Geophysical Research Abstracts
Vol. 19, EGU2017-17209, 2017
EGU General Assembly 2017

Effectiveness of submerged drains in reducing subsidence of peat soils in agricultural use, and their effects on water management and nutrient loading of surface water: modelling of a case study in the western peat soil area of The Netherlands

Rob F. A. Hendriks and Jan J. A. van den Akker

Wageningen Environmental Research, Wageningen University & Research, Wageningen, The Netherlands (rob.hendriks@wur.nl)

Effectiveness of submerged drains in reducing subsidence of peat soils in agricultural use, and their effects on water management and nutrient loading of surface water: modelling of a case study in the western peat soil area of The Netherlands

In the Netherlands, about 8% of the area is covered by peat soils. Most of these soils are in use for dairy farming and, consequently, are drained. Drainage causes decomposition of peat by oxidation and accordingly leads to surface subsidence and greenhouse gas emission. Submerged drains that enhance submerged infiltration of water from ditches during the dry and warm summer half year were, and are still, studied in The Netherlands as a promising tool for reducing peat decomposition by raising groundwater levels. For this purpose, several pilot field studies in the Western part of the Dutch peat area were conducted. Besides the effectiveness of submerged drains in reducing peat decomposition and subsidence by raising groundwater tables, some other relevant or expected effects of these drains were studied. Most important of these are water management and loading of surface water with nutrients nitrogen, phosphorus and sulphate. Because most of these parameters are not easy to assess and all of them are strongly depending on the meteorological conditions during the field studies some of these studies were modelled. The SWAP model was used for evaluating the hydrological results on groundwater table and water discharge and recharge. Effects of submerged drains were assessed by comparing the results of fields with and without drains. An empirical relation between deepest groundwater table and subsidence was used to convert effects on groundwater table to effects on subsidence. With the SWAP-ANIMO model nutrient loading of surface water was modelled on the basis of field results on nutrient concentrations . Calibrated models were used to assess effects in the present situation, as thirty-year averages, under extreme weather conditions and for two extreme climate scenarios of the Royal Netherlands Meteorological Institute.

In this study the model results of one of the pilot studies are presented. The case study ‘de Krimpenerwaard’ is situated in the peat area in the “Green Heart” between the major cities of Amsterdam, The Hague, Rotterdam and Utrecht. Model results show a halving of soil subsidence, a strong increase of water recharge but a lower increase of water discharge, and generally small to moderate effects on nutrient loading , all depending (strongly) on meteorological conditions.