FACTSHEET

4. Channel widening

Many of the Alpine rivers, which once were braiding through their alluvial floodplains, experienced a systematic channelization of their river course, which included narrowing and straightening. The channelization went along with the construction and protection of infrastructures, the creation of arable lands and the protection of settlements against floods. The negative consequences – bed incision and habitat loss – can be countered best by removing bank protection structures and groynes, to allow lateral dynamics and the re-establishment of a more natural morphology. However, channel widening requires large amounts of sediment: 1) for sufficient sediment discharge, which determines the intensity of lateral dynamics, and 2) for deposition in the widened reach to form an increased channel slope and depositional features such as gravel bars.

Widenings may be constructed by excavators, or may be self-initiated through lateral erosion after solely removing the bank protections. At least temporarily, self-initiated widening forms natural, steep eroding banks. If the banks contain grain sizes which are transported as bedload, the bank erosion temporarily increases the sediment supply. Figure 1 shows the development of the Drava River near the village of Obergottesfeld after dynamics were initiated by excavating initial side channels.

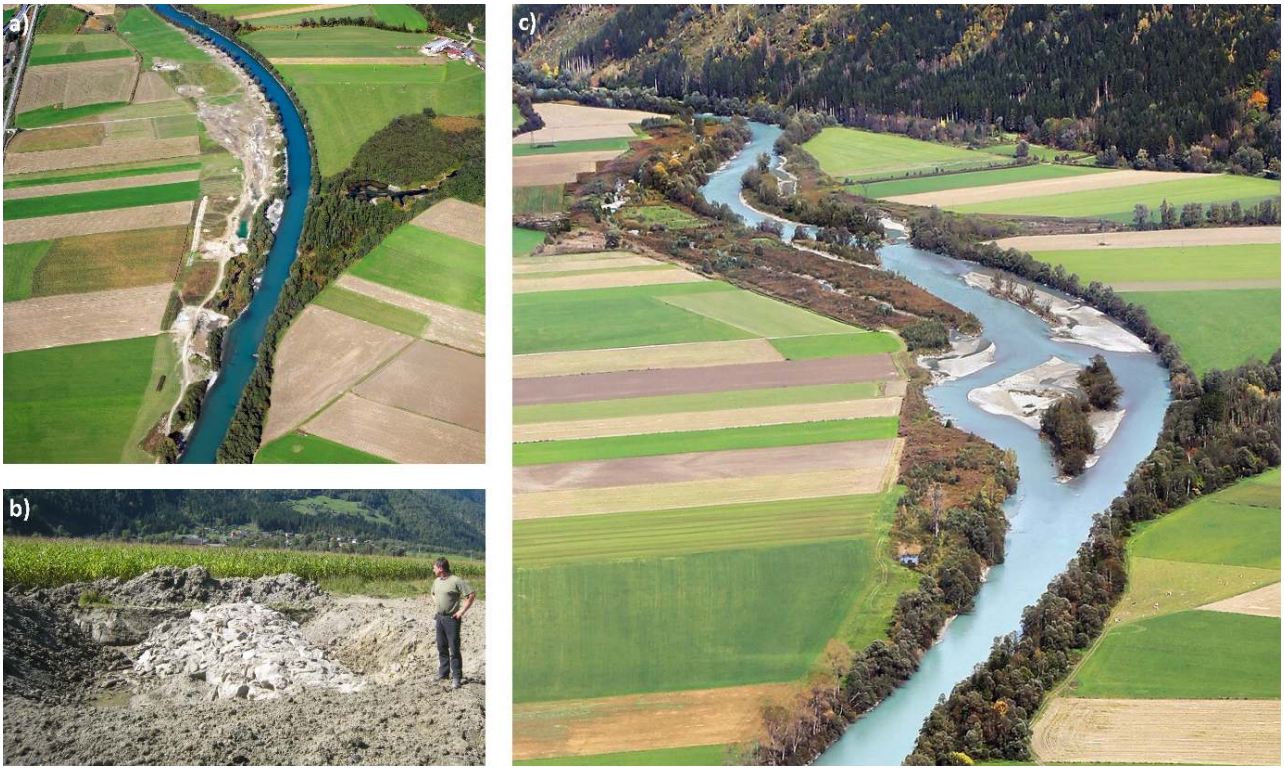
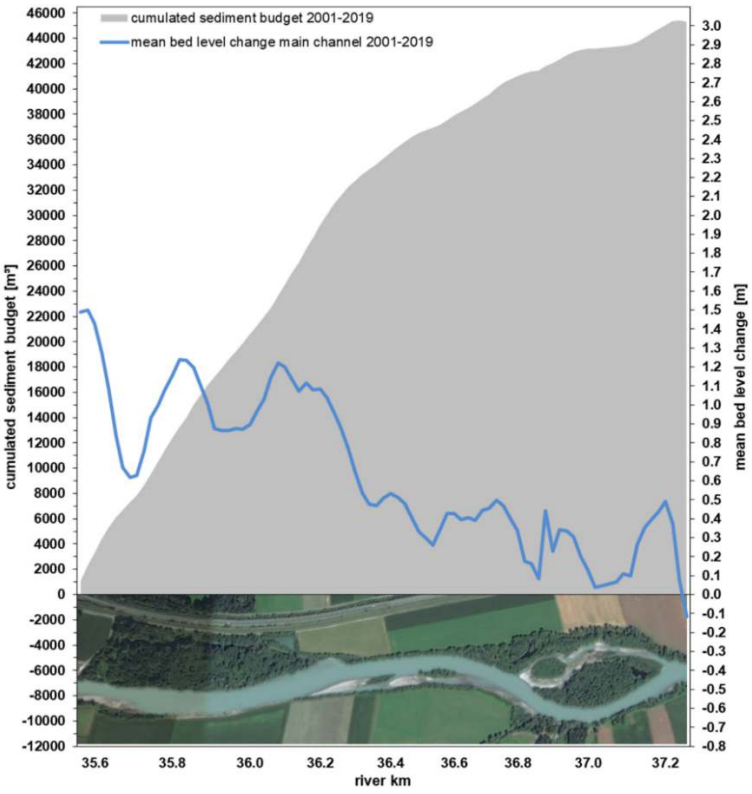


Figure 1. a) River section of the Drava River near the village of Obergottesfeld during restoration works in 2010, b) Groyne installed in the floodplain to prevent from uncontrolled bank erosion, c) Restored reach in 2017 after self-initiated widening (Source of Figure 1a and Figure 1c: Carinthian Government)

The widening of the Drava River in the municipality of Kleblach-Lind was already implemented in the years 2002 and 2003. The resumption of monitoring activities in HyMoCARES allowed assessing the long-term effects of restoration.



In the case of sufficient sediment supply, the widened reach adjusts to the decreased bed shear stresses by increasing the slope. Bars form and create a more natural morphology. Both processes require significant amounts of sediment (Figure 2).

Figure 2. Cumulated sediment budget and mean bed level change in the restored reach of the Drava River in the municipality of Kleblach-Lind in the period between 2001 and 2019 (Klösch et al., 2019; Aerial image: © 2020 Maxar Technologies, google).

Bed widening is a successful solution to improve morphological conditions and subsequent habitat heterogeneity of channelized, once braiding alpine rivers, provided that the sediment supply is high.

Constraints in restored reaches co-determine the restored morphology. After longer-term adjustment, a shift of the constraints may reinitiate morphodynamics (Figure 3). The provision of a wider corridor should be preferred for sustaining lateral dynamics.

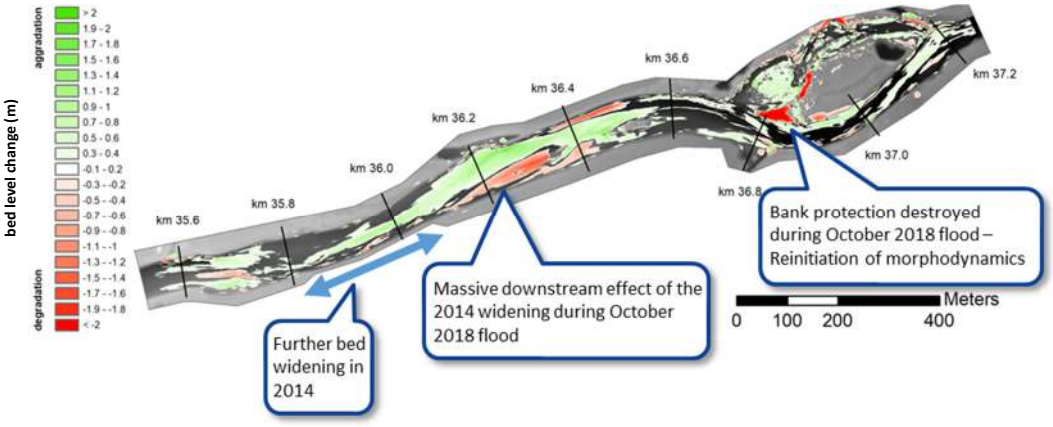


Figure 3. Elevation differences which resulted from the effect of morphodynamics during the major flood event on October 30th, 2018 (~10 year recurrence interval) (Klösch et al., 2019)

References:
Klösch M., Dunst R., Pessenlehner S., Stephan U., Rindler R., Gmeiner Ph., Habersack H. (2019). Technical note on the evaluation of physical and ecological effects of river restoration works, Drava, Mur and Salzach Rivers. D.T3.3.1 HyMoCARES