



## Extreme weather warning system improves water management

**A new study** indicates that water management in the Netherlands uses a reliable warning system for extreme weather, which can incorporate wind and coastal surge level forecasts, as well as precipitation forecasts.

**Managing water** as both a threat and a resource is a major issue and striking the balance between safety and economic interests requires good decision support systems. To tackle this challenge in the Netherlands, the Royal Netherlands Meteorological Institute (KNMI) and the Dutch Association of Regional Water Authorities have set up a warning system for extreme precipitation (rain and snow) events. To provide reliable warnings of extreme events, it combines radar observations of past precipitation, short range (up to 48 hours), numerical weather predictions and medium range (10 to 15 days) weather forecasts, along with risk profiles provided by local water control boards. The risk profiles take into account the area's geography, canal system, soil type and the water control board's capacity to pump and store water. The basic premise of the system is that the sensitivity of water boards to meteorological inputs can be captured through a set of meteorologically based risk profiles. In this way the system essentially decouples meteorology from hydrology.

The system was implemented in 2003 by five water control boards and is now used by 13 boards. Each water control board differed slightly in how they adopted the system and what they prioritised. In general, management plans of weather events seek to strike a balance between not producing too many false alarms (when events turn out to be not as extreme as predicted), and not missing events completely. However it appears that these water control boards tended to be more cautious by choosing a strategy whereby action to manage an extreme event is taken even if the system suggests that there is a relatively low probability of such an event.

There are two possible reasons for this: firstly, these scenarios provide plenty of advance warning which means that they can take precautionary measures and then step up operations if the alerts persist. This means that false alerts are not too costly if only preliminary precautionary measures are taken. Secondly, most water control boards have an exclusive focus on precipitation and do not consider adverse wind conditions or river surge levels, which can aggravate a relatively small event into a more extreme one. Boards choose to use lower limits to avoid missing such events. There is one coastal water control board (in Fryslân) that includes on an experimental basis average wind speed and coastal surge in its risk profile.

The study assessed the application of the system by two of the water boards; one from a small water control board and the other from a large board. The accuracy of the main components of the alert system was assessed, i.e. the predictions of precipitation were compared to actual precipitation and results indicated that both the short-term and long-term forecasts were reasonably reliable.

In order to define risk conditions more accurately, several water boards have plans (like the water board in Fryslân) to use combined probabilities of precipitation with wind and coastal surge level forecasts. River level forecasts can be included as well, if requested.

**Source:** Kok, C.J., Wichers Schreur, B.G.J. & Vogelezang, D.H.P. (2011) Meteorological support for anticipatory water management. *Atmospheric Research*. 100: 285-295.

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