1 - METHOD BACKGROUND			
NAME OR CODE			**Handboek HYMO**
COUNTRY			The Netherlands
KEY REFERENCE			Dam et al. (2007); http://www.scribd.com/doc/82615968/68/Literatuur
WEBPAGE			
CATEGORY			The method carries out an overall hydromorphological assessment (continuity, hydrological regime and morphological conditions) of river, lakes, canals and coastal areas
2 - METHOD CHARACTERISTICS			
A - SOURCE OF INFORMATION / DATA COLLECTION		Maps/Remote sensing	Existing maps and GIS technique are the basic support of the method. Topographic, geomorphological and soil maps (e.g. for the localisation of barriers, to determine channel pattern, land use, etc.); recent groundwater maps and interpolation of topographic maps; use of historical maps to compare the present state (pattern, bank erosion)
		Field survey	The field measurement method is not standard, but depends upon each assessed parameter, e.g.: inventory of barriers to river continuity (weir, dam, etc.); discharge measurement; cross section measurement or profile description. It also uses feature inventorying collected with LAWA method, and several field descriptions (for morphological conditions)
		Rapid field assessment	NOT APPLICABLE
		Existing database	Info on effects of barriers on river continuity; measures at gauged stations; info on groundwater conditions/measures; use of historical cross section, etc.
		Modelling	Modelling/calculation of water level and discharge and other hydro parameters if there is a gauged station
B - SPATIAL SCALE	HIERACHICAL SPATIAL SCALE	River catchment/Water body/ Reach/Cross Section	The method provides info either at the overall water body scale and at the local scale (hydro data); it collects also info at the watershed scale (impacts on the drainage network)
	LONGITUDINAL SPATIAL SCALE	Fixed length	Cross profile is suggested at each 200 m; data from LAWA inventory at each 50 0m
		Scaled to channel width	NOT APPLICABLE
		Variable length	In principle all the water body is assessed; hydrological regime data are assessed at specific sites (where data are available) and in relation to the specific measurement (at least one station in the water body)
	LATERAL SPATIAL SCALE	Channel	Info are collected using maps, databases, historical information and LAWA inventory method and for the entire water body
		Banks/Riparian zones	Processes of bank retreat/deposition assessed using maps, databases, historical information, photos and LAWA inventory method. Info are collected for the entire water body. Land use at 20 m from the banktop (5 m for small rivers)
		Floodplain	Assessed using aerial photos + field survey and existing ecotope maps. For undyked rivers/streams: the area at 100 years of return period is considered. For unclear boundary = buffer of 100 m
C - TEMPORAL SCALE		Physical and morphological assessment	The method mainly assesses the current state; it also considers channel pattern changes from an historical reference state, as well as width pattern (erosion)
		Hydrological assessment	Specific temporal scale information to collect hydro data is given for each river types (and in relation to the type of measure)
D - TYPE OF METHOD		Characterization/classification	NOT APPLICABLE
		Assessment by index	NOT APPLICABLE
		Deviation from reference	Only few parameters are assessed in relation to a reference state (e.g. river pattern)
		General assessment / Design framework	The method aims to give an overall assessment of hymo conditions. Each parameter is assessed individually at the water body scale and in several ways: descriptive, as percentage, quality classes. A quality class is finally assigned at each parameter. For parameters which need an individual feature assessment (e.g. barrier for river continuity), each feature is assessed individually and then the worst class is assigned to the water body. In general, 5 point quality classes are used (organised in 3 or 5 level classes); class attribution is made by experts
		Modelling status / Scenario	NOT APPLICABLE
		Final expert judgment	The judgment of experts enters every time in the evaluation process, to assign each parameter to the relative class
		Links with other systems	It is a single system, but it uses data from LAWA (e.g. during cross section measurement, and for channel and banks assessment)
E - REFERENCE CONDITIONS			Experts judgement if a river is in a bad or good state. Not explicit reference to reference conditions, except for: river pattern to which a reference is determined by water authorities and corresponds to a historical state; naturalness of substrate composition is also assessed compared to a reference (but it is an additional parameter)
F - GENERAL INFORMATION	RIVER TYPOLOGY		Rivers are divided into typologies according to the WFD
	TYPOLOGY LIMITATIONS		Apparently the method could not assess rivers with multi-channel pattern, as well as temporal and ephemeral streams
	TYPE-SPECIFIC (Protocol / Assessment method)		The method indicates specific hydrological protocol/measures in relation to river type (e.g. rivers with or without tidal variation influence; rivers with or without strong annual climatic variation). The method applies different measurements in large and small rivers (e.g. cross profile measurements)
	BASIS FOR STANDARDS / THRESHOLDS		The method uses a 5 classes scoring system: 1=very good (reference); 2=good; 3=moderate; 4=poor; 5=bad. The scoring system is based on an expert form: expert gives an explanation for the score given for each parameter. Standardised tables with general scoring guidelines are added, but experts may opt to score differently based on their own expert judgement
	REACH SCALE SURVEY STRATEGY		Reach scale survey strategy is given only for cross section profile measurement
	TIMING AND FREQUENCY		Frequency of survey is given for each parameters (e.g. river continuity each 6 years). Apparently the method is time-consuming
	DATA PRESENTATION (OUTPUT/LAYOUT)		Parameters are presented in quality classes and colour-based maps could be easily produced
	METHOD SUPPORT / APPLICATION TOOLS		The manual gives detailed explanation on parameter measurement and scoring (standardised tables with general scoring guidelines), as well as photos which represent features
	SPATIAL COMPARISON		The system allows for comparison of scores for each parameter between different sites and water bodies
	CONNECTION TO ECOLOGY		It gives indication on the biological components that are influenced by a specific parameter (e.g. for barrier to sediments ---> alteration to normal grain size sorting from upstream to downstream, and consequently effect on macrofauna and macrophytes). The method assesses the continuity for fish communities, as well as barrier passability for target species. The method links the cross section naturalness (asymmetrical and diverse) to high habitat diversity (for fauna and vegetation)

	USERS		The manual is written for water managers and other specialists like hydrologists, ecologists, surveyors and G.I.S.-specialists. In any case, the method needs expert judgment to classify quality parameters
	SCALE INFORMATION		The method provides information mainly at the large scale of the overall water body
	NUMBER OF END PARAMETERS		The 18 parameters are grouped into 6 sub-elements (barrier assessment (relevance and passability), water flow (quantity and dynamics), groundwater interaction, depth and width variations, structure and substrate of the river bed, structure of the riparian (and floodplain) zone, which refer to the 3 main quality elements (WFD). Some parameter is subdivided into sub-parameters for a total of 22 (e.g. barrier relevance is calculated for sediment and fish separately)
3. RECORDED FEATURES			
A - CATCHMENT / VALLEY	LARGE SCALE CHARACTERISTICS		Degree of naturalness of the drainage pattern due to intervention at the watershed level (upstream; trans-boundary parameters)
	HYDROLOGICAL REGIME	Hydrological conditions	Water level, discharge, water flow velocity, degree of runoff, natural drainage pattern, tidal characteristics. For rivers with tidal influence: existence of double flow direction, difference between high and low water, relationship between surface volume and tidal volume
		Metrics of hydrological regime	Long-term trend to identify drought, subsidence; water level, discharge annual fluctuations; tidal fluctuations (mean daily value); highest/lowest water level; fluctuation in water velocity
		Hydro-peaking	NOT AVAILABLE
	VALLEY FORM / FEATURES		Groundwater conditions at the valley and floodplain scale
B - CHANNEL	CHANNEL PATTERN / PLANFORM		River pattern (degree of sinuosity, braiding pattern); Possibility of natural meandering
	CHANNEL FORMS		NOT APPLICABLE
	BED CONFIGURATION		NOT APPLICABLE
	CHANNEL DIMENSIONS		Depth and width variations (cross section and degree of naturalness)
	FLOW-TYPE		NOT APPLICABLE
	PHYSICAL / HYDRAULIC VARIABLES		Flow velocity and hydrological parameters
	SUBSTRATE		Degree of naturalness of bed substrate composition (compared to reference)
	IN-CHANNEL VEGETATION		NOT APPLICABLE
	WOODY DEBRIS		Fallen trees are considered as Erosion/sedimentation structures
	ARTIFICIAL FEATURES AND STRUCTURES		Presence of artificial bed structures (concrete, soil cribs, solid layers, etc.); sediment and fish continuity barriers: locks, weirs, dams and storm surge, traps, sand trap (determined also during cross profile)
C - RIVER BANKS/ RIPARIAN ZONE	BANK PROFILE / SHAPE		Cross section and degree of naturalness; Erosion/sedimentation structures - location and size, as well as judgment (sand and gravel banks, swallowing, steep edges, fallen trees)
	BANK MATERIAL		NOT APPLICABLE
	RIPARIAN VEGETATION STRUCTURE		NOT APPLICABLE
	LONGITUDINAL CONTINUITY OF RIPARIAN VEGETATION		NOT APPLICABLE
	RIPARIAN VEGETATION WIDTH		NOT APPLICABLE (but in part from banktop land use)
	VEGETATION COMPOSITION, COVERAGE AND OTHER RIPARIAN VEGETATION CHARACTERISTICS		Info on natural land use on banktop (coniferous, deciduous)
	ARTIFICIAL FEATURES AND STRUCTURES		Cross section and degree of naturalness; presence and inventory (% of bank length) of bank protection structure (groynes, rip-rap for bank protection, timber piling, quay walls, willow, etc.), determined also during cross profile
	LAND USE		Bank land use (descriptive; 20 m from the banktop and 5 m for small rivers) using photos, field survey and existing ecotope maps
D - FLOODPLAIN	FLUVIAL FORMS		Degree of natural inundation
	INFO ON FLOODPLAIN FEATURES		Possibility of natural meandering
	LAND USE		Floodplain/valley land use: cultivated fields, pasture production, production forest, natural forest, ruderal, reed beds, roads (% land use in classes)
4. RIVER PROCESSES			
A - LONGITUDINAL CONTINUITY		Sediment and wood	Presence of barrier for sediment (Number, location and relevance of barriers). It is assessed qualitatively
		Water flow	Presence of barrier for fishes (Number, location and relevance) and barrier passability/accessibility for target species. Both are assessed qualitatively. Degree of runoff (qualitatively assessed, or by calculating the length affected by barrier/total length and then assigning classes)
B - LATERAL CONTINUITY		Lateral hydraulic continuity	Degree of natural inundation: obtained from historical maps, photos and info and land use; calculated as the percentage of length of the water body that is influenced by dams, dikes and embankments parallel to the axis of the river (and then divided in classes)
		Sediment (and wood) lateral continuity	NOT APPLICABLE
C - BANK EROSION / STABILITY			From the cross section naturalness and the presence of bank protection structures; Erosion/sedimentation structures
E - CHANNEL ADJUSTMENTS		Planimetric (pattern & width)	Assessment of lateral channel erosion/sedimentation using historical data/map/photos; assessment of pattern change; descriptive assessment (and then classes) of possibility of natural (free) meandering in the floodplain
		Vertical	NOT APPLICABLE
F - VERTICAL CONTINUITY		Groundwater connection	Groundwater level conditions (amongst hydrological regime parameters)
5. APPLICATION TO WFD			
OFFICIAL METHOD (WFD implementation) / COMMONLY USED METHOD (not compulsory)			The method indicates how to perform monitoring and analysis of the hydromorphological conditions trough a set of hydromorphological parameters that are primarily based on the European hydromorphological quality elements (Continuity, Hydro regime, morphological conditions) and uses a 5 points quality classes system
APPLICATION TO ALL WATER BODIES			The method applies to all water types and water bodies at least in The Netherlands
USED IN THE CLASSIFICATION OF HIGH-STATUS / OTHER STATUS CLASSES			It can be used in the classification of any status class
USED TO PREDICT RISK OF DETERIORATION			The method indicates intervals between each measurement (for each parameter), therefore it could be used for this purpose
USED TO IDENTIFY IMPROVEMENT TARGETS			NOT APPLICABLE
USED TO HELP IDENTIFY CAUSE OF ECOLOGICAL IMPACTS			It could be used for this purpose given that it indicates, for each parameter, its relation to biological components
KEY STRENGTHS FOR RIVER MANAGEMENT			It has been explicitly developed for water managers. The manual explains in detail how monitoring and analysis of the hydromorphological conditions could be carried out. It could be applied to all river types in The Netherlands