

Design discharges for Rhine and Meuse “Randvoorwaardenboek 2001”

Assignment

Every 5 years, the design discharges for the rivers Rhine, Meuse and Overijsselse Vecht have to be updated with recent measured data. The design discharge is defined as the discharge with an average exceedance chance of 1/1250 per year, and it determines the design water levels along these rivers.

Period

October 1998

Client

RWS RIZA started this project, called ‘Randvoorwaardenboek 2001’, together with the consultancies WL | Delft Hydraulics and HKV Lijn in Water. This project can be seen as the follow-up of former important projects ‘Boertien I’ for the Rhine (1993) and Meuse and ‘Boertien II’ for the Meuse (1996).



Figure 1 The Meuse at Borgharen

keywords:
river engineering



Description

For the Rhine a measurement serie is available from 1901 (98 values in total), for the Meuse the first value starts from 1911 (88 values). The goal of the project was to determine the discharges for Rhine and Meuse for times of recurrence of 1250, and for various times of recurrence between 2 to 10 000 years. By choosing different types of frequency distributions and different homogeneity methods, several variants can be derived for the values of the design discharge. For the Rhine twelve different values were derived, for the Meuse three. From the twelve Rhine values 4 variants were selected for definitive analysis.

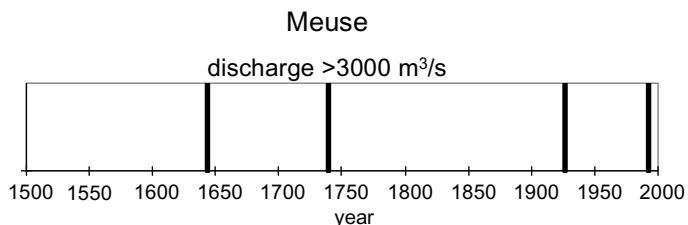


Figure 2 Estimation of discharges > 3000 m³/s of the Meuse from historical analysis

Final variants

An interesting part of this project is the use of historical data, which is derived from historical descriptions of extreme discharges before 1900, to examine the representativity of the measurement series.

For the Rhine the historical analysis goes back until 800 AD. The conclusion for the representativity of the serie of the Rhine of this century is *not* representative. This is most likely caused by changes in the river geometry during the last 100 years, because comparison with the period 1817-1900 show that the design discharge is 2000 m³/s higher. So the series is not representative because of the lack of homogeneity.

For the Meuse the oldest information which could be used stems from the year 1571. The conclusion from this analysis is that the assumption that the series is representative for a longer period, can *not* be rejected. Extreme discharges from the past have the same order of time of recurrence as present extreme discharges derived from the series.

Rhine	
variant 1, equal to Boertien I method, inhomogeneous	15540 m ³ /s
variant 2, equal to Boertien II method, inhomogeneous	15810 m ³ /s
variant 3, equal to Boertien I method, homogeneous	15670 m ³ /s
variant 4, equal to Boertien II method, homogeneous	15990 m ³ /s

Meuse	
variant 1, 1911-1996 with correction 1984-1992	3830 m ³ /s
variant 2, 1911-1998 without correction 1984-1992	3850 m ³ /s
variant 3, 1911-1998 without correction 1984-1992	3805 m ³ /s

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