SEDIMENTATION IN POMMEROEUL-CONDE CANAL, BELGIUM. INSTALLATION OF A SEDIMENT INFLOW MEASUREMENT STATION.

BOUSMAR, D.[1], HIVER, J.M.[2] and ZECH, Y.[3]

[1] Hydraulic Research Laboratory, Ministère de l'Equipement et des Transports, Rue de l'Abattoir 164, 6200 Châtelet, Belgium
(Tel.: +32-71-38 00 28, Fax: + 32-71-38 00 26, e-mail: dbousmar@met.wallonie.be)
[2] Hydraulic Research Laboratory, Ministère de l'Equipement et des Transports, Belgium; and Civil Engineering Dept., Université Libre de Bruxelles, Belgium
[3] Civil and Environmental Engineering Dept., Université catholique de Louvain, Belgium

Severe sedimentation is observed in Pommeroeul-Condé canal, Belgium; and, as a consequence, the navigation has been interrupted for now 12 years. This situation is due to past alteration of the neighbouring river network: the outlet of River Haine has been connected to the upstream part of the canal, which now acts as a settling tank. In order to monitor the actual sediment inflow and to prepare future dredging works, a sediment transport measurement station is being installed on the River Haine.

The River Haine in Belgium has been used for navigation since the thirteenth century. In 1818, the navigation was transferred to a canal dug alongside the River Haine. Also since the nineteenth century, the watershed and the river bed itself underwent major modification, due to the industrial development of the area. The early industrial activity, centred on coal extraction and steel production, was not much concerned by environmental issues. This resulted in severe water and sediment contamination by heavy metals and organic pollutants.

With time, the underground mining activity also generated subsidence with local surface depressions up to 5 m. This caused surface runoff modifications and locally created flooding problems. To solve this issue, an artificial concrete lined bed was build for the River Haine around 1960. This wider and deeper bed was designed as outlet for the drainage and pumping system of the neighbouring areas. From 1970 to 1980, the navigation canal was replaced by a larger one of 1350 t capacity. In the same time, the outlet of the Haine was moved from the River Scheldt (Escaut) to an upstream section of the navigation canal, on the so-called Pommeroeul-Condé reach.

Unfortunately, it rapidly appeared that, with this outlet configuration, the canal served as settling basin for the River Haine. Indeed, the Haine has a bottom width of 11.5 m, an averaged flow depth of 1.5 m, and a bed slope of 0.4×10^{-3}; while the canal has a bottom width of 32 m, a depth of 4 m, and an horizontal bottom. The River Haine has thus a much larger transport capacity than the canal. Dredging was operated until 1993 to maintain navigation. Maintenance had then to be stopped, due to the high level of sediment contamination and new waste disposal laws coming into effect. The canal was rapidly filled up with sediments and the navigation interrupted (Figure 1).

Nowadays, a re-opening of the canal is considered as it represents a major link between France and Belgium inland navigation networks. Moreover, the sediment deposition has now reached the Scheldt River where it could also shortly hinder navigation. Dredged material disposal areas are therefore being built conform to the new legislation. A set of

studies have also been initiated to identify sources of sediments and investigate possible action to reduce the total load.

As part of these studies, a better quantification of the sediment supply is required. Indeed, the present rough estimations are only based on dredged volumes and observed deposits, with no indication of possible dependence on time or discharge. A sediment supply measurement station has therefore recently been installed on the Haine. This case-study paper presents some of the considerations that conducted the selection of the station location: a single measurement/sampling point has been planned, a few hundreds meters upstream of the Haine outlet. The sediment and flow characteristics have been determined, in order to investigate the diffusion and suspension processes affecting the transported sediment, and to identify the best location of the sampling point in the cross-section. Preliminary results obtained during the first month of station recording are then presented.

Keywords: Canal sedimentation, In-situ measurements, Sediment diffusion, Case study

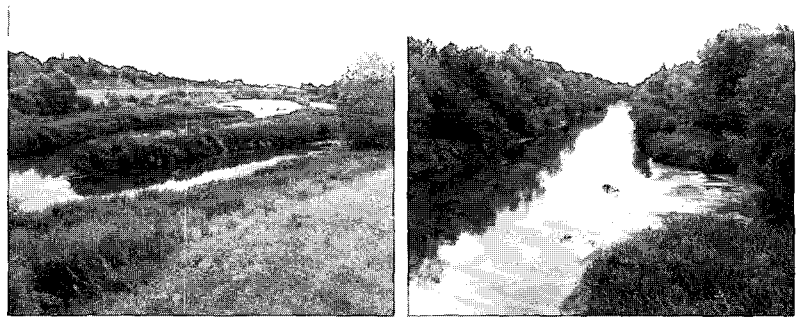

Fig. 1 Present view of the sediment-filled 1350 t canal.

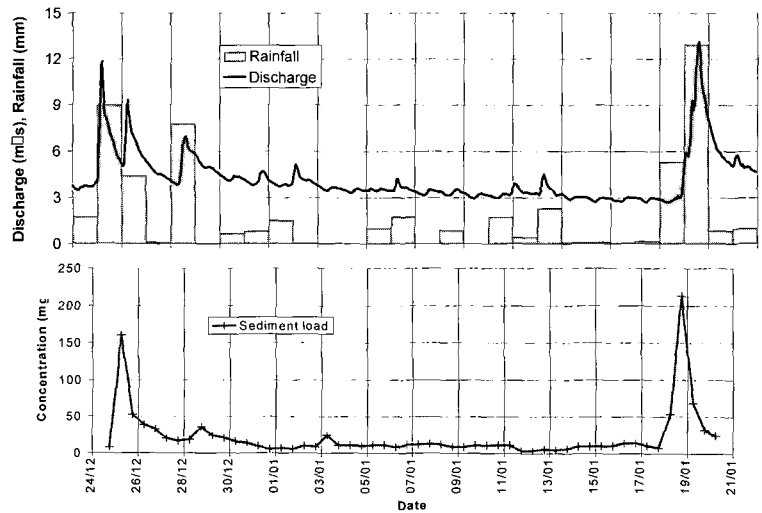

Fig. 2 River Haine: rainfall, discharge and concentration recordings, 12/2004-01/2005.