# Model-based assessment of water table management solutions using the hydrological process-based Flush model

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Modeling tools combined with field data can efficiently simulate the performance of different water table management scenarios under the same hydrological conditions. Field experiments provide the necessary data to verify the model behavior for the simulated settings. In this study, two model setups based on field data were built and used for simulating the effects of adjustable water table management schemes in an arable area. The aim was to distinguish the combined effects of controlled subsurface drainage and damming of a main drainage ditch to optimize agricultural water management practices to different hydrological conditions.

The study was conducted by running model simulations separately for one agricultural field and a distinct main drainage ditch scale application. The field scale simulations were done using a two-dimensional computational grid that comprised of the main hydrological processes within a field whereas the main drainage ditch scale simulations were executed with one-dimensional computational description of an open channel ditch network. The study sites were in Sievi North Ostrobothnia approximately 10 km away from each other. Both applications were parameterized based on available field data measurements. The field scale simulations were done for a 12-year period using measured meteorological inputs and the main drainage ditch simulations were run for year 2021. The simulated water balance of the field provided the inflow boundary condition for the ditch network simulations.

The results demonstrated the spatio-temporal effects of damming in the ditch network as well as on the field. The extent of the damming effect was 900 m upstream of the dam in the ditch network and 200 m on the field. Additionally, the results indicated that water table management can increase the probability of optimal water table depths during growing seasons, but further information about irrigation and regulation schedule are needed.