



DELTA IN TIMES OF CLIMATE CHANGE II INTERNATIONAL CONFERENCE

OPPORTUNITIES FOR PEOPLE, SCIENCE, CITIES AND BUSINESS
ROTTERDAM THE NETHERLANDS, 24–26 SEPTEMBER 2014

Deltas in Depth scientific sessions	
Deltas in Depth 3. Fresh water management	
DD 3.4 Agriculture-water quantity, salinity, adaptation	
Chair	Dr. Ad Jeuken, Deltares, the Netherlands
Presentations	<ul style="list-style-type: none">• Rianne Van Duinen, Deltares, the Netherlands• Prof. Sjoerd van der Zee, Wageningen UR, the Netherlands• Sija Stofberg, Wageningen UR, the Netherlands• PhD Eliska Lorencova, Global Change Research Centre, Czech Republic• MSc Joost Delsman, Deltares, the Netherlands

The main goal of this session is to increase the understanding of local small-scale fresh water supply issues for agriculture and farmers' perceptions of risks and solutions.

Farmers' drought risk perceptions in the Netherlands: an agent-based approach, Rianne van Duinen

The goal of this study is to explore how the adaptive behaviour of farmers at the micro level affects the vulnerability of the agricultural sector to climate-induced uncertainty regarding water availability using an agent-based model. The case study area is the southwest Netherlands. The agent-based model contains a crop-growth sub-model to calculate agricultural production. Agents (farmers) observe the production of their farm and determine their income. Farmers take adaptive decision depending on their behavioural rules, which are formulated based on the Consumat approach. The model produces several emergent outcomes based on which the vulnerability of the sector can be judged. These are: changes in regional income (loss), the rate of adoption and water demand. Future model exercises included experiments with different climate scenarios and behavioural rules.

Questions

Is the model applicable abroad? The conceptual model is applicable to other case study areas; however the model needs to be parameterized to local conditions (land use and behavioural rules)
What is your definition of potential income? The potential income is defined as a farmer's maximum income under perfect meteorological conditions.

Dealing with the unpredictable: anticipation of drought and salinity stress to crops under erratic weather condition, Sjoerd van der Zee

Functions to correctly estimate yield response to drought and salinity are key to predict sustainable agriculture under changing climate and erratic weather. However, current yield functions are old fashioned for several reasons and therefore need to be reassessed. The goal of this study is to develop new salt tolerance functions using a predictions approach. To do this successfully all freshwater water and salt water fluxes in the crop's root zone should be implemented. Then, the effect of erratic weather conditions (several scenarios) need to be assessed. Unfortunately data on crop responses to drought and salinity is limited available.

Questions

What is the scope for future work? What time does it take to finish your ambitions? If we get the funding it can be quickly, two or three years.





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Low salinity levels in Dutch lowland fresh-water fens, Sija Stofberg

In the Netherlands, fen landscapes are a result of peat mining. Floating root mats appear after a couple of decades. The vegetation on the root mats is special and rare. Differences in the vegetation exist due to the susceptibility to ground water dynamics and water quality, especially the edges are vulnerable. To maintain these areas, water levels need to be high and constant and salinity levels need to be in control. The goal of this study is to determine the salt exposure and sensitivity of root mat species. In the literature there is a lot of uncertainty and a practically no experimental data available. To determine the exposure to saline circumstances the electric conductivity is measured in several root mats in the Nieuwkoopse plassen. A link is found between the hydraulic conductivity and the degree of decomposition of the root mat. Areas with low composition, at the edge, are more conductive. In late summer the water quality is found in the edge area of the root mat. The sensitivity of the species is investigated in several greenhouse experiments with hydroponics setup and different salt treatments. Several species have been selected that grow on the root mat edge. Overall growth of total biomass declines with increasing salt concentration, crops are sensitive.

Questions

Did you also look at the effect on nutrients? No I didn't, it would be nice to combine the results to see the whole picture.

What was the time exposure you considered? 7 weeks.

Water availability: Climate change adaptation in the agricultural sector in the Czech Republic, Eliska Lorencova

Climate change causes higher crop yield variability in the Czech Republic, Usti region. It is an area with traditional agriculture and considered to be the driest area of the country. With climate change, a decline of 7 -10 % in agricultural production is expected. The goal of this study is to investigate farmers' perceptions towards climate change and suitable adaptation strategies using a questionnaire (N=50). 65 % of the farmers state that climate change is actually occurring and 75% of the farmers have experienced more extreme events. The majority of farmers think the governments should be responsible to protect their farms from climate change related risks. Financial constraints, uncertainty on the occurrence of climate change and farming regulation are seen as barriers to climate change adaptation. In a second study the impact of several climate change scenarios on carbon sequestration and erosion control is investigated using the inVEST model. A combination of approaches (scenarios/modelling) allows spatially specific analysis of LULC long-term development and supply of ecosystem services in the Czech Republic. The scenarios show a wide range of possible future LULC developments. The analysed Ecosystem Services, carbon sequestration and erosion control, are closely associated with these LULC changes.

Investigating summer flow paths in a Dutch agricultural field using high frequency direct measurements, Joost Delsman

The goal of this study is to determine what controls the dynamics of surface water salinity at the field level and to formulate policy implications.

The water fluxes and salinity levels were measured in an agricultural ditch. Measurements focused on the summer period and were taken during two measurement periods: May 2012 - November 2012, and April 2013 - October 2013. 2012 was a wet year, 2013 was quite dry up to September. This is reflected in the ground water levels and in the discharge: a large peak in 2012 and a low discharge in 2013. In 2013 there is an intake flux. The observed processes mimic normal drainage theory in





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which the tile drains show a non-linear response and the ditch discharge is linear. A second question that was addressed was the the origin of the water in the ditch which can be determined by the level of salinity. Results of a precipitation event were differentiated per flow path. In the drain both shallow and deep groundwater can be found whereas in the ditch, first a peak of the deep ground water occurs and after that a shallow peak. This might be explained by different flow paths due to different pressures. In 2012 (wet year) there was a large contribution of the drain and in 2013 more contribution of the ditch. From this t can be concluded that when it starts raining you need to flush more than during dry events to maintain salinity levels.

Questions

Were the results presented to the water board and what was there reaction. They were surprised.

