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## **Integrating Vulnerability Indicators from Natural and Social Sciences** **Rik Leemans**

### *Indicators*

As complete data sets are not available, measurements and a set of indicators are needed for vulnerability assessments. Identifying the indicators is an important step in a vulnerability assessment. Indicators are needed both to measure progress towards targets and to assess if the final target has been reached e.g. Millennium Development Goals for 2015. Indicators are not data themselves (which can be conflicting) but summarize the overall issues and trends. Sometimes indicators are only partial indicators addressing a small part of the overall issue e.g. economic growth as an indicator for health and the economy. These can hide systemic behaviour and make it difficult to pinpoint what is wrong in a system, it is better to have indicators that address the whole system.

The Biodiversity Convention takes a broad approach with a simple sentence addressing conservation and human development. Indicators for both state and pressure and response are required and a set of around 200 have been decided upon for biodiversity. Data can be collected for mammals, birds, plants etc. but it doesn't need to be complete as an index can be used. For issues such as emission targets the more strategic targets result in a narrower corridor of allowable emissions. When you are at the top of the emissions corridor there is no flexibility for the future, you have to reduce emissions. If you are at the bottom of the corridor there is more flexibility for the future. This allows you to look at some of the results of choices both in the short and long term. The level of danger is a value judgement and so should be based on reasons for concern rather than averages. The use of global mean temperature increase as an indicator for emissions targets is something that is easy to communicate to the general public.

### *Unique systems*

An example of a unique system is coral reefs which suffer from bleaching as a result of increasing sea temperatures. A problem with scenario impact studies is that there is almost none for  $\frac{1}{2}$  °C increase in sea temperature; they are conducted for larger figures such as 2 °C warming. Thus observed impacts should be used to look for small changes and determine the impacts. Whilst a common unit is useful, if monetary value is used it focuses more on richer developed countries, the number of people affected is an alternative unit.

### *Adaptive capacity*

Adaptive capacity is important in vulnerability assessments. To have adaptive capacity you have to both be aware that a problem is coming and also have the ability (technology) and means (resources) to do something about it. Awareness is a function of knowledge and democracy in terms of whether people are willing to share the knowledge.

## **Questions**

Does the one dollar a day indication of poverty take into account inflation?

No it is a flawed measure; in addition it doesn't apply to people in rural areas who eat their own food. But it is not the only indicator used; spending capacity and other measures are also included. It's important to integrate indicators and not just use them on their own.

The human development index indicator is a final measure built from many parts: education, economy etc. this is better than just GDP as an indicator. GDP is a historical indicator and other more useful indicators must compete with it.

Are we doomed?

The human race is but we don't know the timescale, it's a difficult balance between different visions of different countries.

Discussion on the use of targets:

Targets are policy targets, so scientists need to develop means of testing them. Although targets can be flawed, having them is important as a policy tool to bring about action.

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