Methodology for Vulnerability Assessment of the Selected Topics in SE Asia (Land movement and Vegetation Fires)

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Outline:

- Background: Adaptation at the National Level (Indonesia)
- Definition of Vulnerability
- Short term vs. Long term adaptation strategies
- Vulnerability of selected sectors
- TroFCCA approach: is it robust?
- Conclusion

Background: Adaptation at the National Level

- Indonesia is a large country
  - Climate change scenario is greatly varied over the country
  - Relatively rich in natural resources and land availability → many options to avoid climate risk

- Is Indonesia really vulnerable to CC?
  - Which sector?
  - How vulnerable?
  - Where geographically?

Definition of Vulnerability

$$V = f(E, S, AC)$$ ……. (Metzger et al. 2006)

V is vulnerability

the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes.

E is exposure

the nature and degree to which ecosystems are exposed to environmental change.

S is sensitivity

the degree to which a human-environment system is affected, either adversely or beneficially, by environmental change.

AC is adaptive capacity

- The potential to implement planned adaptation measures.
- The ability of a system to adjust to climate change (including climate variability and extremes) to moderate potential damages, to take advantage of opportunities, or to cope with the consequences.

Definition of Vulnerability

$$V = f(E, S, AC)$$ ..... (Metzger et al. 2006)

$$PI = f(E, S)$$

$$V = f(PI, AC)$$

PI is potential impacts

all impacts that may occur given projected environmental change, without considering planned adaptation

When do we need climate scenario as part of the vulnerability assessment?

$V = f(E, S, AC)$ ..... (Metzger et al. 2006)

$V = f(PI, AC)$

Short term adaptation (coping with current/ existing problem):

- PI is already identified, of which E (climate scenario) is **not** required.

Long term adaptation (coping with future climate, i.e. scenario based):

- PI needs to be assessed, of which E (climate scenario) is required.

In any case, vulnerability assessment is required

HOWEVER,

Bottom-up vulnerability based approach of adaptation strategies
→ Involving different stakeholders, better to represent local options and instruments, more attuned to the local circumstances

Scenario / model based (top-down) adaptation strategies
→ Strong in terms of biophysical aspects of impacts and certain types dynamic interactions, but do not perform well in representing human interaction and local abilities to adapt.

Background paper for the UNFCCC Regional Workshop on Adaptation, Apr 2007.

V/A for long term adaptation strategies

$$V = f(E, S, AC)$$ ..... (Metzger et al. 2006)

$$V = f(PI, AC)$$

E, and therefore PI, are model based
AC is considered fix → as a baseline

Increasing AC will reduce the vulnerability

HOW to measure AC? Proposed method:

1) Identify the existing coping mechanism and measures

2) Identify the degree of PI (without planned adaptation) based on biophysical and socio-economic indicators

If PI increases, potential vulnerability becomes higher

3) Identify options that can reduce dependency to Exposure or Sensitivity

e.g. for the case of vegetation fires: operate proper water management system, find alternative livelihood, conduct proper land management practices, apply proper infrastructure measures to break fire spread, conduct proper fire monitoring system
All possible options are identified (different weights may be applicable).

4) Identify aplicability of the options

If more options are applicable (score high), the vulnerability becomes lower

Case: Vegetation fires
Area/location: A regency level, Central Kalimantan

E*	S	PI	Options**	Potential AC***	Applicability of the options (AC)	
•Increased monthly T •Higher annual P •Lower dry season P •Increased dry months	•Water table is lower during the dry season •Annual water deficit increases	Risk of fires increases	Increase the water table by slowing down the flow of river water during the rainy season	2	Yes	2
			Alternative livelihood	1	No	0
			Fire breaks to minimize the spread	1	Yes	1
			Increase fire management capacity	1.5	Yes	1.5
			Impose better land management practices	2	No	0
			SCORE	7.5		4.5 / 7.5
			Qualitative meaning		Potentially moderate resilience, medium vulnerability	

* Obtained from CC scenario
** Identified through studies and multi-stake holders dialogues
*** Weighting dependent on the relative important

Case: Large scale land movement**
Area/location: A regency level, West Java

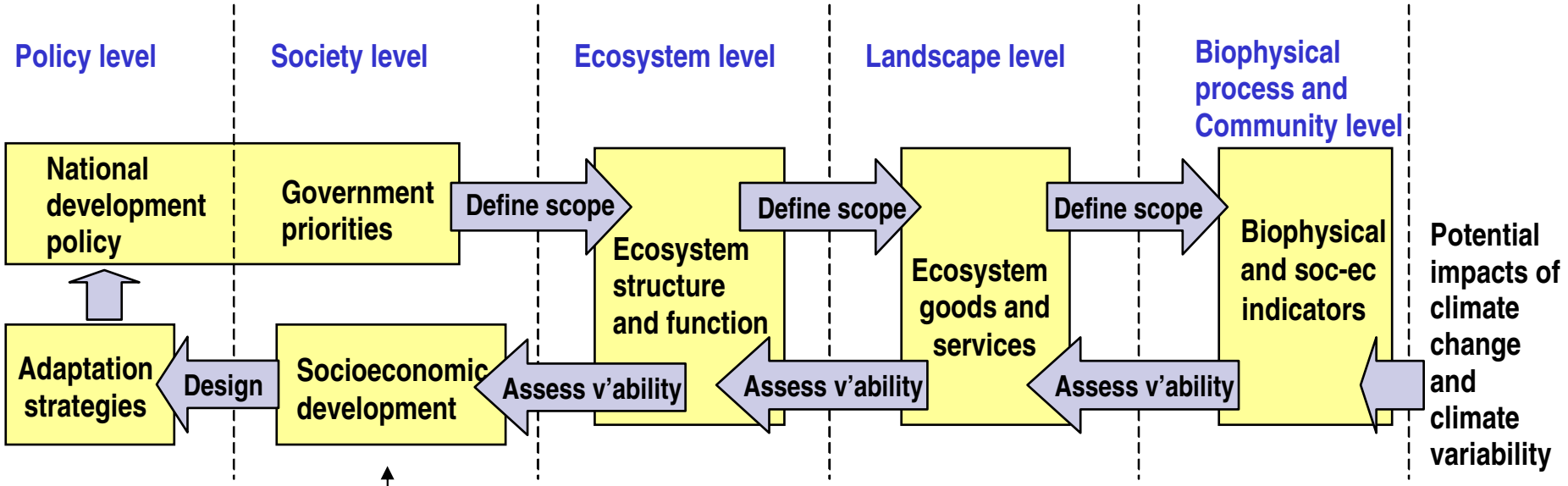
E*	S	PI	Options**	Potential AC**	Applicability of the options (AC)	
•Increased monthly T •Higher P intensity •Lower dry season P •Increased dry months	•Geology/ soil texture allows soil moisture increases quickly •Annual water deficit increases	Risk of medium to large landslides increases	Structural measures	1	Yes	1
			Early warning system (monitoring device)	2	No	0
			Institutional organization for disaster management	2	Yes	2
			Community based disaster risk reduction	1.5	Yes	1.5
			Impose better land use management	2	No	0
			SCORE	8.5		4.5 / 8.5
			Qualitative meaning		Potentially moderate resilience, vulnerability medium	

* Obtained from CC scenario
** Identified through studies and multi-stake holders dialogues
*** Weighting dependent on the relative important

With this method, parameterisation of Adaptive Capacity is difficult.

GIS application is possible to produce geo-referenced vulnerability map.

TroFCCA approach: is it robust?



-Dialogues on vulnerability and adaptation options: multi-stakeholders, multi level
-Cross-fertilization top-down and bottom-up
-Requires CC awareness of all stakeholders

Conclusion:

- Based on definition V = *f*(E, S, AC), vulnerability assessment can be assessed
- Long term model based vulnerability requires identification of E (and PI) whereas short term vulnerability does not require E (and PI).
- The proposed vulnerability assessment method requires identification of a list of all possible adaptation options and weighting.
- TroFCCA approach is good for cross-fertilised model based (top-down) and vulnerability bottom-up approaches, but requires intensive science-policy dialogues among stakeholders of various sectors and multi-level with equal level of understanding on climate change.