

Monitoring Progress of Climate Change Adaptation: The Use of Adaptation Metrics

SVRK Prabhakar and Takuro Kobashi

Institute for Global Environmental Strategies
Japan

Inception Workshop on Mainstreaming Adaptation to Climate Change in
Agriculture and Water Sectors
10-11 August 2009, Ballroom 2, Corus Hotel, Kuala Lumpur, Malaysia

Outline

- Need for adaptation metrics
- Determinants, criteria and types of adaptation metrics
- Adaptation metrics in Agriculture
 - Methods to identify metrics
 - Suggested metrics
- Relevance of Macro indicators
- Future line of work

Adaptation Metrics: Mitigation vs Adaptation

Mitigation	Adaptation
Has a protocol (KP) that governs	No 'protocol' to govern adaptation
There are GHG reduction targets to meet with coordinated efforts	There are no 'adaptation targets' to meet
Ways and means to measure the impact of collective actions	No streamlined measurement system for adaptation
Global actions and global benefits (more organized at global level)	Mostly local actions and local benefits (with some undeniable global spillover benefits)
Physical principles that govern mitigation	At nascent stages: Complex interaction of biophysical and socioeconomic elements

And...in addition

- Adaptation deals with systems
 - that are at different levels of adaptive capacity
 - Several adaptation options deferring in their effectiveness and outcomes

Need for Metrics: BAP on Adaptation (Section c, i-v)

- "Enhanced action on adaptation with consideration of ...**prioritization of actions**...and support adaptation in a **coherent and integrated manner**"
- "**Positive incentives** for developing countries for **enhanced** mitigation and **adaptation actions**"

How to Prioritize and Incentivize Adaptation Actions?

- By
 - Knowing where we want to go (adaptation targets?)
 - Setting a time frame
 - Knowing how much 'adaptation' we want to achieve at each stage to meet the target
- This is facilitated by
 - And agreeing on a measurement system (adaptation metrics)
 - Setting a base line of adaptation (to compare the progress and effectiveness)

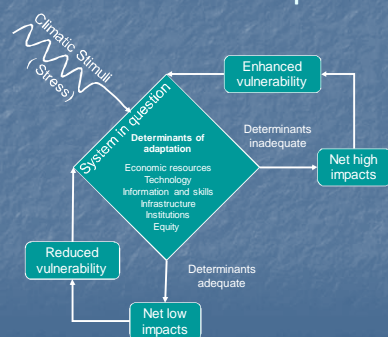
Adaptation Metrics

- Metric:
 - Is a 'measure'
 - A system of measurement
 - It has a unit of measurement
 - I has a value

Advantages of Adaptation Metrics

- Ability to **measure adaptation** at any given point of time
- Provide a **means to compare** the level of adaptation reached across locations, regions, and nations
- Help in decision making related to **identification and prioritization** of appropriate adaptation actions and for funding
- **Help track the progress** over the time
- Help in **minimizing the risk of mal-adaptation**

The Concept: Adaptation Metrics and Determinants of Adaptation



Criteria for Adaptation Metrics

- Measurable
 - Cost effective
- Scalable
- Comparable
 - Across time and geographical scales
- Context specific
 - Specific to system being measured
- Sensitive to degree of adaptation
- Learning and evolving

Different metrics

- Qualitative and quantitative
 - Cost and time resources, effectiveness
- Direct and proxy
 - To accommodate those cannot be directly measured
- Ex-ante vs. Ex-post
 - To chose options and to measure outcomes
- Local vs National
 - To accommodate differential impacts of climate change at different scales

Methods for Choosing Adaptation Metrics in Agriculture

Methodology	Geographical Scope	Source
Benefit-cost analysis	Local (L), national (N) and regional (R) scales	Tubiello and Rosenzweig, 2008
Cost-effectiveness analysis	L,N,R	Rosenzweig and Tubiello, 2006
Multi-criteria analysis	L,N,R	Dolan et al., 2001
Expert consultation (workshops)	L,N,R	Rosenzweig and Tubiello, 2007
Dynamic crop models	L,N,R	Tubiello and Rosenzweig, 2008
Modelling relationship between stressor and outcome variables	L	Luers et al., 2003
GIS based index based on normalization and aggregation of determinants	Sub-national	Swanson et al., 2007
Historical trend analysis and constructing conceptual models	Sub-national	Allison and Hobbs, 2004

Some Suggested Adaptation Metrics

Metric/s	Reference	Description on availability and limitations (includes authors judgement)
Mean and variability of yield and production, income, aggregate of value added	Tubiello and Rosenzweig, 2008	Measured and computed metrics. Available at local, national, regional and international levels in many countries. The aggregate of value added may need to be computed at the local level as such statistics will not be readily available.
Nutrition index	Tubiello and Rosenzweig, 2008	Computed metric (sum of local production and net imports divided by total food demand). Can be computed at national and regional level.
Yield estimates (remotely sensed), yield variability, highest relative yield/yield percentile	Luers et al., 2003	Estimates could help in filling the gaps in the existing yield data, validating the measured yield data etc. Accuracy could be an issue when resolution of remote sensing is low.
Agricultural export, farm income, out-migration from farming, emergency payments	Venema, 2006	Agricultural exports and out-migration of farming are mostly applicable at the macro-economic level, while data on rest of the metrics (emergency payments) could be sparingly available.
Sources of income, livestock number, source of fertilizer	Brooks and Adger, 2005	It was not clear on how many sources of income is considered as optimal, and also the number of cattle. However, it is suggested that the higher the sources of income, with more diversification into non-farm sources, the higher the adaptive capacity.

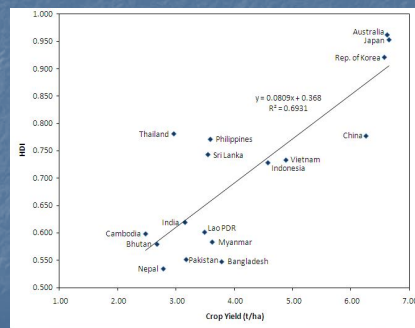
Problems with Earlier Suggestions

- Mostly single metrics and doesn't often provide an overall picture of adaptation in agriculture sector
- Policy makers may often prefer single composite index representing the entire sector with a single number (not withstanding their intrinsic limitation)

Some Composite Indices

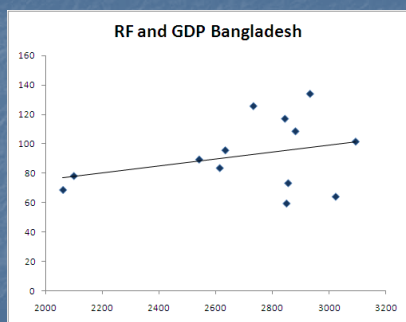
- GDP, HDI...
- Grossly averages out, and even nullifies, the impacts at the sectoral and sub-national level
- Criticized as either too primitive or too unattainable (e.g. HDI)
- Lack of consensus among various stakeholders

HDI vs Rice Yields



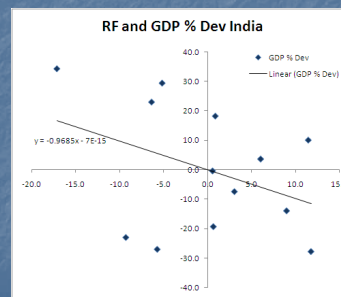
Author calculations

GDP and Rainfall



Author calculations

GDP and Rainfall



Author calculations

- Message: Not all metrics can be equally applicable to all conditions...

Food for Thought

- What is the ideal framework for measuring adaptation?
- How to identify a set of metrics (or a single Adaptation Index) that capture the multiple dimensions of adaptation
- How to prioritize among different metrics using multi-criteria approaches?
- How to validate metrics under different conditions?
- How to operationalize adaptation metrics at different levels of decision making?

The image cannot be displayed. Your computer may not have enough memory to open the image, or the image may have been corrupted. Restart your computer, and then open the file again. If the red x still appears, you may have to delete the image and then insert it again.

Thank You!