Session DD 2.1: General picture

Chair	Prof.dr. Eelco van Beek, Deltares/Technical University Twente, The Netherlands
Keynote speaker	Prof. Gerald Galloway, University of st. Maryland
Speakers	Jill Slinger, Delft University of Technology, the Netherlands
	Ruud Bartholomeus, KWR Watercycle Research Institute, the Netherlands
	Lodewijk Stuyt, Alterra, Wageningen UR, the Netherlands
	Marcel Paalman, KWR Watercycle Research Institute
	Rob Speets, Royal Haskoning, the Netherlands
	Pauline Mollema, University of Bologna, the Netherlands
	Jan Smits, Water Board Hollandse Delta
Rapporteur	MSc. Jeroen Veraart ,Climate changes Spatial Planning, the Netherlands

In his keynote Gerald Galloway explained the challenges for freshwater resources management in the US. One third of the people live near the coast and are exposed to sea level rise. The threat of sea level rise (SLR) for coastal freshwater supply is invisible for the public. As a result it is difficult to trigger change in attitudes, e.g. the will to reduce withdrawals. In New York more water is needed in periods of drought from the Hudson River due to SLR. SLR means also loss of coastal wetlands, which were exemplified with an example from the Mississippi River. What are the adaptation strategies in coastal zone fresh water resources management? (a) retreat (don't develop, go back); (b) accommodation (of salt water intrusion); (c) protection. Galloway prefers to use a risk based approach in order to select the correct/best/acceptable strategy. The final decision should be based upon the trade offs of the strategy. Also other perspectives should be taken into account. Water supply solutions may be the correct one from the supply perspective but may not be the best solution from other perspectives.

Jill Sprinter explained that estuaries in South Africa are situated in three climates (cool temperate, sub tropical and Mediterranean). It is a semi-arid region, as a result water is scarce. In the study ecological fresh water requirements were assessed for various fresh water inflow scenarios. A dynamic model approach was used to model salinity and fresh water inflow in selected estuaries under climate change. A preliminary conclusion was that South African estuaries probably are more vulnerable to changes in waves and less to incremental sea level rise. More fresh water inflow is needed in future to maintain current ecological quality.

Ruud Bartholomeus stated that groundwater recharge in dunes is currently poorly modeled, because the role of vegetation patterns and feedback mechanisms are not well taken into account. He stressed the importance of feedback mechanisms between increased CO_2 uptake and evaporation dynamics on vegetation level as described in the paper from Kruijt et al. (2008). Despite future droughts due to climate change the groundwater recharge in the Dutch dunes increases due to feedbacks via vegetation patterns within the KNMI W+ scenario. So the drinking water supply companies are happy with climate change? It was questioned whether the study took into account the (positive) effect of eutrophication (vegetation growth), that reduces the assumed decline of vegetation. In the scenario's it was assumed that the level of eutrophication in future is comparable with the current situation.

The realization of the delta works did not only result in increased safety levels for the Rotterdam region, explained Jan Smits, but also fresh water reservoirs were created and the accessibility of the islands in the South West of the Netherlands was improved. The increase of fresh water availability has led to the cultivation of economic interesting crops such as bulbs. Horticulture in the Delta area creates upto € 7 billion/yr euro income for the island and € 20 billion/yr around Rotterdam (greenhouse horticulture). Fresh water resources are one of the mean assets of the Rotterdam Port. Fresh water inflow in the Netherlands is used for (a) sprinkling, (b) water leveling and (c) combating salinisation. Fresh water shortage in the Netherlands is a distribution problem. In future Rotterdam has to fight against (dikes) and for water (water shortage).

Lodewijk Stuyt: Agriculture and water managers face EU Directives and climate change. In the Netherlands land drainage systems are too effective. As a result agriculture and water management have to cope with water shortages in summer, salinisation and leaching nutrients. Farmers invented 'controlled drainage'. However, scientists never believe a system, until research has proved its effectiveness. The claimed success of the controlled drainage are (a) water conservation, (b) higher crop yields, (c) groundwater storage and (d) improved use of nutrients. We developed a model to verify these claims and we monitored to verify the model. Farmers are enthusiastic about controlled drainage, also because they are not depended from the regional and national institutions for water management. The policy makers like it because of the positive impact on the EU Water directive. Policy makers want to use controlled drainage also to combine agriculture with nature in landscapes, however, we have not yet enough field scale measurements to verify the success of this new policy. The costs of controlled drainage are higher for the farmer but crop yields go up.

The objective was to the freshwater demand in greenhouse agriculture in Haaglanden and to evaluate measures to increase self-sufficiency, according to Marcel Paalman. This includes also measures such as reuse of waste water (after treatment) and storage of fresh water in aquifers.

The polders between the coastal dunes and secondary dunes (inland) in the Po Delta are more or less comparable with Dutch polders, however the climate is different, explained Pauline Mollema. She took that into account in her model approach by comparing a continuous recharge rate a year and a discontinuous recharge rate (0 in summer and .4mm/d in winter (both total 136 mm/d). The discontinuous recharge rate is characteristic for a Mediterranean climate.

Rob Speets: Water balances were made for pilot regions, including local insights from stakeholders regarding solutions for a climate proof fresh water supply in the Dutch fen meadow area and deep lying reclaimed areas in the Randstad and surroundings. Water management can be made more flexible in the deep lying reclaimed areas compared to the fen meadow areas. The study shows a knowledge gap regarding impacts of climate change on water quality.