



## Human Influence on River Systems: 150 years of river Morphodynamics change in Alpine water basins (Torino, Italy)

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Human interaction has always influenced the structure of watercourses, often resulting in changes that disrupt their morphological balance and the associated river habitats. In Europe, the earliest river reconfiguration efforts date back to Roman times. Since then, distinct stages of river management have emerged. The most significant alterations to waterways occurred during the 20th century, particularly after World War II, driven by industrial and urban growth.

This project aims to assess the anthropogenic impacts on river morphodynamics in three alpine water basins located northwest of Turin, Italy, focusing on the past 150 years, from the pre-industrial phase to the present.

Using a Geographic Information System (GIS)-based approach, the study investigates how human activities, such as urbanization, agriculture, and infrastructure development, have influenced the physical characteristics and behaviour of river systems. The methodology involves collecting spatial data from 1850 to 2022, digitizing it, and applying morphological indices to evaluate changes in river settings, shapes, and sediment transport. For the entire period, major changes in river morphodynamics were correlated with land use patterns. Statistical analyses were subsequently employed to assess variations in river morphology over time. This approach provides a robust framework for evaluating anthropogenic pressure on river morphodynamics.

The results reveal significant changes in river patterns, sediment transport, and habitat availability. Notably, a general narrowing of channels was observed, along with a transition in their layout from sinuous to straight and from braided to single-thread channel configurations.

By comparing the outputs of different indices with major land use changes in the territory, the study highlights the critical interplay between human development and riverine morphodynamics. These findings contribute to a deeper understanding of how human interventions reshape natural water systems, offering valuable insights for future environmental management and conservation strategies.