Environmental Scenario Analysis

METIER Training Course No 7

- MODULE 3 -

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Module 3
How to analyse environmental scenarios

Introduction
Module 1: What are environmental scenarios
Module 2: How to develop environmental scenarios
Module 3: How to analyse environmental scenarios
Module 4: How set up an environmental scenario exercise
Module 5: How to use environmental scenarios
Reflections
How to analyse scenarios

Aim: Think through, what the world would be like under the assumptions made -- How is the focal issue affected?

Commonly this stage requires background research - this benefits from a good system understanding and support from experts or appropriate models to ensure credibility.

Implications can be assessed qualitatively and quantitatively (i.e. using analytical and participatory approaches).

Source: Inspired by various sources
‘Stylised‘ deductive approach (continued)

STAGE 1
- Establish Focal Issue
- Identify Driving Forces
- Label Critical Uncertainties
- Select Scenario Logics
- Elaborate Scenarios

STAGE 2

STAGE 3

STAGE 4
- Use & Communicate Scenarios
- Assess Response Options
- Compare Implications across all Scenarios
- Analyse Implications within each Scenario
Analysing implications within scenarios

So, what if a specific scenario came true?

There is no single recipe for analysing the implications of scenarios: This depends much on the focal issue analysed and the availability of accepted modelling tools or expertise.

Important to ensure internal consistency.

Note that this analysis may alter the scenario storylines.

Source: Inspired by various sources
## Analysing implications across a set of scenarios

<table>
<thead>
<tr>
<th>Comparing across scenarios</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Similar trends / robust trends</td>
<td>Look for future developments that are the same in all scenarios</td>
</tr>
<tr>
<td>Differing trends / critical trends</td>
<td>Look for uncertain future trends, which differ across scenarios</td>
</tr>
<tr>
<td>Offsetting trends</td>
<td>Look for those factors that counter desirable/undesirable trends</td>
</tr>
<tr>
<td>Trade-off analysis</td>
<td>Identify trade-offs described in the different scenarios</td>
</tr>
<tr>
<td>Response options</td>
<td>Identify policy options that make sense in some / across all scenarios</td>
</tr>
</tbody>
</table>

*Source: Based loosely on WRI, 2008*
Qualitative or (and) quantitative analysis

Qualitative analysis

Focusses on

- Relevance
- Not implausible
- Creativity / out-of-the-box thinking
- Stakeholder interest

Based on

- Participatory approaches
- Can be supported by modelling

Quantitative analysis

Focusses on

- Credibility / internal consistency
- Plausibility
- Structure / transparency
- Data availability / model output

Based on

- Analytical / modelling approaches
- Can be supported interactively

Source: Based on Kok 2009; Alcamo and Henrichs 2008
Example: qualitative AND quantitative analysis

In the MA (2005) participatory & analytical methods were combined

Source: Based on MA (2005)
Example: linking different models

In the MA (2005) different models were linked to support analyses

- **EcoSim** - A fisheries model
- **WaterGAP** - ‘Water Global Assessment and Prognosis’ model
- **IMPACT** - A partial equilibrium food supply/demand model
- **IMAGE** - ‘Integrated Model to Assess the Global Environment’
- **AIM** - ‘Asia-Pacific Integrated Model’

*Source: Based on MA (2006)*
Example: modelling results in scenario analysis

Example of quantified results (MA, 2005)

Modelled changes in ecosystem services:

Global water availability increases under all MA scenarios. By 2050, global water availability increases by 5-7% (depending on the scenario)

Demand for water is projected to grow by between 30% and 85%

Source: Millennium Ecosystem Assessment (2006)
Example: outcome of scenario analysis

Example of quantified results (MA, 2005)

Source: Based on MA (2005)
Guest lecture

Characterising future climate for application in impact and adaptation studies

by Timothy Carter
Guest lecture

Scenario analysis - quantitative and qualitative approaches

by Bas Eickhout
Identifying response options

Certain future developments (or at least perceived to be certain)

Uncertain future developments, differ across scenarios

What would it take to make each scenarios ‘rosier’?

Identify response options for each scenario

Trade-off analysis, between scenarios and options

Conflict identification and management

Identify no-regret options, win-win ideas, risky strategies

Develop a common future vision based on all scenarios

Assessing response options

Which options to choose?

**Robust options** - choices that would work well (or not hurt) in any scenario

**High-risk options** - choices that imply a clear bet on one future

**Hedge options** - take different choices, each corresponding to different scenario

**Just in case options** - main choices assuming one scenario will come true, but keep some other options open
How to analyse scenarios
(quick reference sheet)

Phase 2: How to develop scenarios

1. Establish whether, what and how to quantify. Check
   (a) need and role for quantitative information;
   (b) availability of quantification tools;
   (c) availability of budget and time;
   (d) time horizon of the analysis;
   (e) which need to be addressed;
   (f) to what extent models need to be coupled?

   IMPORTANT!
   Even if scenarios will not be underpinned by quantifications, continue with steps 2 and 3 of this Phase

2. Analyse implications of individual scenarios (STAGE 4)
   (a) optional: quantify driving forces and impacts
   (b) assess implications regarding focal issue
   (b) optional: analyse specific response options

   Check if scenarios are internally consistent, else revisit steps 3 and 4 of Phase 2

3. Analyse across the set of scenarios
   (a) identify reasons for differences across scenarios;
   (b) identify differing, similar and offsetting trends;
   (b) optional: analyse response options in scenarios

Continue with Phase 4: How to use scenarios