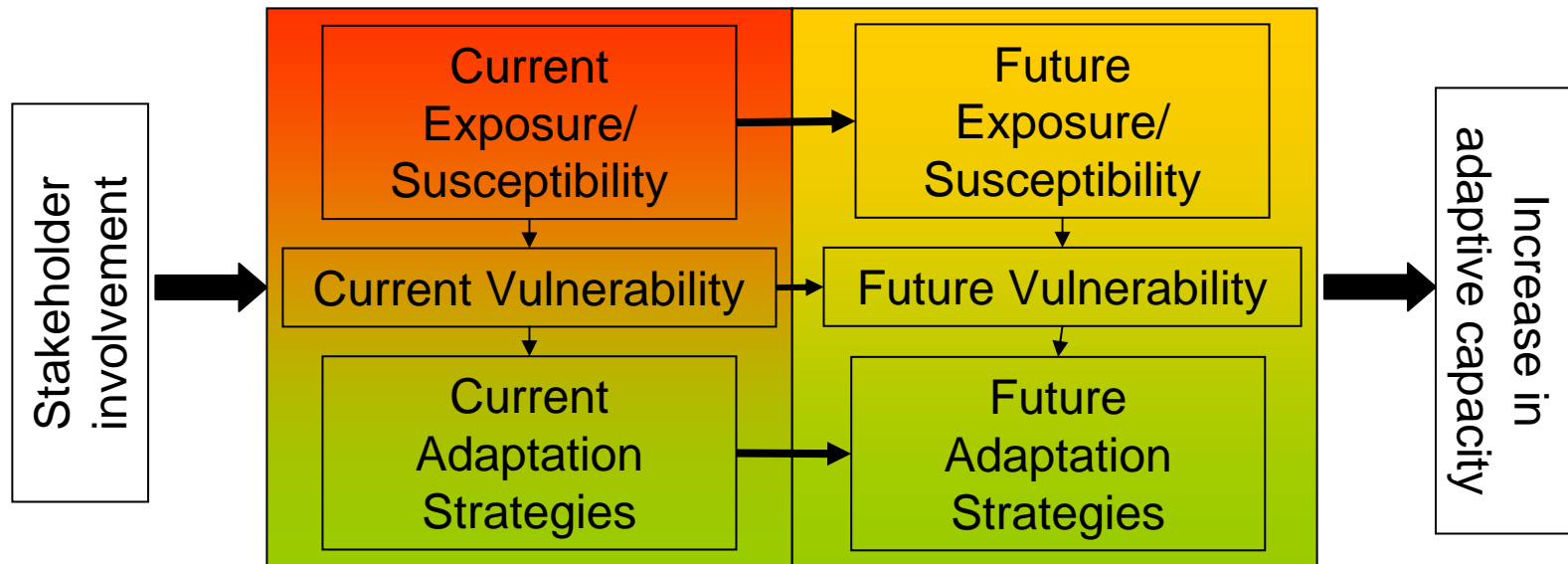
IPCC Approach: Top-Down – guided by sectorally oriented climate change scenarios



Source: Carter *et al.* 1994

Cont.

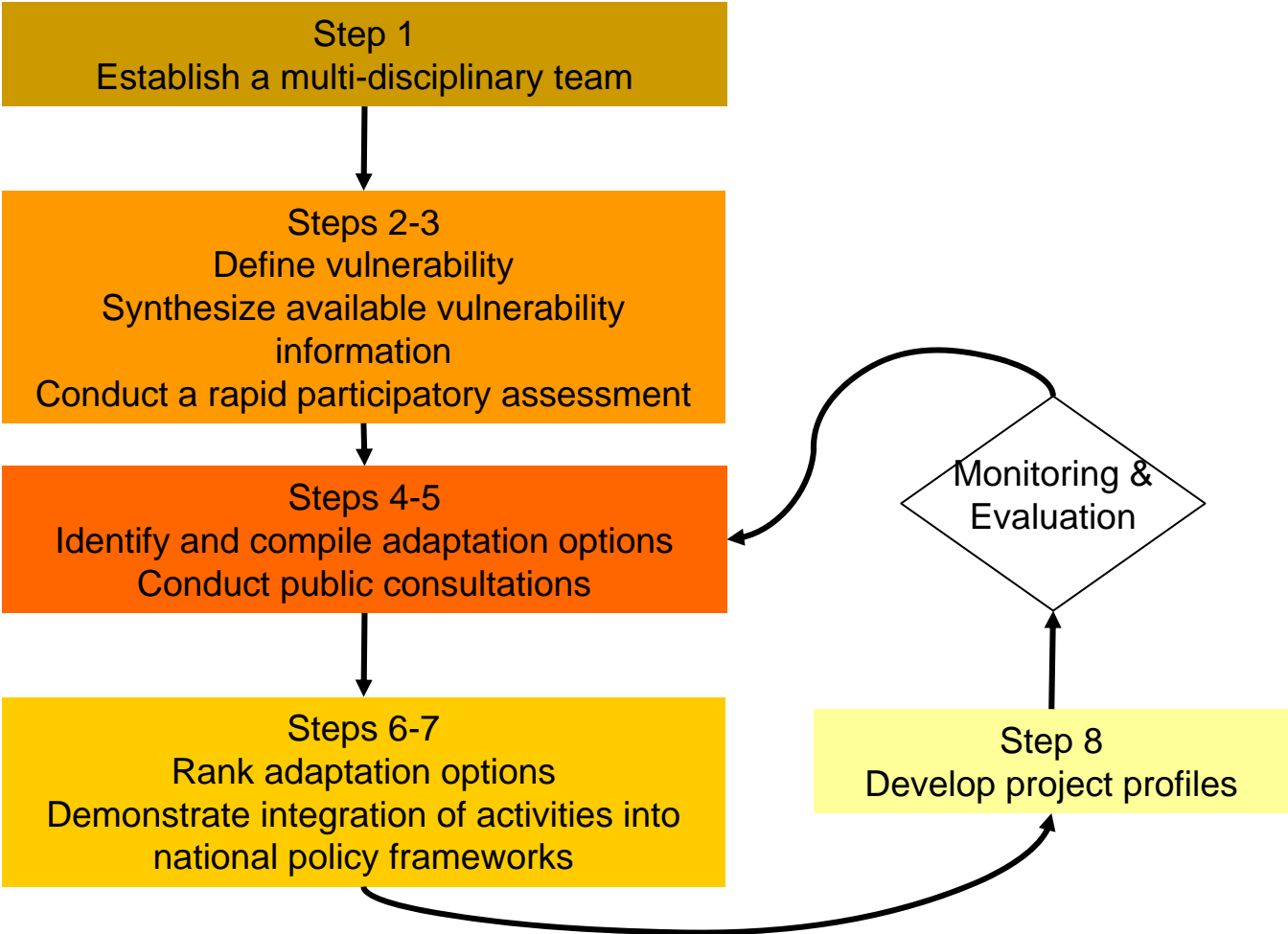
APF/UNDP-GEF Approach: Bottom-Up – with vulnerability as the entry point and a transversal orientation



Source: Lim and Spanger-Siegfried, 2005

Cont.

NAPA approach: Bottom-Up – where vulnerability is the entry point and enhancing endogenous adaptive capacity is sought



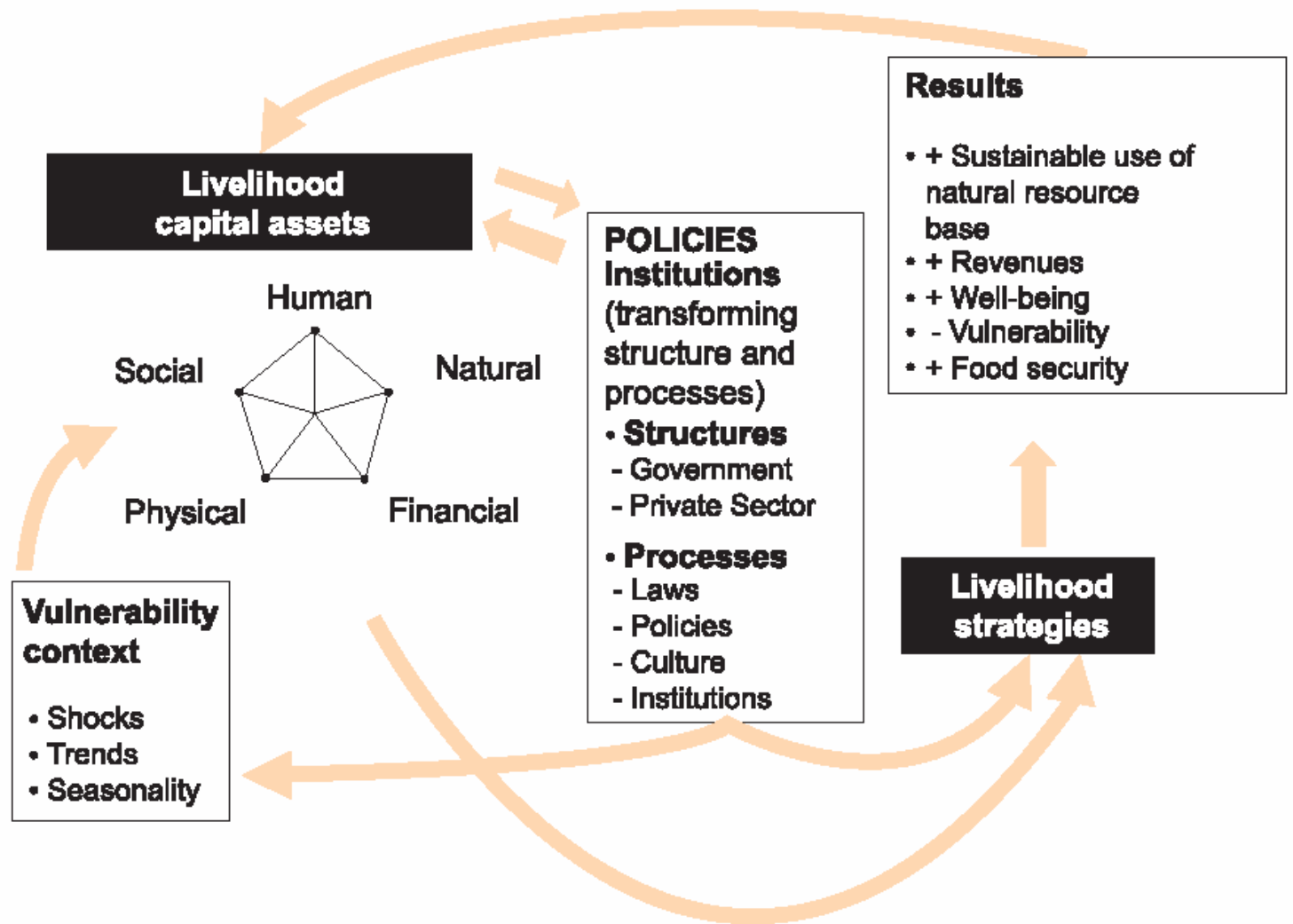
Source:UNFCCC/LEG, 2004

Practical considerations...

- Analysis entry point must be climate variability and change.
- Analysis must be done as a function of the adaptive capacity and must take into consideration that the impacts of climate change are not simply climatic in nature but are influenced by a number of processes and by both anthropogenic and natural factors.
- If the context in which vulnerability arises and its underlying causes are not taken into consideration, one is in danger of underestimating the magnitude of the risk, the extent of the social and environmental problems and impact of extreme events.

3. Model and Methodology Selection

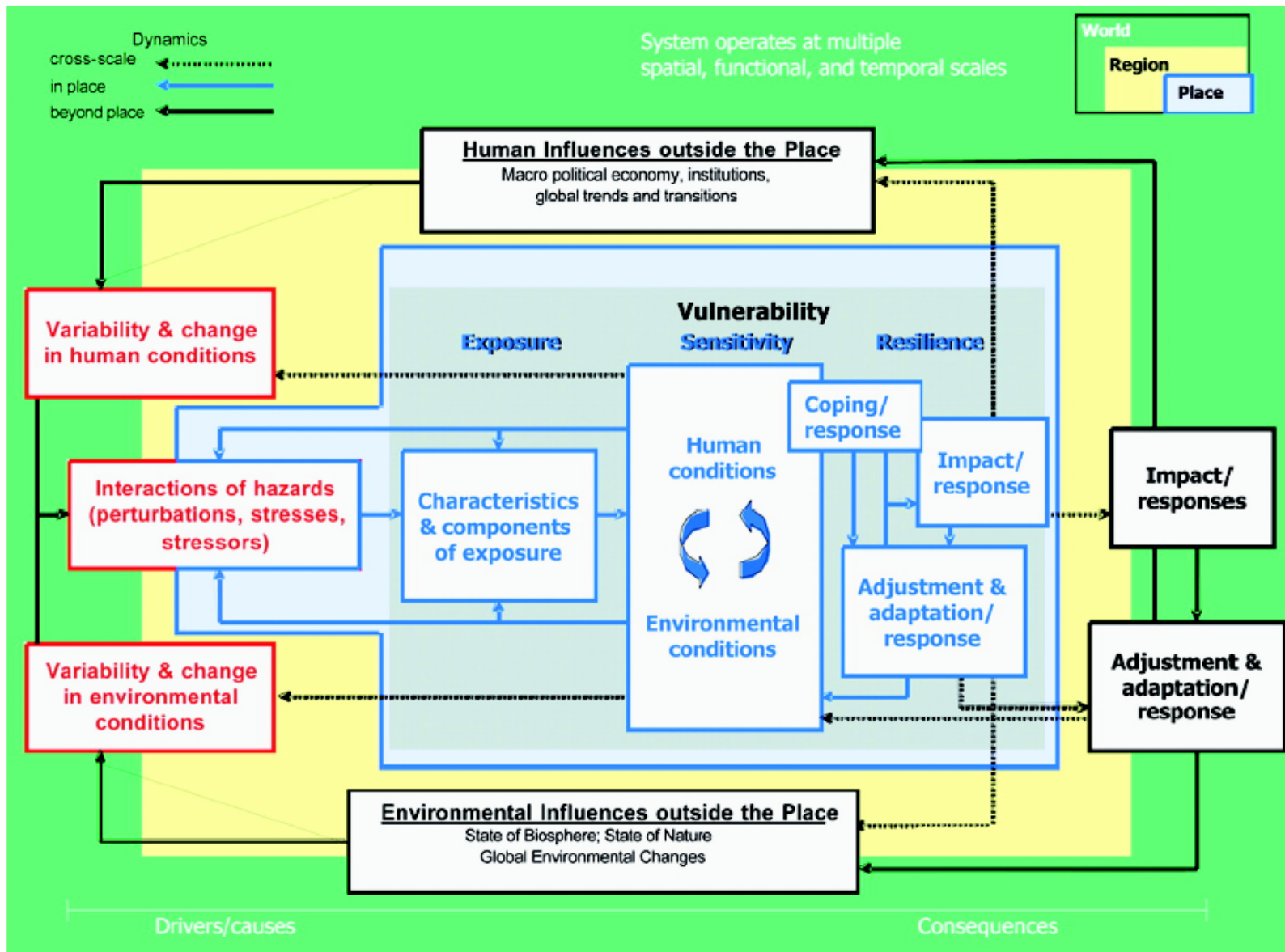
Methodology elements: The livelihoods model



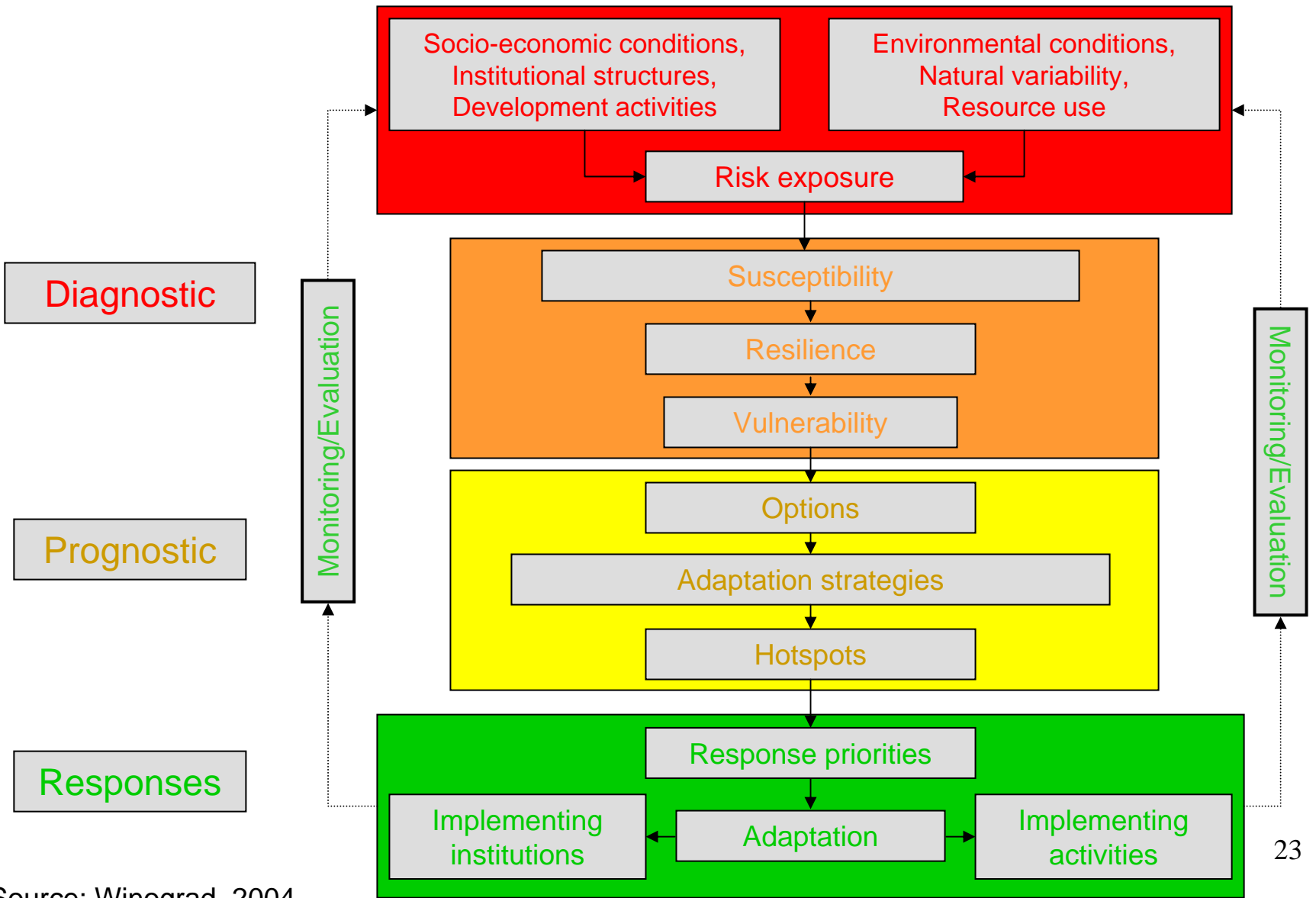
Source: Adapted from Ashley and Carney, 1999, DFID

Cont.

Multi-scale Methodology: Vulnerability analysis model



Cont. Multi-scale Methodology: D-P-R Model



Source: Winograd, 2004

Practical considerations...

Methodologies and models should be chosen as a function of the following elements:

- Who is/are the client(s)?
- What stakeholders are involved in the assessment?
- On what timescale does the problem occur?
- What timescale will the assessment use?
- What is/are the target spatial scale(s)?
- What are the expected results?
- What resources are available?

Practical considerations...

Examples:

- Clients: Multi-lateral agencies, national and local institutions, NAPA teams...
- Actors: Decision-makers, experts, researchers, consultants, NGOs, local populations...
- Timescale: Short-term (1-3 years), medium-term (5-10 years), long-term (10-25 years)...
- Duration: Rapid assessment (1 year), assessment and monitoring (1-5 years), assessment and implementation (5-10 years)...
- Spatial scale: Global, regional, national, municipal, local...
- Expected results: Communication, monitoring of trends, exploration of alternatives, definition of norms, project monitoring...
- Available resources: Consultants and experts, research teams, inter-institutional programmes, finances...

Example:

How to choose the methods and/or models ...

- **Deductive** approach (theoretical) is based on hypotheses that are retained or rejected in accordance with the chosen theory. It is a 'top-down' approach.
- **Inductive** approach (empirical) selects the appropriate methodology by examining which would work well with the available data. It is a 'bottom-up' approach.

Example:

To choose indicators...

- Example of a deductive approach: Working with the hypothesis that poverty and vulnerability are linked (i.e. increased poverty yields increased vulnerability), poverty indicators will be the key indicators in the analysis. Concretely, one develops the theory, defines the indicators and collects data.

- Example of an inductive approach: Analysis of the variables that could explain food insecurity. Statistical methods will enable one to identify the importance difference variables have when it comes to food security. Concretely, one collects data, defines the indicators, and develops the theory.

4. Practical considerations for vulnerability and adaptation assessments

In general, to assess vulnerability one must:

- ✓ Be conscious of the appropriate methods and tools
- ✓ Ensure that all stakeholders participate in the process and that their views are taken into consideration
- ✓ Yield results (i.e. profiles, assessments, analyses) that are relevant for decision-makers
- ✓ Yield information that is clear, understandable and useful for all actors
- ✓ Ensure that vulnerability assessments, profiles or indicators are dynamic, not static
- ✓ Establish consultation and monitoring processes
- ✓ Ensure that the assessment is undertaken in a manner which allows for the participation of all partners and stakeholders

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In general, to identify adaptation options, one must:

- ✓ Be conscious of the appropriate methods and tools
- ✓ Ensure that all stakeholders participate in the process and that their views are taken into consideration
- ✓ Highlight the importance of resolving urgent problems
- ✓ Keep the objective of identifying possible adaptation options at the forefront at all times
- ✓ Ensure that the information used is on the appropriate timescale and meets the needs of decision-makers
- ✓ Pay attention to how models, scenarios and results are used

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In general, to monitor vulnerability and implement adaptation options, one must:

- ✓ Ensure that all stakeholders participate in the process and that their views are taken into consideration
- ✓ Ensure that the information produced is understandable, clear and useful in evaluating actions and strategies
- ✓ Pay attention to the scales and levels used to validate the assessment
- ✓ Guarantee to stakeholders that the assessment process is sustainable
- ✓ Pay attention to the various steps of the assessment so as to ensure that information relevant to the decision-making process is produced

5. Conclusions

- The objective of vulnerability and adaptation assessments is to produce relevant information so as to diminish uncertainty, increase awareness amongst stakeholders and monitor adaptation strategies.
- The assessments should assist in diminishing the gap that exists between the scientific community, decision-makers and the general population.

Scientists

Accept uncertainty
Inequality is a fact
Time = Anticipation
Innovation is rewarded
Risk is accepted

Decision-makers

Desire certainty
Equality is desirable
Time = Election
Innovation is suspect
Risk is intolerable

Rural population

Variability is a fact
Poverty is the reality
Time = Harvest
Innovation is necessary
Risk is integrated

5. Sources for further information

Please refer to:

Modules 1 & 2 Vulnerability and Adaptation Bibliography