

# Use and misuse of scenarios in the climate change debate in the Netherlands

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1

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## Order

- Our annoyances being methodologists
- Handling uncertainty
- Scenarios
- The practice
- Discussion
- Conclusions

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2



## Our annoyances

In their diligence climate scientists tend to forget about other truths (and other disciplines)

A scenario is NOT a prediction of the future

Scenarios and model outcomes are NOT the same

Some uncertainties ARE uncertain ;



## Handling uncertainty

- Three dimensions of uncertainty: (Walker et al 2003)
  - Location – where in the system is the uncertainty located?
  - Level – how uncertain are we; ranging from absent deterministic evidence to total ignorance (we don't know what we don't know)
  - Nature – phenomenon is uncertain due to lack of knowledge (epistemic uncertainty) or variability
- There are no guidelines for using models in policy making (Janssen et al., 2005, Van der Sluijs et al., 2008).

## Handling uncertainty

- Frames
  - (Dewulf et al., 2005, Pahl-Wostl et al., 2005, van der Keur et al., 2008, Brugnach et al., 2008)
- Deep uncertainty
  - (Arrow, 2002; Lempert et al., 2002)
- Exploratory Modeling and Analysis (EMA) uses computational experiments to analyze complex and uncertain systems
  - (Bankes, 1993, Agusdinata, 2008, Kwakkel 2010, Pruyt 2009/2010)

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5



## Scenarios

- Scenarios are an analytical tool for exploring uncertainty and are generated for that reason.
  - (Schwarz 1991, Heijden, 1996, Ensink et al 2010)
- 'Climate scenario's are consistent and plausible images of a possible future climate'.
  - Source: <http://www.knmi.nl/klimaatscenarios/faq/index.php>
- Scenarios are used for designing possible, plausible futures that allow us to assess the robustness of policy options in different futures and to design adaptive policies.
  - (Walker et al 2000; Rahman et al 2008)
- Scenarios never come alone.
  - (Schwartz, 1991; Goodwin and Wright, 2010)

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6



## The Practice

- The research outcomes give an indication of which scenarios are more probable.
  - ("De onderzoeksresultaten brengen wel meer tekening in welke scenario's meer waarschijnlijk zijn." )
  - Source: KNMI,2009:4)
- Extreme scenarios (sometimes indicated as 'worst case scenarios) can be useful when facing big risks, for instance when concerning coastal safety, like the Deltacommittee explored. For the occurrence of such extreme scenarios there is relatively little scientific evidence.
  - ("Extreme scenario's (soms aangeduid als 'worst case' scenario's) kunnen hun nut hebben wanneer de risico's groot zijn, bijvoorbeeld wanneer het gaat om de veiligheid van de kust zoals bij de Deltacommissie. Voor dergelijke extreme scenario's bestaat echter relatief weinig wetenschappelijke onderbouwing." )
  - Source: KNMI 2009:4)

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7



## The Practice

- "Users should design and apply [data from] multiple scenarios in impacts assessments, where these scenarios span a range of possible future climates, rather than designing and applying [data from] a single 'best guess' scenario" (IPCC, 2001).
- NL Deltacommittee issued a climate scenario for local sea-level rise as reference for the long-term (2100 and beyond) robustness assessment of measures and investments.
- NL Deltacommittee set a 'plausible upper limit' [in Dutch: plausibele bovengrens] for sea-level rise, founded on the KNMI climate change scenarios
- KNMI provided an important scientific contribution (KNMI 2009:11).

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8



## Analysis = KNMI in Catch22 position

- Communicating uncertainty is a challenge.
- KNMI knows that its climate change models are not perfect
- KNMI knows scenarios are not predictions

BUT

- KNMI operates in a politicized environment that does not appreciate uncertainty.

AND

- KNMI by continuously upgrading, improving and further detailing its climate scenarios generates expectations about the predictive value of scenarios (in fact 'models')
- Suggestions are made about future scenarios that are "most probable".
- KNMI's positivistic vision on science advice: more knowledge will yield better decisions.

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9



## Discussion

- Our understanding of the elements of the climate system and their interactions is not sufficient to reduce uncertainty to manageable levels.”
  - (Petersen, 2006)
- Instead of trying to predict the future, we should not use models and scenarios to predict the future state of a system, but to better understand a system's behaviour, and point towards a way to improve its health.
  - (Orrell and McSharry, 2009)

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10



## Conclusions

- Model based scenarios inherit all modeling uncertainties.
- A proper consideration of uncertainty in every policy analysis and especially in climate change policy is essential in order to properly inform/guide policymakers in the making of choices, but scenarios are often not properly used to highlight uncertainties. (Rahman et al 2008)

## Conclusions

- Valuing scenarios primarily as useable products is more likely for those operating within the natural sciences or economics; valuing scenarios primarily as learning processes is more likely for those operating within the social sciences or within organizational settings (Enserink 2000; Hulme and Dessai 2008b).