Politecnico di Torino
Department of Environment, Land and Infrastructure Engineering

PhD in civil and environmental engineering
XXXVII cycle

River habitat modeling for the macroinvertebrate community

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Supervisor: prof. Paolo Vezza

BentHab project

1.The model

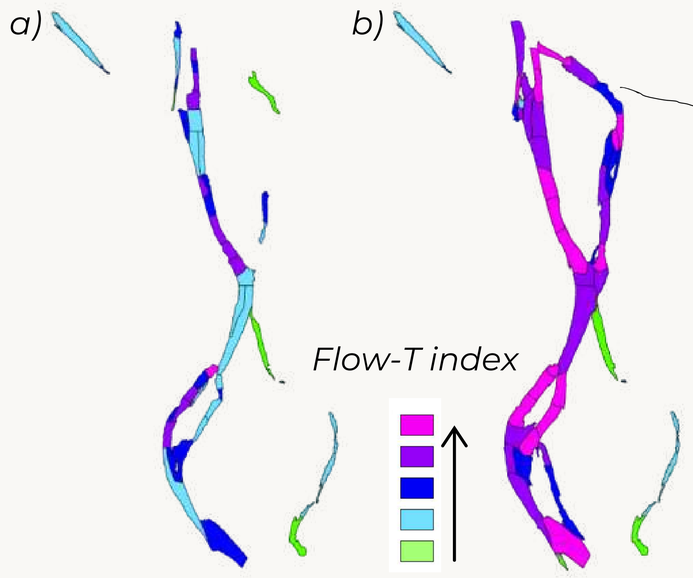
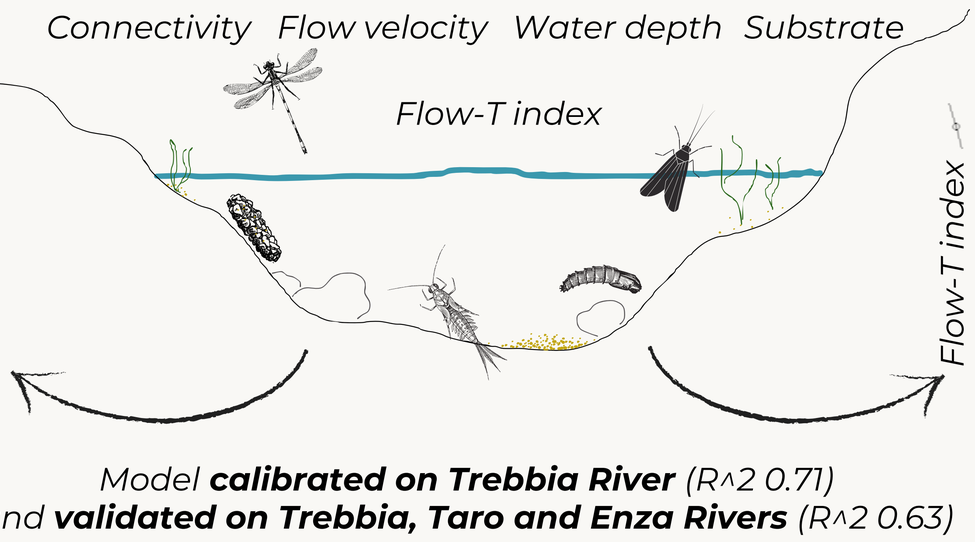


Fig.1 Result of the application of the model on the Enza River: Flow-T maps at a) minimum (0.33 m3/s) and b) maximum (5 m3/s) considered discharge conditions



Model ***calibrated on Trebbia River*** *(R^2 0.71)*
and ***validated on Trebbia, Taro and Enza Rivers*** *(R^2 0.63)*

SIMSTREAM WEB

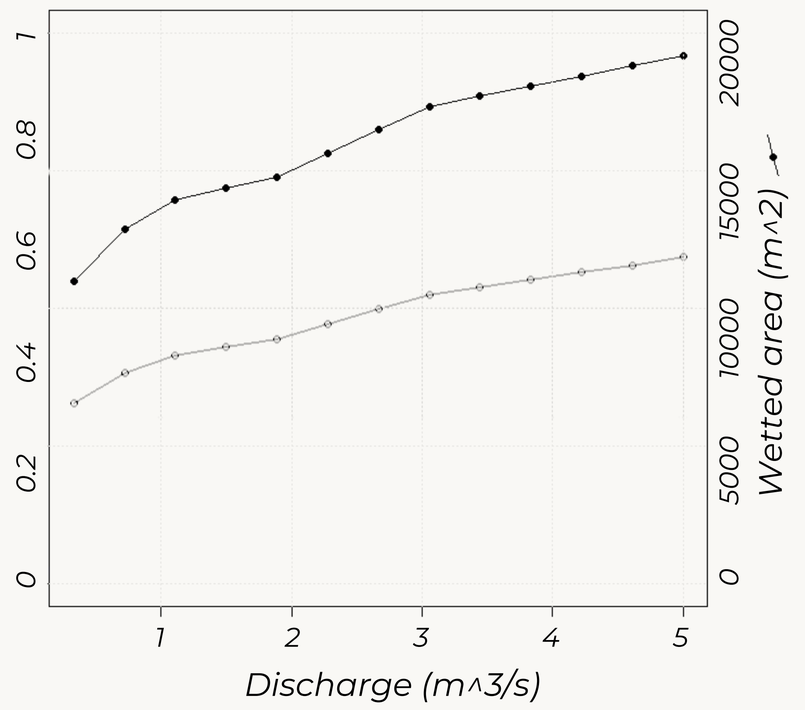


Fig.2 Result of the application of the model on the Enza River: Flow-T index and wetted area rating curve

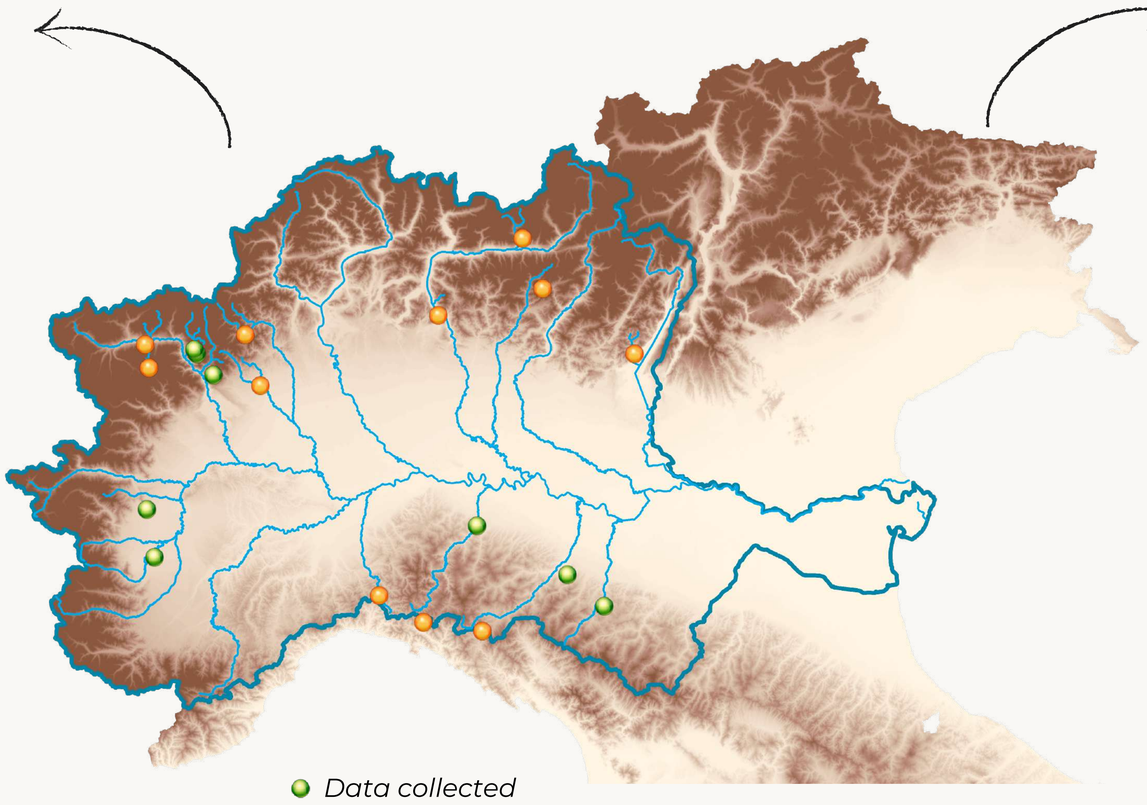
2.Model testing: data collection

Mobile mapping technique

MAPSTREAM

Fig.3 Scheme of hydromorphological data collection with a mobile mapping tehnique coupled with macroinvertebrate sampling

19 river sites *from theISPRA database*
of ***MesoHABSIM*** *applications*
Different morphologies and hydrological regimes



Photogrammetric surveys

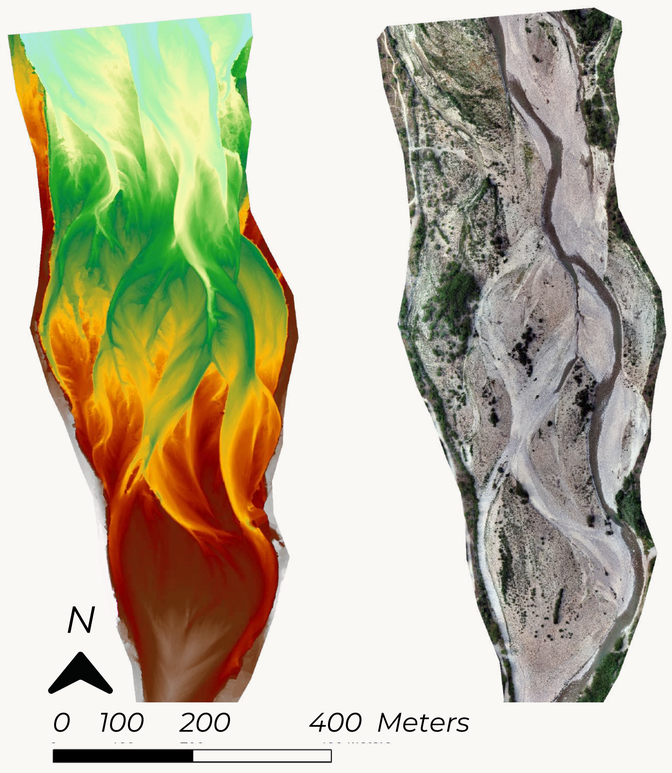
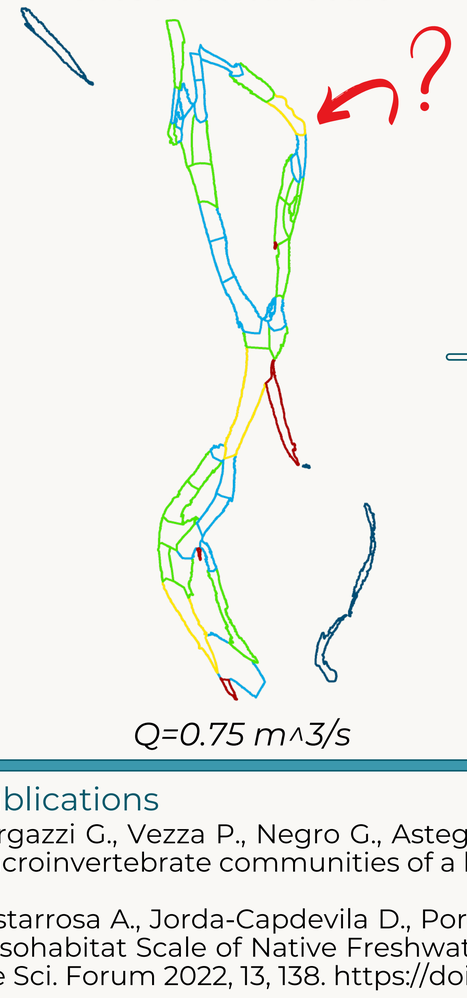


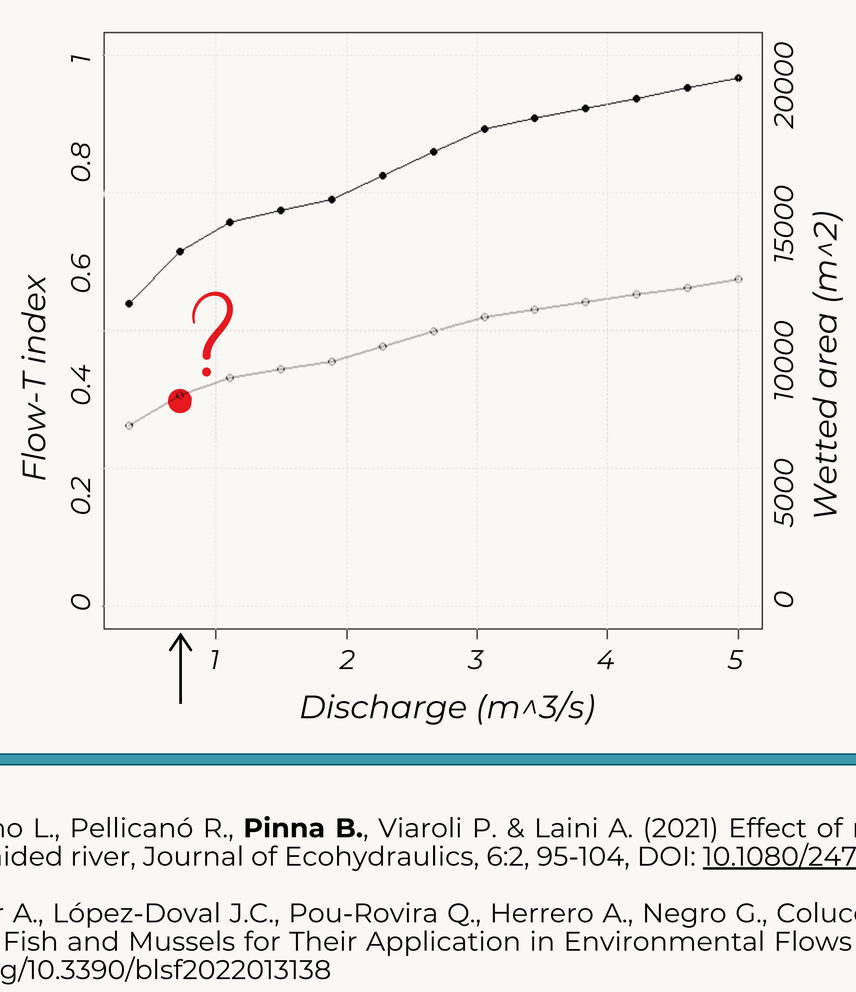
Fig.4 Digital Terrain Model and high resolution orthophoto resulting from photogrammetric survey in the Enza River (July 2023)

3.Future developments

Validation at the
mesohabitat scale



Validation at the
river reach scale



- *Generation of* ***Flow-T time series*** *from flow time series*
- *Statistical analysis of the series to quantify the lentification/lotification processes and the* ***alteration*** *from the reference natural conditions*
- *Definition of an* ***Habitat Integrity index*** *for the macroinvertebrate community and* ***e-flows*** *based on both fish and macroinvertebrates*

Publications

Burgazzi G., Vezza P., Negro G., Astegiano L., Pellicanó R., **Pinna B.**, Viaroli P. & Laini A. (2021) Effect of microhabitats, mesohabitats and spatial position on macroinvertebrate communities of a braided river, Journal of Ecohydraulics, 6:2, 95-104, DOI: 10.1080/24705357.2021.1938254

Costarrosa A., Jorda-Capdevila D., Porcar A., López-Doval J.C., Pou-Rovira Q., Herrero A., Negro G., Colucci R., **Pinna B.** & Vezza P. (2022) Suitability Models at Mesohabitat Scale of Native Freshwater Fish and Mussels for Their Application in Environmental Flows Assessment in the NE of the Iberian Peninsula. Biol. Life Sci. Forum 2022, 13, 138. https://doi.org/10.3390/blsf2022013138

PhD courses

Soft skills	100%
Hard skills	100%