

1 - METHOD BACKGROUND

NAME OR CODE	SIHM - Methodology for assessing hydromorphological status
COUNTRY	Slovenia
KEY REFERENCE	Tavzes & Urbanic (2009)
WEBPAGE	
CATEGORY	The method aims to assess the overall hydromorphological status (habitat quality and modification, hydrological modification and general hydromorphological status) and to link it with benthic invertebrate community characteristics. It has been developed/modified from RHS

2 - METHOD CHARACTERISTICS

A - SOURCE OF INFORMATION / DATA COLLECTION	Maps/Remote sensing Field survey Rapid field assessment Existing database Modelling	It uses Slovenian map of river catchments classes for the hydrological modification assessment Consistent with RHS Consistent with RHS Existing information on water quality (pollution) used to determine reference sites NOT APPLICABLE
B - SPATIAL SCALE	HIERARCHICAL SPATIAL SCALE River catchment/Water body/Reach/Cross Section LONGITUDINAL SPATIAL SCALE Fixed length Scaled to channel width Variable length LATERAL SPATIAL SCALE Channel Banks/Riparian zones Floodplain	Consistent with RHS Consistent with RHS NOT APPLICABLE NOT APPLICABLE Consistent with RHS Consistent with RHS Consistent with RHS
C - TEMPORAL SCALE	Physical and morphological assessment Hydrological assessment Characterization/classification	Consistent with RHS NOT APPLICABLE
D - TYPE OF METHOD	Assessment by index Deviation from reference General assessment / Design framework Modelling status / Scenario Final expert judgment Links with other systems	The feature inventorying is done by using the RHS protocol Several indices have been developed to be applied to data collected with the RHS protocol. MORPHO STATUS: River habitat quality index (RHQ); River habitat modification index (RHM). HYDRO STATUS: Hydrological modification index (HLM). HYMO STATUS: Hydromorphological modification index (HMM); Hydromorphological quality and modification index (HQM). A specific weight has been assigned to each morphological feature recorded in the survey, in order to consider not only their presence/absence/frequency but also their influence on benthic invertebrate communities. MORPHO STATUS: features are grouped in 7 main variables: 1) bank, 2) channel, 3) riparian, 4) land use within 50 m; 5) features of interest along 500 m, 6) bank modifications, 7) channel modifications. RHQ: calculated through variables 1 to 5. RHM: calculated with 6 and 7. HYDRO STATUS: HLM: calculated either for the main course and tributaries, considering catchment size's classes either for inflowing tributaries and river at confluence; the final index at site considers HLM for both (main channel and tributaries). HYMO STATUS: HMM: multimetric index, combination of weighted values of RHM and HLM. HQM: combination of weighted values of RHQ, RHM and HLM It uses reference conditions to normalize values of RHQ and RHM and to calculate HQM index The method makes a general assessment of hydromorphological status NOT APPLICABLE Expert judgment is used to weight values for features The method develops several indices, for the assessment of physical habitats status and for hymo status. Hymo status is obtained as a combination of indices (status = quality and modification)
E - REFERENCE CONDITIONS		Reference sites corresponds to sites where the sum of habitat modification scores (HMS) does not exceed 5 points and if they have been classified at least as good regarding water pollution; then, they are confirmed by comparison of RHQ values between reference and impaired sites
F - GENERAL INFORMATION	RIVER TYPOLOGY TYPOLOGY LIMITATIONS TYPE-SPECIFIC (Protocol / Assessment method) BASIS FOR STANDARDS / THRESHOLDS REACH SCALE SURVEY STRATEGY TIMING AND FREQUENCY DATA PRESENTATION (OUTPUT/LAYOUT) METHOD SUPPORT / APPLICATION TOOLS SPATIAL COMPARISON CONNECTION TO ECOLOGY USERS SCALE INFORMATION NUMBER OF END PARAMETERS	In Slovenia, in the hydro-ecoregion Alps (where the method has been tested and developed), 26 different national river types have been identified (using system B) ranging from small to medium and large rivers The method has been developed and applied to Slovenian river types of the hydro-ecoregion Alps Specific catchment size has been considered to evaluate the effect of major impoundment (length impoundment vs catchment size) The assigned weighting values have been chosen considering expert judgment or literature sources. Values have been determined considering if features increase/decrease habitat diversity and have a positive/negative effect on macrobenthos Consistent with RHS Consistent with RHS Description of features, index values The RHS manual; indications on how calculate indices It allows for comparison between considered river types The method in its phase of development has been tested on macrobenthos fauna. Features have been weighed to consider their influence on benthic invertebrate communities Consistent with RHS Consistent with RHS 33 assessment variables. 22 for RHQ: 8 bank features; 7 channel features; 4 riparian features; 1 features of land use within 50m; 2 features of special interest. 11 for RHM: 3 bank features modification; 8 features for channel modification

3. RECORDED FEATURES

A - CATCHMENT / VALLEY	LARGE SCALE CHARACTERISTICS	Consistent with RHS and info on catchment impoundment structures
	HYDROLOGICAL REGIME	For the survey of hydro properties the method considers the distance from the impoundment and the number of tributaries between the impoundment and the site
	VALLEY FORM / FEATURES	NOT APPLICABLE NOT APPLICABLE Same as RHS
B - CHANNEL	CHANNEL PATTERN / PLANFORM	Same as RHS
	CHANNEL FORMS	Same as RHS
	BED CONFIGURATION	Same as RHS
	CHANNEL DIMENSIONS	Same as RHS
	FLOW-TYPE	Same as RHS
	PHYSICAL / HYDRAULIC VARIABLES	NOT APPLICABLE
	SUBSTRATE	Same as RHS
	IN-CHANNEL VEGETATION	Same as RHS
	WOODY DEBRIS	Same as RHS
C - RIVER BANKS/ RIPARIAN ZONE	ARTIFICIAL FEATURES AND STRUCTURES	Same as RHS
	BANK PROFILE / SHAPE	Same as RHS
	BANK MATERIAL	Same as RHS
	RIPARIAN VEGETATION STRUCTURE	Same as RHS
	LONGITUDINAL CONTINUITY OF RIPARIAN VEGETATION	Same as RHS
	RIPARIAN VEGETATION WIDTH	Same as RHS
	VEGETATION COMPOSITION, COVERAGE AND OTHER RIPARIAN VEGETATION CHARACTERISTICS	Same as RHS
	ARTIFICIAL FEATURES AND STRUCTURES	Same as RHS
	LAND USE	Same as RHS
D - FLOODPLAIN	FLUVIAL FORMS	Same as RHS
	INFO ON FLOODPLAIN FEATURES	NOT APPLICABLE
	LAND USE	Same as RHS

4. RIVER PROCESSES

A - LONGITUDINAL CONTINUITY	Sediment and wood	Consistent with RHS
	Water flow	The method calculates a hydrological modification index at the catchment level (HLM)
B - LATERAL CONTINUITY	Lateral hydraulic continuity	Consistent with RHS
	Sediment (and wood) lateral continuity	Consistent with RHS
C - BANK EROSION / STABILITY		Consistent with RHS
E - CHANNEL ADJUSTMENTS	Planimetric (pattern & width)	NOT APPLICABLE
	Vertical	NOT APPLICABLE
F - VERTICAL CONTINUITY	Groundwater connection	Consistent with RHS + value assigned to artificial channel material (in the RHM)

5. APPLICATION TO WFD

OFFICIAL METHOD (WFD implementation) / COMMONLY USED METHOD (not compulsory)	The method has been developed to comply with WFD requirement. It is the national methodology
APPLICATION TO ALL WATER BODIES	It has been developed in Alpine hydro-ecoregion in Slovenia (26 river types), but it can be applied to all water bodies
USED IN THE CLASSIFICATION OF HIGH-STATUS / OTHER STATUS CLASSES	It can be used in the classification of any river status
USED TO PREDICT RISK OF DETERIORATION	It can be used to determine the risk of deterioration on macrobenthos
USED TO IDENTIFY IMPROVEMENT TARGETS	Potentially it could be used for this purpose on macrobenthos
USED TO HELP IDENTIFY CAUSE OF ECOLOGICAL IMPACTS	It has been used to determine the relationship between the hydromorphological status and the macrobenthos community
KEY STRENGTHS FOR RIVER MANAGEMENT	Assessment is calibrated to macrobenthos community; it assesses the overall hydromorphological state