Deltas in Depth scientific sessions		
Deltas in Depth Theme 11. Decision support tools and risk assessment		
DD 11.6 Visualisation and mapping		
Chair	Prof. Carlo Giupponi, Ca' Foscari University of Venice, Italy	
Presentations	•	Dr. Heidi Kreibich, German Research Centre for Geosciences, Germany
	•	Prof. Efi Foufoula-Georgiou, University of Minnesota, USA
	•	PhD MBA Mathijs van Ledden, Royal HaskoningDHV, the Netherlands
	•	MSc Tessa Eikelboom, VU University Amsterdam, Institute for Environmental Studies, the Netherlands
	•	Dr. Hasse Goossen, Wageningen UR, the Netherlands

Dr. Heidi Kreibich,Flood damage modelling on basis of urban structure mapping using high-resolution remote sensing data

Aim: to produce flood damage maps for residential areas, thereby focussing on the susceptibility to flooding, taking into account the building use, location, type, material used, basement presence, etc.
Method: IKONOS and LiDAR data were used to classify land use, after that the urban structure type was mapped and flood losses were modelled.
Results: Flood loss estimations (in €) is one of the outcomes. The Elbe flood of 2003 is used to check the model. The presented model slightly underestimates the flood damage, however, the spatial distribution of the damage was accurately modelled.
Conclusion: remote sensing methods have a high potential to further improve flood damage modelling and risk assessments.
It is discussed that models based on remote sensing data are especially useful in areas without detailed GIS data. So, after modelling floods in Dresden, flood damage in the Mekong delta will be modelled. So far, the model uses flood height and doesn't take into account flow velocity. Heidi Kreibich explains that in the city of Dresden river water rises slowly, in other areas flow velocity could be useful as well.

Prof. Efi Foufoula-Georgiou, Constructing vulnerability maps of material and energy pathways in deltas

Aim: to provide insight in the structure of delta areas. To maintain a desired socio-ecological state of a delta, material and energy fluxes must be delivered to its body and to its coastal zone in a way that 'malnourishment' is avoided.
Method: deltas are pathways of energy and can be reflected in a matrix. Such a matrix can be used to model the effect of a dam or other construction on the outlet sediment charge.
Results: pristine deltas (e.g. Niger delta) and deltas with a larger anthropogenic influence (e.g. Wax Lake delta) are modelled looking at geomorphological complexity. Vulnerability Signature maps are being build to various scenarios of development.
Conclusion: The model provides a framework that allows efficiently studying of delta systems as 'graphs' in order to systematically compute the distribution of fluxes and define sub-networks, nourishment networks, contributing networks and evaluate scenarios of change.
After the presentation, the applicability of this model for inland deltas is discussed, as well as the possibility of improving the model by including meandering instead of linear length between junctions. Furthermore we discuss the possibility of including the weighting of a flux; currently the width of the channels are used as a proxy for the size of the flux, however, this method seems to estimate rather accurately the load of a river.

PhD MBA Mathijs van Ledden, North sea storm atlas

Large-scale flood disasters in low-lying deltas around the world occur frequently. Currently, modelling storm surges is a slow and computer intensive process with low flexibility, short forecast horizon and limited in scenario exploration.

Aim: to propose an alternative concept for storm surge forecasting with a pilot application to the North Sea. The objective is to have quick but still reasonably accurate storm surge predictions for 10-day ensemble weather forecasts.

Method: information from coastal stations in the North Sea is combined with a weather forecast database of long period seasonal forecasts. Current data is compared with database to find best analogue and predict storm surges.

Results: the product is a web application. The team wants to proceed with more validation of the forecasts with real time storms, reduce uncertainties and to refine the operationalization to the end user needs (public and private sector, e.g. water board, Rijkswaterstaat).

In the discussion Mathijs van Ledden explained that current uncertainty is about 50 cm for a 1:100 years storm surge. This storm atlas aims to be more accurate.

MSc Tessa Eikelboom, Geodesign tools for regional adaptation planning

Aim: to combine stakeholder interests with physiological relations to support interactive spatial planning at a regional level in adaptation processes.

Method: a touch table is the platform of communication. In an ArcGis+Community Viz environment. The effects of spatial adaptations measures can be explored by comparing traffic lights which reflect the scores for different objectives. Doing so, adaptation options can be identified and appraised. The latest development concerns an algorithm to calculate the optimal use of measures, according to the objectives defined by the stakeholders. This optimum can be used for inspiration and as a starting point for the design of the adaption measures.

Results: the results of stakeholder workshops in the province of Friesland are used as an example. Participants were very enthusiastic and new adaptations measures and scenarios were build.

Conclusion: these tools stimulate discussion amongst stakeholders. By inviting local stakeholders, local knowledge is being used in addition to physiological relations.

In the discussion it became clear that once GIS data is available and physiological relations are available, this method can be applied in different kind of areas, both in rural and in urban regions. Not all adaptation measured can be visualised in maps, however, notes and drawings can be made. Agreement on the objectives is needed for optimisation. In the current phase of development, the participants can give weights to the objectives. This approach is quite close to serious gaming.

Dr. Hasse Goossen, Climate adaptation services for the Netherlands: the power of visualization

The amount of climate data is exploding, but the relevant and directly usable information for policy making regarding climate adaptation is limited. Adaptation services can bridge the gap between climate data and the spatial planning community.

Aim: to produce a climate adaptation atlas, per relevant aspect of climate change, one map is produced for each climate scenario.

Method/results: For the municipality of The Hague a heat events map was produced. This map is tested with local people to explore ways of visualisation. Already it is clear that using a small amount of maps and commonly used tools instead of new tools result in the best understanding of the maps.

In the discussion the trade of between presenting uncertainties and ´keeping it simple´ is discussed. Furthermore, downscaling of the maps is discussed, a housing association in Rotterdam questions if

the maps can be used at a local scale. Hasse Goossen responds that the maps only give an order of magnitude instead of small-scale changes.
After the presentation, Hasse Goossen demonstrates the touch table they use. No separate computer is needed, that is incorporated in the screen (windows 8, GIS data on a server). They use web-mapping services instead so use up to date maps. The software Phoenix has been developed to use in workshops with local stakeholders. A case study in Bangladesh is presented; current flood maps and future projections are displayed so one can for example see if urbanisation occurs in flood prone areas. The web viewer can be found at www.ruimtelijkeadaptatie.nl