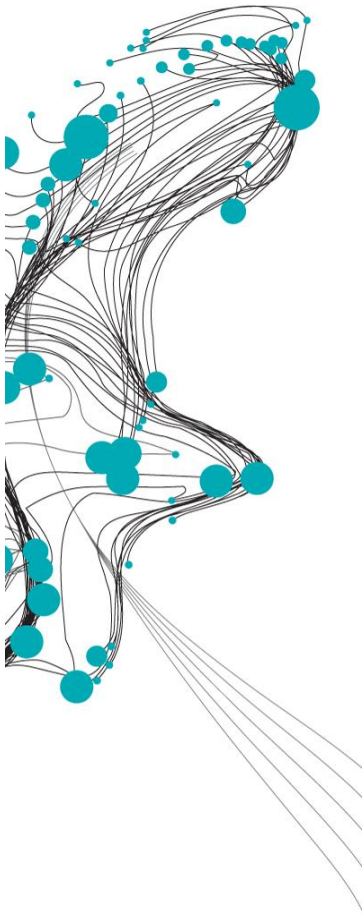


Effect of vegetation distributions on the water levels of the Overijsselse Vecht



In the floodplains of the Overijsselse Vecht various types of vegetation can be found. Regional Water Authority Vechtstromen has a demand for an instrument that can be used to support decisions at what locations nature development can be permitted on the one hand and flood safety is guaranteed on the other hand. The objective of this research was to investigate the possibility of using a 1D-2D SOBEK 2 model to support these management decisions.

By analyzing model runs, the effects on water levels and flow velocities for various scenarios were determined. First of all, model runs with an extremely rough scenario and an extremely smooth scenario showed that the bandwidth between peak water levels is in the order of magnitude of 1 m and that narrower sections of the winter bed are more sensitive to roughness changes.

Next, the suitability of different vegetation data sources for describing the hydraulic roughness was investigated. The ecotopes map seems to be the best alternative at the moment, a method using satellite images to determine the vegetation can be a suitable alternative when accuracy is improved.

Furthermore, the suitability of mixing classes, in which the roughness of different vegetation species on a lot is expressed by a single roughness value, was examined. The mixing classes as defined in this research cause a large overestimation of the water levels. However, if the definitions of the mixing classes are changed, it is a useful method for R.W.A. Vechtstromen to give the owners of lots more freedom to manage their lot.

Finally, different vegetation distributions on a lot have been studied with the 1D-2D model. This showed that two aspects must be taken into account if designing the winter bed: (1) the blockage effect of rough vegetation causes lower flow velocities and (2) the presence of wide flow paths with smooth vegetation results in higher flow velocities (Figure 1). This results in higher and lower maximum water levels, respectively. The presence of river bank vegetation does not necessarily cause higher water levels.

The hydraulic 1D-2D SOBEK 2 model seems capable of determining the effects of vegetation in the floodplains on the water levels, however the calculated water levels contain some uncertainties. This makes the used method in this research to seem appropriate, with the challenge of reducing the uncertainty in the various data sources that were used.

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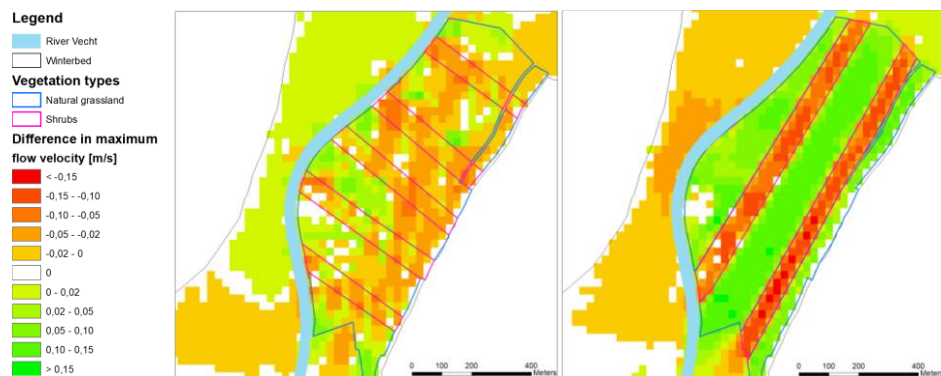


Figure 1: Difference in maximum flow velocity [m/s] for the different scenarios on a lot compared to a scenario in which the same amount of rough vegetation (shrubs) and smooth vegetation (natural grassland) is expressed by one roughness-value on the lot.