Deltares

FAQ

How does a steep discharge wave move through the Meuse?

Update: 31-8-2021

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What is a steep discharge wave?
The high water in July 2021 was caused by intense rainstorms in the Meuse catchment. Before the showers, the discharge in the Meuse was still low, as is usual in the summer. The average summer discharge in the Meuse at the Sint Pieter monitoring station near Maastricht is less than 100 m3/s. In addition to a historically high discharge wave, the sudden arrival of large quantities of water also created an exceptionally steep discharge wave in a very short time. In just two days, the discharge rose to 3260 m3/s.

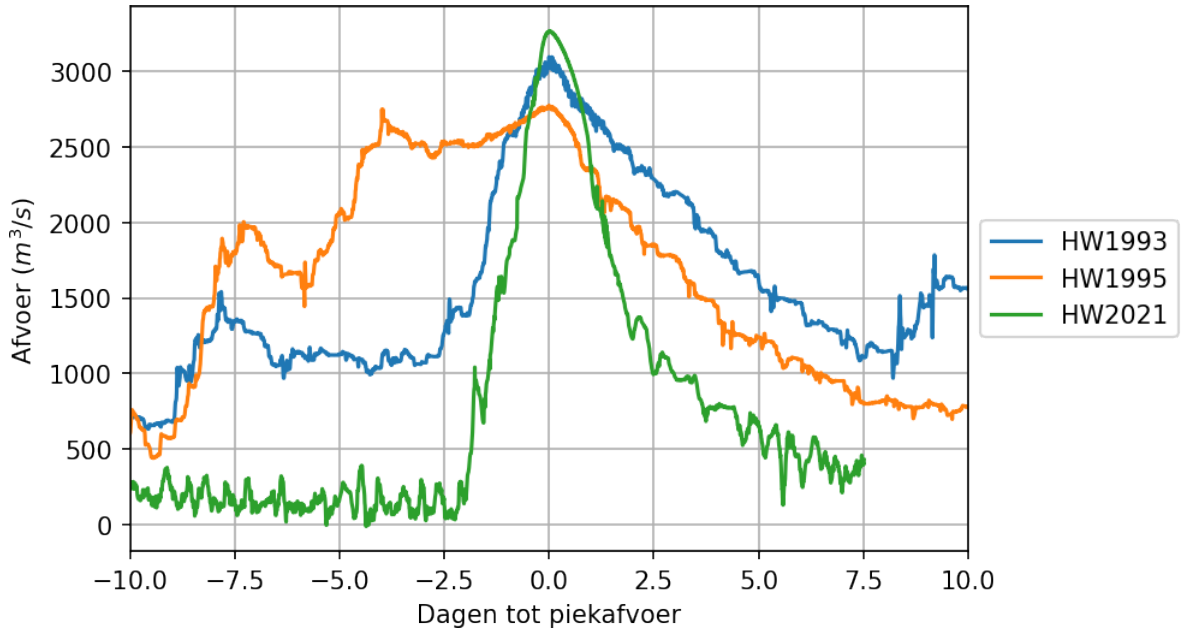

Figure: The measured discharge at the Sint Pieter monitoring station (near Maastricht) for the high water waves in 1993, 1995, and 2021
[in Figure: Linkeras: Discharge Onder: Days to peak discharge]

Flattening
A steep discharge wave causes water levels to rise rapidly. As the wave travels along the Meuse, the floodplains fill up as the water levels rise and then empty again after the discharge wave has passed. Due to the flooding of the floodplains, the shape of the discharge wave changes and the maximum discharge tails off. Research into the effect of discharge waves has shown that most flattening occurs when discharge waves are steep.

Computer model calculations have demonstrated that, at comparable peak discharges, flattening can amount to as much as 400 m3/s on the section leading to Roermond and increase to over 800 m3/s in the section leading to Den Bosch. When the discharge wave is steep, downstream water levels will therefore be lower.

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The effect of streams on a high-water wave

The discharge of the Meuse increases due to the inflow of streams and tributaries. During the high water in July 20201, the Geul and Roer in particular made major contributions.

With a steep discharge wave, however, it is less likely that a high discharge in the Meuse will coincide with the peak discharge in the tributary.

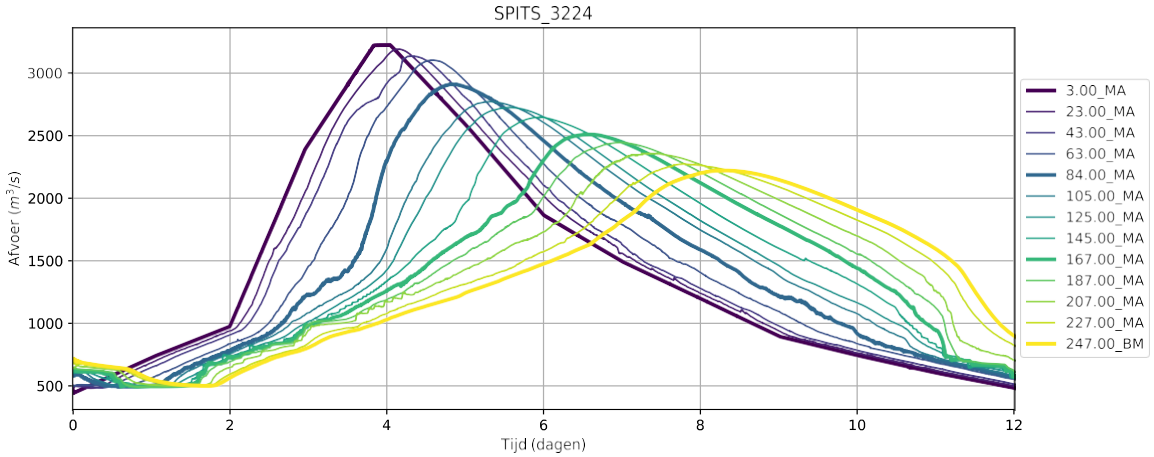

Figure: Flattening of a steep wave form as it travels along the Meuse, shown in 20-km intervals (calculated from Eijsden onwards).

[In Figuur: Linker as: Discharge Onder: Time (days)]

The effect of retention areas

Several retention areas have been created along the Meuse in the context of the Room for the River programme to further wave flattening. On the Flemish side, for example, the western Negenoord lake serves as a retention area. The Lateraal Kanaal West (LKW) retention area has been built near Heel (west of Roermond). The LKW flooded for the first time during the high water, helping to flatten the discharge wave in the downstream section.

Figure: Inlet threshold at LKW retention area. On the left: an archive photo taken from the south; on the right: a photo during the high water period taken from the north.[1]

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[1] https://www.linkedin.com/posts/eddy-witjes-a10a481b_hij-werkt-vijf-jaar-geleden-is-de-flexibele-ugcPost-6821820690673479680-sAvi/