FACTSHEET
Hydromorphological river restoration tools

Given the involvement and interaction of many natural processes, river restoration remains a challenging issue, while the demands on the functionality of restored rivers are increasing. Planning, design and management tools are required, which help to optimise restoration measures for effective re-establishment or improvement of a variety of ecosystem services. HyMoCARES compiled a collection of tools, which are dedicated to river morphology and sediment transport, and which support river managers and planners in restoring rivers. The tool collection comprises existing and new tools, which assist in the planning of effective river restoration, or in the monitoring of restoration effects. In the Ecosystem Services Framework of O.T1.1, the tools serve as the functioning clogs which link measures and management actions with river functions and ecosystem services. Some of the existing and newly developed tools were prepared for easy online application on this website: https://hymo.azurewebsites.net. Find a selection here and a full technical description of the new tools in deliverable D.T2.3.1 (Klösch et al., 2019).

RIVER BAR PREDICTOR

Crosato and Mosselman (2009) developed a simple model to predict the number of river bars which emerge within a cross section at a certain channel width. It may be used to determine the effect of width changes on the morphological appearance.

If your site falls into the range of the tool's applicability (see notes on the web page), enter your data to see the most likely morphological appearance. What is the width you need to provide for the emergence of central bars?

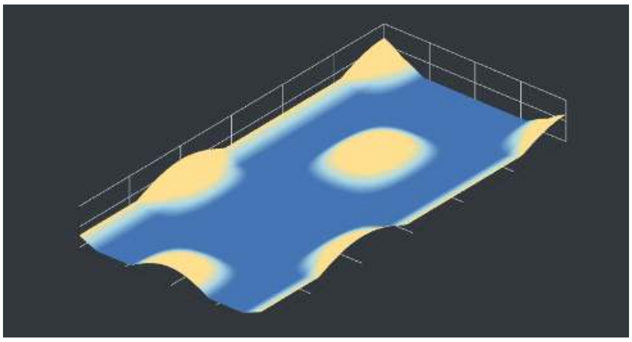

Figure 1. River bar predictor from Crosato and Mosselman (2009), prepared for online use in HyMoCARES

(B/H;h/d)-PLAN

Da Silva (1991) related the ratio between channel width and water depth to the ratio between water depth and grain size, which allowed delineating different morphological types. This diagram may be used to estimate the minimum channel width which you need to provide to restore a certain morphology. Model the flow in varying cross section widths and see the morphology your river would evolve to according to this plan.

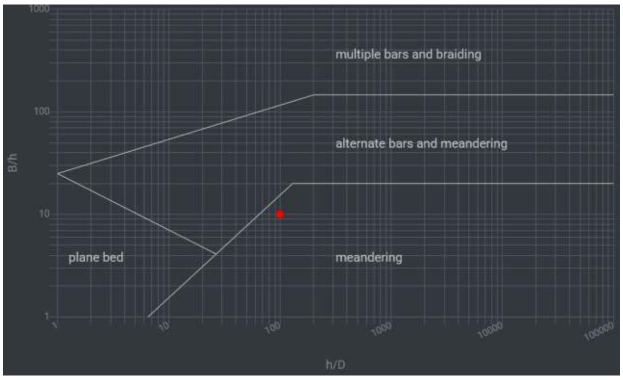

Figure 2. (B/H;h/d)-plan from Da Silva (1991) and Ahmari and Da Silva (2011), prepared for online use in HyMoCARES.

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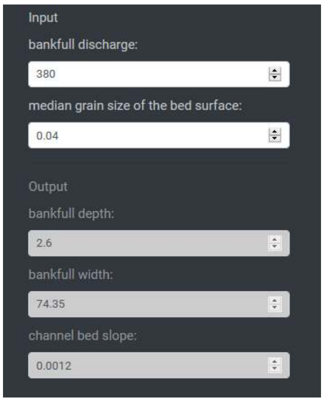
REGIME EQUATIONS

Parker et al. (2007) derived regime equations from natural British and US-American Rivers. The regime equations allow estimating the width, depth and slope of single-thread rivers by knowing the bankfull discharge and median grain size of the bed surface only. These equations may be used to estimate the width of a river needed after restoration of the riverbanks.

Figure 3. Data panel of the online available Regime equation tool, using formulas derived by Parker et al. (2007)



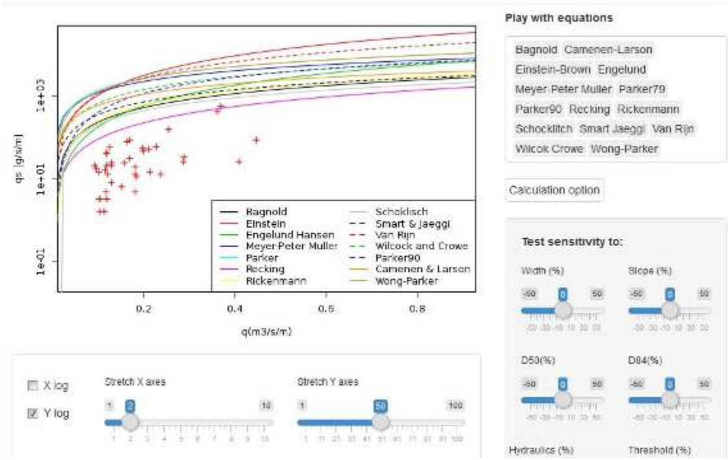


Figure 4. BedloadWeb accessible via https://en.bedloadweb.com

BEDLOAD WEB

BedloadWeb is an online interactive web application from Irstea Grenoble dedicated to the quantification of bedload transport in rivers, based on the most widely used and advanced bedload transport equations. The tool offers the possibility to easily explore bedload datasets from the literature, and it provides an assistance for bedload transport computation for a given river reach. A toolbox is proposed for the implementation of a comprehensive bedload transport study including different timescales of analysis.

HyMoLINK

HyMoLink is a tool for a systematic analysis of the morphodynamics of a river and for interpretation of the relevance of the morphodynamics in providing riverine habitats, especially of those which are critical for the reproduction of many riverine species.

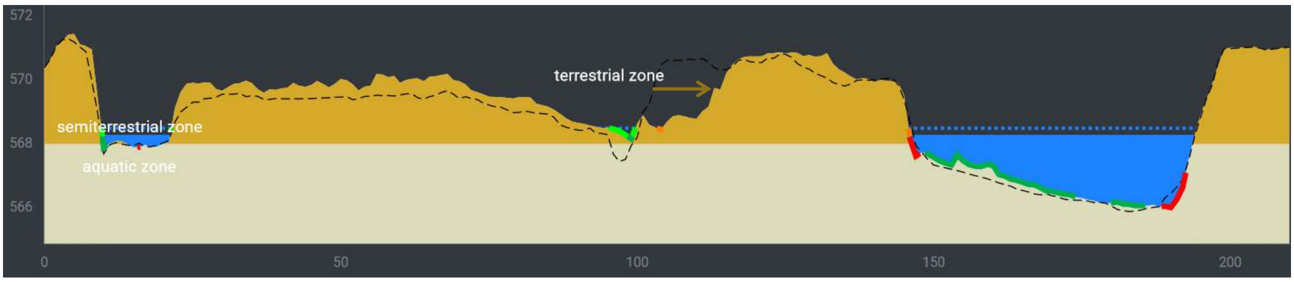


Figure 5. HyMoLink: Tool for linking morphodynamics to habitat zones, developed in HyMoCARES and available online.

References

Ahmari H., Da Silva A. M. (2011): Regions of bars, meandering and braiding in da Silva and Yalin's plan, Journal of Hydraulic Research, 49:6, 718-727.

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Parker, G., Wilcock, P. R., Paola, C., Dietrich, W. E., & Pitlick, J. (2007). Physical basis for quasi-universal relations describing bankfull hydraulic geometry of single-thread gravel bed rivers. J Geophys Res, 112, F04005, doi:10.1029/2006JF000549.

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