Minutes:	Exchange Climate Scenarios Workshop
Date	12th – 13th of February 2019
Place:	Bremen
Subject:	Which climate scenarios are to be used? Which governance arrangements are suitable for each of the participating countries?
Compilation:	Jörg Krywkow
Participants:	Jörg Elbracht, Tobias Schlinsog, Eva González, Nico Deus, Rinke van Veen, Helga Wiederhold, Reinhard Kirsch, Wolfgang Scheer, Mohammad Azis Zarif, Marian van Dongen, Katherina Seiter, Björn Panteleit, Joachim Blankenburg, Hans Hakvoort, Leo de Vree, Arne Roelevink, M. Azizur Rahman, Silke Mollenhauer, Peter Nailon, Harry Jager, J. Hippen, Diedre Buist, Arne Spekat, Agnieszka T. Beutzen, Vincent de Looij, Jan den Besten

DAY 1

13:00 Introduction

All participants introduce to their particular issues in the countries and the specific pilot areas. The guiding questions for this introductory session were:
1) What is your aim for this workshop?
2) What do you want to take home?
As a result, a pin board with record cards was produced displaying the most relevant issues that have been emerged from the statements of the participants (fig.1 and 2)

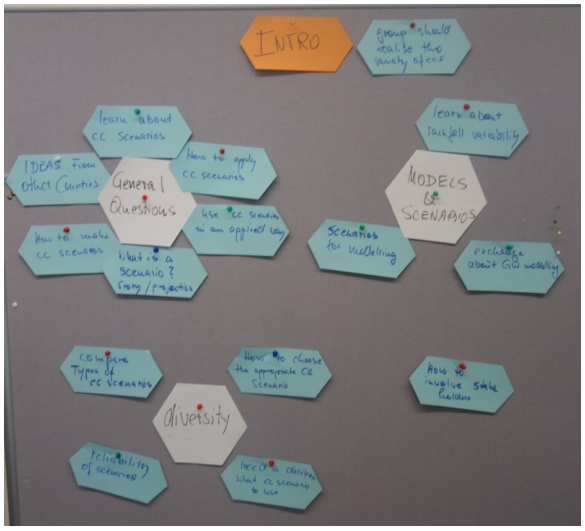

Figure 1: Statements of the participants (pin board)

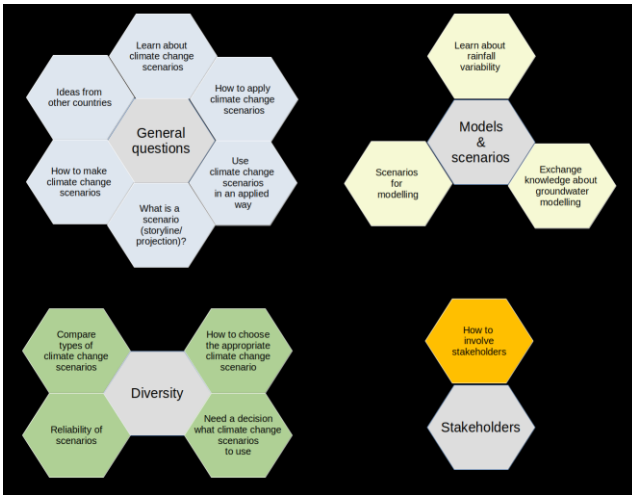

Figure 2: Statement of the participants (transcription)

The most relevant issues will be displayed in the wrap up session at the end of the workshop for analysing and summarizing the results.

14:00 Presentation Arne Spekat - , Visiting scientist at PIK and consultant at Climate & Environment Consulting Postdam GmbH; P*roviding information on climate change to regional (water) manager"*

- Uncertainty makes it difficult to apply scenarios;
- The notion of "scenarios" was discussed. According to Arne Spekat Scenarios are not a prognosis but a story line that supports tasks such as designing a projection of, for instance, the environmental development in the future;
- What is the difference between forecast and prognosis? According to Arne Spekat: there is no difference;
- Complexity of atmospheric models is a problem when it comes to presenting it to lay people, simplification is needed;
- Regionalisation, how to introduce external factors into a particular region?
- The one "golden model" approach does not work;
- A number of researchers agreed in creating 8 models (ensembles) instead of 40 models;
- The World Data Center for Climate Change (WDCC) is the main source for models, scenarios and data (CORDEX web site);
- There is a shared responsibility of researchers and users when it comes to the application of models and scenarios;
- The days of one member ensembles are over;
- The difference between forecast, storyline and projection is not always clear among users and the public;
- In Germany models are provided upon hydrological units.

14:30 Discussion
Typical elements for a region are not included in the model. There is no complete solution. For instance, urbanisation is not included in the model. The advice of Arne Spekat is: do not go too much into extremes. Thus, do not use the 0,1 % scenario but rather the 1% that occurs.

15:00 Coffee break

15:30 Presentation Hans Hakvoort – Senior Consultant Water and Information Management at HKV; *Climate change; past, present or future?*

- Extreme precipitation events appear more often in the future which entails more flooding;
- Events with formerly low probability will occur more often and with higher intensity in the future;
- Authorities and experts have already acknowledged climate change. The measured rainfall is now based on the time series > 100 years;
- Therefore, you have to detrend the time series in order to incorporate climate change effects;
- Discharge series are similar (40 – 50 % increase, with detrending);
- Climate projections: in the Netherlands researchers calculate with 4 different climate change scenarios;
- Data are available on their website. (www.meteobase.nl).

16:00 Discussion
Discussion abyput the question why not extending the trend in yearly precipitation instead of using climate models to calculate the increase of yearly precipitation?

16:30 Different pilots, different approaches.

One presenter from each of the countries presents (15min). The focus was on how to apply climate scenarios

1. UK: Peter Nailon (Wear River Trust)

- UKCP18 is the standard model with 12 different scenarios/simulations (MET office or open source?)
- The environmental agency requires scenario building and projections;
- The pilot UK1 might have future drought problems;
- UK2 has irrigation facilities and issues with groundwater abstraction for drinking water production

2. Denmark: Agnieskza Bentzen (Region of Southern Denmark)

- These partners use already IPCC climate change scenarios;
- Recognition of climate change pattern (temperature rising, wetter climate);
- Changing pattern are already calculated and presented as a projection;
- The partners assess the polluted areas in the ground. Drinking water is only produced from abstraction groundwater. Thus, pollution of groundwater has a main priority in Denmark;
- They employ IPCC AR5 RCP scenarios;
- The time span projected ends in 2100; different players (stakeholders) have different time spans in mind;
- One of the pilot project has the objective to determine the best groundwater model to be used;

3. Netherlands: Jan den Besten (Regional Water Authority Hunze & Aa's)

- The development of the global climate is uncertain. In addition, the knowledge about climate change models and the modelling process differs significantly among different stakeholders. How do you deal with these uncertainties?
- KNMI delivers revised climate change scenarios every 5 – 10 years based upon IPCC greenhouse gas concentration scenarios (e.g. www.climatescenarios.nl);
- STOWA translates KNMI scenarios into suitable data for water managers;
- The DELTA programme requires scenarios for sea level rise, land use development and socio-economic scenarios;
- Knowledge about models changes continuously over the years, assumptions change accordingly;
- The Netherlands might have serious drought problems in the future;
- It remains to be difficult to find appropriate mitigation measures;
- For flood risk assessment they use WH winter data scenarios (most extreme) also for droughts;
- 2018: design year, is in 2050 a 1/10 dry year. It is advantageous to communicate this assumption to stakeholders, since they still remember the meteorological conditions of this year.

4. Germany: Tobias Schlinsog (LBEG)

The German partners use IPCC AR5 greenhouse gas concentration scenarios as a basis for regional climate scenarios. These scenarios show the best results in a ground water model. The focus on this scenario is: what happens, if we do not adapt our policy? This delivers recommendations to policymakers.

17:30 Discussion

Four main points for further discussion have been identified:

1) How are climate change scenarios to be chosen for particular regional approaches?
2) The importance of groundwater modelling for modelling the entire water cycle within an environmental unit;
3) How to convey the use of climate change scenarios and the implications for environmental management;
4) The implications of climate change scenarios and the management of water quality.

All countries start with IPCC scenarios.
Then the local authorities calculate the local scenarios modified for the region.
Questions come from different point of views.
The main issues in the pilots of TOPSOIL are quite different.
It remains difficult to exchange experiences because of these differences.

18:00 End

DAY 2

9:00 What do you do with the outcome of the climate scenarios?
One presenter from each of the countries presents (15min)

1. Germany: Eva González (LBEG)

- GE1: issues are brackish water, drainage, ground water models, sea level rise, inform the communities about their work;
- Partners calculate with a sea level rise of 1m;
- The results will supplement recommendations for the ministry responsible for water management in this area – road map for Schleswig Holstein;
- The results will be extrapolated from the pilot to the entirety of Schleswig Holstein;
- GE2 use IPCC greenhouse gas concentration scenarios for ground water modelling;
- They have various stakeholders interested in the outcomes of the modelling effort;
- GE3: this area had a dyke breakthrough in 1981, the reconstruction of dam was in 1991;
- Sea level rise is the central issue, the ground water model is based upon climate change scenarios;
- Stakeholder are groundwater users. Their activities have implications on the groundwater quality;
- Authorities want to regulate extraction and recharge;
- This pilot uses the IPCC AR5 0.98m sea level rise scenario;
- GE 5 applies the same scenarios as GE 3.

2. Netherlands: Vincent de Looij (Regional Water Authority Noorderzijlvest)

- KNMI provides climate change scenarios for further modelling efforts and in particular for regional water authorities;
- These scenarios are relevant for the water board;

- Climate change scenarios are employed in the Netherlands for: raising awareness, planning, strategy for construction life span;
- Within our TOPSOIL project stakeholder sessions have been conducted. The involvement and a sense of urgency are important for the water board;
- Questions are raised such as: how can climate change affect stakeholders personally? How to visualise the effects of climate change? Examples of the effects on agriculture (dry crops) are provided;
- Measures such as dykes vs. pumping stations with higher capacity at the long term are discussed and balanced against each other. Reinforcing dykes might be the cheaper solution on a short term perspective but might be more expensive one in the long term. This is another example of using climate scenario outside the scope of our TOPSOIL project;
- The choice of scenarios determines the investment costs for flood protection measures;
- Stakeholder involvement requires a long planning especially for commercial stakeholders;
- An early involvement of stakeholders is useful;
- Climate-proved constructions must be tested for replacement;
- The moderators of the participatory processes must strive for couple win-win solutions with mutual benefit for authorities, NGOs and commercial stakeholders. Otherwise, the credibility of some stakeholders will decrease.

3. UK: Peter Nailon (Wear River Trust)

- Climate change scenarios result in new management strategies as a key TOPSOIL output for the British pilots;
- Water supply for public and for the agriculture (interrelated) is a key issue;
- TOPSOIL partners (rivers trust) are not entitled to legal enforcement but have to convince and influence stakeholders and authorities;
- Stakeholders are: UK government, local authorities, environmental agency (DEFRA), community with catchment partnerships;
- Partners receive funding from the polluters to implement mitigation work;
- Commercial stakeholders use the label for environmental friendliness,
- The partners organised consultation events with the public;
- River Trust is an NGO. They maintain an ongoing consultation with farmers with the objective to convince them to take measures for environmental protection or pay for protection measures;
- UK1 pilot: the main issues are water quality around weather events (risk management),
- historical heavy metal accumulations still affect the river banks during flood events. It may be seen as an integrated river management approach;
- UK2 pilot applies cross sector modelling Thresholds and absolute red lines are determined and explored against future scenarios on water demand and climate change to identify **interventions** and trade-offs.

10:40 Coffee break

11:00 Wrap up

The final result of the workshop is a matrix that describes the Pilot with their type of scenarios, the purpose of the scenarios, what are these scenarios employed for and management prospects.

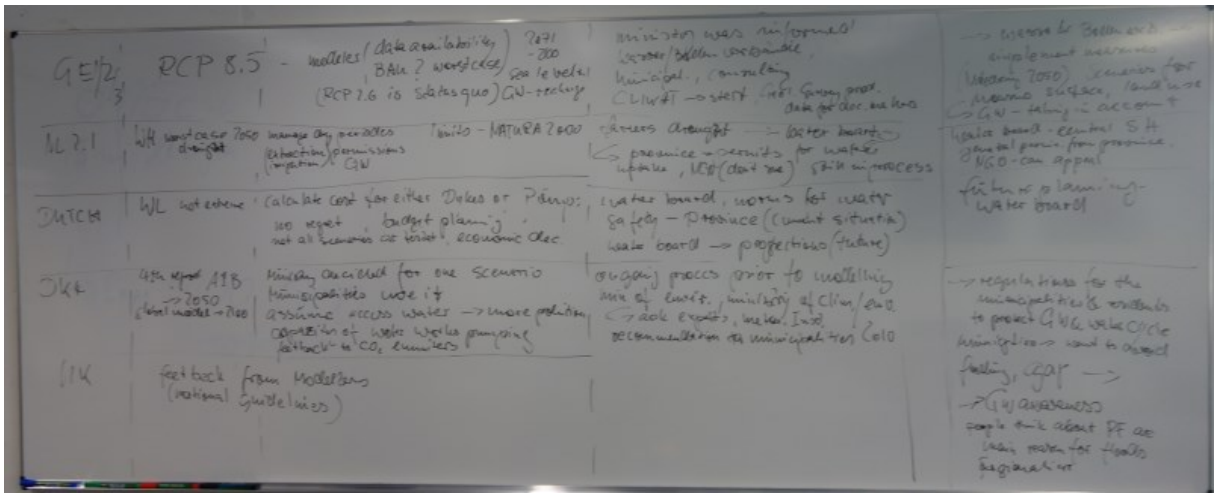

Figure 3: Final result including scenario choices, reasons and management