

## EXECUTIVE SUMMARY

This document contains the results of the environmental and hydromorphological characterization of the river Cornia catchment and main course, with a deepening of the reach (about 17 km long) between Campetroso in Suvereto (Livorno) - upstream of the SR398 bridge and the confluence with the river Milia - and the bridge of the Tyrrhenian railway in Campiglia M.ma (Livorno). Based on the obtained outputs, the study - taking into account the boundary conditions imposed by land ownership along the river corridor too (not to be changed in the short term) - has identified some morphological restoration measures aimed primarily at enhancing groundwater recharge within the framework of LIFE REWAT project.

In this sense, a literature review about the ecological status of the water bodies included along Cornia river has been carried out, together with some additional field investigations carried out under the action C2 of REWAT project in relation to the application of the Fluvial Functioning Index (Indice di Funzionalità Fluviale, IFF) developed by Siligardi et al. (2007) and by the survey of main natural features of the investigated reach. The Ecological State is satisfactory (class "good") in the upstream water body, extended from the upper river section to the confluence with the Milia stream, and altered (class "moderate") in the water body downstream from the confluence with the Milia stream up to the Tyrrhenian railway bridge. The North's Apennines Water Management Plan identifies morphological modifications as a main environmental pressure along the whole river stretch. Only a 10% of the investigated stretch - between the confluence with the Milia stream and the SP 21 bridge - presents a fluvial functionality that could be considered satisfactory (class "good"), while the remaining part is somewhat impaired with almost continuous critical modifications in the downstream part.

With reference to the hydro-morphological characterization, a morphometric and physiographical framing of the Cornia catchment has been reported together with outputs of the application of Morphological Quality Index (Indice di Qualità Morfologica - IQM) developed by Rinaldi et al. (2016) to the entire course of the Cornia river from the upper section to the bridge of the Tyrrhenian railway in Campiglia M.ma (Livorno). The hydro-morphological condition of the investigated reach is altered mainly because of the dredging activity conducted intensively in different sections of the river from the end of World War II until the late '80s. The hydromorphological consequences of this modification is a IQM class "high" or "good" for about 19 kilometers from the upper section of Cornia river down till the confluence with Massera stream and "moderate" or "poor" for the remaining about 21 kilometers downstream till the Tyrrhenian railway bridge.

The restoration measures identified on the basis of the outputs of this research are aimed mainly to enhance the mobilization of sediments within the incised river channel. In this sense, an obsolete not-functioning weir removal has been identified as a possible intervention, together with some in situ mobilization of sediments long the river stretch.

This report was prepared by Studio Associato OIKOS and Studio ECOINGEGNO following the requirements suggested by the researchers of the Scuola Superiore Sant'Anna; the document was then reviewed by two anonymous reviewers, which we wish here to thank. The document was at the same time subject to review by the researchers of the Scuola Superiore Sant'Anna.