Interreg
Danube Transnational Programme
SIMONA

TABLE OF SAMPLING SITES

FOR DRB BASELINE NETWORK IN SIMONA COUNTRIES

WORKING REPORT

Deliverable 3.2.2

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SIMONA

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1. INTRODUCTION

SIMONA project WP3 activity 3.2.2 ”Planning sampling points for DRB baseline network” was initially scheduled to be completed in the fifth period of the project. However, due to the impossibility of carrying out in March and April the sampling of the sediments in the 10 stations proposed in the third project period for each of the test area (Drava, Upper Tisa, Lower Danube), due to pandemia restrictions, the project members worked at the draft report of the national baseline stations, D.3.2.2.

Moreover, it was proposed to have a pre-training of the samplers, which could not take place in the fourth period, also because of the above-mentioned reasons.

SIMONA developed the DRB baseline network (2 sampling stations per contry) for HS sediment monitoring that serves as a benchmark for the longterm harmonised transnational sediment quality assessment. For all the 3 case studies the field samples will be analysed in one project reference laboratory, and all the sampling, laboratory and evaluation procedures will follow the SIMONA protocols. The samples of DRB baseline network will be analysed in national laboratories accredided for sediment analyses, also in compliance with the SIMONA protocols.

The matrices to be analysed consist in: stream/bottom sediment, suspended sediment and floodplain sediment, according to the specifications of SIMONA Quality Sampling Protocol (Šorša, A., The SIMONA Project Team. 2019). The hazardous substances in these matrices are listed in Appendix 2 of the above-mentioned SIMONA protocol.

Some of the proposed baseline monitoring stations might suffer changes/replacements, after their check on the field will be possible.

2. CRITERIA USED FOR SELECTION

For the selection of the 2 representative sampling points for the DRB baseline network, the criteria settled in the following documents and standards were applied:

- ISO 5667 - 12:2017
- ISO 5667 - 17:2008
- Guidance Document No. 25
- TNMN monitoring sites criteria
- SIMONA transnationally harmonized sediment sampling protocol

The criteria (Table 1) were discussed and completed during the SIMONA Workshop in Sofia (Bulgaria) in October 2019, where priorities have been assigned to each one.

The location of the 26 baseline stations selected for SIMONA countries are presented in Fig. 1.

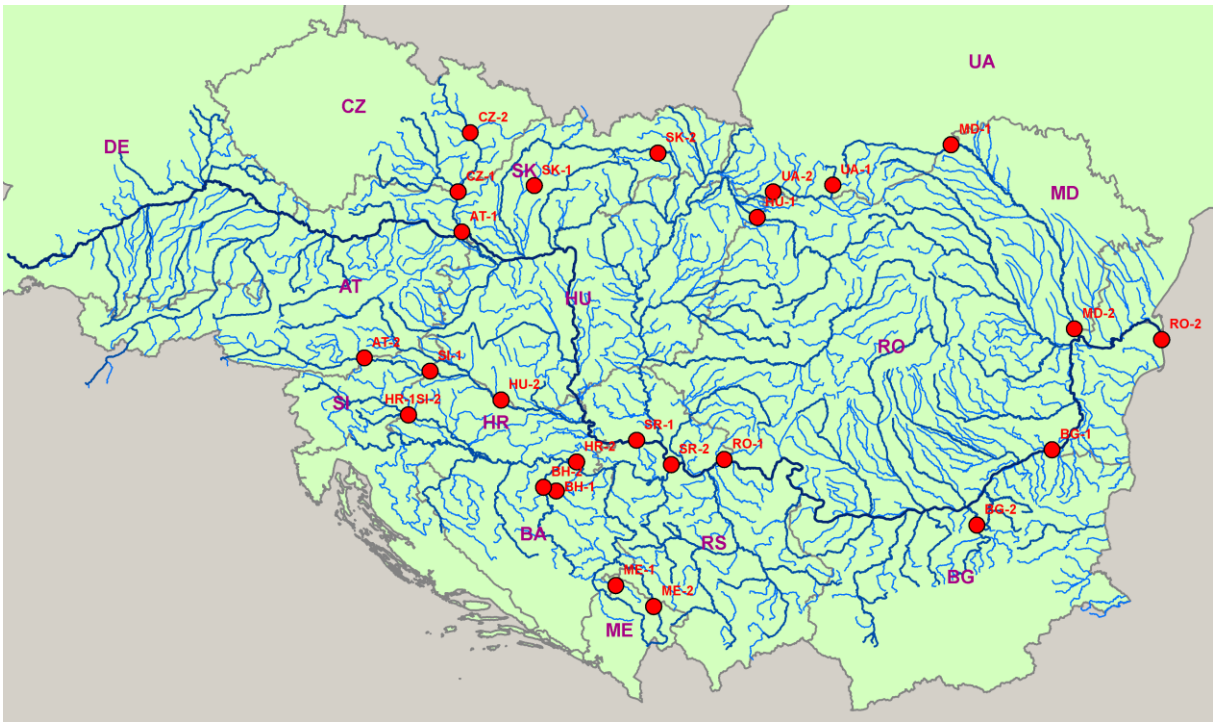

Fig.1: Location of SIMONA baseline monitoring stations in the DRB

Table 1: Sets of criteria used for selection of national baseline DRB sediment sampling stations

Origin of criteria	No.	Question
Discussed at Upper TISA WG 1st Workshop of the SIMONA Project	1	Is there enough background data?
	2	Data on water body status?
	3	Transbordary catchment
	4	Ease of transbordary travel to the sampling points (visa, roads, distances) for the nonlocal members
	5	Point pollution sources for heavy metals (mines, smelters, etc) and a known soil chemistry map the envisaged pollutants
	6	Point pollution sources for organic pollutants (chemical, pharmaceutical, food, rubber, paint industry, etc) and a known soil chemistry map the envisaged pollutants
	7	Intensive agricultural activity (pesticides and fertilizers) and a known soil chemistry map regarding the envisaged pollutants
	8	Is there archived/regular water/suspendend sediments/sediment monitoring data?
	9	Is there an TNMN monitoring point?
	10	Is there an FOREGS monitoring point/data?
	11	Ease of acces to the to the sampling points (roads, distances) for the sampling team
	12	Good quality of sediment granularity (creeping sediment), to collect the required quantity of relevant grains for every fraction
	13	Other high accident risk index spots or areas from industries in the region demonstrated by ICPDR
	14	Catchment with significant flood plains to collect floodplain sediments
	15	ASP/stakeholders/local water body administrators confirms the utility of the sampling points
	16	Water depth (the sampling operation is technically driven more by water depth then by type of water body)
	17	Samples to be collected from physically undisturbed sediments (external disturbances tourism, boating, debris)
	18	period of sampling: time of lowest water discharge rate, without biodisturbation (during winter?). Attention to flood events or icecover
ISO 5667-12:2017	1	Meteorological and climatic (e.g. temperature, precipitation, solar radiation);
	2	Hydrological (e.g. discharge, water depth, current, velocity);
	3	Geological (e.g. characteristics/composition/stratification of sediments, erosion);
	4	Biological (e.g. with reference to macrophyte accumulation).
ISO 5667-17:2008	1	Sampling points should be representative for an extended section of the river;
	2	Sampling sites should consider the existing network of water-monitoring sites so that could be used related results;
	3	Location for sampling should be placed taking in account the sources of pollution;
	4	The sampling site has to have proper access to the water, a satisfactory site for the portable centrifuge, the protection of the sampling equipment from vandals;
	5	The knowledge of the tributary loadings;
	6	Collection of suspended sediment samples as far downstream as possible, but above confluence;
	7	There should be preliminary investigations at potential monitoring sites to determine representativeness of the sampling location;
	8	Suitable sampling points are often near bridges or gauging stations.
Guidance document No. 25	1	Sampling sediments should perform at sites representative of the water body;
	2	There is no need for even distribution of sampling sites in a water body;
	3	Knowledge of hydrological and geo-morphological characteristics;
	4	Knowing the pollution sources from present or past industries;
	5	Acquaintance of earlier studies and current monitoring programmes;
	6	Conduction of a dedicated preliminary survey;
	7	Understanding hydrogeological conditions like that the tributaries often transport different material because they have different geological background;
	8	The sampling site should be located downstream of the discharges or the tributary confluence, at a point where complete mixing has been established;
	9	The sampling sites should not be placed in the mixing zones;
	10	Determination of sediment homogeneity.
TNMN monitoring sites criteria	1	The already monitoring sites which are also suitable long-term trend analysis:
	1,1	Placed just upstream/downstream of an international border;
	1,2	Located upstream of confluences between Danube and main tributaries or main tributaries and larger sub-tributaries;
	1,3	Positioned downstream of the major point sources and
	1,4	Posted to control important water uses.
	2	Sites relevant for assessing pollutant loads which are transferred across boundaries of Contracting Parties and are transported into the marine environment.

3. COUNTRIES BASELINE STATIONS

3.1. AUSTRIA

The national baseline monitoring stations selected for Austria are shown in Table 2 and an overview map of these in Fig.2.

Table 2: Selected sediment sampling stations for DRB baseline network in Austria

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	GZÜV-FW31000377	Danube	Hainburg	48.164344	16.992605	Austrian Federal Ministry of Agriculture, Regions and Tourism	Austrian Federal Ministry of Agriculture, Regions and Tourism	Austrian Federal Ministry of Agriculture, Regions and Tourism	yes	
2.	GZÜV-FW21500097	Drau	Lavamünd	46.640657	14.943968	Austrian Federal Ministry of Agriculture, Regions and Tourism	Austrian Federal Ministry of Agriculture, Regions and Tourism	Austrian Federal Ministry of Agriculture, Regions and Tourism	yes	

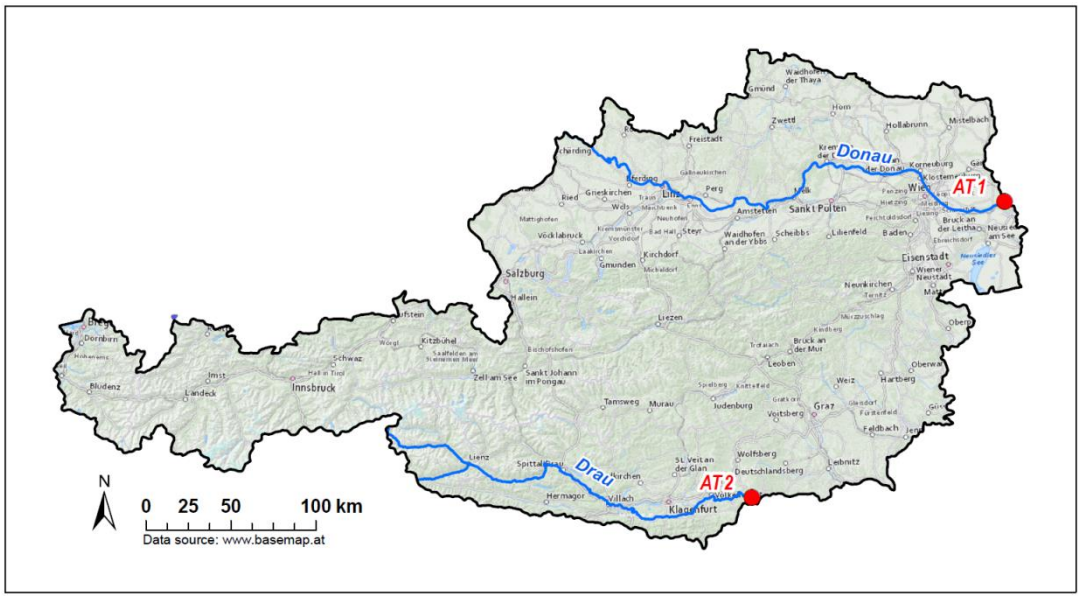

Fig.2: Overview map of Austria with localisation of two sampling stations (stations marked with symbols in red colour)

3.1.1. Donau - Hainburg

The sampling point AT 1 Donau - Hainburg is one of the points where bottom sediments are monitored by the Austrian Water Authority and is also part of the Trans National Monitoring Network – TNMN (SM1, SM2). It is situated on the Danube River near the Austrian town of Hainburg and near the border to Slovakia. In Fig.3 a Google map of the localisation of station AT 2 is shown.

Fig.3: Google map with localisation of sampling station AT 1 (station marked with symbol in red colour)

3.1.2. Drau - Lavamünd

The sampling point AT 2 Drau - Lavamünd is one of the points where bottom sediments are monitored by the Austrian Water Authority (SM1). It is situated on the Drava River at the town of Lavamünd and near the Austrian border to Slovenia. In Fig.4 a Google map of the localisation of station AT 2 is shown.

Fig.4: Google map with localisation of sampling station AT 2 (station marked by symbol in red colour).

3.2. BOSNIA AND HERZEGOVINA

The national baseline monitoring stations selected for Bosnia and Herzegovina are shown in Table 3.

Table 3: Selected sediment sampling stations for DRB baseline network in Bosnia and Herzegovina

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	BH-1	Spreca	Karanovak (Gracanica)	44.6961111	18.2736111	"Sava river watershed agency" Sarajevo			yes	
2.	BH-2	Bosna	Rudanka	44.763072	18.050125	Vode Srpske	Vode Srpske	Vode Srpske	yes	

3.2.1. BH-1 (FEDERATION OF B&H) Karanovak

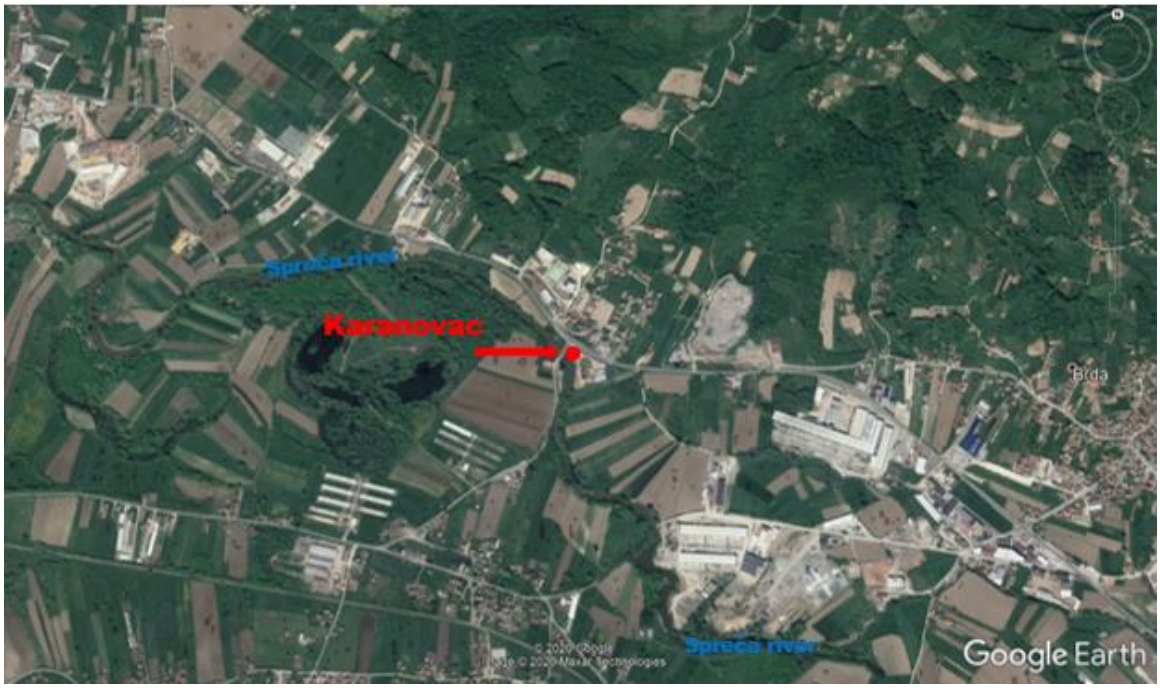

Fig.5: Sampling point Karanovac on the river Spreča – Bosnia and Herzegovina (Federation of Bosnia and Herzegovina) (Google Maps)

The sampling point is located on the right bank of the river Spreča, near the town of Gračanica. The sampling point was selected due to the different quality of sediments from different natural / geomorphological conditions and land use. In addition, upstream of the sampling point, there are a number of industrial plants as well as coal mines. Also water measuring stations are located near this sampling point.

Fig.6: Location of the Karanovac sampling point on the map of Bosnia and Herzegovina

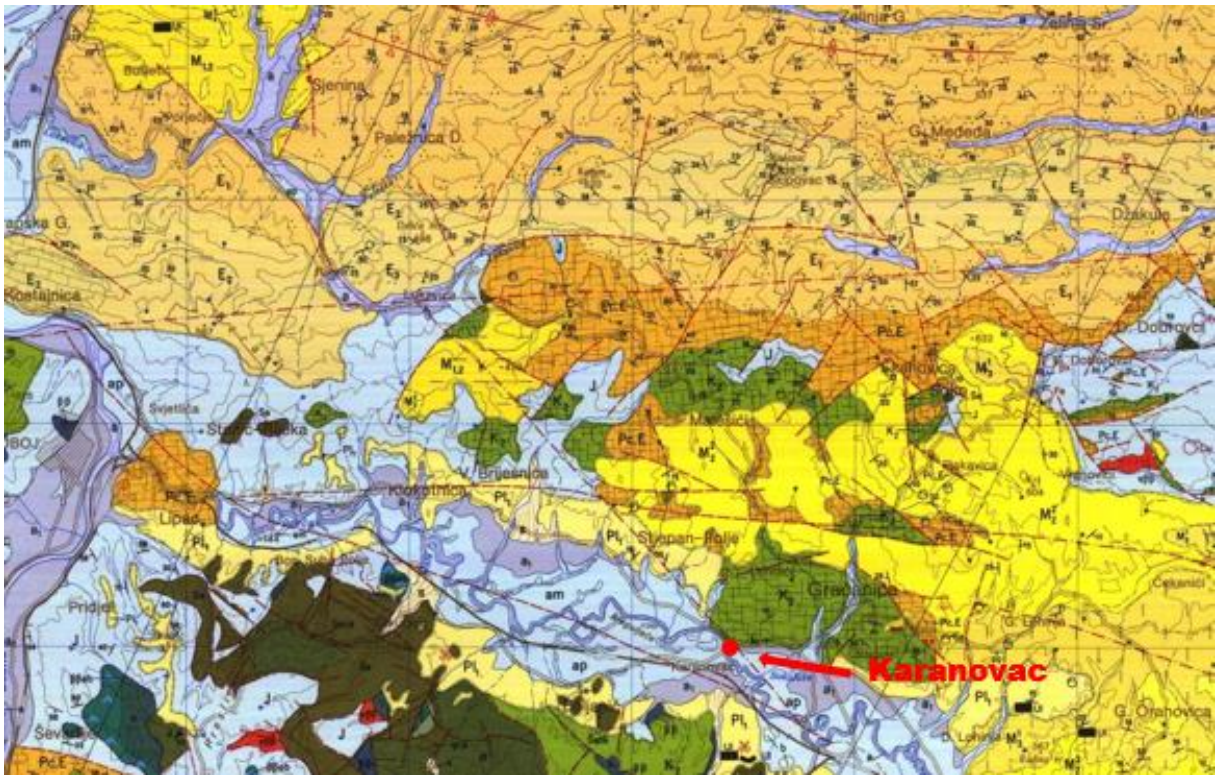

Fig.7: Geological map of the wider area showing the sampling point Karanovac on the river Spreča - Bosnia and Herzegovina (Federation of Bosnia and Herzegovina)

3.2.2. BH-2 (REPUBLIKA SRPSKA) Rudanka

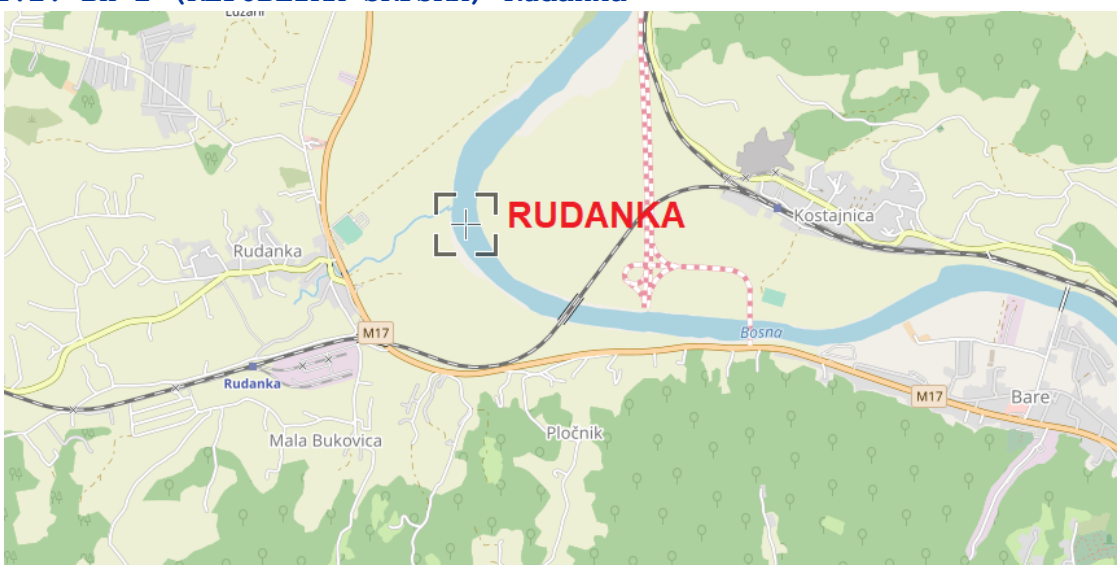

Fig.8: Open Steet map with Rudanka station on Bosna river, in Republika Srpska (Bosnia and Herzegovina)

3.3. BULGARIA

Sampling sites for DRB baseline network, like the sampling sites in the South Danube test area, were selected upon the following major criteria:

- Transnational character;
- Covering river of different size (small, medium, and large), including the Danube River;
- Existing sediment/water monitoring sites;
- Different geology;
- Diverse pollution sources;
- Good infrastructure.

The following sites were selected:

- 1 transnational sampling point/transect (RO/BG) on the Danube River at Silistra (Bulgaria);
- 1 sampling points on the Yantra River at Karantsi.

Table 4: Selected sediment sampling stations for DRB baseline network in Bulgaria

Nr.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	BG1DU00999MS100R	**Danube**	Danube, port Silistra, right bank	44.12497	27.2675	DRBD Pleven	DRBD Pleven	GI-BAS	yes	
2.	BG1YN00319MS030	**Yantra**	Yantra at Karantsi	43.38694	25.66812	DRBD Pleven	DRBD Pleven	GI-BAS	yes	

The points have been approved by the Bulgarian Water Authorities (DBRD Pleven). The characteristics of the selected sample points are shown in Table 4 and their overall spatial distribution in Fig 9.

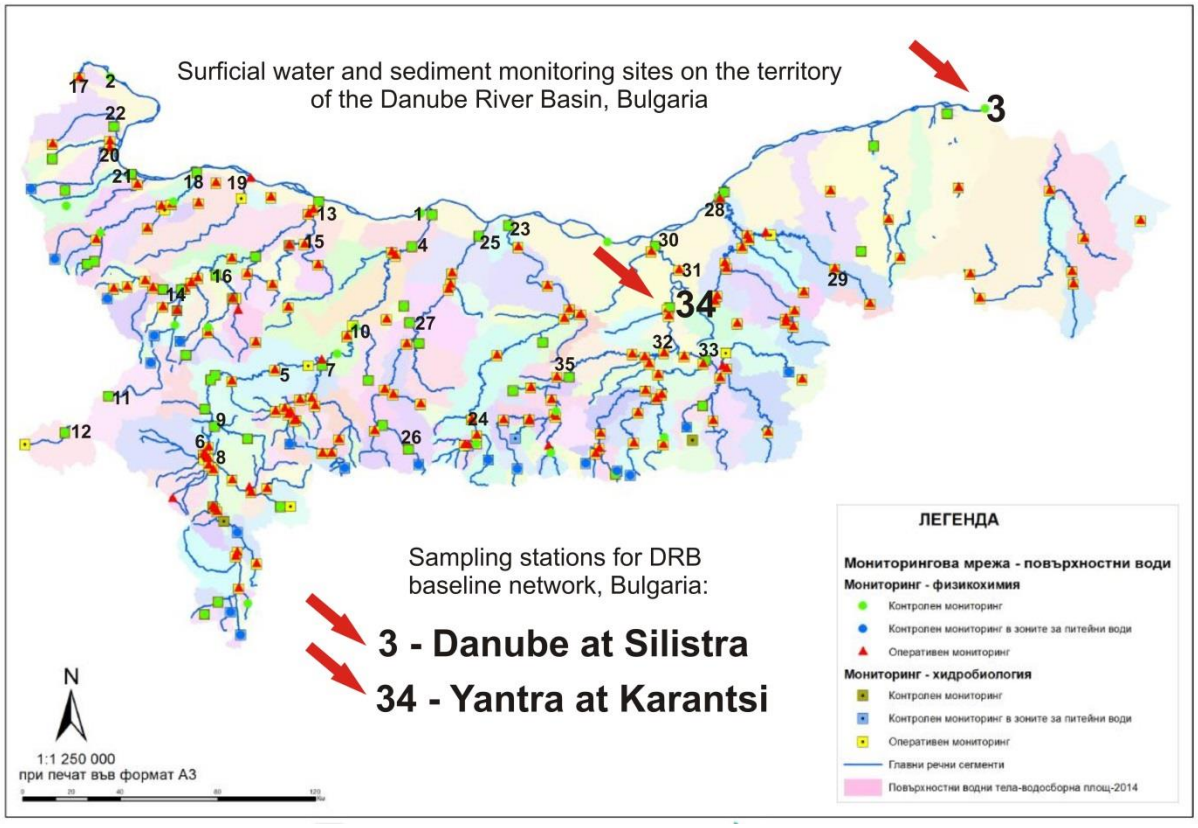

Fig.9: Overall view of the sediment sampling stations for DRB baseline network in Bulgaria

3.3.1. Danube, Silistra, port Silistra

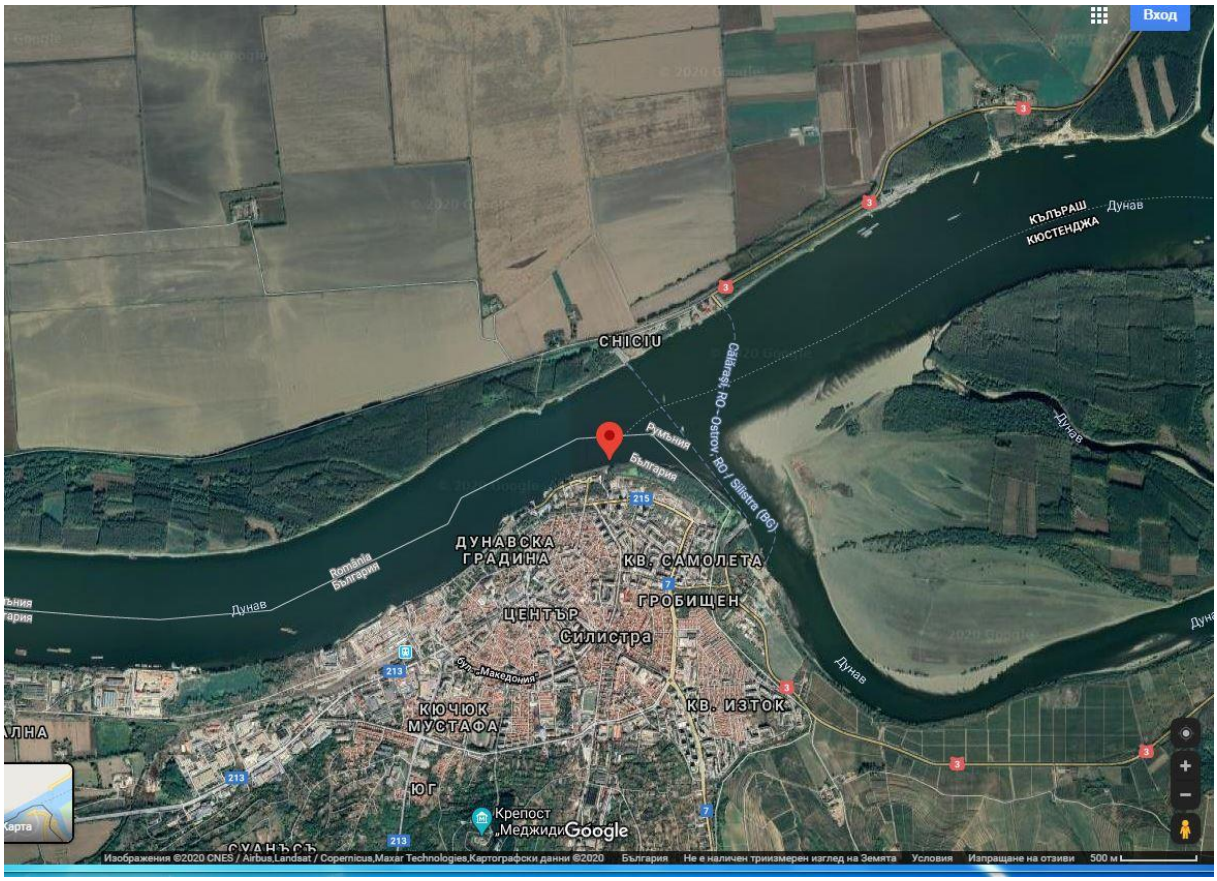

Fig.10: Sampling point Danube - Silistra - Bulgaria/Romania (Google Maps)

Danube at Silistra sampling point is one of the points where bottom sediments are monitored by the Bulgarian Water Authority and is also part of the Trans National Monitoring Network (TNMN). It is situated on the Danube River at the town of Silistra, port Silistra, right bank. Posible pollution from industrial and agricultural activity.

National Bulgarian water and sediment monitoring: Yes
Monitoring type: (S, TNMN) surveillance monitoring program
Monitoring programs: Hazardous substances (HS) and Basic physicochemical parameters

3.3.2. Yantra at Karantsi

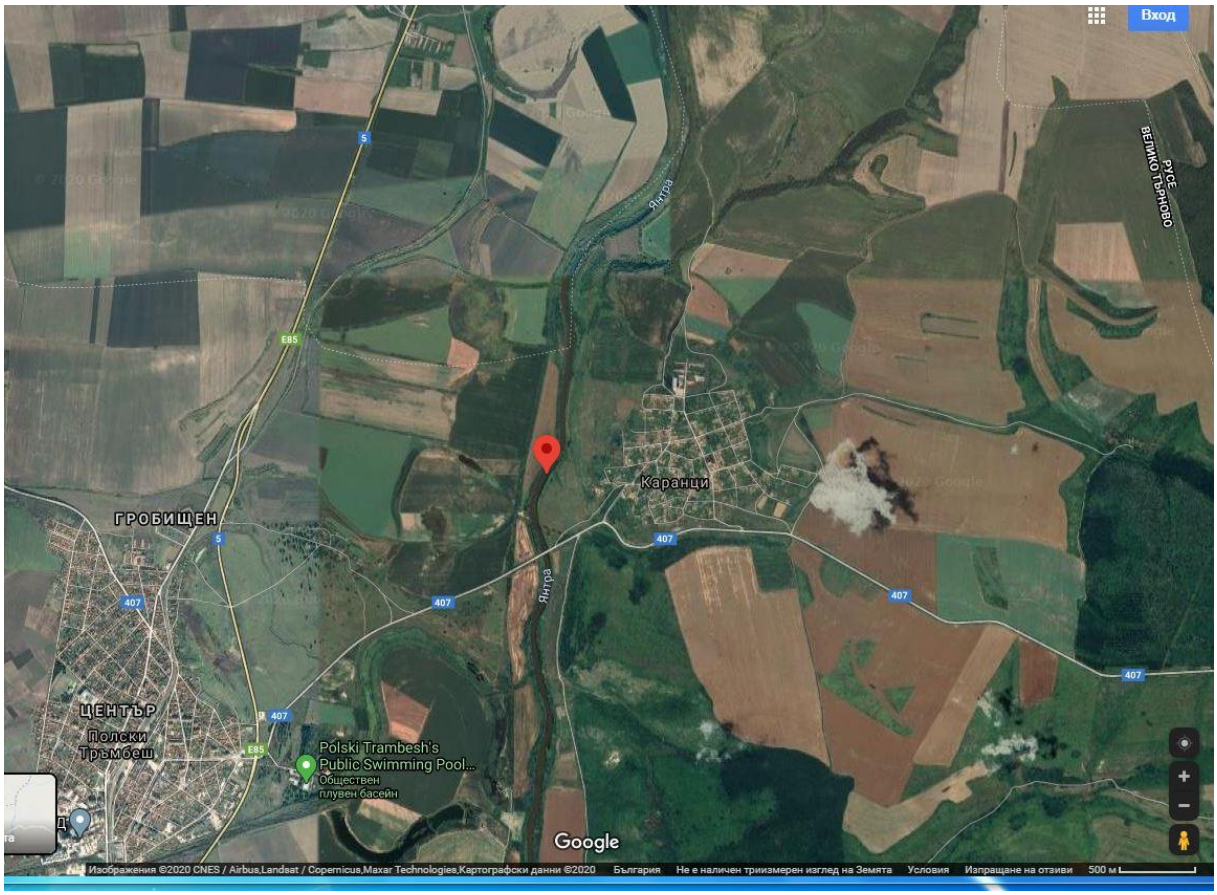

Fig.11: Sampling point Yantra at Karantsi - Bulgaria (Google Maps)

Yantra sampling point is one of the points where bottom sediments are monitored by the Bulgarian Water Authority and is also part of the Trans National Monitoring Network (TNMN). It's situated on the Yantra River, 50 km before the confluence with the Danube. Possible pollution from industrial and agricultural activity.

National Bulgarian water and sediment monitoring: Yes
Monitoring type: (S, TNMN) surveillance monitoring program
Monitoring programs: Hazardous substances (HS) and Basic physicochemical parameters

3.4 CROATIA

The sampling sites for DRB baseline network were selected according to the following major criteria:

- Transnational character;
- Covering river of different size;
- Existing sediment/water monitoring sites;
- Diverse pollution sources;
- Good infrastructure.

The following sites were selected:

- 1 sampling point at the border (SLO/CRO) on the Sava River near places Jesenice (Slovenia) and Drenje (Croatia);
- 1 transnational sampling point/transect (B&H/CRO) on the Sava River near places Orašje (B&H) and Županja (Croatia).

Fig.12: The Google map of Croatia and neighboring countries with the sampling locations

The national baseline monitoring stations selected for Croatia are shown in Table 5.

Table 5: Selected sediment sampling stations for DRB baseline network in Croatia

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	HR-1	Sava	Jesenice	45.861	15.692	Croatian Waters				
2.	HR-2	Sava	Županja	45.04	18.696	Croatian Waters				

3.4.1. Jesenice

Fig.13: Sampling point Jesenice at Sava River - Croatia (Google Maps)

3.4.2. Županja

Fig.14: Sampling point Županja at Sava River - Croatia (Google Maps)

The both proposed sampling points are part of the Trans National Monitoring Network (TNMN). One locatiotn is on the left bank of Sava River, near Slovenian town Jesenice and Croatian town Drenje. The second proposed sampling point is located downstrem from Croatian town Županja and near Bosnian town Orašje, on the left, in the middle of river and right bank of the Sava River. Posible pollution from industrial and agricultural activity.

Responsible for monitoring: Croatian Waters.

Monitoring type: TNMN Surveillance Monitoring II.

3.5. CZECH REPUBLIC

Sampling points were selected with respect to different quality of sediments from the different natural/geomorphological condition and land use. We regularly monitor quantity of suspended solids (daily collection of sample) and quality of: sediment (twice per year), suspended solids (4 times per year), passive sampling of polar organic compounds - POCIS (twice per year) and biota (once per year) at selected sites. Also water gauging stations are situated close to these sampling sites.

The national baseline monitoring stations selected for Czech Republic are shown in Table 6.

Table 6: Selected sediment sampling stations for DRB baseline network in Czech Republic

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	CZ-1	Morava	Lanžhot (ID 0402)	48.6870237	16.*9884817*				yes	Monitoring since 1999
2.	CZ-2	Bečva	Troubky (ID 3670)	49.4345193	17,340237				yes	Monitoring since 1999

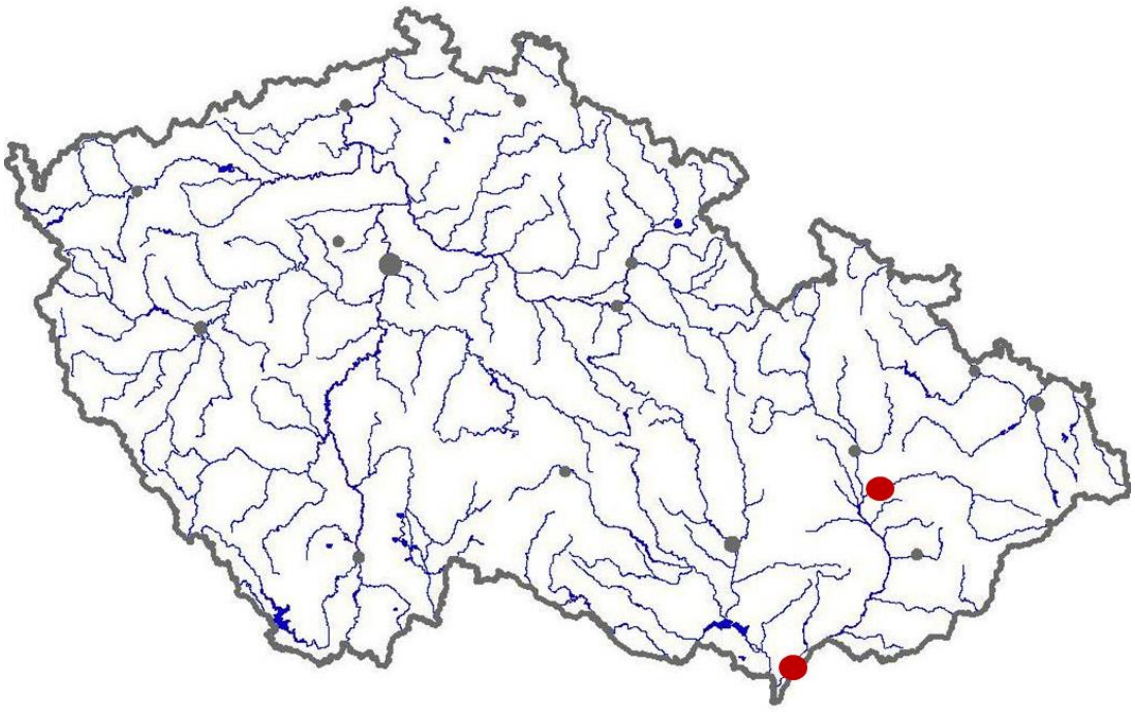

Fig.15: Map of Czech Republic with selected sampling sites (red points)

Table 7: Critria met in selecting the Czech baseline monitoring stations

Origin of criteria	No.	Question	Catchment in CZ Lanžhot - Morava River	Catchment in CZ Troubky - Bečva River
Discussed at Upper TISA WG 1st Workshop of the SIMONA Project	1	Is there enough background data?		
	2	Data on water body status?	yes	yes
	3	Transbordary catchment	yes	no
	4	Ease of transbordary travel to the sampling points (visa, roads, distances) for the nonlocal members	yes	yes
	5	Point pollution sources for heavy metals (mines, smelters, etc) and a known soil chemistry map the envisaged pollutants	yes	yes
	6	Point pollution sources for organic pollutants (chemical, pharmaceutical, food, rubber, paint industry, etc) and a known soil chemistry map the envisaged pollutants	yes	yes
	7	Intensive agricultural activity (pesticides and fertilizers) and a known soil chemistry map regarding the envisaged pollutants	yes	yes
	8	Is there archived/regular water/suspendend sediments/sediment monitoring data?	yes	yes
	9	Is there an TNMN monitoring point?	yes	no
	10	Is there an FOREGS monitoring point/data?	not sure, probably not	not sure, probably not
	11	Ease of acces to the to the sampling points (roads, distances) for the sampling team	yes	yes
	12	Good quality of sediment granularity (creeping sediment), to collect the required quantity of relevant grains for every fraction	yes	yes
	13	Other high accident risk index spots or areas from industries in the region demonstrated by ICPDR	yes	yes
	14	Catchment with significant flood plains to collect floodplain sediments	possible	possible
	15	ASP/stakeholders/local water body administrators confirms the utility of the sampling points	yes	yes
	16	Water depth (the sampling operation is technically driven more by water depth then by type of water body)	yes	yes
	17	Samples to be collected from physically undisturbed sediments (external disturbances tourism, boating, debris)	yes	yes
	18	period of sampling: time of lowest water discharge rate, without biodisturbation (during winter?). Attention to flood events or icecover	summer (early autumn)	summer (earlyautumn)
ISO 5667-12:2017	1	Meteorological and climatic (e.g. temperature, precipitation, solar radiation);	yes (it is possible use data from our institution)	yes (it is possible use data from our institution)
	2	Hydrological (e.g. discharge, water depth, current, velocity);	yes	yes
	3	Geological (e.g. characteristics/composition/stratification of sediments, erosion);	yes	yes
	4	Biological (e.g. with reference to macrophyte accumulation).	periphyton, invertebrates, zebra mussel, 0+ and adults fish	periphyton, invertebrates, zebra mussel, 0+ and adults fish
ISO 5667-17:2008	1	Sampling points should be representative for an extended section of the river;	yes	yes
	2	Sampling sites should consider the existing network of water-monitoring sites so that could be used related results;	yes	yes
	3	Location for sampling should be placed taking in account the sources of pollution;	yes	yes
	4	The sampling site has to have proper access to the water, a satisfactory site for the portable centrifuge, the protection of the sampling equipment from vandals;	access ok, protection from vandals no	access ok, protection from vandals no
	5	The knowledge of the tributary loadings;	yes	no
	6	Collection of suspended sediment samples as far downstream as possible, but above confluence;	yes	yes
	7	There should be preliminary investigations at potential monitoring sites to determine representativeness of the sampling location;	yes	yes
	8	Suitable sampling points are often near bridges or gauging stations.	yes	yes
Guidance document No. 25	1	Sampling sediments should perform at sites representative of the water body;	yes	yes
	2	There is no need for even distribution of sampling sites in a water body;	yes	yes
	3	Knowledge of hydrological and geo-morphological characteristics;	yes	yes
	4	Knowing the pollution sources from present or past industries;	probably yes	
	5	Acquaintance of earlier studies and current monitoring programmes;	yes	yes
	6	Conduction of a dedicated preliminary survey;	?	?
	7	Understanding hydrogeological conditions like that the tributaries often transport different material because they have different geological background;	yes	yes
	8	The sampling site should be located downstream of the discharges or the tributary confluence, at a point where complete mixing has been established;	yes	yes
	9	The sampling sites should not be placed in the mixing zones;	yes	yes
	10	Determination of sediment homogeneity.	yes	yes
TNMN monitoring sites criteria	1	The already monitoring sites which are also suitable long-term trend analysis:	yes	yes
	1,1	Placed just upstream/downstream of an international border;	yes	no
	1,2	Located upstream of confluences between Danube and main tributaries or main tributaries and larger sub-tributaries;	one of tha main tributaries of Danube	sub trubutaries (one of the main triburtaries of Morava River)
	1,3	Positioned downstream of the major point sources and	yes	yes
	1,4	Posted to control important water uses.	yes	yes
	2	Sites relevant for assessing pollutant loads which are transferred across boundaries of Contracting Parties and are transported into the marine environment.	yes (transport polutant fom CZ to Danube River)	no

3.5.1. Lanžhot - Morava River

Fig.16: Field photos, Google and topographic map of Morava river at Lanžhot

3.5.2. Troubky - Bečva River

Fig.17: Field photos, Google and topographic map of Bečva river at Troubky

Table 8: Basic statistical parameters of the analyzed components - monitoring 1999 - 2018

n - number of samples; x - arithmetic mean; med - median; s - standard deviation; min - minimum; max - maximum (note - the metals are analyzed at fraction smaller than 20 µm), sum of 5PAHs ([benzo[b]fluoranthen, benzo[k]fluoranthen, benzo[a]pyrene, benzo[ghi]perylene and ideno[1,2,3cd]pyrene]).

Locality ID	**Morava - Lanzhot**						**Becva - Troubky**					
	n	x	med	min	max	s	n	x	med	min	max	s
Fe (mg.kg^{-1})	4	50625	48950	45900	59300	6467.032	2	45700	45700	43100	48300	3676.955
Mn (mg.kg^{-1})	23	1351	1300	366	2741	696.1492	20	691.7	702.0	122.0	1200	295.7625
Al (mg.kg^{-1})	37	33857	33800	6050	68100	15419.7	34	314200	28450	7330	69800	14741.29
As (mg.kg^{-1})	43	10.10	9.0	1.0	38.8	6.56	40	9.677	7.000	2.130	43.700	8.4135
Cd (mg.kg^{-1})	43	0.596	0.430	0.06	2.35	0.498	40	0.5236	0.400	0.040	2.1400	0.4768
Co (mg.kg^{-1})	25	13.21	12.98	4.95	33.70	7.777	22	10.319	10.235	4.10	18.0	4.11
Cr (mg.kg^{-1})	43	79.12	80.0	14.70	223.00	40.385	40	55.98	55.0	12.20	116.0	2.0712
Cu (mg.kg^{-1})	43	37.04	41.00	5.29	77.0	17.1789	40	37.87	40.50	6.28	78.60	14.2528
Hg (mg.kg^{-1})	43	0.2533	0.200	0.0180	1.160	0.1982	40	0.2287	0.20	0.02	0.71	0.1594
Ni (mg.kg^{-1})	43	49.43	49.50	12.80	100.00	19.5253	40	46.71	47.45	14.40	78.20	14.1911
Pb (mg.kg^{-1})	43	30.82	34.00	5.17	55.7	14.0117	40	32.55	35.45	6.10	51.0	12.0323
Sb (mg.kg^{-1})	33	1.677	1.000	0.1	5.0	1.5375.0	32	1.877	1.170	0.1	5.0	1.5533
Se (mg.kg^{-1})	19	1.373	1.000	1.0	2.940	0.6530	13	1.819	1.0	1.0	4.88	1.3164
Zn (mg.kg^{-1})	43	232.1	242.0	45.0	591.0	119.4375	40	159.8	168.5	42.7	247.0	46.8786
Ba (mg.kg^{-1})	6	271.2	306.5	50.1	458.0	176.284	40	1.375	1.3	0.495	2.8	0.51
Anthracen (µg.kg^{-1})	43	73.6	55.0	1.0	306.0	64.6672	40	194.8	186.5	1.0	541.0	147.5625
Fluoranthene (µg.kg^{-1})	43	383.6	276.0	1.0	1426.0	321.5372	40	1899	1875	324	4790	1157.742
Benzo[*a*]pyrene (µg.kg^{-1})	43	188.7	120.0	28.0	742.0	179.8682	40	739.7	6.97.5	84.0	1820.0	480.8906
Sum of 5 PAHs (µg.kg^{-1})	43	729.4	555.0	56.0	3122.0	679.8087	40	4759	4439	818	12818	2855.744
DEHP (µg.kg^{-1})	16	245.7	140.0	1.0	924.0	272.2912	17	813.8	1020.0	1.0	1500.0	537.5346
Hexachlorobenzene (µg.kg^{-1})	43	3.708	3.00	0.4	43.0	6.6416	40	5.221	3.000	0.500	76.00	12.2251

3.6. HUNGARY

The national baseline monitoring stations selected for Hungary are shown in Table 9.

Table 9: Selected sediment sampling stations for DRB baseline network in Hungary

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	HU11	Tisa - Somes	Csenger	47.840912	22.692401	General Directorate of Water Management	General Directorate of Water Management	Upper-Tisa Water Management Directorate	yes	Monitorng since 1970
2.	HU101180198	Drava	Barcs	45.948333	17.428816	General Directorate of Water Management	General Directorate of Water Management	Upper-Tisa Water Management Directorate	yes	Monitorng since 1970

3.6.1. Csenger

Fig.18: Google map in the area of Csenger sampling station on Tisa (Hungary – Romania)

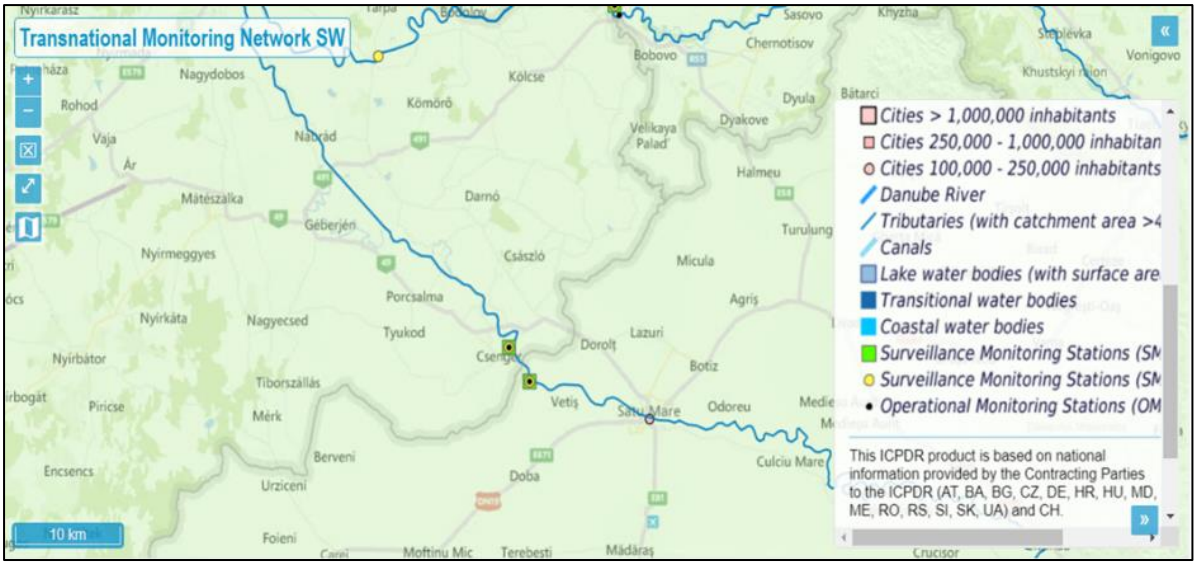

Fig.19: Transnational Monitoring Network map in the area of Csenger sampling station on Tisa (Hungary – Romania)

Operational station type: YES

Surveillance station type (SM1):YES

Surveillance programme of the ICPDR of specific pressure SM2):YES

Monitoring program: water and sediment

3.6.2. Barcs

The whole length of the river is approximately 749 km, it is running 140 km long, along the border between Hungary and Croatia. These countries are downstream regions of the river with meandering character, different biogeographical properties and sedimentation. There is a regional historical pollution, originating mainly from mining and smelting industry in the Alps, that can be found in the sediments and in the soils in the floodplain. Moreover, industrial areas, water power plants, water reservoirs, agricultural areas, forests and numerous settlements can be found all along the river.

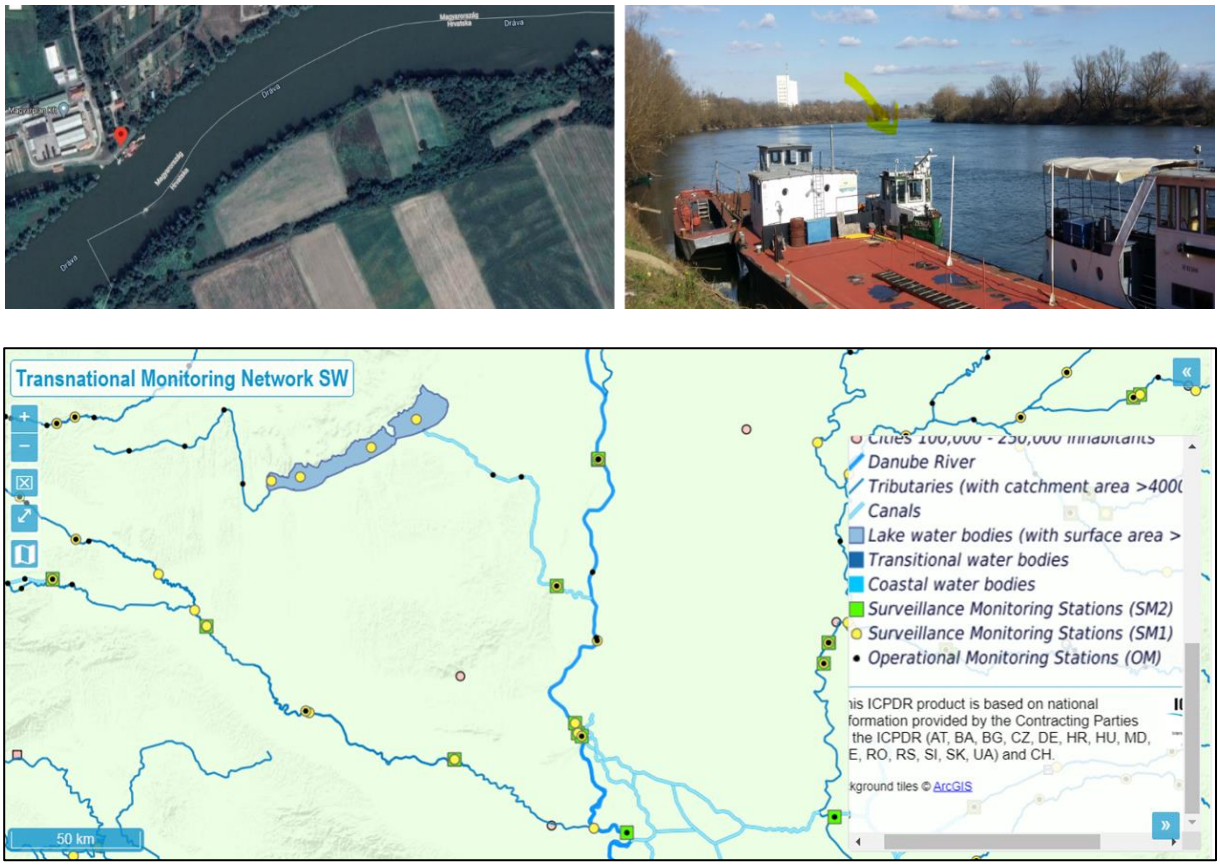

Fig.20: Google map, local photo and Transnational Monitoring Network map in the area of Barcs sampling station on Drava (Hungary – Croatia)

Operational station type: YES

Surveillance station type (SM1):YES

Surveillance programme of the ICPDR of specific pressure SM2): NO but important river on RBD level

Monitoring program: water and sediment

3.7. REPUBLIC OF MOLDAVIA

The national baseline monitoring stations selected for The Republic of Moldovia are shown in Table 10.

Table 10 Selected sediment sampling stations for DRB baseline network in Moldavia

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	MD-1	Prut	Criva	48.2644883	26.660255				yes	
2.	MD-2	Prut	Slobozia Mare	45.1467472	29.765025				yes	

Fig.21: Localisation of the baseline stations in the Republic of Moldavia on Prut river

3.7.1. Criva on Prut

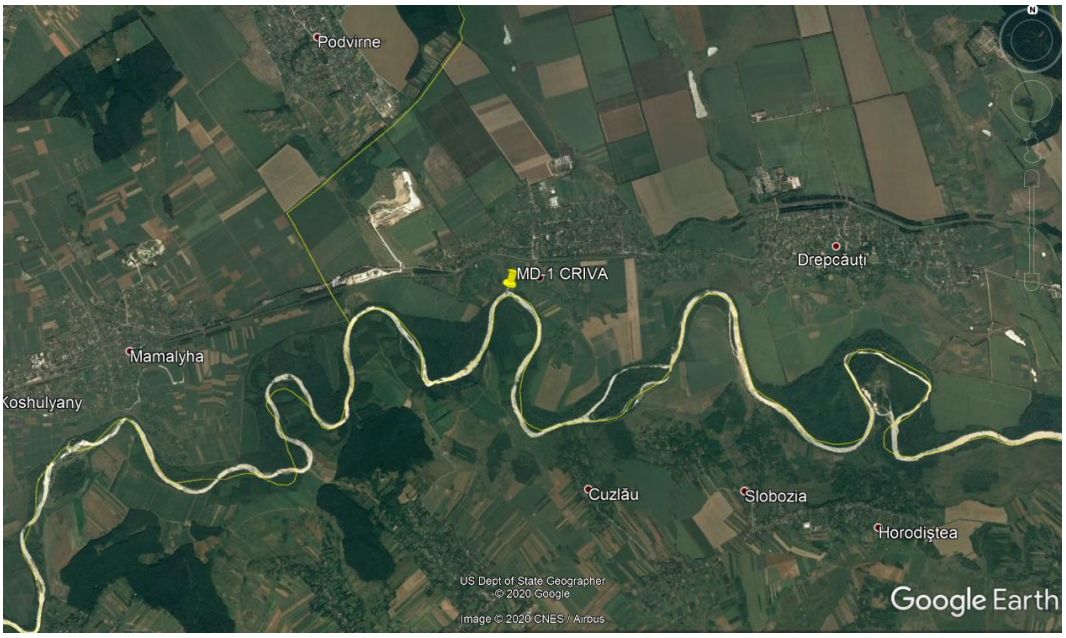

Fig.22: Station Criva on Prut river, in the northern part of the Republic of Moldavia

3.7.2. Slobozia Mare

Fig.23: Station Slobozia Mare on Prut river, in the southern part of the Republic of Moldavia

3.8. MONTENEGRO

Systematic examination of surface and underground waters quality on Montenegro territory is done Institute of Hydrometeorology and Seismology of Montenegro (IHMS) in accordance with the Programme of systematic examination of water quality and quantity in Montenegro, which brings the competent Ministry of Agriculture and Rural Development (MARD). By this Programme is defined the network station for water quality, as well as scope, kind and frequency of analysis of water quality.

The monitoring of surface and underground water quality is done on station network for water quality, which encompass sampling, physico-chemical and biological-saprobiological analysis, hydrobiological water analysis, as well as hydromorphological screening from 2020, aiming to determine authoritative indicators of water quality. We decided to chose sampling sites for DRB baseline network in existing monitoring stations.

Area of the Black Sea drainage basin in Montenegro is somewhat larger than the area of the Adriatic Sea drainage basin, covering about 7260 km^2. From this part on, the Ibar River drains through the Zapadna Morava River, while Lim, Ćehotina, Piva and Tara river with its tributary Komarnica drain through the Drina River.

The national baseline monitoring stations selected for Montenegro are shown in Table 11.

Table 11: Selected sediment sampling stations for DRB baseline network in Montenegro

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	ME-1	Ćehotina	Gradac	43.3897944	19.1510972	MARD	-	IHMS	IHMS	
2.	ME-2	Lim	Bijelo Polje	43.0566	19.7755555	MARD	-	IHMS	IHMS	

Fig.24: Locations of the two Montenegrian baseline DRB sampling stations

3.8.1. Gradac - Ćehotina river

The Ćehotina River originates from the Stožer mountain. It is the second largest tributary of Drina after the Lim River. It is composed of Koraci and Brezovski streams. Tributaries of the Ćehotina River are Koričkа, Maočnica, Vezišnica and Voloder. Area of the Ćehotina River basin to the Hydrological Stations Gradac is 809,8 km^2. Its length is 128,5 km. Hydrological stations at the Ćehotina River are Ćirovići (became operational in 1978), Pljevlja (1948) and Gradac (1963).

Fig.25: Google Earth image in the area of sampling station on Ćehotina river

3.8.2. Bijelo Polje - Lim river

Lim River is the most important Montenegrin river from the hydrographic point of view. It flows out of the Lake Plav. Area of the Lim River basin to Dobrakovo is 2880 km^2. Its length is 234,2 km. Observations and measuring are currently performed at the stations: Plav, Andrijevica, Zaton, Berane, Bijelo Polje and Dobrakovo. With regard to the above hydrological station, the Hyd-met Institute has been keeping a long set of data (about 50 years).

Fig.26: Google Earth image in the area of sampling station on Lim river

3.9. ROMANIA

The national baseline monitoring stations selected for Romania are shown in Table 12. They are located in different geological backgrounds and are important for monitoring by the National Administration Romanian Waters (ANAR – Admnistratia Nationala Apele Romane) for determining the quality of water bodies at the entrance of the Danube in the Romanian territory, and at its flow into the Black Sea(Fig. 27). Both selected stations are used for ANAR for monitoring priority susbtances in water and once per year, in suspended sediments.

Table 12: Selected sediment sampling stations for DRB baseline network in Romania

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	RORW14-1_B1	Danube	Bazias	44.81533	21.383491	ANAR Banat	ANAR Banat	IGR	yes	Monitoring since 1971
2.	RORW14-1_B5	Danube	Sulina	45.158571	29.672069	ANAR Dobrogea	ANAR Dobrogea	IGR	yes	Monitoring since 1979

These stations are also interesting for SIMONA because the status of the Danube waters entering the country is bad at the entrance and good at the flow into the sea.

Fig.27: Locations of the two Romanian baseline DRB sampling stations

3.9.1. Bazias on Danube

Fig.28: Google Earth image and geological map in the area of Bazias sampling station on Danube (Romania – Serbia)

RO-1 monitoring site Bazias is located at kilometer 1072.5 of the Danube River, at its entrance on the Romanian territory.

Apart from the sediments brought by the Danube River upstream from the Romanian territory, in the Bazias sector there are other sources of sediments. At Bazias, the Danube River cuts its course through the western end of the Southern Carpathians. In this area the river is fed by two important tributaries that transport the erosion products of the geological substrate of the Southern Carpathians and Tertiary sedimentary deposits accumulated in the eastern end of the Pannonian Depression. These tributaries are the Caraș and Nera rivers.

They erode Devonian and Lower Carboniferous metamorphic terrains of low grade metamorphic rock associations, as well as sandstones of the Middle Jurassic and Lower Cretaceous limestones from the Reșița-Moldova Nouă Syncline. The complex geology of this part of the South Carpathians is due to the very complicated tectonics, consisting of several litho-tectonic units of the Getic and Supra-Getic realms, affected by deep-seated shear zones. From the area of the eastern confines of the Pannonian Depression, terrigenous sediments of Tertiary (Sarmatian-Pliocene) and Quaternary age are resedimented and transported by the Caraș River into Danube River.

From the geomorphological point of view, the area between Bazias and Gura Vaii is a spectacular gorge, one of the most beautiful in Europe, 134 km long. On the Romanian side there is the natural park Iron Gates (Portile de Fier), the special protected area ROSPA0026, between Danube – Bazias – Portile de Fier. A similar protected area is on the Serbian side.

The sampling sation at Bazias is s transversal section on the Danube, taking measuring points in the left river bank, canter and right bank. Once a year,the National Administration Romanain Waters measures the folloing priority substances in suspended sediments:

- Antracen
- Cadmium and its compunds
- Fluoranten
- Hexclorbenzen
- Hexaclorbutadiena
- Hexaclorciclohexan
- Lead and its counpunds
- Mercury and its compunds
- Pentaclorbenzen
- PAHs,
- Dietilhexil-flatati

The monitoring programmes are of surveillance type (S) and operational type (O).

One per year, priority substances are measured in biota, also during the S and O monitoring programme (Source: Updated Management Plan for the hydrographic sector of South Bant 2016 -2021, in Romanian). The measured substances are:

- Hg
- Hexaclorbenzen
- Hexaclorbutadiena

3.9.2. Sulina on Danube

Fig.29: Google Earth image and geological map in the area of Sulina sampling station on Danube flowing into the Black Sea (Romania)

RO-2 monitoring site is located at the seaward end of the Danube Delta.

The Danube Delta is a vast sedimentary area, over 4000 sq. km, with a shape resembling a triangle, crossed by the Sulina canal, 64 km long, which follows mostly its old, natural course, to which some adjustments have been made over time, to facilitate navigation.

The Danube Delta is the youngest part of the territory Romania, geologically speaking, and largely provides sediments that are transported along the Sulina canal.

The Sulina canal is feed by erroded older deltaic sediments accumulated in the recent geological history of this area (mainly Holocene). The sediment cover of the Delta constitutes the so-called delta plain, and consists of mud and sand successions accumulated subaerially and subaqueous, in various geomorphic features as steamlets and shallow channels, lakes and ponds, marshes, swamps, banks and levees, floodplains, old strand plains, wetlands. In the chanels, which are the most active sediment transfer routes, fine grained sediments accumulate as fining-upward sands and muds.

Depending on the hydrological regime, mainly by flooding, the sandy and muddy delta plain sediments are eroded and set in motion as bedload and in suspension. The sandy bedload and suspended sediment are carried toward the wave-dominated delta front, in the Black Sea.

The sampling sation at Sulina is s transversal section on the Danube, taking measuring points in the left river bank, canter and right bank. Once a year,the National Administration Romanain Waters measures the folloing priority substances in suspended sediments:

- Antracen
- Cadmium and its compunds
- Fluoranten
- Hexclorbenzen
- Hexaclorbutadiena
- Hexaclorciclohexan
- Lead and its counpunds
- Mercury and its compunds
- Pentaclorbenzen
- PAHs,
- Dietilhexil-flatati

The monitoring programmes are of surveillance type (S) and operational type (O).

One per year, priority substances are measured in biota, also during the S and O monitoring programme(Source: Updated Management Plan for the Danube river, Danube Delta, hydrographic space Dobrogea and costal waters 2016 - 2021, in Romanian). The measured substances are:

- Hg
- Hexaclorbenzen
- Hexaclorbutadiena

3.10. SERBIA

The two sampling stations were selected in accordance with the criteria set out and agreed upon by the project partners. In addition the proximity of the two selected stations to urban areas makes them of interest especially for the purposes of HS monitoring.

These locations are currently used as monitoring sites by the Serbian Environmental Protection Agency who conduct both water quality and sediment quality monitoring at these sites.

Table 13: Selected sediment sampling stations for DRB baseline network in Serbia

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	RS42035	Danube	Novi Sad	45.22446	19.83669	Serbian Environmental Protection Agency	Serbian Environmental Protection Agency	RS-JCI RS-JCI	yes	
2.	RS42045	Danube	Zemun	44.84885	20.41183	Serbian Environmental Protection Agency	Serbian Environmental Protection Agency	RS-JCI	yes	

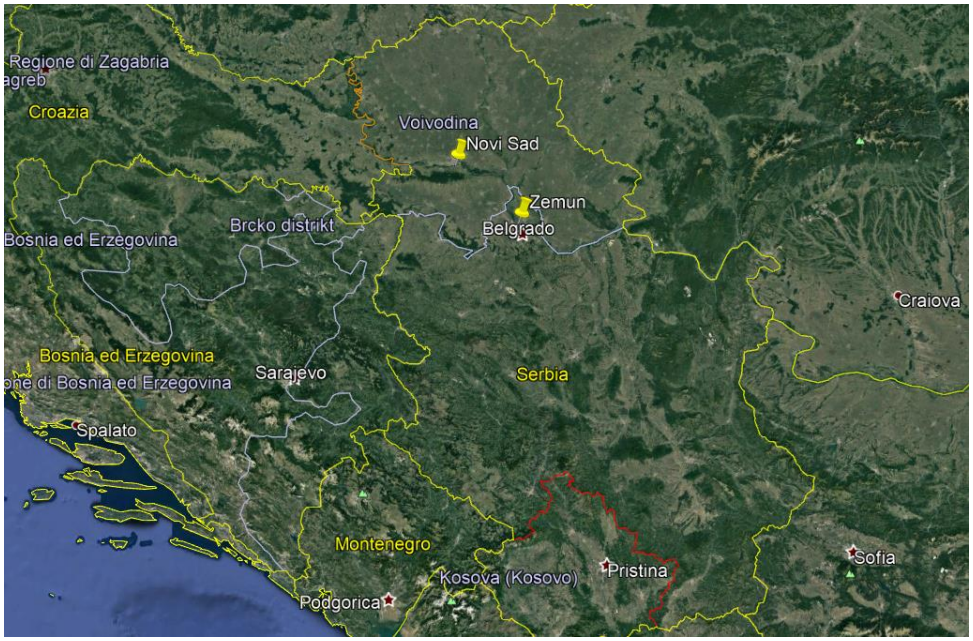

Fig.30: Localisation of baseline stations in Serbia (Google Earth)

3.10.1. Novi Sad on Danube

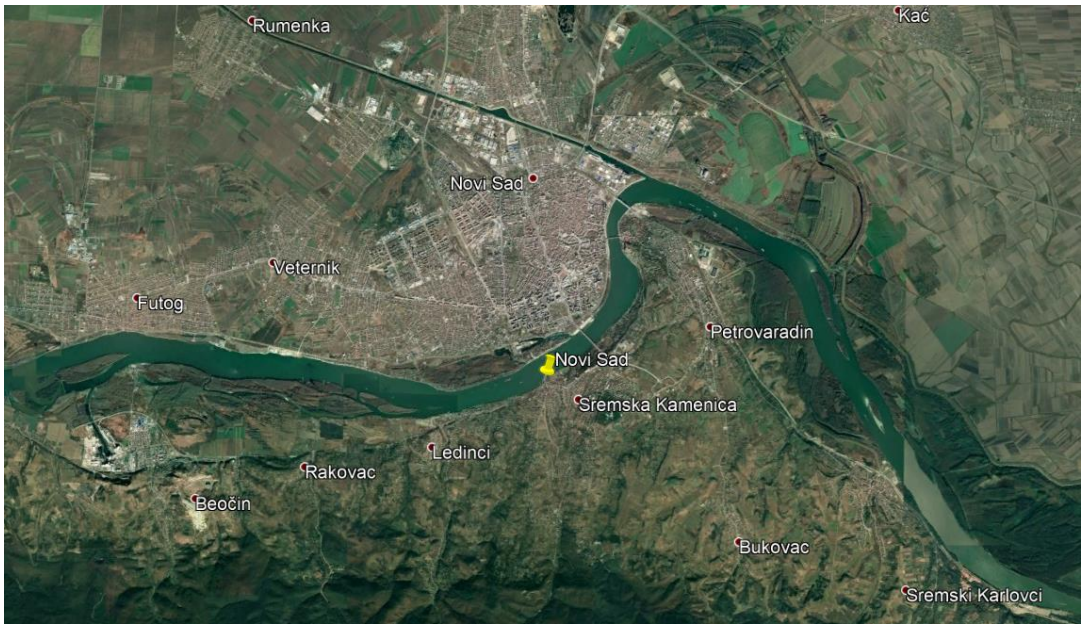

Fig.31: Novi Sad station on Danube (Google Earth)

3.10.2. Zemun on Danube

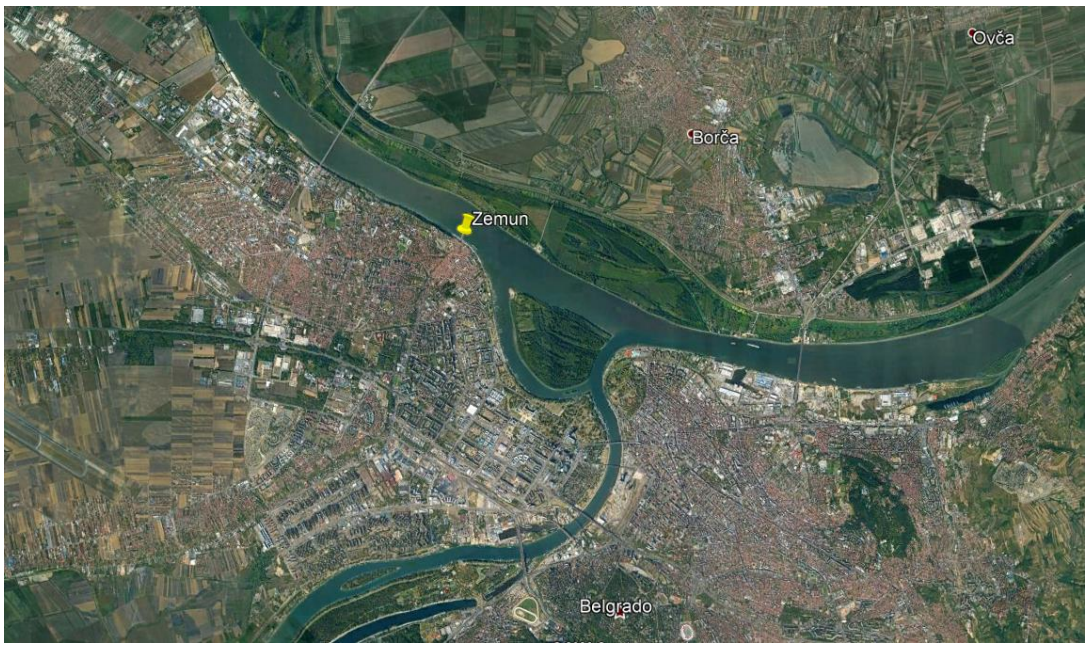

Fig.32: Zemun station on Danube (Google Earth)

3.11. SLOVAKIA

Sampling points were selected with respect to different quality and quantity of sediment from the different geological environment and land use.

Stream sediments from these sampling sites are regularly monitored and water gauging stations are situated nearby.

Table 14: Selected sediment sampling stations for DRB baseline network in Slovakia

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	SK-1	Nitra	Chalmová (ID 14)	48.662458	18.483413				yes	Monitoring since 1996
2.	SK-2	Hnilec	Jaklovce (Ružín reservoir tributary) ID 33	48.870015	20.976673				yes	Monitoring since 1996

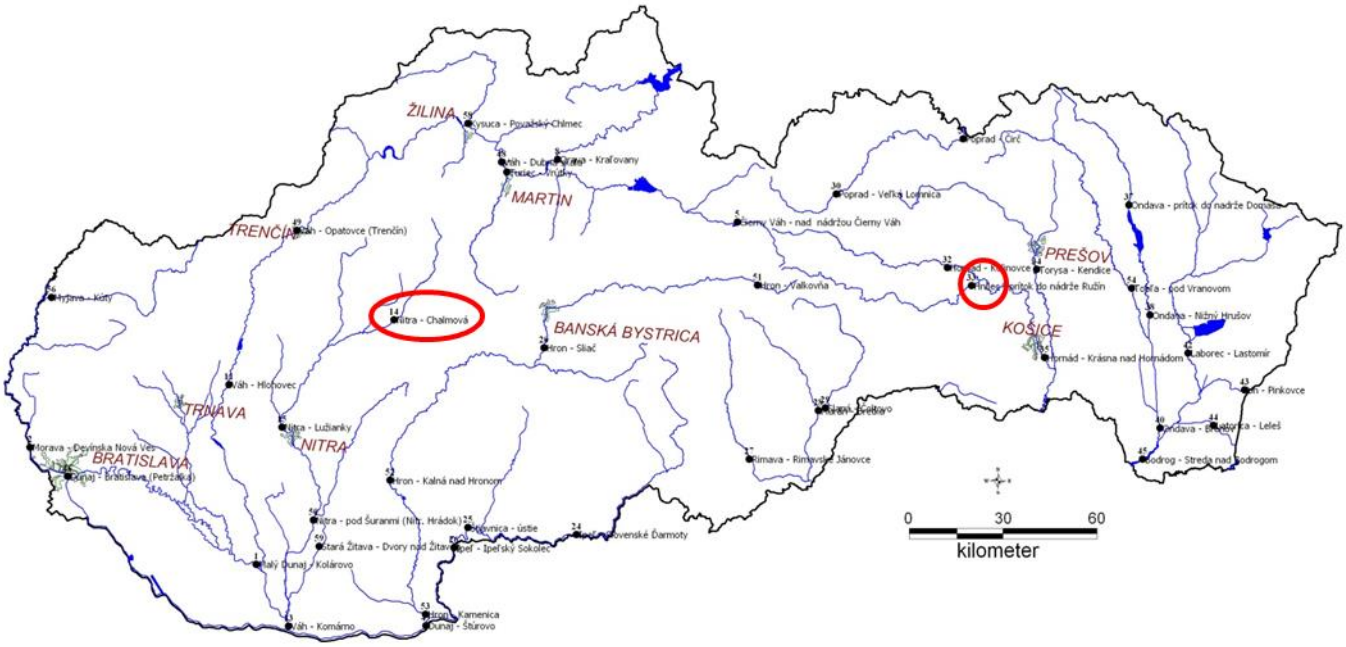

Fig.33: Localisation of baseline monitoring ststions in Slovakia

Table 15: Critria met in selecting the Slovakian baseline monitoring stations

Origin of criteria	No.	Question	Catchment in SK (no. 14) - Nitra – Chalmová	Catchment in SK (no. 33) - Hnilec – Jaklovce (Ružín reservoir tributary)
Discussed at Upper TISA WG 1st Workshop of the SIMONA Project	1	Is there enough background data?	yes	yes
	2	Data on water body status?	yes	yes
	3	Transbordary catchment	no	no
	4	Ease of transbordary travel to the sampling points (visa, roads, distances) for the nonlocal members	yes	yes
	5	Point pollution sources for heavy metals (mines, smelters, etc) and a known soil chemistry map the envisaged pollutants	yes	yes
	6	Point pollution sources for organic pollutants (chemical, pharmaceutical, food, rubber, paint industry, etc) and a known soil chemistry map the envisaged pollutants	no/yes	no
	7	Intensive agricultural activity (pesticides and fertilizers) and a known soil chemistry map regarding the envisaged pollutants	no/yes	no
	8	Is there archived/regular water/suspendend sediments/sediment monitoring data?	yes	yes
	9	Is there an TNMN monitoring point?	no	no
	10	Is there an FOREGS monitoring point/data?	no	no
	11	Ease of acces to the to the sampling points (roads, distances) for the sampling team	yes	yes
	12	Good quality of sediment granularity (creeping sediment), to collect the required quantity of relevant grains for every fraction	yes	yes
	13	Other high accident risk index spots or areas from industries in the region demonstrated by ICPDR	?	?
	14	Catchment with significant flood plains to collect floodplain sediments	possible	possible
	15	ASP/stakeholders/local water body administrators confirms the utility of the sampling points		
	16	Water depth (the sampling operation is technically driven more by water depth then by type of water body)	yes	yes
	17	Samples to be collected from physically undisturbed sediments (external disturbances tourism, boating, debris)	yes	yes
	18	period of sampling: time of lowest water discharge rate, without biodisturbation (during winter?). Attention to flood events or icecover	summer (autumn)	summer (autumn)
ISO 5667-12:2017	1	Meteorological and climatic (e.g. temperature, precipitation, solar radiation);	yes	yes
	2	Hydrological (e.g. discharge, water depth, current, velocity);	yes	yes
	3	Geological (e.g. characteristics/composition/stratification of sediments, erosion);	yes	yes
	4	Biological (e.g. with reference to macrophyte accumulation).	?	?
ISO 5667-17:2008	1	Sampling points should be representative for an extended section of the river;	yes	yes
	2	Sampling sites should consider the existing network of water-monitoring sites so that could be used related results;	yes	yes
	3	Location for sampling should be placed taking in account the sources of pollution;	yes	yes
	4	The sampling site has to have proper access to the water, a satisfactory site for the portable centrifuge, the protection of the sampling equipment from vandals;	access ok, protection from vandals?	access ok, protection from vandals?
	5	The knowledge of the tributary loadings;	?	?
	6	Collection of suspended sediment samples as far downstream as possible, but above confluence;	?	?
	7	There should be preliminary investigations at potential monitoring sites to determine representativeness of the sampling location;	yes	yes
	8	Suitable sampling points are often near bridges or gauging stations.	yes	yes
Guidance document No. 25	1	Sampling sediments should perform at sites representative of the water body;	yes	yes
	2	There is no need for even distribution of sampling sites in a water body;	yes	yes
	3	Knowledge of hydrological and geo-morphological characteristics;	yes	yes
	4	Knowing the pollution sources from present or past industries;	yes	yes
	5	Acquaintance of earlier studies and current monitoring programmes;	yes	yes
	6	Conduction of a dedicated preliminary survey;	yes	yes
	7	Understanding hydrogeological conditions like that the tributaries often transport different material because they have different geological background;	yes	yes
	8	The sampling site should be located downstream of the discharges or the tributary confluence, at a point where complete mixing has been established;	yes	yes
	9	The sampling sites should not be placed in the mixing zones;	yes	yes
	10	Determination of sediment homogeneity.	?	?
TNMN monitoring sites criteria	1	The already monitoring sites which are also suitable long-term trend analysis:	yes	yes
	1,1	Placed just upstream/downstream of an international border;	no	no
	1,2	Located upstream of confluences between Danube and main tributaries or main tributaries and larger sub-tributaries;	?	?
	1,3	Positioned downstream of the major point sources and	yes	yes
	1,4	Posted to control important water uses.	?	?
	2	Sites relevant for assessing pollutant loads which are transferred across boundaries of Contracting Parties and are transported into the marine environment.	?	?

3.11.1. Nitra – Chalmová

Fig.34: Field photos, Google and topographic map of Nitra river at Chalmová

3.11.2. Hnilec – Jaklovce (Ružín reservoir tributary)

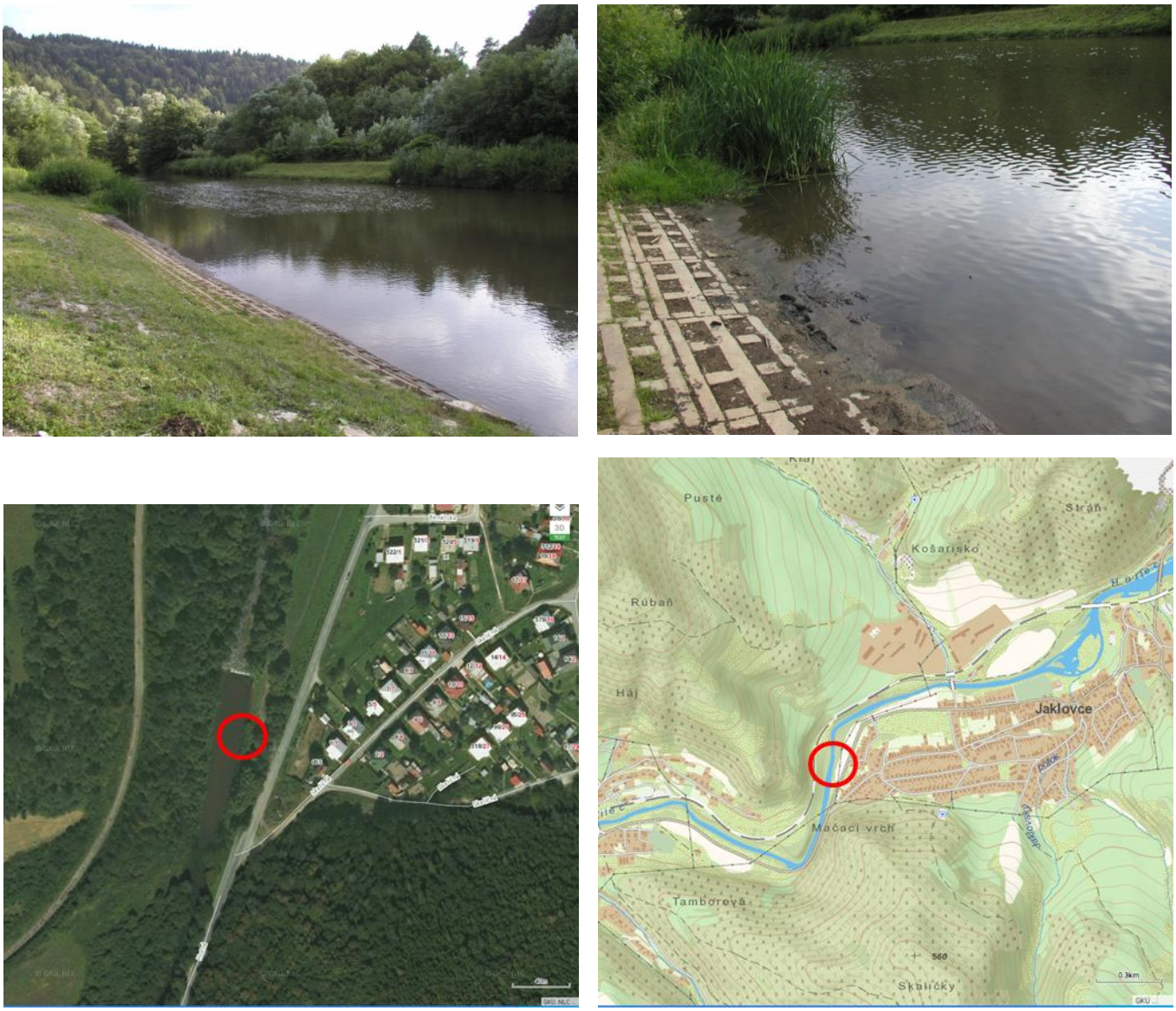

Fig.35: Field photos, Google and topographic map of Hnilec river at Jaklovce

Table 16: Basic statistical parameters of the analyzed components - monitoring 1996 - 2018

(110 °C - loss on drying at 110 °C; 110-450 °C - loss on ignition at 110-450 °C; > 450 °C - loss on ignition above 450 °C; n - number of samples; x - arithmetic mean; med - median; s - standard deviation; min - minimum; max - maximum)

Locality ID	Nitra 14						Hnilec 33					
	n	x	med	min	max	s	n	x	med	min	max	s
110 °C (%)	23	2,34	2,16	0,63	3,96	1,02	23	1,91	1,86	0,69	3,69	0,78
110-450 °C (%)	13	8,84	8,91	4,74	19,27	3,91	13	6,52	6,93	2,40	13,6	3,52
>450 °C (%)	13	6,5	5,1	2,6	12,9	2,97	13	2,7	2,4	1,7	6,0	1,08
Na (%)	16	0,83	0,84	0,53	1,05	0,13	16	0,99	1,00	0,70	1,23	0,13
K (%)	16	1,27	1,24	0,93	1,71	0,19	16	2,21	2,18	1,74	2,87	0,31
Mg (%)	16	1,07	0,99	0,82	1,68	0,21	16	0,91	0,90	0,78	1,09	0,08
Ca (%)	16	5,71	5,19	2,61	12,38	2,73	16	0,70	0,64	0,46	1,22	0,18
Fe (%)	16	2,68	2,70	1,83	3,52	0,43	16	6,08	5,36	4,30	16,48	2,89
Mn (%)	16	0,06	0,05	0,04	0,08	0,01	16	0,15	0,14	0,10	0,22	0,04
Al (%)	16	4,70	4,75	2,16	6,37	0,94	16	7,43	7,29	6,21	9,50	0,95
As (mg.kg^{-1})	23	44,7	44,4	0,0	133	29,29	23	56,7	58,6	0,0	106	19,88
Cd (mg.kg^{-1})	23	0,36	0,20	0,05	1,23	0,32	23	0,74	0,79	0,05	1,34	0,39
Co (mg.kg^{-1})	16	9,4	10,0	6,0	13,8	2,37	16	30,4	28,8	19,3	50,0	8,68
Cr (mg.kg^{-1})	23	53,0	56,0	27,0	72,0	11,9	23	80,5	79,0	61,5	98,0	10,4
Cu (mg.kg^{-1})	23	36,9	30,0	13,2	117	24,1	23	328,5	333	175	457	75,1
Hg (mg.kg^{-1})	22	28,06	12,3	0,74	157	40,48	22	1,49	1,41	0,30	3,65	0,85
Ni (mg.kg^{-1})	23	19,8	19,5	11,2	39,93	6,37	23	34,34	33,66	20,22	44,65	6,13
Pb (mg.kg^{-1})	23	28,10	29,0	7,50	45,73	8,74	23	75,28	74,0	7,50	125	23,97
Sb (mg.kg^{-1})	22	0,85	0,87	0,00	1,70	0,48	23	41,86	46,0	0,00	82,0	20,86
Se (mg.kg^{-1})	23	0,75	0,84	0,00	2,00	0,51	23	0,66	0,60	0,00	2,00	0,46
Zn (mg.kg^{-1})	23	149	146	75	247	54	23	439	377	226	791	165
Ba (mg.kg^{-1})	8	449	457	398	490	29	8	503	507	434	544	32
Sr (mg.kg^{-1})	8	156	152	116	234	38	8	66	65	63	69	2
V (mg.kg^{-1})	8	81,3	75,5	62,0	114	18,0	8	82,9	85,5	62,0	94,0	11,3
Zr (mg.kg^{-1})	8	383	363	319	500	64	8	446	454	355	514	57
TOC (%)	5	2,98	3,55	1,84	3,97	1,00	5	2,52	2,76	1,14	3,25	0,82

3.12. SLOVENIA

The national baseline monitoring stations selected for Slovenia are two TNMN stations, used by Slovenian Water Authorities and shown in Table 17.

Table 17: Selected sediment sampling stations for DRB baseline network in Slovenia

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	SI1; L1390; L	Drava	Ormoz most	46.40314	16.15540	National Slovenian water and sediment monitoring	National Slovenian water and sediment monitoring	National Slovenian water and sediment monitoring	yes	
2.	SI2; L1330; R	Sava	Jesenice na Dolenjskem	45.86092	15.69200	National Slovenian water and sediment monitoring	National Slovenian water and sediment monitoring	National Slovenian water and sediment monitoring	yes	

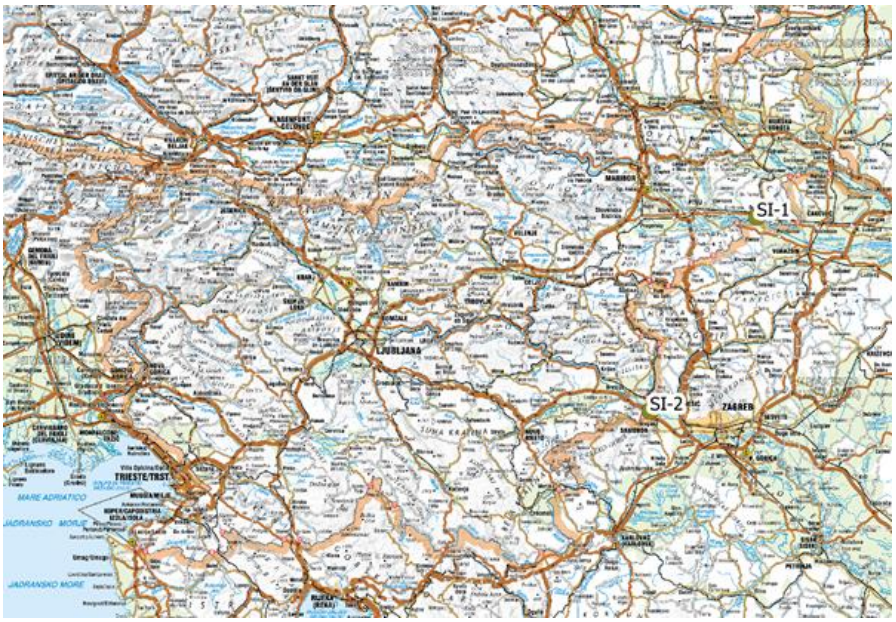

Fig.36: Map of Slovenia with the chosen national sampling points: SI-1 Ormoz most on Drava and SI-2 Jesenice na Dolenjskem on Sava

The sampling on the sites Sava – Jesenice na Dolenjskem and Drava – Ormož, started in 1995 under the PHARE funded Environmental Programme for the Danube River Basin (EPDRB). A year later, all EPDRB countries began operating the TransNational Monitoring Network. From 1999 experts from Slovenia and Croatia have been working together on water quality data collection.

3.10.1. Ormoz most on Drava

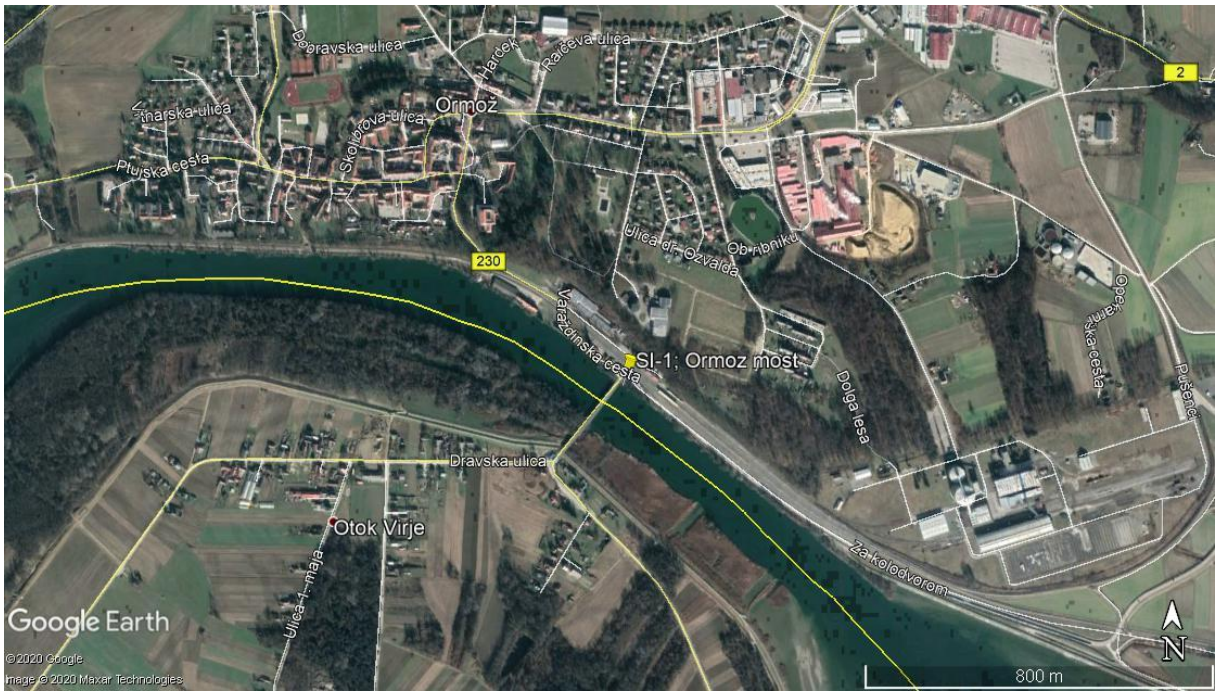

Fig.37: Sampling point SI-1 Ormoz most on Drava - Slovenia (Google Earth Pro)

Sampling point Ormoz most on Drava is located in the NE part of Slovenia. The sampling point is located in the river Drava, which is in this part also border with Croatia.

The river Drava and tributaries of Drava are crossing over rich ore deposits such as; Cave del Predil in Italy, Bleiberg-Kreuth in Austria, and Mežica in Slovenia. In Slovenia are major deposits found in Triassic sedimentary, which containing Pb and Zn ore. This geological picture and mining in the past has still a great impact of concentrations of heavy metals on sediments and soil in the catchment of Drava

The sampling point Ormoz most is one of the points, which is monitored by National Slovenian water and sediment monitoring. They also monitor the sediment`s quality, as well as the quality and ecological status of water. The monitoring in 2017 shows good to a very good condition of chemical and physical elements of quality. This sampling point is a part of NATURA 2000. The aim of NATURA 2000 is to preserve important animal and plant species. This part of Slovenia has a large part of the agriculture industry in the country. For this reason, is a possibility for pollution with pesticides.

National Slovenia water and sediment monitoring: Yes

Monitoring type: (S, TNMN) surveillance monitoring program

Monitoring programs: Hazardous substances (HS) and Basic physicochemical parameters

3.10.2. Jesenice na Dolenjskem on Sava

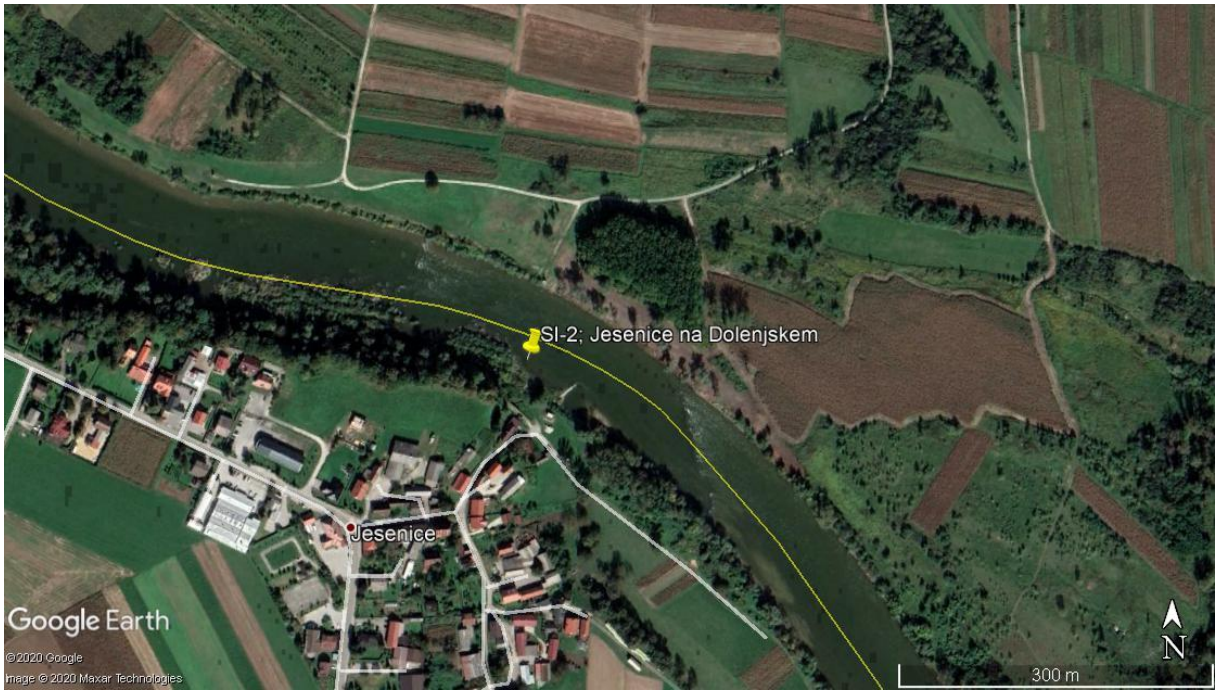

Fig.38: Sampling point SI-2 Jesenice na Dolenjske on Sava - Slovenia (Google Earth Pro)

Sampling point Jesenice na Dolenjskem on Sava is located in the SE part of Slovenia. The sampling point is located in the river Sava, which is in this part also border with Croatia.

The point is on the river Sava, which has two sources; Sava Dolinka and Sava Bohinjka. The confluence of both sources is in the Radovljica. The Sava is Slovenia's largest and longest river, after Slovenia it continues its path to Croatia; untill Beograd, were it flows into the Danube. The Sava is one of the most important tributaries of Danube.

Jesenica na Dolenjskem sampling point is one of the points, which is monitored by National Slovenian water and sediment monitoring. They also monitor sediment`s quality and the quality and ecological status of water. The monitoring in 2017 shows good to a very good condition of biological elements of quality, chemical, and physical elements of quality. The sampling point is located in an area, which has the status of an ecological important area. In the nearby, no heavy industry or farming are present.

National Slovenia water and sediment monitoring: Yes

Monitoring type: (S, TNMN) surveillance monitoring program

Monitoring programs: Hazardous substances (HS) and Basic physicochemical parameters

3.13. UKRAINE

The national baseline monitoring stations selected for Ukraine are shown in Table 18.

Table 18: Selected sediment sampling stations for DRB baseline network in Ukraine

No.	Code	Name of the river	Name of the site	WGS Lat	WGS Long	Owner of water monitoringdata	Owner of sediment monitoring data	Responsible for sampling	Existent archive water, sediment monitoring data	Comment
1.	UA-1	White-Black Tisa	Rahiv	48.0734222	24.2425333	-	-	UA-UGC	no	New station
2.	UA-2	Tisa	Vinogradovo and Tekovo	48.1325	23.0893055	-	-	UA-UGC	no	New staion

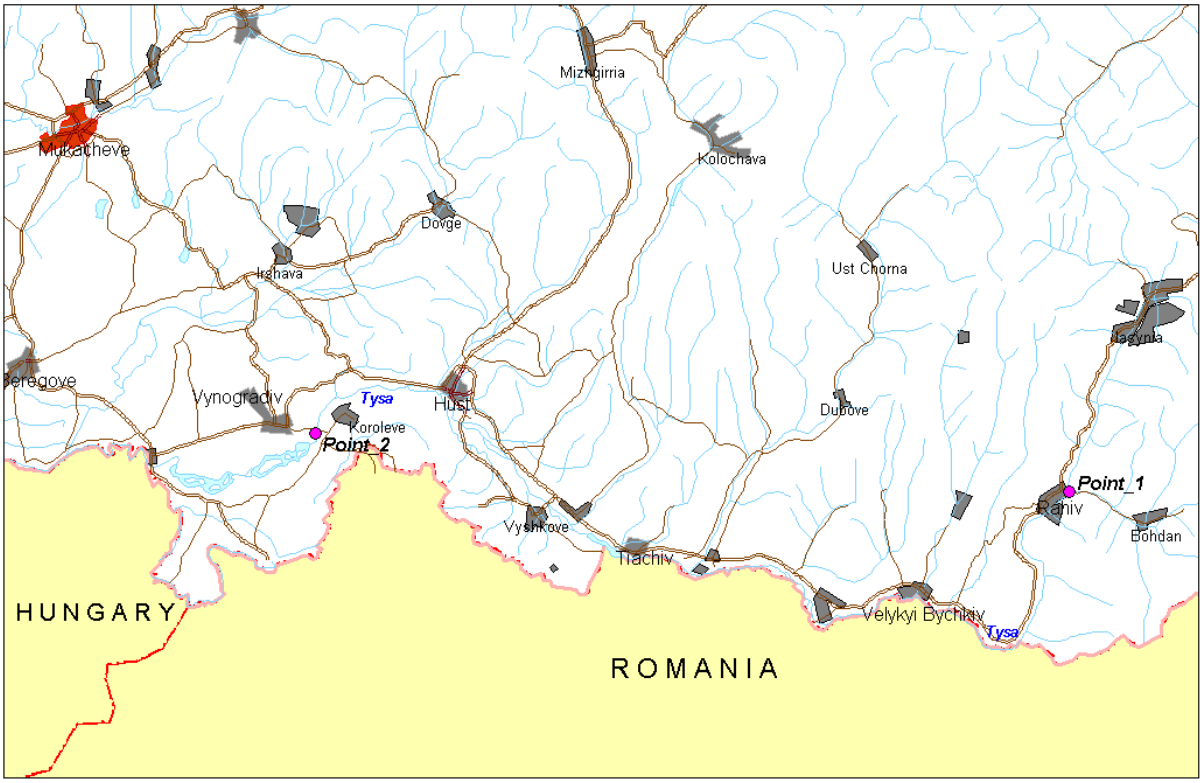

Fig.39: Location of the two Ukrainian baseline stations in Tisa river cathment

3.13.1. UA-1 Rahiv

The sampling station is located 200 m downstream the confluence of the Black and White Tisa (Fig.40).

Fig.40: Sampling station at Rahiv

Geologically, the catchment area of the point is located outside the geochemical anomalies (Fig. 42), large settlements and man-made objects. According to preliminary estimates, the obtained concentrations of chemical elements in the bottom sediments of this point can serve as the baseline for assessing the concentration of chemical elements in the bottom sediments of other points of selection along the Tisa River.

3.13.2. UA-2 Vinogradovo and Tekovo

The second proposed station for Ukraine is located on left bank of the Tisa river, 300 m downstream from the bridge between the villages of Vinogradovo and Tekovo (Fig. 41).

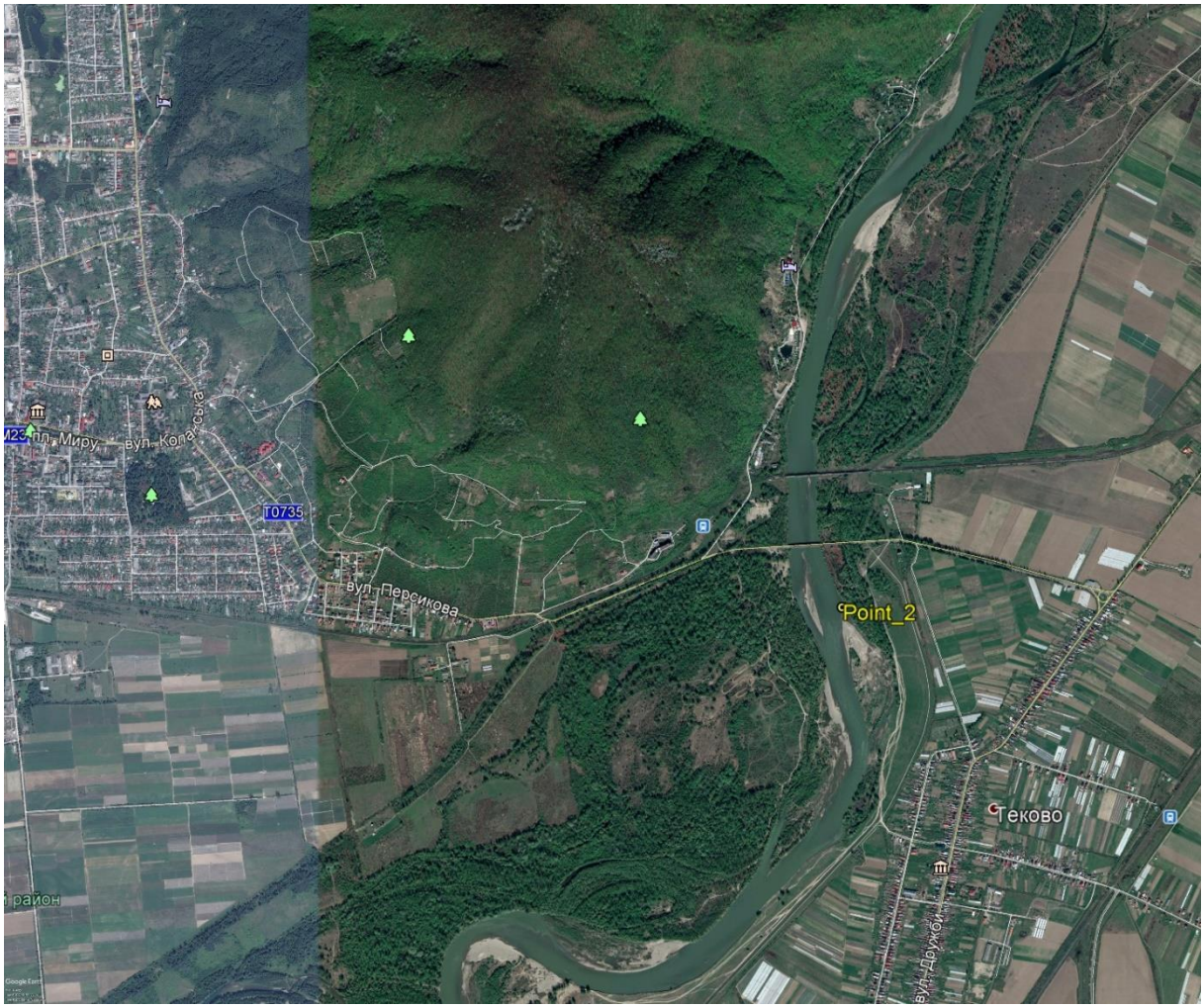

Fig.41: Sampling staion between Vinogradovo and Tekovo

The catchment area of this point is outside the natural geochemical anomalies and large man-made objects (Fig. 42).

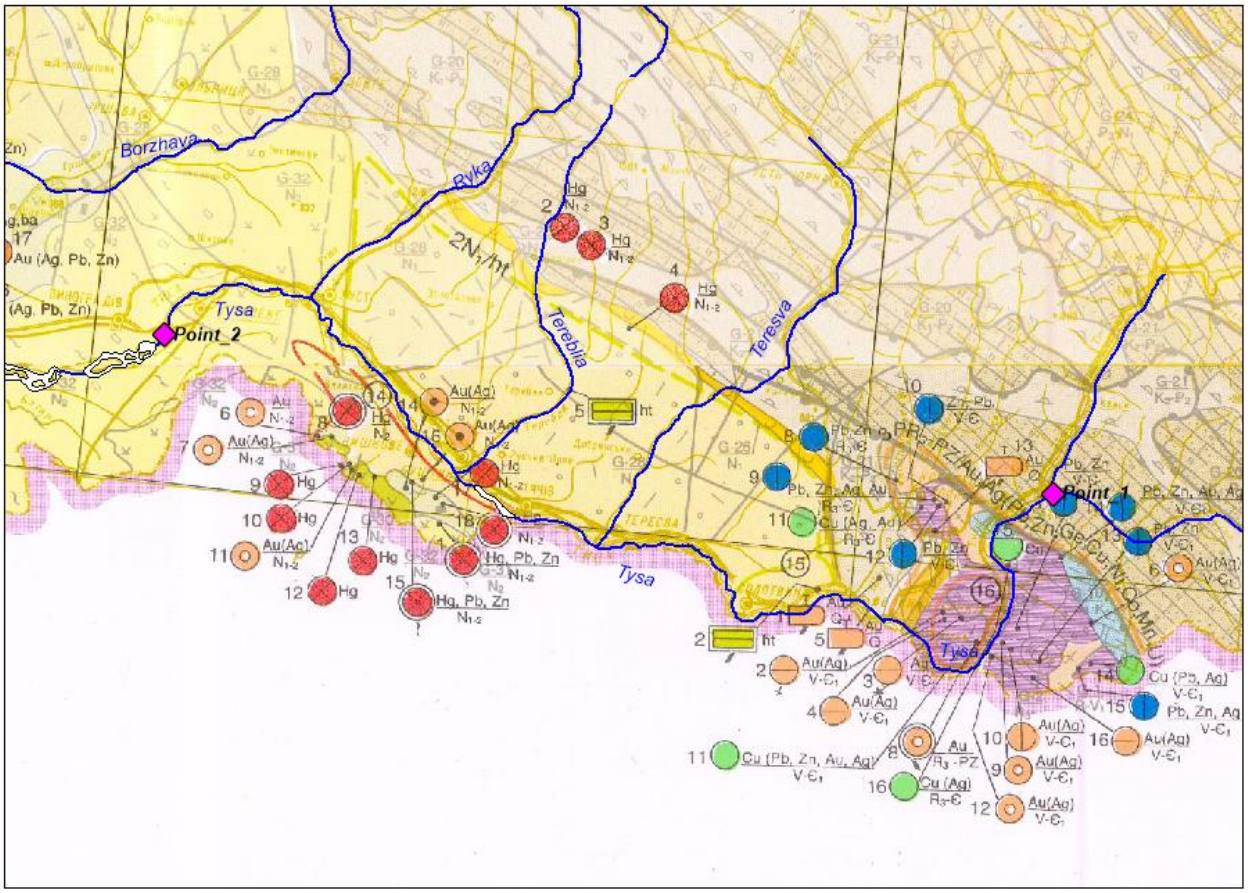

Fig.42: Metallogenic map of the area of work (original scale 1: 500,000; 2003). Circles indicate the location of geochemical anomalies, their elements and the index of the rocks in which they are identified (denominator)

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Updated Management Plan for the hydrographic sector of South Bant 2016 - 2021(in Romanian)

Updated Management Plan for the Danube river, Danube Delta, hydrographic space Dobrogea and costal waters 2016 -2021 (in Romanian)