1 - METHOD BACKGROUND			
NAME OR CODE			**Guidelines for assessing the hydromorphological status of running waters**
COUNTRY			Austria
KEY REFERENCE			Mühlmann (2010)
WEBPAGE			http://www.lebensministerium.at/wasser/wasser-oesterreich/plan_gewaesser_ngp/nationaler_gewaesserbewirtschaftungsplan-nlp/hymo_lf.html
CATEGORY			The aim is the overall hydromorphological assessment of rivers following the WFD requirements
2 - METHOD CHARACTERISTICS			
A - SOURCE OF INFORMATION / DATA COLLECTION		Maps/Remote sensing	A preliminary desk study based on existing GIS maps is used to identify the survey reach on the national network (each river having a catchment larger than 10 squared-km has been identified, indexed and reported in a national database - results of the hydromorphological survey method and assessment must be transferred into this national system). The method also uses available maps, aerial photos, and remote sensing techniques in the assessment procedure (photo-interpretation). The manual aids to select the best method to collect data (when use maps and remote sensing and/or when apply field analysis)
		Field survey	The field survey is used to complete the set of information already available from existing database
		Rapid field assessment	NOT AVAILABLE
		Existing database	Existing database represents the core of the data collection for the hymo assessment. Mainly, existent data on human structures must be collected before the survey (i.e. hydroelectric power plants, dams, etc.), as well as existing hydrological data
		Modelling	NOT APPLICABLE
B - SPATIAL SCALE	HIERACHICAL SPATIAL SCALE	River catchment/Water body/ Reach/Cross Section	The hydrographical network has been subdivided into reaches of 500 m length at the national scale (for catchment larger than 10 squared-km)
	LONGITUDINAL SPATIAL SCALE	Fixed length	The survey must be conducted on segments 500 m long (correspond to segments of the national network)
		Scaled to channel width	NOT APPLICABLE
		Variable length	NOT APPLICABLE
	LATERAL SPATIAL SCALE	Channel	Channel is assessed (morphological parameters)
		Banks/Riparian zones	Right and left banks are assessed together (morphological parameters). Riparian vegetation is assessed separately from banks (morphological parameters)
		Floodplain	NOT APPLICABLE
C - TEMPORAL SCALE		Physical and morphological assessment	It assesses the present state
		Hydrological assessment	
D - TYPE OF METHOD		Characterization/classification	The method aims to characterize hydromorphological conditions. 3 groups of parameters: hydrological parameters (intakes, hydro-peaking, impoundments), transversal structures for the assessment of continuity, morphological parameters (main parameters: planform/river course, bank dynamic, bed dynamic; secondary parameters: substrate composition, bed structure, riparian vegetation). Parameters are recorded through presence/absence criteria (e.g. fish passability); by measuring the proportion(%) of reach interested by the feature (e.g. intakes); by measuring them (e.g. water flow velocity); by describing them (e.g. transversal structures); qualitatively assessed in a 5-points class scale (only morphological parameters)
		Assessment by index	Morphological parameters (for channel and banks) are assessed in a 5-point scale from 1 (natural) to 5 (anthropogenic)
		Deviation from reference	NOT AVAILABLE
		General assessment / Design framework	NOT AVAILABLE
		Modelling status / Scenario	NOT AVAILABLE
		Final expert judgment	The expert opinion enters in the assessment procedure for example by integrating their judgment in the evaluation of the impact of intakes and water transfer
		Links with other systems	NOT AVAILABLE
E - REFERENCE CONDITIONS			The method does not refer directly to some reference condition, but considers only rivers where ecological status is classified as high; the high hydromorphological status is defined by the absence or negligible presence of human impacts
F - GENERAL INFORMATION	RIVER TYPOLOGY		Similar to Germany: 26 river types
	TYPOLOGY LIMITATIONS		NOT AVAILABLE
	TYPE-SPECIFIC (Protocol / Assessment method)		The method indicates that the use of aerial photos must be limited to large rivers; for small rivers it is suggested to collect field
	BASIS FOR STANDARDS / THRESHOLDS		The basis for thresholds are defined by the method/authors: thresholds are defined for morphological parameters (classes 1 to 5), as well as for the definition of the high and good hymo status as part of the assessment of ecological status
	REACH SCALE SURVEY STRATEGY		The overall reach or single point-transect are assessed, on the basis of the specific parameter of interest
	TIMING AND FREQUENCY		During low flow and not during vegetative seasons (from November to April)
	DATA PRESENTATION (OUTPUT/LAYOUT)		NOT AVAILABLE
	METHOD SUPPORT / APPLICATION TOOLS		Operational guidelines (manual); field forms
	SPATIAL COMPARISON		NOT AVAILABLE
	CONNECTION TO ECOLOGY		The connection to ecology is direct in the evaluation of the environmental flow (minimum water level and discharge) in fish habitats. The riparian vegetation is evaluated by taking into account the functions it provides to ecosystem (e.g. shading, source of food, buffering from pollutants, etc.)
	USERS		The method is used to support the assessment and monitoring of hydromorphological status in the definition of (high) ecological status for the implementation of the WFD
	SCALE INFORMATION		Reach scale information is mainly provided
	NUMBER OF END PARAMETERS		3 groups of parameters, organised into main and additional/sub-parameters and several indicators: hydrology (3 main parameters), morphology (2 main parameters, 4 additional parameters) and river continuity

3. RECORDED FEATURES			
A - CATCHMENT / VALLEY	LARGE SCALE CHARACTERISTICS		NOT APPLICABLE
	HYDROLOGICAL REGIME	Hydrological conditions	The method collects and assesses data on hydrological conditions in terms of hydrological regime alteration: intakes, hydro-peaking and impoundment
		Metrics of hydrological regime	Water level, water discharge, runoff characteristics; minimum water level and discharge (environmental flow)
		Hydro-peaking	It is collected/assessed as specific hydrological parameter (main parameter)
	VALLEY FORM / FEATURES		NOT APPLICABLE
B - CHANNEL	CHANNEL PATTERN / PLANFORM		E.g. straight, meandering, tortuous
	CHANNEL FORMS		E.g. gravel islands, gravel or fine sediment benches, vegetated islands and bars
	BED CONFIGURATION		E.g. bed structures (e.g. riffle/pool sequences)
	CHANNEL DIMENSIONS		NOT AVAILABLE
	FLOW-TYPE		NOT AVAILABLE
	PHYSICAL / HYDRAULIC VARIABLES		NOT AVAILABLE
	SUBSTRATE		Substrate composition (megalithal, macrolithal, mesolithal, microlithal, gravel, sand, mud)
	IN-CHANNEL VEGETATION		NOT AVAILABLE
	WOODY DEBRIS		Branches, trees, woody debris
	ARTIFICIAL FEATURES AND STRUCTURES		Water intakes, transfer, hydroelectric power-plants, impoundment; artificial substrate; transversal structures [structures for hydropower (e.g. weirs); structures for flood protection (e.g. dams); other structures for other human purposes (e.g. pipes); natural fall (> 1 m height); structures for riverbed stabilisation]
C - RIVER BANKS/ RIPARIAN ZONE	BANK PROFILE / SHAPE		Bank dynamics, bank profile
	BANK MATERIAL		Artificial substrate (e.g. concrete, riprap, wood obstruction, bioengineering / engineering and biological materials, groynes, dredging materials)
	RIPARIAN VEGETATION STRUCTURE		Vegetation structure (on banks and channel)
	LONGITUDINAL CONTINUITY OF RIPARIAN VEGETATION		Status of riparian vegetation is assessed for 500 m stretches in a 5-point scale from 1 (natural) to 5 (riparian vegetation missing)
	RIPARIAN VEGETATION WIDTH		NOT APPLICABLE
	VEGETATION COMPOSITION, COVERAGE AND OTHER RIPARIAN VEGETATION CHARACTERISTICS		It assesses the status of the riparian vegetation in relation to the service that it provides to ecosystems (e.g. food, shading, etc.) and river dynamic (e.g. preventing erosion, dead wood entry, etc.)
	ARTIFICIAL FEATURES AND STRUCTURES		Embankments; artificial substrate (e.g. concrete, riprap, wood obstruction, bioengineering / engineering and biological materials, groynes, dredging materials)
	LAND USE		NOT APPLICABLE
D - FLOODPLAIN	FLUVIAL FORMS		NOT APPLICABLE
	INFO ON FLOODPLAIN FEATURES		NOT APPLICABLE
	LAND USE		NOT APPLICABLE

4. RIVER PROCESSES		
A - LONGITUDINAL CONTINUITY	Sediment and wood	A specific group of parameters focuses on transverse structures affecting longitudinal continuity: structures for hydropower (e.g. weirs); structures for flood protection (e.g. dams); other structures for other human purposes (e.g. pipes); natural fall (> 1 m height); structures for riverbed stabilization. It defines how to assess the passability of those structures
	Water flow	
B - LATERAL CONTINUITY	Lateral hydraulic continuity	Indirectly assessed through the presence of artificial structures and the assessment of riparian vegetation conditions
	Sediment (and wood) lateral continuity	
C - BANK EROSION / STABILITY		Bank dynamics (is a main parameter); bank erosion
E - CHANNEL ADJUSTMENTS	Planimetric (pattern & width)	NOT APPLICABLE
	Vertical	NOT APPLICABLE
F - VERTICAL CONTINUITY	Groundwater connection	NOT APPLICABLE

5. APPLICATION TO WFD	
OFFICIAL METHOD (WFD implementation) / COMMONLY USED METHOD (not compulsory)	The method has been developed by the Federal Ministry of Agricolture, Forestry, Environment and Water Management in collaboration with the 9 Federal provinces (Bundesländern). The objective was to have a standard national method to assess the hydromorphology of rivers to support the assessment of ecological status, according to WFD. It is the official method for Austria
APPLICATION TO ALL WATER BODIES	It has been developed to apply to all water bodies in Austria
USED IN THE CLASSIFICATION OF HIGH-STATUS / OTHER STATUS CLASSES	It is used only for the classification of high status (as required by the WFD), and to assess hydromorphological conditions for rivers which can achieve the good ecological status
USED TO PREDICT RISK OF DETERIORATION	The hydromorphological assessment carried out by this method can be used to predict the risk of deterioration by human impacts on hydromorphology
USED TO IDENTIFY IMPROVEMENT TARGETS	The assessment can be used to identify improvement targets for the hydromorphological component of a river, as well as in those cases in which the good ecological status can be reached
USED TO HELP IDENTIFY CAUSE OF ECOLOGICAL IMPACTS	The method can be potentially used for this purpose given that it collects data and assesses impacts on hydromorphology linked to biological/ecological responses
KEY STRENGTHS FOR RIVER MANAGEMENT	It provides strong links to ecology; it uses a standard procedure (for Austrian territory). It complies with WDF requirements