

The role of river trajectories and channel recovery potential within sustainable river management: some case studies from southern Italy

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Most of Italian and European rivers have undergone notable channel adjustments since the last 150-200 years. Major adjustments fall within the second half of the last century and consisted in overall channel narrowing and degradation, accompanied by important pattern changes.

In the cases of the six investigated rivers located in southern Italy (namely Trigno, Biferno, Fortore, Volturno, Sinni and Crati), major adjustments occurred from the 1950s to the end of the 1990s. They consisted in channel narrowing up to 98%, bed level lowering from -2 to -10m and extensive changes from multi-thread to single thread pattern that led to the abandonment of extensive channel areas and consistent increase of floodplain and terraced areas.

The integrated analysis of river trajectories and potential control factors, both of natural and anthropic origin, showed that human disturbances, especially gravel mining and river control works, are key driving factors of channel adjustments. Furthermore, the presence of major hydraulic structures along the rivers Biferno, Fortore, Sinni and Trigno significantly influenced the amounts of channel adjustments which are sharply higher within the reaches located downstream of such structures.

Considering the last 15-20 years, most of the evolutionary trajectories of the investigated reaches highlight ongoing channel stabilization or even some appreciable channel recovery. Particularly, channel widening had occurred in those reaches that are not under the direct influence of major hydraulic structures (check-dams and dams) and in which in-channel interventions had practically ceased and woody riparian vegetation developed only in a discontinuous manner. Conversely, the reaches that are located immediately downstream of major hydraulic structures, in which control works are placed very close to the actual riverbanks and/or a continuous riparian forest has developed, appear stable, only locally affected by very slight widening, or even affected by ongoing narrowing.

The assessment of evolutionary trajectories and current states of the study reaches coupled with the analysis of their connectivity at the reach to basin scale, has allowed to identify the reaches whose recovery potential and/or good ecological values maximizes the likelihood of success of future river restoration interventions. Nevertheless, as the study highlights, the widespread anthropization of river segments, including/connected to the study reaches, has to be taken in account. Therefore, any attempt to promote their natural dynamics and channel recovery, has to be accurately assessed in the framework of sustainable and risk-reduced river management according to implemented basin plans and other territorial constraints. Conversely, the obtained knowledge on the present status of river reaches and their potential near-future changes is fundamental in considering revising actual basin plans and/or programming monitoring activities.