

	and production, SDG 13 Climate action, SDG 14 Life below water
Opportunities for participatory data collection	No opportunities identified
Additional information	
References	<p>European Parliament. (2000). <i>Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy</i>. http://data.europa.eu/eli/dir/2000/60/oj</p> <p>European Commission. (2012). <i>Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC). River Basin Management Plans</i>.</p>

4.59 Fluvial Functionality Index

Project Name: PHUSICOS (Grant Agreement no. 776681)

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Fluvial Functionality Index	Water Management
Description and justification	Indicators of Effects on Water Quality sub-criterion will assess the effects of project scenarios on water quality, in terms of physical, microbiological, biological and chemical parameters.
Definition	The main objective of the FFI (APAT, 2007) consists of the overview of the comprehensive state of the river environment and in the evaluation of its functionality, understood to be the result of synergy and integration of an important series of biotic and abiotic factors present in the water ecosystem and in the connected terrestrial one. Through the analysis of morphological, structural and biotic parameters of the ecosystem, interpreted following the principles of river ecology, the functions associated with it as well as the distances from the condition of greatest functionality, identified following a reference model, can be highlighted. The understanding of the environmental features allows the definition of a global index of functionality in terms of retention and cycling capacity of

	<p>the fine and coarse particulate organic matter (short FPOM and CPOM) (Elwood et al., 1983), of buffer potential of the riparian ecotones as well as of morphological structure.</p> <p>It is important to define what is considered as reference conditions or which the objectives of the evaluation are in order to specify which landscape changes merit a second evaluation.</p>
Strengths and weaknesses	<p>+ The FFI provides a rigorous but easy to use tool, to read and understand the functional relationships affecting river ecology, with the aim of recovering, as much as possible, that ratio of positive functionality between rivers, man and territory.</p> <p>-The FFI is an adaptation for Italian waters of the RCE index (Petersen, 1992). Although it is very well adapted for European water bodies, using the most reliable adaptation to specific regional water bodies is highly recommended.</p>
Measurement procedure and tool	<p>The degree of naturalness is determined through a card with 14 questions related to the same number of environmental parameters: 1) state of surroundings, 2) vegetation belt, 3) size and, 4) continuity of functional structures, 5) hydric conditions, 6) flooding efficiency, 7) riverbed substrate, 8) erosion, 9) transversal section, 10) fish fitness, 11) hydro-morphology, 12) riverbed vegetation, 13) detritus, and 14) microbenthic community. In order to apply the method, the operator should undertake an experimental campaign on the stream to be investigated, and must assign the scores on the basis of the observations required by the survey.</p> <p>Then the sum of these scores is carried out and a final result can be converted into a corresponding class quality and in the respective quality assessment. Some parameters must be evaluated separately for the two shores of the stream, and thus they may provide two different final judgments.</p> <p>It is recommended to perform the evaluation along a reach of 150 m per watercourse.</p>
Scale of measurement	<p>River basin.</p> <p>The FFI is translated in class quality.</p>
Data source	
Required data	Information about morphological, structural and biotic parameters of the ecosystem.
Data input type	Semi-quantitative
Data collection frequency	As many of the characteristics of the FFI are landscape dependent, there is no need to repeat the methodology

	with a constant frequency. However, it is important to specify both the reference conditions and the objectives of the evaluation in order to detect which landscape changes merit a second evaluation.
Level of expertise required	High
Synergies with other indicators	
Connection with SDGs	6
Opportunities for participatory data collection	
Additional information	
References	<p>APAT. (2007). IFF Indice di funzionalità fluviale 2007. Agenzia Nazionale per la Protezione dell'Ambiente e per i Servizi Tecnici. Roma. ISBN 978-88-448-0318-6.</p> <p>Elwood J.W., Newbold J.D., O'Neil R.V., Van Winkle W. (1980). <i>Resource spiralling: an operational paradigm for analysing lotic ecosystem</i>. In: Dynamics of lotic ecosystems, Fontaine T.D., S.M. Bartell eds., Ann Arbor, Michigan, USA, 3-27.</p> <p>Petersen, R.C. Jr. (1992). The RCE: A Riparian, Channel, and Environmental Inventory for small streams in the agricultural landscape. <i>Freshwater Biology</i>, 27, 295-306.</p>