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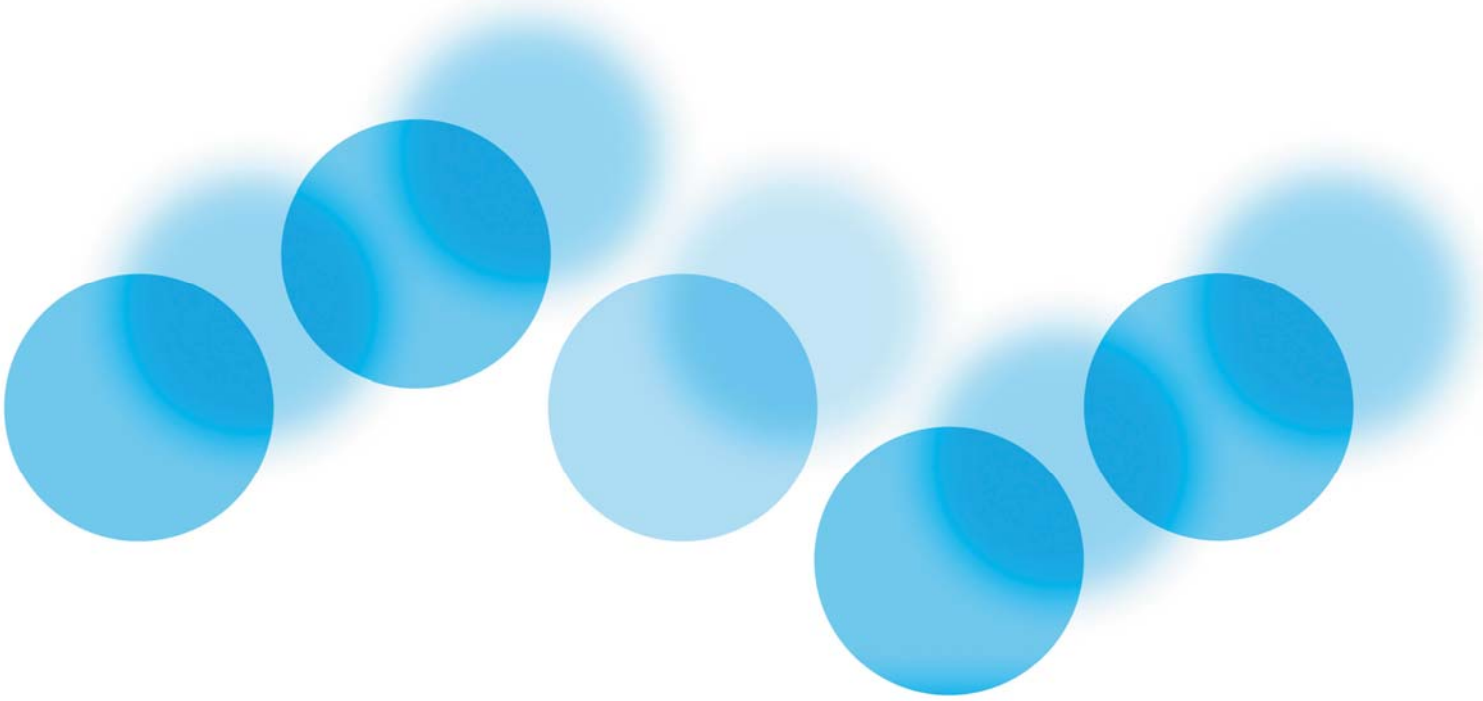
RIVER BASIN MANAGEMENT TOOLS: RIVER TYPOLOGIES

HARMONISATION OF DRB TYPOLOGIES



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ABBREVIATIONS

DRB	Danube River Basin
DRBD	Danube River Basin District
EU WFD	EU Water Framework Directive
sil	siliceous
cal	calcareous
org	organic
tq Sed	tertiary and quaternary sediments

EXECUTIVE SUMMARY

In the countries of the Danube River Basin District (DRBD) different stream typologies have independently been developed for the implementation of the EU Water Framework Directive (EU WFD). The development of the typology systems as well as the attribution of water courses to stream types followed the national needs within the scope of interpreting the EU WFD specifications.

In order to prepare a stream type map of an international river basin, a synopsis of all relevant national stream types is in demand. The high number of national types requires harmonisation efforts to reduce the total number of stream types. Similar types defined by several countries need to be identified and duplicate denominations have to be deleted. Harmonisation of national stream typologies also plays an essential role in analogous mapping of the DRBD.

In this study stream types at rivers of the DRBD with catchment areas >4,000 km^2 were considered. The harmonisation of 157 national stream types resulted in a total number of 72 international stream types.

Due to missing data the ecoregions 6 Hellenic Western Balkan and 7 Eastern Balkan could not be integrated in the analysis.

In summary, the particular ecoregions cover: Alps – 14 types, Dinaric Western Balkan - 7 types, Central Highlands – 9 types, The Carpathians - 12 types, Hungarian Lowlands - 13 types, Pontic Province - 10 types und Eastern Plains - 5 types. Furthermore, 2 stream types were specified as "ecoregion independent types" that can occur in different ecoregions ("azonal types").

In Ecoregion 11 Hungarian Lowlands the harmonisation of stream types reduced the number of types by one-third. Number of types in ecoregions 4 Alps, 5 Dinaric Western Balkan und 10 The Carpathians were approximately halved.

1. INTRODUCTION

In the countries of the Danube River Basin District (DRBD) different stream typologies have independently been developed for the implementation of the EU Water Framework Directive (EU WFD). The development of the typology systems as well as the attribution of water courses to stream types followed the national needs within the scope of interpreting the EU WFD specifications.

In order to prepare a stream type map of an international river basin, a synopsis of all relevant national stream types is in demand. The high number of national types requires harmonisation efforts to reduce the total number of stream types. Similar types defined by several countries need to be identified and duplicate denominations have to be deleted. Harmonisation of national stream typologies also plays an essential role in analogous mapping of the DRBD.

Hence, a table of the national stream types is to be prepared as a synopsis of the national typology systems, called "Table of Harmonisation".

The "Table of Harmonisation"

- sets fundamentals for a basin-wide stream type map,
- creates common basis for communication,
- facilitates transboundary monitoring issues,
- defines common types as basis for intercalibration.

The "Table of Harmonisation" covers all stream types at rivers in the Danube River Basin with >4,000 km^2 catchment area. This also includes stream types <4,000 km^2 located at the upstream courses of these rivers. The Danube river and its section types are not considered in this study.

Data on the latest versions of the national typologies were collected and analysed with regard to commonalities and differences. Most relevant for the typology comparison were the obligatory parameters of the system A of the WFD (ecoregion, size, altitude, geology) and several optional parameters of the system B, that were used in a comparable way in the national typology systems e.g. sub-ecoregions and mean substrate.

2. BRIEF OVERVIEW OF NATIONAL STREAM TYPOLOGIES

For the harmonisation of national stream types at relevant rivers 13 countries provided most recent information about stream typologies and descriptions of individual stream types (see **Table 1**).

Data from Ukraine only covered the Tisza river. Moldavian information was confined to descriptions of national types at the Prut river.

Table 1 Overview of typology data delivered by individual countries

Country	System A parameter	System B parameter and further information
Germany	x	x
Austria	x	x
Czech Republic	x	x
Slovakia	x	x
Hungary	x	x
Croatia	x	x
Slovenia	x	x
Bosnia i Herzegovina	x	x
Serbia and Montenegro**	x	x
Romania	x	x
Bulgaria	x	x
Moldova*	x	x
Ukraine*	x	x

* incomplete information

** no information about ecoregions (see chapter 2.1)

2.1. Ecoregions

The Danube River Basin District covers nine ecoregions or parts thereof (see **Table 2**). Some countries have shares of several ecoregions, e.g. Austria and Serbia and Montenegro have parts of five ecoregions on its territory in the DRBD. Ecoregion 11 (Hungarian Lowlands) has an importance due to its location in the middle of the basin. Nine DRB countries have territories in this ecoregion (see **Table 2**).

Table 2 Ecoregions in the Danube River Basin

Ecoregion	Countries with territories in the DRB
4 – Alps	Germany, Austria, Slovenia, Italy, Switzerland
5 – Dinaric Western Balkan	Austria, Slovenia, Croatia, Bosnia i Herzegovina, Serbia and Montenegro, Albania
6 – Hellenic Western Balkan	Serbia and Montenegro, Albania, Macedonia
7 – Eastern Balkan	Serbia and Montenegro, Macedonia
9 – Central Highlands	Germany, Austria, Czech Republic
10 – The Carpathians	Austria, Czech Republic, Slovak Republic, Poland, Serbia and Montenegro, Romania
11 – Hungarian Lowlands	Austria, Czech Republic, Slovak Republic, Slovenia, Hungary, Croatia, Bosnia i Herzegovina, Serbia and Montenegro, Romania
12 – Pontic Province	Romania, Bulgaria, Moldova, Ukraine
16 – Eastern Plains	Romania, Moldova, Ukraine

All national typology included ecoregional data to delineate stream types except for Serbia and Montenegro. According to statements of national experts (M. Paunovic, email notice), the scale on which ecoregion borders are generally defined is too large. In Serbia more precise maps are required to include information on ecoregions in the national stream typology.

2.2. Stream Types

All countries in the Danube River Basin District applied System B according to Annex II of the EU WFD. Besides System A parameters (altitude, catchment size, geology) additional information about climatic, hydrological, morphological or biocoenotic characteristics was available (see **Table 3**). These data partly covered typological factors of System B.

Countries adopted class boundaries of System A parameters following national requirements: For instance, Austria and Slovak Republic included an additional altitude class for watercourses higher than 1500 metres. Hungary established overlapping class boundaries of catchment area in order to account for continuous changes in nature that do not stop at fixed borders. Serbia and Montenegro defined an additional catchment area boundary at 4000 km²; Slovenia at 2500 km². Slovak Republic and Bulgaria introduced the class of "mixed" geology.

Table 3 Additional parameters used in national stream typologies

Parameter	Countries
Mean water slope	Germany, Slovakia, Bosnia i Herzegovina, Romania, Moldova
Mean substratum composition	Germany, Hungary, Bosnia i Herzegovina, Serbia and Montenegro, Romania, Bulgaria, Moldova, Ukraine
River discharge	Slovakia, Bosnia i Herzegovina, Moldova
Valley shape	Germany, Czech Republic, Bosnia i Herzegovina, Moldova
Channel form	Germany, Slovakia, Bosnia i Herzegovina, Moldova
Hydrology / water flow	Germany, Slovenia, Bulgaria, Bosnia i Herzegovina, Moldova
Saprobiological Basic Condition	Germany, Austria
Precipitation [mm p.a.]	Romania
Temperature [°C]	Romania
Fish Zonation	Romania

Most of the countries used data on mean substratum composition, mean water slope or valley shape to characterise their national stream types more precisely. Croatia classified the mean annual river flow [m^3/s] in its national typology. Slovenia added information about lake outflow influence and linmocrene spring influence to the parameter "hydrology/water flow". The Romanian river types were defined regarding precipitation [mm p.a.] and temperature [°C] amongst other parameters.

3. METHODOLOGY AND BASE DATA

3.1. Basic Considerations

- Objective: Harmonisation of all river types of the Danube River Basin located at rivers with >4,000 km^2 catchment area excluding the Danube River (see **Annex 1**)
- Descriptions of stream types differed among countries and available data on national typologies was heterogeneous. Therefore, only System A parameters (ecoregion, altitude, catchment area, geology) and respective parameter classes according to Annex II of the EU WFD as the "least common denominator" were used in the harmonisation exercise.
- In a first step, stream types were aggregated according to ecoregion, followed by altitude, catchment size and geology.
- Stream types of Serbia and Montenegro could not be assigned to ecoregions and thus were not considered in the harmonisation.
- If parameter values of System A corresponded among national types, these types were merged. Therefore, Austrian types of various saprobiological basic conditions or Hungarian types with different channel substrate were subsumed. Although altitude was further divided within several national typologies, altitude classes of System A were used in the harmonisation. Stream types covering different hydrological regimes were also aggregated, e.g. for the Bulgarian typology.

3.2. Steps of Work

To develop a "Table of Harmonisation" for the stream types in the Danube River Basin the following steps were performed:

1. **Request for updating information on types of rivers relevant in the basin wide overview**

   To ask for data about the latest version of national typologies, a template was established and circulated. Countries were requested to note down as much additional information as possible - also available data on types that were not used to officially describe the types (For example, information on channel form is not used as a System B parameter in Germany. But to establish the national typology, information about that parameter was very useful).

   Requested general information, obligatory factors of System A and further optional factors of System B were:

   - Code/abbreviation of stream type (with country code)
   - Name of stream type (English)
   - Name of stream type (national)
   - Ecoregion
   - Altitude
   - Catchment size
   - Geology (dominant type)
   - Sub-ecoregion/bioregion

- Mean water slope
- Mean substratum composition (megalithal >40 cm; macrolithal 20 to 40 cm; mesolithal 6 to 20 cm; microlithal 2 to 6cm; akal 0.2 to 2 cm; sand and mud; silt, loam and clay)
- River discharge (e.g. <10 l/s; 10 to 300 l/s; 300 to 1,000 l/s; 1,000 to 10,000 l/s; >10,000 l/s)
- Valley shape (canyon; V-shaped valley; meander valley; U-shaped valley; trough; plain floodplain)
- Channel form (meandering; braided; anabranching; sinuate; ...)
- Hydrology / water flow (permanent, temporary, backwater, lake outflow influence, limnocrene springs influence…)
- Other parameters

2. **Preparation of an overview of all national stream types of the Danube River Basin including type specific descriptions** (national code, name, ecoregion, altitude, catchment area, geology, mean substrate composition etc.) (see **Annex 2**)

3. **Selection of data relevant for the "Table of Harmonisation"**

   Data analysis including selection and validation of criteria for the aggregation of national types: Since descriptions of stream types differed among countries and available data on national typologies was heterogeneous, only System A parameters (ecoregion, altitude, catchment area, geology) and respective parameter classes according to Annex II of the EU WFD as the "least common denominator" were used in the harmonisation exercise.

4. **Merging of national stream types within the same ecoregion based on descriptions of the abiotic conditions = Compilation of "Table of Harmonisation" for all national types in the DRB**

5. **Design of a new trans-national stream type code for the DRB**

   For the harmonised stream types a "Danube River Basin type code" has been developed. The Code is composed of a number combination, e.g. 1000[1)]_12[2)]_3[3)]:

   [1)] 1000: for all stream types in the Danube River Basin according to the „RiverBasinDistrictCode" of the WFD-Code list

   [2)] number of the ecoregion; "99" was assigned to the "ecosystem independent types"

   [3)] consecutive number

4. "TABLE OF HARMONISATION" – COMPARATIVE TABLES OF NATIONAL STREAM TYPES IN THE DRBD

Within the harmonisation exercise the total number of 157 national stream types at rivers of the DRBD with catchment areas >4,000 km^2 were combined to 72 harmonised DRB-types (see **Table 5**). In Table 5 the aggregated stream types are marked by a blue frame.

Due to missing data the ecoregions 6 Hellenic Western Balkan and 7 Eastern Balkan could not be integrated in the analysis.

In summary, the particular ecoregions cover: Alps – 14 types, Dinaric Western Balkan - 7 types, Central Highlands – 9 types, The Carpathians - 12 types, Hungarian Lowlands - 13 types, Pontic Province - 10 types und Eastern Plains - 5 types (see **Table 4**). Furthermore, 2 stream types were specified as "ecoregion independent types" that can occur in different ecoregions ("azonal types").

In Ecoregion 11 Hungarian Lowlands the harmonisation of stream types reduced the number of types by one-third. Number of types in ecoregions 4 Alps, 5 Dinaric Western Balkan und 10 The Carpathians was more than halved.

Table 4 Overview of the number of national and harmonised DRB types

Ecoregion	Countries with types at relevant rivers	No. of national types	No. of harmonised types
4 Alps	Germany, Austria, Slovenia	32	14
5 Dinaric Western Balkan	Slovenia, Croatia, Bosnia i Herzegovina, Serbia and Montenegro**	20	7
6 Hellenic Western Balkan	Serbia and Montenegro**	--	--
7 Eastern Balkan	Serbia and Montenegro**	--	--
9 Central Highlands	Germany, Austria, Czech Republic	17	9
10 The Carpathians	Czech Republic, Slovak Republic, Serbia and Montenegro**, Romania	25	12
11 Hungarian Lowlands	Austria, Czech Republic, Slovak Republic, Hungary, Slovenia, Bosnia i Herzegovina, Serbia and Montenegro**, Ukraine*, Romania	40	13
12 Pontic Province	Romania, Bulgaria, Moldova*, Ukraine*	14	10
16 Eastern Plains	Romania, Moldova*, Ukraine*	7	5
Ecoregion independent	Germany, Romania	2	2

* incomplete information

** no information about ecoregions

Table 5 Synopsis of national stream types in the Danube River Basin, sorted by ecoregion. Types aggregated to a DRB-type are marked by a blue frame.

Ecoregion 4 Alps		
DRB-Type		National Types
1000_4_1	DE	Type 1.1: Small alpine streams 800 m 10-100 km² calcareous
	AT	KH_Type b-1,25: Limestone Alps 800-1,600 m 10-100 km² calcareous
	AT	KH_Type b-1,25: Limestone Alps >1,600 m 10-100 km² calcareous
	SI	SI_4_KB-AL-D_1_LI: Small rivers of Carbonate Alps-Danube river basin with a limnocrene spring influence >800 m 10-100 km² calcareous
1000_4_2	AT	UZA_Type b-1,25: Non-glaciated Crystalline Alps >1,600 m 10-100 km² siliceous
	AT	UZA_Type c-1,50: Non-glaciated Crystalline Alps 800-1,600 m 10-100 km² siliceous
1000_4_3	DE	Type 1.2: Mid-sized alpine streams >800 m 100-1,000 km² calcareous
	AT	KH_Type c-1,50: Limestone Alps 800-1,600 m 100-1,000 km² calacareous
1000_4_4	AT	UZA_Type c-1,50: Non-glaciated Crystalline Alps 800-1,600 m 100-1,000 km² siliceous
1000_4_5	DE	Typ 4: Large rivers in the alpine foothills >800 m 1,000-10,000 km² calcareous
	AT	KH_Type c-1,50: Limestone Alps 800-1,600 m 1,000-10,000 km² calacareous
	AT	ST_Large Rivers_Alpine River_Type d-1,75: Mur, Drau, Salzach, Inn 800-1,600 m 1,000-10,000 km²

Ecoregion 4 Alps		
DRB-Type		National Types
1000_4_6	AT	UZA_Type c-1,50: Non-glaciated Crystalline Alps 800-1,600 m 1,000-10,000 km² siliceous
1000_4_7	SI	SI_4_KB-AL-D_1_KI: Small rivers of Carbonate Alps-Danube river basin with a karst spring influence >400 m 10-100 km²
1000_4_8	AT	BR_type c-1,50: Ridges and Foothills of the Crystalline Alps 200-500 m 10-100 km² siliceous
	AT	BR_type c-1,50: Ridges and Foothills of the Crystalline Alps 500-800 m 10-100 km² siliceous
	AT	BR_type d-1,75: Ridges and Foothills of the Crystalline Alps 200-500 m 10-100 km² siliceous
1000_4_9	AT	UZA_Type c-1,50: Non-glaciated Crystalline Alps 500-800 m 100-1,000 km² siliceous
	AT	BR_type c-1,50: Ridges and Foothills of the Crystalline Alps 200-500 m 100-1,000 km² siliceous
	AT	BR_type c-1,50: Ridges and Foothills of the Crystalline Alps 500-800 m 100-1,000 km² siliceous
1000_4_10	AT	KV_Type d-1,75: Limestone Foothills 500-800 m 100-1,000 km² calcareous
	AT	KH_Type c-1,50: Limestone Alps 500-800 m 100-1,000 km² calacareous
	SI	SI_4_KB-AL-D_2_KI: Medium-size rivers of Carbonate Alps-Danube river basin with a karst spring influence >400 m 100-1,000 km² calacareous
	SI	SI_4_KB-AL-D_2_liJ: Medium-size rivers of Carbonate Alps-Danube river basin with a lake outflow influence >400 m 100-1,000 km² calacareous
	SI	SI_4_PA-hrib-D_2: Medium-size rivers of Pre-alpine hills-Danube river basin >200 m 100-1,000 km² calacareous

Ecoregion 4 Alps		
DRB-Type		National Types
1000_4_11	AT	UZA_Type d-1,75: Non-glaciated Crystalline Alps 500-800 m 1,000-10,000 km² siliceous
1000_4_12	AT	KV_Type d-1,75: Limestone Foothills 200-500 m 1,000-10,000 km² calcareous
	AT	KV_Type d-1,75: Limestone Foothills 500-800 m 1,000-10,000 km² calcareous
	AT	KH_Type c-1,50: Limestone Alps 500-800 m 1,000-10,000 km² calacareous
	SI	SI__VR1: Alpine Sava <400 m 1,000-10,000 km² calacareous
1000_4_13	AT	ST_Large Rivers_Alpine River_Type d-1,75: Mur, Drau, Salzach, Inn 200-500 m 1,000-10,000 km²
	AT	ST_Large Rivers_Alpine River_Type d-1,75: Mur, Drau, Salzach, Inn 500-800 m 1,000-10,000 km²
1000_4_14	AT	ST_Large Rivers_Alpine River_Type d-1,75: Mur, Drau, Salzach, Inn <200 m 1,000-10,000 km²

Table 5 (continued)

Ecoregion 5 Dinaric Western Balkan		
DRB-Type		National Types
1000_5_1	BA	WB_Type_5.22: Mountain Brook on silicate ground and coarse substrate >800 m 10-100 km² siliceous
1000_5_2	HR	Type 13a:Hilly medium travertine rivers 200-800 m 100-1,000 km² calcareous
	HR	Type 13b: Hilly medium non-travertine rivers 200-800 m 100-1,000 km² calcareous
	BA	WB_Type_4.4: Small lowland-hilly watercourse on carbonate ground and coarse substrate 200-500 m 100-1,000 km² calcareous
	BA	WB_Type_4.7: Small hilly-mountainous watercourse on carbonate ground and coarse substrate 500-800 m 100-1,000 km² calcareous
	SI	SI_5_ED-hrib_2_KI: Medium-size rivers of Dinaric hills >200 m 100-1,000 km² calcareous
	SI	SI_5_PD-hrib-ravni_2: Medium-size rivers of Pre-Dinaric hills and plains >100 m 100-1,000 km² calcareous

Ecoregion 5 Dinaric Western Balkan		
DRB-Type		National Types
1000_5_3	HR	Type 14a: Hilly large travertine rivers 200-800 m 1,000-10,000 km² calcareous
	BA	WB_Type_3.4: Medium big lowland-hilly watercourse on carbonate ground and coarse substrate 200-500 m 1,000-4,000 km² calcareous
	BA	WB_Type_2.4: Big lowland-hilly watercourse on carbonate ground and coarse substrate 200-500 m >4,000 km² calcareous
	BA	WB_Type_2.17: Big lowland – hilly watercourse on silicate ground and medium substrate 200-500 m >4,000 km² calcareous
	SI	SI_VR3: Dinaric Sava >400 m >2,500 km² calcareous
1000_5_4	BA	WB_Type_2.16: Big lowland – hilly watercourse on silicate ground and coarse substrate 200-500 m 1,000-4,000 km² siliceous

Ecoregion 5 Dinaric Western Balkan		
DRB-Type		National Types
1000_5_5	HR	Type 14c: Lowland large travertine rivers <200 m 1,000-10,000 km² calacareous
	BA	WB_Type_3.1: Medium big lowland watercourse on carbonate ground and coarse substrate <200 m 1,000-4,000 km² calacareous
	BA	WB_Type_3.2: Medium big lowland watercourse on carbonate ground and medium substrate <200 m 1,000-4,000 km² calcareous
	SI	SI_VR5: Kolpa <200 m >1,000 km² calcareous
1000_5_6	BA	WB_Type_3.14: Medium big lowland watercourse on silicate ground and medium substrate <200 m 1,000-4,000 km² siliceous
	BA	WB_Type_2.14: Big lowland watercourse on silicate ground and medium substrate <200 m >4,000 km² siliceous
1000_5_7	BA	WB_Type_1.14: Very big lowland watercourse on silicate ground and medium substrate <200 m >10,000 km² siliceous

Table 5 (continued)

Ecoregion 9 Central Highlands		
DRB-Type		National Types
1000_9_1	DE	Type 5: Small coarse substrate dominated siliceous highland rivers 200->800 m 10-100 km² siliceous
	AT	GG_Type c-1,50: Granite and Gneiss Region of Bohemian Massif 500-800 m 10-100 km² siliceous
1000_9_2	DE	Type 9: Mid-sized fine to coarse substrate dominated siliceous highland rivers 200-800 m 100-1,000 km² siliceous
	AT	GG_Type d-1,75: Granite and Gneiss Region of Bohemian Massif 200-500 m and 500-800 m 100-1,000 km² siliceous
	CZ	Type 34: greater sil. Hercynium foothill stream 200-800 m 100-1,000 km² siliceous
1000_9_3	DE	Tye 9.1: Mid-sized fine to coarse substrate dominated calcareous highland rivers 200-800 m 100-1,000 km² calcareous
1000_9_4	AT	GG_Type d-1,75: Granite and Gneiss Region of Bohemian Massif 200-500 m 1,000-10,000 km² siliceous
	CZ	Type 35: great sil. Hercynium foothill stream 200-500 m 1,000-10,000 km² siliceous

Ecoregion 9 Central Highlands		
DRB-Type		National Types
1000_9_5	DE	Type 9.2: Large highland rivers 200->800 m 1,000-10,000 km² calcareous
	AT	AV_Type d-1,75: Bavarian Austrian Piedmont 200-500 m 1,000-10,000 km² tertiary and quarternary sediments
	AT	ST_Large Rivers_Thaya_Type d-1,75 200-500 m 1,000-10,000 km²
1000_9_6	DE	Type 10: Very large gravel-dominated rivers 200-800 m >10,000 km² calacareous
1000_9_8	CZ	Type 24: small sil. Hercynium lowland stream <200 m 10-100 km² siliceous
1000_9_9	AT	GG_Type d-1,75: Granite and Gneiss Region of Bohemian Massif <200 m 1,000-10,000 km² siliceous
	CZ	Type 27: great sil. Hercynium lowland stream <200 m 1,000-10,000 km² siliceous

Table 5 (continued)

Ecoregion 10 The Carpathians		
DRB-Type		National Types
1000_10_1	UA	3A: Small rivers, calcareous, mid-mountain >800 m 10-100 km² calcareous
	SK	K4M: Small streams, > 800 m, Carpathians >800 m 10-100 km² mixed
1000_10_2	RO	01: Mountain stream >800 m 10-1,000 km² siliceous, calacareous
1000_10_3	UA	3B: Medium rivers, calcareous, mid-mountain >800 m 100-1,000 km² calcareous
1000_10_4	SK	K2M: Middle size streams, 200-500 m, Carpathians 200-500 m 10-100 km² mixed
	SK	K3M: Middle size streams, 500-800 m, Carpathians 500-800 m 10-100 km² mixed
1000_10_5	UA	2A: Small rivers, calcareous, low-mountain 200-800 m 10-100 km² calcareous
1000_10_6	SK	K2S: Middle size streams, 200-500 m, Carpathians 200-500 m 100-1,000 km² mixed
	SK	K3S: Middle size streams, 500-800 m, Carpathians 500-800 m 100-1,000 km² mixed
1000_10_7	UA	2B: SMediumrivers, calcareous, low-mountain 200-800 m 100-1,000 km² calcareous
1000_10_8	RO	02: Stream in pied-mont or high plateau area 500-800 m 10-1,000 km² siliceous
	RO	05: Stream sectors in intramountain depression 500-800 m 10-1,000 km² siliceous

Ecoregion 10 The Carpathians		
DRB-Type		National Types
1000_10_9	SK	K2V-H1: Large streams, 200-500 m, Carpathians 200-500 m 1,000-10,000 km² siliceous
	SK	K2V-H2: Large streams, 200-500 m, Carpathians 200-500 m 1,000-10,000 km² siliceous
	SK	K2V-R1: Large streams, 200-500 m, Carpathians 200-500 m 1,000-10,000 km² siliceous
	SK	K2V-V2: Large streams, 200-500 m, Carpathians 200-500 m 1,000-10,000 km² siliceous
	SK	K2V-V1: Large streams, 500-800 m, Carpathians 500-800 m 1,000-10,000 km² siliceous
	RO	03: Stream sector in pied-mont or high plateau area 500-800 m 1,000-10,000 km² siliceous
	RO	04: Stream sector in hilly or plateau area 200-500 m 1,000-10,000 km² siliceous
	RO	06: Stream sector with wetlands in hilly or plateau area 200-500 m 1,000-10,000 km² siliceous, organic
	RO	08: Stream sector in hilly or plateau area 200-500 m 1,000-10,000 km² siliceous
1000_10_10	UA	2C: Large rivers, low-mountain 200-800 m 1,000-10,000 km² calcareous
1000_10_11	CZ	Type 3: great silic. Carpathian lowland stream <200 m 1,000-10,000 km² siliceous
1000_10_12	AT	ST_Large Rivers_Thaya_Type e-2,00 <200 m 1,000-10,000 km²
	AT	ST_Large Rivers_Morava_Type e-2,00 <200 m 1,000-10,000 km²

Table 5 (continued)

Ecoregion 11 Hungarian Lowland		
DRB-Type		National Types
1000_11_1	AT	FH_Type d-1,75: Eastern Ridges and Lowlands <200 m 200-500 m 10-100 km² tertiary and quartemary sediments
1000_11_2	AT	FH_Type d-1,75: Eastern Ridges and Lowlands <200 m 200-500 m 100-1,000 km² tertiary and quartemary sediments
1000_11_3	AT	FH_Type d-1,75: Eastern Ridges and Lowlands <200 m 200-500 m 1,000-10,000 km² tertiary and quartemary sediments
	SI	SI_VR6: Pannonian Sava <200 m >400 m >2,500 km² calcareous
1000_11_4	HU	Type 11: small calcareous lowland stream <200 m 10-200 km² calcareous
	HU	Type 15: small calcareous lowland brook <200 m 10-200 km² calcareous
	HU	Type 16: small with low slope calcerous lowland stream <200 m < 200 m 10-200 km² calcareous
1000_11_5	HU	Type 21: small organic lowland stream <200 m 10-200 m organic
1000_11_6	AT	FH_Type d-1,75: Eastern Ridges and Lowlands <200 m <200 m 100-1,000 km² tertiary and quartemary sediments
1000_11_7	HU	Type 12: medium calcareous lowland stream <200 m <200 m 100-2,000 km² calcareous
	HU	Type 17: medium with low slope calcerous lowland stream <200 m <200 m 100-2,000 km² calcareous
	HU	Type 18: middle calcareous lowland stream <200 m <200 m 100-2,000 km² calcareous
1000_11_8	HU	Type 22: medium organic lowland stream <200 m <200 m 100-2,000 km² organic

Ecoregion 11 Hungarian Lowland		
DRB-Type		National Types
1000_11_9	RO	10: Stream in plain area <200 m <200 m 10-1,000 km² siliceous
1000_11_10	CZ	Type 13: great silic. Panonnic. lowland stream <200 m <200 m 1,000-10,000 km² siliceous
	HR	Type 6: Lowland large rivers, lover parts, carst catchment area <200 m <200 m 1,000-10,000 km² siliceous
	BA	WB_Type_2.14: Big lowland watercourse on silicate ground and medium substrate <200 m <200 m >4,000 km² siliceous
	SK	P1V - B1: Large streams, < 200 m, in Hungarian lowland <200 m <200 m 1,000-10,000 km² siliceous
	SK	P1V - R2: Large streams, < 200 m, in Hungarian lowland <200 m <200 m 1,000-10,000 km² siliceous
	SK	P1V - I1: Large streams, < 200 m, in Hungarian lowland <200 m <200 m 1,000-10,000 km² siliceous
	SK	P1V - V3: Large streams, < 200 m, in Hungarian lowland <200 m <200 m siliceous
	RO	11: Stream sector in plain area <200 m <200 m 1,000-3,000 km² siliceous
	RO	12: Stream sector in plain area <200 m <200 m >3,000 km² siliceous
	RO	13: Stream sector with wetlands in plain area <200 m <200 m >3,000 km² siliceous

Ecoregion 11 Hungarian Lowland		
DRB-Type		National Types
1000_11_11	CZ	Type 16: great cal. Panonnic. lowland stream <200 m <200 m 1,0 00-10,000 km² calcareous
	HU	Type 13: large calcareous lowland stream <200 m < 200 m 1,000-12,000 km² calcareous
	HU	Type 19: large calcareous lowland streams <200 m <200 m 1,000-12,000 km² calcareous
	UA	1C: Large rivers, lowland <200 m < 200 m 1,000-10,000 km² calacareous
	CZ	Type 16: great cal. Panonnic. lowland stream <200 m <200 m 1,0 00-10,000 km² calcareous
	HU	Type 13: large calcareous lowland stream <200 m < 200 m 1,000-12,000 km² calcareous
	HU	Type 19: large calcareous lowland streams <200 m <200 m 1,000-12,000 km² calcareous
	UA	1C: Large rivers, lowland <200 m <200 m 1,000-10,000 km² calacareous

Ecoregion 11 Hungarian Lowland		
DRB-Type		National Types
1000_11_12	CZ	Type 11: greater sil. Panonnic. lowland stream <200 m <200 m >10,000 km² siliceous
	HR	Type 9a: Lowland very large rivers, Drava lower part <200 m <200 m >10,000 km² siliceous
	HR	Typ 9b: Lowland very large rivers, Sava lower part <200 m <200 m >10,000 km² siliceous
	HR	Type 7a: Lowland very large rivers, Drava and Mura <200 m <200 m >10,000 km² siliceous
	HR	Type 8: Lowland very large rivers, Sava medium part <200 m <200 m >10,000 km² siliceous
	BA	WB_Type_1.15: Very big lowland watercourse on silicate ground and fine substrate <200 m <200 m >10,000 km² siliceous
	BA	WB_Type_1.14: Very big lowland watercourse on silicate ground and medium substrate <200 m <200 m >10,000 km² siliceous
	SK	P1V - M1: Large streams, < 200 m, in Hungarian lowland <200 m <200 m >10,000 km² siliceous
1000_11_13	HU	Type 14: very large calcareous lowland stream <200 m <200 m >10,000 km² calcareous
	HU	Type 20: very large calcareous lowland river <200 m <200 m >10,000 km² calcareous
	HR	Type 7b: Lowland very large rivers, Sava upper part <200 m <200 m >10,000 km² calcarous
	UA	1D: Very large river, lowland <200 m <200 m >10,000 km² calacareous

Table 5 (continued)

Ecoregion 12 Pontic Province		
DRB-Type	National Types	
1000_12_1	BG	TR15: alpine, middle size river >1,500 m 10-1,000 km² mixed
1000_12_2	BG	TR9: mid-altitude, middle size river 200-800 m 10-1,000 km² mixed
	BG	TR13: mid-altitude, middle size river 200-800 m 10-1,000 km² mixed
1000_12_3	BG	TR11: mid-altitude, middle size river 200-800 m 10-1,000 km² calcareous
1000_12_4	BG	TR12: mid-altitude, middle size river 200-800 m >1,000 km² mixed
1000_12_5	BG	TR5: lowland, small size river 0-200 m 10-1,000 km² mixed
	BG	TR8: lowland, small size river 0-200 m 10-1,000 km² mixed

Ecoregion 12 Pontic Province		
DRB-Type	National Types	
1000_12_6	BG	TR 4: lowland, small size river 0-200 m >1,000 km² mixed
	BG	TR 7: lowland, small size river 0-200 m >1,000 km² mixed
1000_12_7	BG	TR 2: lowland, small size river 0-200 m >1,000 km² calcareous
1000_12_8	RO	16: Stream sector in plain area <200 m 1,000-5,000 km² siliceous
1000_12_9	RO	17: Stream sector in plain area <200 m >5,000 km² siliceous
	RO	18: Stream sector with wetlands in plain area <200 m >5,000 km² siliceous
1000_12_10	MD	06: stream sector with wetlands in plain area <200 m >10,000 km² siliceous

Table 5 (continued)

Ecoregion 16 Eastern Plains		
DRB-Type	**National Types**	
1000_16_1	**RO**	23: Stream in hilly or plateau area 200-500 m 10-1,000 km² siliceous
1000_16_2	**RO**	24: Stream in plain area <200 m 10-2,000 km² siliceous
1000_16_3	**RO**	25: Stream sector with wetlands in plain area <200 m 1,000-5,000 km² siliceous
1000_16_4	**MD**	02: stream sector in plain area <200 m >10,000 km² siliceous
	RO	26: Stream sector in plain area <200 m >5,000 km² siliceous
1000_16_5	**RO**	27: Stream sector with wetlands in plain area <200 m >5,000 km² siliceous
	MD	03: stream sector with wetlands in plain area <200 m >10,000 km² siliceous

Ecoregion independent		
DRB-Type	**National Types**	
1000_99_1	**DE**	Typ 21: Lake outflows <200 m and 200-800 m 10-1,000 km² siliceous, calcareous
1000_99_2	**RO**	31: Temporary stream in plateau area 200-500 m 10-1,000 km² siliceous

5. DISCUSSION

For the harmonisation of national stream types at relevant rivers in the Danube River Basin parameters of the typology System A according to Annex II of the EU WFD (ecoregion, altitude, catchment area, geology) and respective parameter classes according to Annex II of the EU WFD were selected. This approach provided a high level of aggregation, e.g. relevant for cartographic editing.

Gaps

Nevertheless, the compilation of the "Table of Harmonisation" remained incomplete due to incomplete data about typologies of Moldova and Ukraine. In addition, the missing allocation of Serbian types to respective ecoregions prevented further processing of Serbian data.

However, most likely the number of harmonised types will not increase significantly when adding the information on national typologies currently lacking.

Prospect

Due to the differences in national typologies the aggregation of stream types based on additional parameters such as mean substratum composition was not practicable. This approach would have increased the total number of harmonised types, nevertheless it also would have allowed for the assignment of biologically meaningful stream types on the international level, e.g. to further facilitate the comparison of biological assessment results among countries. However, the collected base data may serve this purpose on a smaller sub-basin scale.

Comparison: Table of harmonisation and intercalibration

The concept for harmonisation underlying this analysis differed from the approach followed in the Eastern Continental intercalibration exercise. The latter aimed at defining stream types for the intercalibration of biological classification schemes. Besides pooling of different ecoregions and geology classes, channel substrates and more precise altitude classification were used to assign common intercalibration stream types. These types covered various countries and included different national stream types (or parts thereof).

The small to medium-sized mountain streams of the Carpathians (R-E1), for example, correspond to the harmonised type 1000_10_8. Although Czech Republic, Hungary, Romania and Slovak Republic took part in intercalibration of this type, 1000_10_8 only represents an aggregation of Romanian types. Corresponding types of other countries are not located at streams relevant to this study. The intercalibration type of large lowland rivers with mixed geology (R-E3) embraces 10 harmonised types (1000_11_10 to 13 and 1000_12_6 to 11) because of its combined ecoregional and geological characteristics.

ANNEXES

ANNEX 1	List of rivers selected for the basin-wide overview of the DRB - Basis of the "Table of Harmonisation"
ANNEX 2	Overview of national descriptions of stream types at relevant rivers, sorted by ecoregion

ANNEX 1: LIST OF RIVERS SELECTED FOR THE BASIN-WIDE OVERVIEW OF THE DRB - BASIS OF THE "TABLE OF HARMONISATION"

This list includes all rivers with a catchment size > 4 000 km² as depicted in the DRB overview map.

Name of river	Countries (from source to mouth)	Name of river	Countries (from source to mouth)
Lech	AT, DE	Sava	HR, SI, BH, CS, AL
Naab	CZ, DE	Drina	AL, BH, CS
Isar	AT, DE	Lim	AL, CS, BH
Inn	CH, IT, AT, DE	Bosna	BH
Salzach	AT, DE	Vrbas	BH
Traun	AT	Una	HR, BH
Enns	AT	Kolpa/Kupa	SI, HR
Morava/March	CZ, SK, AT	Timis/Tami	RO, CS
Dyje/Thaya	CZ, AT	Velika Morava	MK, BG, CS
Svratka	CZ	Zapadna Morava	CS
Raab/Rába	AT, HU	Ibar	CS
Rabnitz/Rábca/Répce	AT, HU	Juzna Morava	MK, BG, CS
Váh	PL, SK	Nisava	BG, CS
Nitra	SK	Timok	CS, BG
Hron	SK	Jiu	RO
Ipel/Ipoly	SK, HU	Ogosta	BG
Sió	HU	Iskâr	BG
Drau/Drava	IT, AT, SI, HR HU	Olt	RO
Mur/Mura	AT, SI, HR, HU	Yantra	BG
Tysa/Tisza/Tisa	UA, RO, HU, SK, CS	Vedea	RO
Bega/Begej	RO, CS	Arges	RO
Mures/Maros	RO, HU	Ialomita	RO
Târnava	RO	Seret/Siret	UA, RO
Körös	RO, HU	Buzau	RO
Hortobágy-Berettyó	HU	Barlad	RO
Kettos-Körös (Fekete+Fehér)	RO, HU	Trotus	RO
Crisul Alb/Fehér-Körös	RO, HU	Bistrita	RO
Crisul Negru/Fekete-Körös	RO, HU	Moldova	RO
Barcau/Berettyó	RO, HU	Prut	UA, MD, RO
Crisul Repede/Sebes-Körös	RO, HU	Jijia	RO
Zagyva	HU	Ialpug	MD, UA
Slaná/Sajó	SK, HU		
Hornád/Hernád	SK, HU		
Bodrog	UA, SK, HU		
Ondava	SK		

Name of river	Countries (from source to mouth)	Name of river	Countries (from source to mouth)
Latorica	SK, UA		
Somes/Szamos	RO, HU		
Somesul Mare	RO		
Somesul Mic	RO		
Zala	HU		

ANNEX 2: OVERVIEW OF NATIONAL DESCRIPTIONS OF STREAM TYPES AT RELEVANT RIVERS, SORTED BY ECOREGION

ECOREGION 4 ALPS

code	name (English)	altitude [m]	size [km²]	geology	sub-ecoregion/bioregion	mean water slope [‰]	mean substratum composition	river discharge [l/s]	valley shape	channel form	hydrology / water flow	Mean anual river [m³/s]
DE_Typ 1.1	Small alpine streams	>800	11-100	cal	calcareous Alps, Flysch, coarse material floodplains	6-45	blocks, boulders, pebbles, large-sized sand		V and U-shaped valley	braided		
DE_Typ 1.2	Mid-sized alpine streams	>800	100-1,000	cal	calcareous Alps, Flysch, coarse material floodplains	6-45	blocks, boulders, pebbles, large-sized sand		V and U-shaped valley	braided		
DE_Typ 4	Large rivers in the alpine foothills	>800	1,000-10,000	cal	large coarse material floodplains	>2	stones, in addition blocks and pebbles		wide U-shaped valley	anastomosing		
AT_UZA_Type b-1,25	Non-glaciated Crystalline Alps, Saprobiological Basic Condition = 1,25	>1,600	11-100	sil								
AT_UZA_Type c-1,50	Non-glaciated Crystalline Alps, Saprobiological Basic Condition = 1,50	500-799	101-1,000	sil								
AT_UZA_Type c-1,50	Non-glaciated Crystalline Alps, Saprobiological Basic Condition = 1,50	800-1599	11-100	sil								
AT_UZA_Type c-1,50	Non-glaciated Crystalline Alps, Saprobiological Basic Condition = 1,50	800-1599	101-1,000	sil								
AT_UZA_Type c-1,50	Non-glaciated Crystalline Alps, Saprobiological Basic Condition = 1,50	800-1599	1,001-10,000	sil								
AT_UZA_Type d-1,75	Non-glaciated Crystalline Alps, Saprobiological Basic Condition = 1,75	500-799	1,001-10,000	sil								
AT_BR_type c-1,50	Ridges and Foothills of the Crystalline Alps, Saprobiological Basic Condition = 1,75	200-499	11-100	sil								
AT_BR_Type c-1,50	Ridges and Foothills of the Crystalline Alps, Saprobiological Basic Condition = 1,50	500-799	11-100	sil								
AT_BR_Type c-1,50	Ridges and Foothills of the Crystalline Alps, Saprobiological Basic Condition = 1,50	500-799	101-1,000	sil								
AT_BR_type d-1,75	Ridges and Foothills of the Crystalline Alps, Saprobiological Basic Condition = 1,75	200-499	11-100	sil								
AT_BR_type d-1,75	Ridges and Foothills of the Crystalline Alps, Saprobiological Basic Condition = 1,75	200-499	101-1,000	sil								
AT_KV_Type d-1,75	Limestone Foothills, Saprobiological Basic Condition = 1,75	200-499	1,001-10,000	cal								
AT_KV_Type d-1,75	Limestone Foothills, Saprobiological Basic Condition = 1,75	500-799	1,001-10,000	cal								
AT_KV_Type d-1,75	Limestone Foothills,	500-799	101-1,000	cal								

code	name (English)	altitude [m]	size [km²]	geology	sub-ecoregion/bioregion	mean water slope [‰]	mean substratum composition	river discharge [l/s]	valley shape	channel form	hydrology / water flow	Mean anual river [m³/s]
	Saprobiological Basic Condition = 1,75											
AT_KH_Type b-1,25	Limestone Alps, Saprobiological Basic Condition = 1,25	800-1599	11-100	cal								
AT_KH_Type b-1,25	Limestone Alps, Saprobiological Basic Condition = 1,25	>1,600	11-100	cal								
AT_KH_Type c-1,50	Limestone Alps, Saprobiological Basic Condition = 1,50	500-799	101-1,000	cal								
AT_KH_Type c-1,50	Limestone Alps, Saprobiological Basic Condition = 1,50	500-799	1,001-10,000	cal								
AT_KH_Type c-1,50	Limestone Alps, Saprobiological Basic Condition = 1,50	800-1599	101-1,000	cal								
AT_KH_Type c-1,50	Limestone Alps, Saprobiological Basic Condition = 1,50	800-1,599	1,001-10,000	cal								
AT_ ST_Large Rivers_ Alpine River_Type c-1,50	Alpine Rivers (Mur, Drau, Salzach, Inn), Saprobiological Basic Condition = 1,50	<200	1,001-10,000									
AT_ ST_Large Rivers_ Alpine River_Type d-1,75	Alpine Rivers (Mur, Drau, Salzach, Inn), Saprobiological Basic Condition = 1,75	200-499	1,001-10,000									
AT_ ST_Large Rivers_ Alpine River_Type d-1,75	Alpine Rivers (Mur, Drau, Salzach, Inn), Saprobiological Basic Condition = 1,75	500-799	1,001-10,000									
AT_ ST_Large Rivers_ Alpine River_Type d-1,75	Alpine Rivers (Mur, Drau, Salzach, Inn), Saprobiological Basic Condition = 1,75	800-1,599	1,001-10,000									
SI_4_KB-AL-D_1_LI	Small rivers of Carbonate Alps-Danube river basin with a limnocrene spring influence	>800	10-100	cal	Carbonate Alps-Danube river basin						permanent - limnocrene spring influence	
SI_4_KB-AL-D_1_KI	Small rivers of Carbonate Alps-Danube river basin with a karst spring influence	>400	10-100	cal	Carbonate Alps-Danube river basin						permanent	
SI_4_KB-AL-D_2_KI	Medium-size rivers of Carbonate Alps-Danube river basin with a karst spring influence	>400	100-1,000	cal	Carbonate Alps-Danube river basin							
SI_4_KB-AL-D_2_IiJ	Medium-size rivers of Carbonate Alps-Danube river basin with a lake outflow influence	>400	100-1,000	cal	Carbonate Alps-Danube river basin						permanent - lake outflow influence	
SI_4_PA-hrib-D_2	Medium-size rivers of Pre-alpine hills-Danube river basin	>200	100-1,000	cal	Pre-alpine hills-Danube river basin						permanent	
SI__VR1	Alpine Sava	<400	>1,000	cal							permanent	

ECOREGION 5 DINARIC WESTERN BALKAN

code	name (English)	altitude [m]	size [km2]	geology	sub-ecoregion/bioregion	mean water slope [‰]	mean substratum composition	river discharge [l/s]	valley shape	channel form	hydrology / water flow	Mean anual river [m^3/s]
HR_Type 13a	Hilly medium travertine rivers	200-800	100-1,000	cal	Continental Dinaric Sub-ecoregion							2-20
HR_Type 13b	Hilly medium non-travertine rivers	200-800	100-1,000	cal	Continental Dinaric Sub-ecoregion							2-20
HR_Type 14a	Hilly large travertine rivers	200-800	1,000-10,000	cal	Continental Dinaric Sub-ecoregion							>20
HR_Type 14c	Lowland large travertine rivers	< 200	1,000-10,000	cal	Continental Dinaric Sub-ecoregion							>20
BA_WB_Type_3.4	Medium big lowland-hilly watercourse on carbonate ground and coarse substrate	200-500	1,000-4,000	cal		1-3,7	megalithal, macrolithal (>25.6 cm)	>10,000	canyon		permanent	
BA_WB_Type_4.4	Small lowland-hilly watercourse on carbonate ground and coarse substrate	200-500	100-1,000	cal		0.56-2,3	megalithal, macrolithal (>25.6 cm)	>10,000	meander valley, canyon		permanent	
BA_WB_Type_4.7	Small hilly-mountainous watercourse on carbonate ground and coarse substrate	500-800	100-1,000	cal		4.6	megalithal, macrolithal (>25.6 cm)	>10,000	canyon		permanent	
BA_WB_Type_5.22	Mountain Brook on silicate ground and coarse substrate	>800	<100	sil		7.8	megalithal, macrolithal (>25.6 cm)	1,000-10,000	canyon		permanent	
BA_WB_Type_3.1	Medium big lowland watercourse on carbonate ground and coarse substrate	0-200	1,000-4,000	cal		1.5-2,2	megalithal, macrolithal (>25.6 cm)	>10,000	meander valley canyon		permanent	
BA_WB_Type_3.14	Medium big lowland watercourse on silicate ground and medium substrate	0-200	1,000-4,000	sil		2.36-8	mesolithal, microlithal (0.2-25.6 cm)	>10,000	meander valley		permanent	
BA_WB_Type_3.2	Medium big lowland watercourse on carbonate ground and medium substrate	0-200	1,000-4,000	cal		0.9	mesolithal, microlithal (0.2-25.6 cm)	>10,000	meander valley		permanent	
BA_WB_Type_2.4	Big lowland-hilly watercourse on carbonate ground and coarse substrate	200-500	>4,000	cal		1.5-2	mesolithal, microlithal (0.2-25.6 cm), megalithal, macrolithal (>25.6 cm)	>10,000	canyon		permanent	
BA_WB_Type_2.17	Big lowland – hilly watercourse on silicate ground and medium substrate	200-500	>4,000	cal		1.77	megalithal, macrolithal (>25.6 cm)	10-300	canyon		permanent	
BA_WB_Type_2.16	Big lowland – hilly watercourse on silicate ground and coarse substrate	200-500	>4,000	sil		0.82-1.9	megalithal, macrolithal (>25.6 cm)	>10,000	canyon		permanent	
BA_WB_Type_1.14	Very big lowland watercourse on silicate ground and medium substrate	0-200	>10,000	sil		0.5-1.35	mesolithal, microlithal (0.2-25.6 cm)	>10,000	meander valley canyon		permanent	
BA_WB_Type_2.14	Big lowland watercourse on silicate ground and medium substrate	0-200	>4,000	sil		0.47 - 0,9	mesolithal, microlithal (0.2-25.6 cm)	>10,000	meander valley		permanent	
SI_5_ED-hrib_2_KI	Medium-size rivers of Dinaric hills	>200	100-1,000	cal	Dinaric hills						permanent	
SI_5_PD-hrib-ravni_2	Medium-size rivers of Pre-Dinaric hills and plains	>100	100-1,000	cal	Pre-Dinaric hills and plains						permanent	
SI__VR3	Dinaric Sava	<400	>2,500	cal							permanent	
SI__VR5	Kolpa	<200	>1,000	cal							permanent	

ECOREGION 6 HELLENIC WESTERN BALKAN

code	name (English)	altitude [m]	size [km^2]	geology	sub-ecoregion/bioregion	mean water slope [‰]	mean substratum composition	river discharge [l/s]	valley shape	channel form	hydrology / water flow	Mean anual river [m^3/s]
no data												

ECOREGION 7 EASTERN BALKAN

code	name (English)	altitude [m]	size [km²]	geology	sub-ecoregion/bioregion	mean water slope [‰]	mean substratum composition	river discharg e [l/s]	valley shape	channel form	hydrology / water flow	Mean anual river [m³/s]
no data												

ECOREGION 9 CENTRAL HIGHLANDES

code	name (English)	altitude [m]	size [km²]	geology	sub-ecoregion /bioregion	mean water slope [‰]	mean substratum composition	river discharge [l/s]	valley shape	channel form	hydrology / water flow	Mean anual river [m3/s]
DE_Typ 5	Small coarse substrate dominated siliceous highland rivers	200-> 00	10-100	sil	schists, gneiss, granites	10-50	cobbles and stones, pebbles		V-and U-shaped valley, trought	sinuate to meandering, braiding channels	permanent	
DE_Typ 9	Mid-sized fine to coarse substrate dominated siliceous highland rivers	200-> 00	100-1,000	sil	schists, gneiss, granites, Buntsandstein sandstone	2-6	cobbles and stones, many pebbles		V-and U-shaped valley	sinuate to meandering, braiding channels	permanent	
DE_Typ 9.1	Mid-sized fine to coarse substrate dominated calcareous highland rivers	200-> 00	100-1,000	cal	Lacustrine limestone, Lower an Middle Jurassic rocks, loess regions	0.7-4.0	cobbles and stones, pebbles		U-shaped valley	sinuate to meandering, braiding channels	permanent	
DE_Typ 9.2	Large highland rivers	200-> 00	1,000-10,000	cal	Large floodplains	3	stones and cobbles		floodplain valley	sinuate to meandering, braiding channels	permanent	
DE_Typ 10	Very large gravel-dominated rivers	200->800	>10,000	cal	Large floodplains	2 - 0.2	pebbles and cobbles		canyon-like to large floodplains	sinuate to meandering, braiding channels	permanent	
AT_GG_Type c-1,50	Granite and Gneiss Region of Bohemian Massif, Saprobiological Basic Condition = 1,50	500-799	11-100	sil							permanent	
AT_GG_Type d-1,75	Granite and Gneiss Region of Bohemian Massif, Saprobiological Basic Condition = 1,75	200-499	101-1,000	sil							permanent	
AT_GG_Type d-1,75	Granite and Gneiss Region of Bohemian Massif, Saprobiological Basic Condition = 1,75	500-799	101-1,000	sil							permanent	
AT_AV_Type d-1,75	Bavarian Austrian Piedmont, Saprobiological Basic Condition = 1,75	200-499	1,001-10,000	tq Sed							permanent	
AT_GG_Type d-1,75	Granite and Gneiss Region of Bohemian Massif, Saprobiological Basic Condition = 1,75	200-499	1,001-10,000	sil							permanent	
AT_GG_Type d-1,75	Granite and Gneiss Region of Bohemian Massif, Saprobiological Basic Condition = 1,75	<200	1,001-10,000	sil							permanent	
AT_ST_Large Rivers_Thaya_Type d-1,75	River Thaya Saprobiological Basic Condition = 1,75	200-499	1,001-10,000									
CZ_Typ 34	greater sil. Hercynium foothill stream	200-800	-1,000	sil					V-shaped valley		permanent	
CZ_Typ 35	great sil Hercynium foothill stream	200-800	-10,000	sil					meander valley		permanent	
CZ_Typ 24	small sil,Hercynium lowland stream	0-200	<100	sil					floodplain - V shaped valley		permanent	
CZ_Typ 27	great sil,Hercynium lowland stream	0-200	-10,000	sil					floodplain - V shaped valley		permanent	

ECOREGION 10 THE CARPATHIANS

code	name (English)	altitude [m]	size [km^2]	geology	sub-ecoregion /bioregion	mean water slope [‰]	mean substratum composition	river discharge	valley shape	channel form	hydrology / water flow	Mean anual river [m^3/s]
CZ_Typ 3	great silic,Carpathian lowland stream	0-200	-10,000	sil					plain floodplain		permanent	
SK_K2V - H1	Large streams, 200-500 m, Carpathians	200-500	>1,000	sil	middle part of Hornad river	2-5		1,000-10,000		sinuate		
SK_K2V - H2	Large streams, 200-500 m, Carpathians	200-500	>1,000	sil	lowest part of Hornad river	2-5		>10,000		sinuate		
SK_K2V - R1	Large streams, 200-500 m, Carpathians	200-500	>1,000	sil	middle part of Hron river	2-5		>10,000		sinuate		
SK_K2V - V2	Large streams, 200-500 m, Carpathians	200-500	1,000-10,000	sil	middle part of Vah river	<2		>10,000		sinuate		
SK_K3V - V1	Large streams, 500-800 m, Carpathians	500-800	1,000-10,000	sil	upper part of Vah river with its tributaries	<2		>10,000		sinuate		
SK_K2M	Small streams, 200-500 m, Carpathians	200-500	10-100	mixed		5-50		1,000-10,000		sinuate		
SK_K3M	Small streams, 500-800 m, Carpathians	500-800	10-100	mixed		5-50				sinuate		
SK_K4M	Small streams, >800 m, Carpathians	>800	10-100	mixed		5-50				sinuate		
SK_K2S	Middle size streams, 200-500 m, Carpathians	200-500	100-1,000	mixed						sinuate		
SK_K3S	Middle size streams, 500-800 m, Carpathians	500-800	100-1,000	mixed		5-50		1,000-10,000		sinuate		
AT_ST_Large Rivers_Thaya_Type e-2,00	River Thaya Saprobiological Basic Condition = 2,00	<200	1,001-10,000									
AT_ST_Large Rivers_Morava_Type e-2,00	River Morava Saprobiological Basic Condition = 2,00	<200	1,001-10,000									
RO01	Mountain stream	>800	10-1,000	sil, cal		40-200	Blocks, boulders, gravel					
RO02	Stream in pied-mont or high plateau area	500-800	10-1,000	sil		20-50	Boulders, gravel					
RO03	Stream sector in pied-mont or high plateau area	500-800	1,000-10,000	sil		3-20	Gravel, boulders					
RO04	Stream sector in hilly or plateau area	200-500	1,000-10,000	sil		0,5-5	Sand, gravel					
RO05	Stream sectors in intramountain depression	500-800	10-1,000	sil		1-3	Sand, gravel, boulders					
RO06	Stream sector with wetlands in hilly or plateau area	200-500	1,000-10,000	sil, org		1-2	Sand, gravel					
RO08	Stream sector in hilly or plateau area	200-500	1,000-10,000	sil	Subecoregion 10-Carphatian Intramountain area/ Transilvanian plateau	3-20	Sand, gravel					
UA_ 2A	Small rivers, calcareous, low-mountain	200-800	10-100	cal	under development		pebble					
UA_ 3A	Small rivers, calcareous, mid-mountain	>800	10-100	cal	under development		boulder					
UA_ 2B	Medium rivers, calcareous, low-mountain	200-800	100-1,000	cal	under development		pebble					
UA_ 3B	Medium rivers, calcareous, mid-mountain	>800	100-1,000	cal	under development		boulder					
UA_ 2C	Large rivers, low-mountain	200-800	1,000-10,000	cal	under development		pebble					

ECOREGION 11 HUNGARIAN LOWLANDS

code	name (English)	altitude [m]	size [km²]	geology	sub-ecoregion /bioregion	mean water slope [‰]	mean substratum composition	river discharge	valley shape	channel form	hydrology / water flow	Mean anual river [m³/s]
AT_FH_Type d-1,75	Eastern Ridges and Lowlands, Saprobiological Basic Condition = 1,75	200-499	11-100	tq Sed								
AT_FH_Type d-1,75	Eastern Ridges and Lowlands, Saprobiological Basic Condition = 1,75	200-499	101-1,000	tq Sed								
AT_FH_Type d-1,75	Eastern Ridges and Lowlands, Saprobiological Basic Condition = 1,75	200-499	1,001-10,000	tq Sed								
AT_FH_Type d-1,75	Eastern Ridges and Lowlands, Saprobiological Basic Condition = 1,75	<200	101-1,000	tq Sed								
CZ_Typ 11	greater sil. Panonnic. lowland stream	<200	>10,000	sil					plain floodplain		permanent	
CZ_Typ 13	great silic,Panonnic. lowland stream	<200	-10,000	sil					plain floodplain		permanent	
HR_Type 9a	Lowland very large rivers, Drava lower part	<200	>10,000	sil								>20
HR_Type 7a	Lowland very large rivers, Drava and Mura	<200	>10,000	sil								>20
HR_Type 9b	Lowland very large rivers, Sava lower part	<200	>10,000	sil								>20
HR_Type 8	Lowland very large rivers, Sava medium part	<200	>10,000	sil								>20
HR_Type 6	Lowland large rivers, lover parts, carst catchment area	<200	1,000-10,000	sil								>20
BA_WB_Type_1.15	Very big lowland watercourse on silicate ground and fine substrate	<200	>10,000	sil			sand, mud (<0.2cm)	>10,000	meander valley		permanent	
BA_WB_Type_1.14	Very big lowland watercourse on silicate ground and medium substrate	<200	>10,000	sil			mesolithal, microlithal (0.2-25.6cm)	>10,000	meander valley canyon		permanent	
BA_WB_Type_2.14	Big lowland watercourse on silicate ground and medium substrate	<200	>4,000	sil			mesolithal, microlithal (0.2-25.6cm)	>10,000	meander valley		permanent	
CZ_Typ 16	great cal, Panonnic. lowland stream	<200	-10,000	cal					plain floodplain		permanent	
SK_P1V - B1	Large streams, <200 m, in Hungarian lowland	<200	>1,000	sil				>10,000	plain floodplain	sinuate		
SK_P1V - R2	Large streams, <200 m, in Hungarian lowland	<200	>1,000	sil				>10,000		sinuate		
SK_P1V - M1	Large streams, <200 m, in Hungarian lowland	<200	>10,000	sil				>10,000		sinuate		
SK_P1V - V3	Large streams, <200 m, in Hungarian lowland	<200		sil				>10,000		sinuate		
SK_P1V - I1	Large streams, <200 m, in Hungarian lowland	<200	1,000-10,000	sil				>10,000		sinuate		
HU- Typ 11	small calcareous lowland stream	<200	10-200	cal			coarse					
HU-Typ 12	medium calcareous lowland stream	<200	100-2,000	cal			coarse					
HU-Typ 13	large calcareous lowland stream	<200	1,000-12,000	cal			coarse					
HU-Typ 14	very large calcareous lowland stream	<200	>10,000	cal			coarse					
HU-Typ 15	small calcareous lowland brook	<200	10-200	cal			middle-fine					
HU- Typ 16	small with low slope calcareous lowland stream	<200	10-200	cal			middle-fine					
HU- Typ 17	medium with low slope calcareous lowland stream	<200	100-2000	cal			middle-fine					
HU-Typ 18	middle calcareous lowland stream	<200	100-2000	cal			middle-fine					
HU-Typ 19	large calcareous lowland streams	<200	1,000-12,000	cal			middle-fine					
HU-Typ 20	very large calcareous lowland river	<200	>10,000	cal			middle-fine					
HU-Typ 21	small organic lowland stream	<200	10-200	org			not relevant					
HU-Typ 22	medium organic lowland stream	<200	100-2,000	org			not relevant					
HR_Type 7b	Lowland very large rivers, Sava upper part	<200	>10,000	cal								>20
RO10	Stream in plain area	<200	10-1,000	sil		<8	sand, silt					
RO11	Stream sector in plain area	<200	1,000-3,000	sil		<1	sand, silt, clay					
RO12	Stream sector in plain area	<200	>3,000	sil		0,5-5	sand, clay					
RO13	Stream sector with wetlands in plain area	<200	>3,000	sil		<1	sand, silt					
UA_ 1C	Large rivers, lowland	0-200	1,000-10,000	cal			gravel					
UA_ 1D	Very large river, lowland	0-200	›10,000	cal			gravel					
SI__VR6	Pannonian Sava	<400	>2,500	cal							permanent	

ECOREGION 12 PONTIC PROVINCE

code	name (English)	altitude [m]	size [km²]	geology	sub-ecoregion/bioregion	mean water slope [‰]	mean substratum composition	river discharge	valley shape	channel form	hydrology / water flow	Mean anual river [m³/s]
RO16	Stream sector in plain area	<200	1,000-5,000	sil		0,5-5	Sand, silt					
RO17	Stream sector in plain area	<200	>5,000	sil		<1	Sand, silt, clay					
RO18	Stream sector with wetlands in plain area	<200	>5,000	sil		<1	Sand, silt, clay					
MD_06	stream sector with wetlands in plain area Prut downstream confl Jijia/Nemteni-confl Danube	25-2	27,500	sil		0,1	sand, mud	105000	meander valley	sinuous with side channels	permanent	3,41
BG_TR2	low land, small size river	0-200	>1,000	cal			grave, sand				permanent	
BG_TR4	low land, small size river	0-200	>1,000	mixed			sand				permanent	
BG_TR5	low land, small size river	0-200	10-1,000	mixed			sand				permanent	
BG_TR7	low land, small size river	0-200	>1,000	mixed			mud				permanent	
BG_TR8	low land, middle size river	0-200	10-1,000	mixed			mud				permanent	
BG_TR9	mid-altitude, middle size river	200-800	10-1,000	mixed			stone				permanent	
BG_TR11	mid-altitude, small size river	200-800	10-1,000	cal			grave, sand				permanent	
BG_TR12	mid-altitude, middle size river	200-800	>1,000	mixed			grave, sand				permanent	
BG_TR13	mid-altitude, middle size river	200-800	10-1,000	mixed			grave, sand				permanent	
BG_TR15	alpine, middle size river	>1,500	10-1,000	mixed			stone				permanent	

ECOREGION 16 EASTERN PLAINS

code	name (English)	altitude [m]	size [km²]	geology	sub-ecoregion/bioregion	mean water slope [‰]	mean substratum composition	river discharge	valley shape	channel form	hydrology / water flow	Mean anual river [m³/s]
RO23	Stream in hilly or plateau area	200-500	10-1,000	sil								
RO24	Stream in plain area	<200	10-2,000	sil								
RO25	Stream sector with wetlands in plain area	<200	1,000-5,000	sil								
RO26	Stream sector in plain area	<200	>5,000	sil								
RO27	Stream sector with wetlands in plain area	<200	>5,000	sil								
MD_02	stream sector in plain area Prut - Orofteana/Lipcani-confl Solonet-Pruteni	130-45	13,601	sil		0,3	sand, microlithal	83600	meander valley	meandering	permanent	7,10
MD_03	stream sector with wetlands in plain area Prut conf Solonet/Pruteni-downstream confl Jijia-Nemteni	45-25	16,242	sil		0,2	sand, mud	103000	meander valley	sinuous with side channels	permanent	6,9

ECOREGION INDEPENDENT STREAM TYPES

code	name (English)	altitude [m]	size [km²]	geology	sub-ecoregion/bioregion	mean water slope [‰]	mean substratum composition	river discharge	valley shape	channel form	hydrology / water flow	Mean anual river [m³/s]
DE_Type 21	Lake outflows	<200, 200-800	10-1,000	sil, cal								
RO31	Temporary stream in plateau area	200-500	10-1,000	sil			Gravel, sand	5-30				

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