Geophysical Research Abstracts
Vol. 16, EGU2014-15088, 2014
EGU General Assembly 2014

Preparing the Dutch delta for future droughts: model based support in the national Delta Programme

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Keywords: uncertainty, policymaking, adaptive policies, fresh water management, droughts, Netherlands, Dutch Deltaprogramme, physically-based complex model, theory-motivated meta-model

To prepare the Dutch Delta for future droughts and water scarcity, a nation-wide 4-year project, called Delta Programme, is established to assess impacts of climate scenarios and socio-economic developments and to explore policy options. The results should contribute to a national adaptive plan that is able to adapt to future uncertain conditions, if necessary.

For this purpose, we followed a model-based step-wise approach, wherein both physically-based complex models and theory-motivated meta-models were used.

First step (2010-2011) was to make a quantitative problem description. This involved a sensitivity analysis of the water system for drought situations under current and future conditions. The comprehensive Dutch national hydrological instrument was used for this purpose and further developed.
Secondly (2011-2012) our main focus was on making an inventory of potential actions together with stakeholders. We assessed efficacy, sell-by date of actions, and reassessed vulnerabilities and opportunities for the future water supply system if actions were (not) taken. A rapid assessment meta-model was made based on the complex model. The effects of all potential measures were included in the tool.
Thirdly (2012-2013), with support of the rapid assessment model, we assessed the efficacy of policy actions over time for an ensemble of possible futures including sea level rise and climate and land use change.
Last step (2013-2014) involves the selection of preferred actions from a set of promising actions that meet the defined objectives. These actions are all modeled and evaluated using the complex model. The outcome of the process will be an adaptive management plan.

The adaptive plan describes a set of preferred policy pathways - sequences of policy actions - to achieve targets under changing conditions.
The plan commits to short term actions, and identifies signpost indicators and trigger values to assess if next actions of the identified policy pathways need to be implemented or if reassessment of the plan is needed. For example, river discharges could be measured to monitor changes in low discharges as a result of climate change, and assess whether policy options such as diverting more water the main fresh water lake (IJsselmeer) need to be implemented sooner or later or not at all.

The adaptive plan of the Delta Programme will be presented in 2014. First lessons of this part of the Delta Programme can already be drawn: Both the complex and meta-model had its own purpose in each phase. The meta-model was particularly useful for identifying promising policy options and for consultation of stakeholders due to the instant response. The complex model had much more opportunities to assess impacts of regional policy actions, and was supported by regional stakeholders that recognized their areas better in this model. Different sector impact assessment modules are also included in the workflow of the complex model. However, the complex model has a long runtime (i.e. three days for 1 year simulation or more than 100 days for 35 year time series simulation), which makes it less suitable to support the dynamic policy process on instant demand and interactively.