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Anthropocene paleohydrology since 1950 and good modelling practice in the Netherlands, a sociohydrological overview

Gerrit Rot (1) and Jan van Bakel ()

(1) SMC-f (Soil Moisture Concern foundation), Chairman Researcher, Schagen, Netherlands (g.rot@quicknet.nl), (2) De Bakelse Stroom, Wageningen, Netherlands

Spring 2017 a working group of the Dutch Hydrological Society (NHV) published an investigative study about sofar insufficiently explained overall general groundwater level declines in the Netherlands since 1950 (Werkgroep Achtergrondverlaging NHV, 2014-2018). It will be evaluated May 2018, with the intention to publish an (extended) English version later this year.
In meantime work proceeds on the national hydrological model of the Netherlands, the NHI (the Nederlands Hydrologisch Instrumentarium, i.e.. Progress within the NHI is made in two directions.
On the one hand sophisticated coupling of existing open software modules on surface water, unsaturated and saturated flow and water quality at a national and regional scale.
On the other hand building an open access database of all relevant data about hydrological structures and monitoring data of the water cycle, plus remote sensing data, to be maintained by the STOWA (the research organization of Dutch Water Boards).
This hydrological data base will probably become part of the nationwide spatial organisation database, as required for the Omgevingswet (the new Law on Spatial Organization and stakeholder participation), planned to be implemented in 2021 (after several years of delay already).
There is a growing awareness, that the database encompassing geoecological and geohydrological structures and volumes has to be tagged with definite chronological periods.
In fact, since 1950 many water data have changed, due to human interventions in both water infrastructures and more general landscape infrastructures, plus changes in water extractions and redistributions and climatological trends.
Among the more outspoken geohydrological changes are groundwater extractions by industrial and drinking water companies; large scale land reallotment and land reconfiguration projects in about two thirds of the Netherlands, leading to sometimes decimeters of land subsidence, following stream canalization and stream bed lowering, or polder ditch level lowerings and subsequent settings of unconsolidated clay and sand layers and settings and oxidation of peat layers; intensification of agricultural production with new plant variaties, increase of irrigation and implementation on a massive scale of drain tube systems on agricultural parcels; augmentation of impermeable surfaces due to urbanization and road building; population growth and climate change probably since the eighties.
Land surface lowerings due to massive natural gas extractions
There has also been an augmentation of hydrological data, although groundwater levels and soil moisture are less systematically monitored and satellite data are not yet fully integrated in water management. There is also a wealth of exact analogically data mostly unused in hydrological modelling, because no government institution has so far systematicically digitized these data.
It will be a socio-hydrological challenge to apply the good modelling recommendations in the further development of the Dutch hydrological models.