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Astrid Blom, Laura M. Stancanelli, Jelle A. Dercksen, Clàudia Ylla Arbós,
M. Kifayath Chowdhury, Shelby M. Ahrendt, Carolina Piccoli,
Ralph M.J. Schielen, Kees Sloff & Jill H. Slinger (eds.)

**Netherlands
Centre for
River studies** NCR

Final evaluation of longitudinal-training-walls pilot in the river Waal

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Introduction

Rijkswaterstaat Oost-Nederland launched the idea of a new system of river training. It replaces the existing system of a single main channel between groynes by two parallel channels, separated by a longitudinal training wall. Expected benefits included reduction of overall bed incision, improved navigability, improved ecological conditions, and more safety against flooding.

To test this new system, Rijkswaterstaat implemented a pilot with three longitudinal training walls in the river Waal between Wamel (km 911.5) and Ophemert (km 921.5) in the years 2014-16 (Figs. 1 and 2). Before, during and after implementation, an extensive monitoring and research programme was executed by the WaalSamen partnership consisting of Rijkswaterstaat, Koninklijke BLN-Schuttevaer, Sportvisserij Nederland, Hengel-sportfederatie Midden-Nederland, Deltares, and the universities of Nijmegen, Wageningen, Delft and Twente. In 2020, Rijkswaterstaat commissioned Deltares to evaluate the results from the monitoring and research programme. Part of the evaluation was subcontracted to HKV, Witteveen+Bos, MARIN and Bureau Waardenburg.

Method

The effects on hydraulics and morphology were assessed by analysing field data (De Jong et al., 2021) and carrying out numerical simulations (Paarlberg et al., 2021). The field data comprised water level registrations, flow velocity measurements and bed topographies derived from bathymetric surveys. The effects on how vessel used the waterway were assessed by analysing AIS data (Indah-Everts and Hermans, 2021). The effects on ecological conditions were studied by a broad array of biotic and abiotic field surveys (Collas et al., 2020). Surveys and interviews were used to assess how stakeholders and the local population experienced the pilot with the training walls (Verbrugge and Van den Born, 2021).

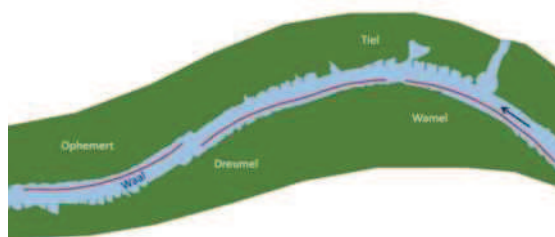Figure 1. Location of pilot of longitudinal training walls in the river Waal.

Figure 2: Three longitudinal training walls between Wamel (km 911.5) and Ophemert (km 921.5).

The data were used to evaluate the consequences of the new system for safety against flooding (Asselman and De Grave, 2021), navigation (Van der Mark and Van der Wijk, 2021), nature (Collas et al., 2020), freshwater supply (Van der Vat, 2021), public acceptance (Verbrugge and Van den Born, 2021), and morphological response in the light of maintenance and long-term sustainability (Chavarrías et al., 2021). Zuijderwijk & De Jong (2021) explored possibilities for optimization. Huppes (2021) reviewed the applicability of longitudinal training walls to other reaches of the Dutch Rhine branches.

Results

The new system was found to improve navigability at low flows if applied in reaches of least available depth. Moreover, it was found to

sustain long-term navigability by countering the ongoing overall incision of the river bed. After implementation of the pilot, the waterway continued satisfying the international navigability standards. Yet a paradox was that, despite improvement of navigability during droughts and on a long term, skippers still saw the system with longitudinal training walls as an encroachment of the waterway in their day-to-day experience.

The pilot substantially improved the quality of nature in the reach of the training walls. The walls lowered design flood water levels at least as much as the groyne lowering previously planned in this reach. A modestly positive effect was found on freshwater supply during droughts.

Local inhabitants and recreational boaters were positive about the training walls from the start. The experience of inhabitants and sport fishers became more positive in the course of time, but inland waterway skippers remained skeptical. Participation of stakeholders in the monitoring and research programme was found to have increased support and appreciation for the pilot.

Conclusions and recommendations

The system tested in the pilot opens perspectives for integral solution of several river problems. It performs better than the old system with groynes thanks to spatial diversification through separation of functions. The pilot generally confirmed the expectations about the potential of the new system. No unforeseen negative impacts have surfaced. The new system does not solve all river problems completely, but it offers more space for further improvements in the future than the old system (Mosselman et al., 2021).

Figure 3. Inlet sill at upstream end of the longitudinal training wall at Wamel.

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Rijkswaterstaat and Deltares jointly identified three points of further attention: (i) regulation of flow and sediment transport by modifying inlet sills (Fig. 3); (ii) operation and maintenance; (iii) the inland waterway (Mosselman & Buijse, 2021). We recommend addressing these points by continued monitoring and close consultation of the inland waterway transport sector.

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