



## **netherlands hydrological modeling instrument**

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Netherlands Hydrological Modeling Instrument  
A decision support system for water basin management.

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The Netherlands Hydrological modeling Instrument (NHI) is the center point of a framework of models, to coherently model the hydrological system and the multitude of functions it supports. Dutch hydrological institutes Deltares, Alterra, Netherlands Environmental Assessment Agency, RWS Waterdienst, STOWA and Vewin are cooperating in enhancing the NHI for adequate decision support. The instrument is used by three different ministries involved in national water policy matters, for instance the WFD, drought management, manure policy and climate change issues.

The basis of the modeling instrument is a state-of-the-art on-line coupling of the groundwater system (MODFLOW), the unsaturated zone (metaSWAP) and the surface water system (MOZART-DM). It brings together hydro(geo)logical processes from the column to the basin scale, ranging from 250x250m plots to the river Rhine and includes salt water flow.

The NHI is validated with an eight year run (1998-2006) with dry and wet periods. For this run different parts of the hydrology have been compared with measurements. For instance, water demands in dry periods (e.g. for irrigation), discharges at outlets, groundwater levels and evaporation. A validation alone is not enough to get support from stakeholders. Involvement from stakeholders in the modeling process is needed. There fore to gain sufficient support and trust in the instrument on different (policy) levels a couple of actions have been taken:

1. a transparent evaluation of modeling-results has been set up
2. an extensive program is running to cooperate with regional waterboards and suppliers of drinking water in improving the NHI
3. sharing (hydrological) data via newly setup Modeling Database for local and national models
4. Enhancing the NHI with "local" information.

The NHI is and has been used for many decision supports and evaluations. The main focus of the instrument is operational drought management and evaluating adaptive measures for different climate scenario's. It has also been used though as a basis to evaluate water quality of WFD-water bodies and measures, nutrient-leaching and describing WFD groundwater bodies. There is a toolkit to translate the hydrological NHI results to values for different water users. For instance with the NHI results agricultural yields can be calculated, effects on ground water dependant ecosystems, subsidence, shipping, drinking water supply. This makes NHI a valuable decision support system in Dutch water management.