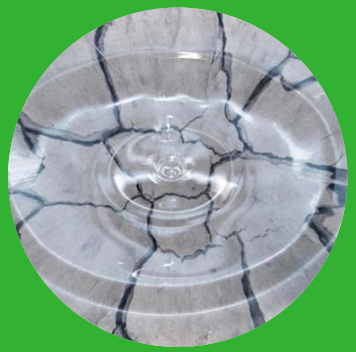
Impacts of Rainfall Variability and Expected Rainfall Changes on the Cost-Effective Adaptation of Water Systems to Climate Change

Thomas van der Pol (Wageningen University, Environmental Economics and Natural Resources)

ABSTRACT of presentation held on **6 March 2014, room C82, 12.30 – 13.15 hrs., Leeuwenborch**, Wageningen

Water systems, including water resource, urban drainage and dike systems, are vulnerable to climate change and must be timely adapted to keep system performance in line with reliability goals, or flood risk standards. In this paper, we investigate impacts of rainfall variability and expected changes in the return period of rainfall extremes on the cost-effective adaptation of water systems to climate change. We distinguish between perceived system performance estimated with hydro-meteorological observations, and 'true' system performance, which is unknown. We show that variability in rainfall extremes results in variability of performance estimates, which influences the cost-effectiveness of climate change adaptation strategies through the requirement to meet the system performance goal over time. We provide a model description for this setting, and develop a solution method to identify cost-effective investment strategies for surface or urban drainage system adaptations. Runoff and water levels are simulated with rainfall from stationary rainfall distributions for a range of system configurations, and annual rainfall maxima are simulated over time based on a climate scenario. Cost-effective investment strategies are computed with dynamic programming. As an illustration, we evaluate the volume of a water storage basin in a polder in the Netherlands. We find that the initial cost-effective volume of the storage basin is larger if the system performance goal is defined for a longer period of time. Long-term performance goals may therefore be useful to increase the robustness of water systems to climate change, and to reduce the probability that costly re-investments are required in the short-run.



WAGENINGEN UNIVERSITY
WAGENINGEN UR