



Supervision and Environmental Monitoring of River Training and Dredging Works on Critical Sectors on the Danube River

STAKEHOLDERS' FORUM MEETING NO. 2 – 4th May 2018

Republic of Serbia
Ministry of Construction,
Transport and Infrastructure



OBJECTIVE

The overall objective of this project is the improvement of navigation conditions on the Danube River in accordance with the national policy and strategy provisions and with the respect to the Danube Commission Recommendations and the EU transport system development plans in order to ensure fast, safe, reliable and environmentally friendly transportation, smooth flow of freight and mobility of people.



Main parameters analyzed

Environmental monitoring has been developed before the commencement of the Works (dredging and training works), covering the six critical sectors and extending for some parameters to Bačka Palanka (km 1295) and Zemun (km 1270).

- Hydromorphology
- Sediment and water quality
- Biology
 - Macrozoobenthos,
 - Vegetation (*Limosella aquatica*)
 - Birds (*Charadrius dubius* and *Riparia riparia*)
 - Fish (*Acipenser ruthenus*)
- Protected Areas
- Archaeology and cultural heritage

Species of interest were detected during the elaboration of the EIA Study

- ❑ **Danube River – under regular national and international monitoring system**
- ❑ **Data obtained for the technical documentation and the EIA Study preparation, until 2011**
 - water and sediment quality data for 2006-2011 period (Republic Hydro-Meteorological Service of Serbia, RHMZ) as well as the Joint Danube Survey's campaigns from 2003 and 2007 (JDS 1, JDS 2) (International Commission for the Protection of the Danube River, ICPDR),
 - Field investigation during the EIA Study preparation
- ❑ **Data collected from 2012 to 2016**
 - National water and sediment quality monitoring (SEPA/RHMZ), 2012-2016
 - International water and sediment quality monitoring (ICPDR) (JDS 3), 2013
- ❑ **Water Law adopted in 2010 but first implementation of the monitoring in accordance with the requirements of the Water Framework Directive (2000/60/EC (WFD)) was performed in 2012 – after the technical documentation was carried out**
- ❑ **Assessment of the surface water quality from the previous years is not fully comparable with new one**
- ❑ **Data to be collected during this project:**
 - Monitoring Program for the Period before the Works - BASELINE
 - Monitoring during the Works execution period
 - Monitoring after the Works completion

Monitoring Program for the Period before the Works - BASELINE

Field surveys

November 2017

- In order to check and complete existing data
- In accordance with the ToR
- Includes official SEPA's monitoring points, as well as points on the exact locations of the Works execution, and some additional (upstream, downstream, Tisza etc.)
- Parameters defined into the ToR
- Water: 27 sampling points on 12 different locations (L, D, M)
- Sediment: 23 sampling points

Location	Chainage	Profile GPS coordinates	Planned construction works		Number of samples for the period before works execution					
			Dredging	Traning	Water sampling			Sediment sampling		
					left (W L)	middle (W M)	right (W R)	left (S L)	middle (S M)	right (S R)
Bačka Palanka	km 1300	7374121.60 5009925.63			1	1	1	1	1	1
Susek -18	km 1284+800	7385552.00 5011924.00	yes							1
	km 1284+100	7386534.00 5011168.00	yes							1
	km 1282+600	7387064.00 5009830.00	yes						1	
Futog - 19	km 1282+150	7387388.00 5009226.00	yes		1	1	1		1	
	km 1266+500	7401049.00 5009069.00	yes	yes						1
Novi Sad (upstream)	km 1259	7408501.92 5008509.34				1			1	
Novi Sad (downstream)	km 1252	7412641.00 5012282.00			1	1	1	1	1	1
Arankina Ada - 21	km 1246+750	7415968.00 5008157.00	yes							1
	km 1245+400	7416421.00 5007220.00	yes		1	1	1			1
Čortanovci - 22	km 1240+200	7420243.00 5003538.00	yes	yes				1		
	km 1239+800	7420448.00 5003462.00	yes	yes	1	1	1	1		
Beška - 23	km 1229	7430455.00 5002139.00	yes					1		
	km 1228	7432085.26 5002356.68	yes		1	1	1	1		
Slankamen (upstream from Tisa confluence)	km 1216	7442239.00 4999387.00							1	
Tisa River (1 km from confluence)	km 1215 (+ 1 km)	7443500.00, 4999198.00				1			1	
Preliv - 24	km 1199+800	7449556.00 4985688.00		yes	1	1	1		1	
Zemun	km 1174	7453939.00 4967310.00					1			1
TOTAL 1					8	10	9	6	8	9
TOTAL 2					27			23		

Baseline monitoring program planned for the period before works

Work on site



On site:

- temperature,
- turbidity,
- pH value,
- conductivity,
- dissolved oxygen

Ship and some equipment used for water and sediment sampling (November 2017)

Review of the water quality results – SEM's baseline investigation before the Works, November 2017

Profile	Watercourse	Chainage	Code of water body or sampling points	Monitoring system and campaign	VALUE OF THE WATER QUALITY PARAMETERS																										
					General Parameters		Oxygen regime					Nutrients					Salinity				Metals					Microbiological parameters					
					pH value	Suspended matters	Dissolved oxygen (O2)	Percentage of saturation of water by oxygen	BOD 5	COD from K2Cr2O7	COD from KMnO4	Total Organic Carbon (TOC)	Total nitrogen (N)	Nitrates (NO3-N)	Nitrites (NO2-N)	Ammonium ion (NH4-N)	Total phosphates (P)	Orthophosphates (PO4-P)	Chlorides (Cl-)	Sulphates (SO4--)	Total soluble salts	Electroconductivity	Arsenic (As)	Boron (B)	Copper (Cu)	Zinc (Zn)	Chromium (Cr)	Iron (Fe)	Manganese (Mn)	Fecal coliforms	Total coliforms
	mg/l	mg/l	%	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µS/cm	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	cfu/100 ml	cfu/100 ml	cfu/100 ml	cfu/100 ml			
Bačka Palanka	Danube	km 1299	BP WL	Baseline, 2017	I	III	I		II		II	III	II	VII	III	I	VII	I	I	I	I	I	I	I	I	I	II	I	I	III	
			BP WR	Baseline, 2017	I	II	I		II		II	III	II	VII	II	I	VII	I	I	I	I	I	I	I	I	I	I	II	II	I	III
Susek	Danube	km 1282+150	SUS 4 WL	Baseline, 2017	I	II	I		II		II	III	II	VII	III	I	VII	I	I	I	I	I	I	I	II	I	II	II	III	III	
			SUS 4 WM	Baseline, 2017	I	II	I		II		II	III	II	VII	II	I	VII	I	I	I	I	I	I	I	I	I	I	III	III	I	II
			SUS 4 WR	Baseline, 2017	I	I	I		II		II	III	II	VII	I	I	VII	I	I	I	I	I	I	I	II	I	III	II	I	I	III
Futog	Danube	km 1265	FUT 2 WL	Baseline, 2017	I	I	I		II		II	III	II	VII	I	I	VII	I	I	I	I	I	I	I	I	I	III	II	II	III	
			FUT 2 WM	Baseline, 2017	I	I	I		II		II	III	II	VII	I	I	VII	I	I	I	I	I	I	I	II	I	III	II	II	III	
			FUT 2 WR	Baseline, 2017	I	I	I		II		I	III	II	VII	II	I	VII	I	I	I	I	I	I	I	II	I	III	II	II	IV	
Novi Sad, upstream	Danube	km 1259	NS WM	Baseline, 2017	I	I	I		II		II	III	II	VII	I	II	VII	I	I	I	I	I	I	II	I	II	II	II	IV		
			NS DOWN WL	Baseline, 2017	I	I	I		II		II	III	II	VII	I	I	VII	I	I	I	I	I	I	I	II	I	IV	III	IV	IV	
Novi Sad, downstream	Danube	km 1251+500	NS DOWN WM	Baseline, 2017	I	I	I		II		II	III	II	VII	III	I	VII	I	I	I	I	I	I	I	I	II	II	II	IV		
			NS DOWN WR	Baseline, 2017	I	I	I		II		II	III	II	VII	I	I	VII	I	I	I	I	I	I	I	II	I	II	I	I	III	
			AA 1 WL	Baseline, 2017	I	I	I		II		II	III	II	VII	III	II	VII	I	I	I	I	I	I	I	I	I	II	II	II	III	
Arankina Ada	Danube	km 1246+750	AA 1 WM	Baseline, 2017	I	I	I		II		II	III	II	VII	III	II	VII	I	I	I	I	I	I	I	I	III	II	III	II		
			AA 1 WR	Baseline, 2017	I	I	I		II		II	III	II	VII	III	II	VII	I	I	I	I	I	I	I	I	I	III	II	III	II	
			ČOR 2 WL	Baseline, 2017	I	I	I		II		II	III	II	VII	III	I	VII	I	I	I	I	I	I	I	I	I	III	II	II	IV	
Čortanovci	Danube	km 1239+800	ČOR 2 WM	Baseline, 2017	I	I	I		II		II	III	II	VII	III	I	VII	I	I	I	I	I	I	I	I	III	II	I	III		
			ČOR 2 WR	Baseline, 2017	I	I	I		II		II	III	II	VII	III	I	VII	I	I	I	I	I	I	I	I	I	III	II	I	III	
			BEŠ 2 WL	Baseline, 2017	I	I	I		II		II	III	II	VII	III	I	VII	I	I	I	I	I	I	I	I	I	IV	III	III	IV	
Beška	Danube	km 1228	BEŠ 2 WM	Baseline, 2017	I	I	I		II		II	III	II	VII	III	I	VII	I	I	I	I	I	I	I	I	III	II	III	III		
			BEŠ 2 WR	Baseline, 2017	I	I	I		II		II	III	II	VII	III	I	VII	I	I	I	I	I	I	I	I	I	III	II	III	IV	
			SLAN WM	Baseline, 2017	I	I	I		II		II	III	II	VII	III	I	VII	I	I	I	I	I	I	I	I	I	II	III	III	III	
Tisa	Tisa	1 km from confluence on km 1215	TISA WM	Baseline, 2017	I	I	I		III		II	II	I	VII	IV	I	VII	I	I	I	I	I	II	I	III	III	II	III			
			PREL WL	Baseline, 2017	I	I	I		II		II	III	I	VII	III	II	VII	I	I	I	I	I	I	I	II	I	II	II	III	IV	
Zemun	Danube	km 1174	PREL WM	Baseline, 2017	I	I	I		II		II	III	I	VII	I	II	VII	I	I	I	I	I	I	I	I	II	I	III	III		
			ZEM WR	Baseline, 2017	I	I	I		II		II	III	II	III	I	II	I	I	I	I	I	I	I	II	I	IV	III	III	IV		

Profile	Code of water body or sampling points	Monitoring system and campaign	Priority and priority hazardous substances
Bačka Palanka	BP WL	Baseline, 2017	lead (II), cadmium (II)
	BP WR	Baseline, 2017	
Susek	SUS 4 WL	Baseline, 2017	cadmium (III)
	SUS 4 WM	Baseline, 2017	
	SUS 4 WR	Baseline, 2017	
Futog	FUT 2 WL	Baseline, 2017	lead (III)
	FUT 2 WM	Baseline, 2017	
	FUT 2 WR	Baseline, 2017	
Novi Sad, upstream			
	NS WM	Baseline, 2017	
Novi Sad, downstream			
	NS DOWN WL	Baseline, 2017	lead (III)
	NS DOWN WM	Baseline, 2017	
NS DOWN WR	Baseline, 2017		
Arankina Ada			
	AA 1 WL	Baseline, 2017	mercury (V)
	AA 1 WM	Baseline, 2017	
AA 1 WR	Baseline, 2017		
Čortanovci			
	ČOR 2 WL	Baseline, 2017	lead (III)
	ČOR 2 WM	Baseline, 2017	
ČOR 2 WR	Baseline, 2017		
Beška			
	BEŠ 2 WL	Baseline, 2017	
	BEŠ 2 WM	Baseline, 2017	
BEŠ 2 WR	Baseline, 2017		
Slankamen			
	SLAN WM	Baseline, 2017	
Tisa			
	TISA WM	Baseline, 2017	lead (III)
Preliv			
	PREL WL	Baseline, 2017	
Zemun			
	ZEM WR	Baseline, 2017	lead (III), cadmium (II)

Review of priority and priority hazardous substances detection – SEM's baseline investigation before works, November 2017

Review of sediment quality results – SEM's baseline investigation before the Works, November 2017

			MDK AND VALUE OF THE SEDIMENT QUALITY PARAMETERS																																
Profile	Code of water body or sampling points	Monitoring system and campaign	MDK	DM	OC	Metal Content							PCBs	Polycyclic aromatic hydrocarbons (PAHs)								Oils	Pesticides				TOC	Granulometric composition							
				Determination of the dry matter content	Determination of the content of organic matter by loss by ignition	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Mercury (Hg)	Copper (Cu)	Nickel (Ni)	Lead (Pb)	Zinc (Zn)	Polychlorinated biphenyls (PCBs) (total) (PCB 28, 52, 101, 118, 138, 153 and 180)	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Chrysen	Phenanthrene	Indeno (1,2,3-cd) pyrene	Fluoranthene	Naphthalene	Benzo (g, h, i) perylene	Benzo (k) fluoranthene	PAHs (total)	Mineral oils	DDT (total)	Cyflodiol pesticides	HCH (total)	Alpha-endosulfane	Heptachlor	Heptachlor epoxide	Total organic carbon (TOC)	Sand (2 - 0.05 mm)	Powder (0.05 - 0.002 mm)
			%	mg/kg																									µg/kg				mg/kg	%	
Limit values for the sediment quality assessment for dredging of sediment from the watercours (Annex 3, Table 2 of Regulation)																																			
	MDK 4	/	/	29	6.3	194	6.7	82	63	317	268	1	40	/	/	/	/	/	/	/	/	/	/	/	5000	4000	4000	2000	4000	4000	4000	/	/	/	/
	MDK 3	/	/	29	3.9	194	1.1	39	14	317	268	0.2	10	/	/	/	/	/	/	/	/	/	/	/	3000	40	/	/	/	/	/	/	/	/	/
	MDK 2	/	/	29	1	194	0.33	16	11	317	178	/	1	/	/	/	/	/	/	/	/	/	/	/	1000	10	/	/	/	/	/	/	/	/	/
	MDK 1	/	/	15	0.4	51	0.2	16	11	51	52	0.02	1	/	/	/	/	/	/	/	/	/	/	/	50	10	5	10	0.01	0.7	0.002	/	/	/	/
Limit values for the status and trend of sediment quality assessment (Annex 3, Table 1 of Regulation)																																			
	Remed. Value	/	/	55	12	380	10	190	210	530	720	1												40	5000	4000	4000	2000	4000	4000	4000				
	MDK	/	/	42	6.4	240	1.6	110	44	310	430	200	0.1	0.4	3	11	0.5	6	3	0.1	8	2	10	3000											
	Target value	/	/	29	0.8	100	0.3	36	35	85	140	20	0.001	0.003	0.003	0.1	0.005	0.06	0.03	0.001	0.08	0.02	1	50	10	5	10	0.01	0.7	2E-04					
Bačka Palanka	BP WL	Baseline, 2017	69	0.35	1.5	<0.1	4.3	<0.01	2.5	3.9	3	14	<0.016	0.245	<0.001	<0.003	<0.003	0.037	<0.001	<0.001	<0.001	<0.002	<0.003	0.282	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1426	99	0.8	0.2
Susek	SUS 1 SR	Baseline, 2017	69	0.45	1.6	<0.1	3.7	<0.01	2.3	4.6	3.2	19	<0.016	0.092	<0.001	<0.003	<0.003	0.026	<0.001	<0.001	<0.001	<0.002	<0.003	0.118	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1120	99	0.3	0.7
	SUS 2 SR	Baseline, 2017	70	0.41	1.5	<0.1	4.6	<0.01	2.5	3.6	2.9	12	<0.016	0.247	<0.001	<0.003	<0.003	0.041	<0.001	<0.001	0.044	<0.002	<0.003	0.332	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1576	99	0.8	0.2
	SUS 3 SM	Baseline, 2017	68	0.28	1.6	<0.1	3.5	<0.01	2	3.9	3.1	13	<0.016	0.161	<0.001	<0.003	0.008	0.028	<0.001	<0.001	0.061	<0.002	<0.003	0.258	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1576	99	0.8	0.2
	SUS 4 SM	Baseline, 2017	68	0.31	2.9	<0.1	4.2	0.02	2.3	5.6	4.1	23	<0.016	0.155	<0.001	<0.003	<0.003	0.041	<0.001	<0.001	0.022	<0.002	<0.003	0.218	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1166	99	0.7	0.3
Futog	FUT 1 SM	Baseline, 2017	67	0.33	1.7	<0.1	4.7	0.011	2.4	4.5	3.4	16	<0.016	0.075	<0.001	<0.003	<0.003	0.017	<0.001	<0.001	<0.001	<0.002	<0.003	0.092	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1116	99	0.7	0.3
	FUT 2 SM	Baseline, 2017	70	0.39	2.5	<0.1	5.8	0.012	3	6.2	4.2	25	<0.016	<0.001	<0.001	<0.003	<0.003	0.032	<0.001	<0.001	0.024	<0.002	<0.003	0.056	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1493	99	0.6	0.4
Novi Sad, upstream	NS SM	Baseline, 2017	69	0.44	1.8	<0.1	5.2	0.02	2.2	4.4	3.4	15	<0.016	<0.001	<0.001	<0.003	<0.003	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.017	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1354	99	0.5	0.5
Novi Sad, downstream	NS DOWN SM	Baseline, 2017	67	0.35	1.6	<0.1	5.1	0.013	2.7	5	3.5	18	<0.016	<0.001	<0.001	<0.003	<0.003	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.017	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1276	99	0.5	0.5
	NS DOWN SR	Baseline, 2017	65	0.31	1.5	<0.1	4.1	0.02	2.6	4.1	3.4	15	<0.016	<0.001	<0.001	<0.003	<0.003	0.018	<0.001	<0.001	<0.001	<0.002	<0.003	0.018	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1288	99	0.6	0.4
Arankina Ada	AA 1 SM	Baseline, 2017	63	1.2	2.7	<0.1	8.6	0.02	7.8	8.7	6.2	40	<0.016	0.153	<0.001	<0.003	<0.003	0.013	<0.001	<0.001	<0.001	<0.002	<0.003	0.166	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	4479	91	7	2
	AA 2 SR	Baseline, 2017	67	0.39	1.4	<0.1	4.9	0.013	2.5	4.4	3	16	<0.016	0.065	<0.001	<0.003	<0.003	0.019	<0.001	<0.001	0.012	<0.002	<0.003	0.096	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	559	99	0.6	0.4
Čortanovci	ČOR 1 SL	Baseline, 2017	68	0.4	1.6	<0.1	5.7	<0.01	5.2	5.1	4.4	22	<0.016	0.064	<0.001	<0.003	<0.003	0.01	<0.001	<0.001	<0.001	<0.002	<0.003	0.074	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1882	95	4.2	0.8
	ČOR 2 SL	Baseline, 2017	67	0.34	1.7	<0.1	5	0.02	3	5.5	3.4	21	<0.016	<0.001	<0.001	<0.003	<0.003	<0.001	<0.001	<0.001	<0.001	<0.002	<0.003	<0.022	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	223	99	0.7	0.3
Beška	BEŠ 1 SL	Baseline, 2017	70	0.3	1.3	<0.1	3.8	0.01	2.6	3.9	3.1	14	<0.016	0.077	<0.001	0.004	<0.003	0.012	<0.001	<0.001	0.011	<0.002	<0.003	0.104	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	340	99	0.5	0.5
	BEŠ 2 SM	Baseline, 2017	65	0.83	1.7	<0.1	9	<0.01	7.7	6.5	4.6	27	<0.016	0.026	<0.001	<0.003	<0.003	0.019	<0.001	<0.001	<0.001	<0.002	<0.003	0.045	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	2874	94	4.2	1.8
Slankamen	SLAN SR	Baseline, 2017	67	0.3	1.5	<0.1	6.3	<0.01	3.1	5.1	3.6	17	<0.016	0.039	0.012	<0.003	0.01	0.038	<0.001	0.079	0.016	<0.002	<0.003	0.194	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1436	99	0.4	0.6
Tisa	TISA SR	Baseline, 2017	69	0.88	2.1	0.3	9.1	0.02	9.9	8.6	7.7	41	<0.016	0.005	0.004	0.006	0.005	0.006	<0.001	<0.001	<0.001	<0.002	<0.003	0.026	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	5206	88	6.2	5.8
Preliv	PREL SM	Baseline, 2017	78	0.4	2.5	<0.1	6.6	<0.01	2.8	6.7	4.2	23	<0.016	0.07	<0.001	<0.003	<0.003	0.03	<0.001	<0.001	0.01	<0.002	<0.003	0.11	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1523	99	0.8	0.2
Zemun	ZEM SR	Baseline, 2017	57	4.3	4.9	0.3	35	0.04	25	25	12	80	<0.016	0.02	<0.001	<0.003	<0.003	0.01	<0.001	0.03	0.01	<0.002	<0.003	0.07	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	18110	69	21.5	9.5

Sediment Quality – Results

Review of sediment quality results – SEM's baseline investigation before the Works, November 2017

Profile	Code of water body or sampling points	Monitoring system and campaign	MDK AND VALUE OF THE SEDIMENT QUALITY PARAMETERS																																		
			DM	OC	Metal Content							PCBs	Polycyclic aromatic hydrocarbons (PAHs)								Oils	Pesticides					TOC	Granulometric composition									
					Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Mercury (Hg)	Copper (Cu)	Nickel (Ni)	Lead (Pb)		Zinc (Zn)	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Chrysen	Phenanthrene	Indeno (1,2,3-cd) pyrene	Fluoranthene		Naphthalene	Benzo (g, h, i) perylene	Benzo (k) fluoranthene	PAHs (total)	Mineral oils		DDT (total)	Cyclodial pesticides	HCH (total)	Alpha-endosulfane	Heptachlor	Heptachlor epoxide	Total organic carbon (TOC)	Sand (2 - 0.05 mm)	Powder (0.05 - 0.002 mm)	Clay (<0.002 mm)
			%	mg/kg																									µg/kg					mg/kg	%		
Limit values for the sediment quality assessment for dredging of sediment from the watercourses (Annex 3, Table 2 of Regulation)																																					
MDK 4	/	/	29	6.3	194	6.7	82	63	317	268	1	40	/	/	/	/	/	/	/	/	/	/	/	/	/	5000	4000	4000	2000	4000	4000	4000	/	/	/	/	
MDK 3	/	/	29	3.9	194	1.1	39	14	317	268	0.2	10	/	/	/	/	/	/	/	/	/	/	/	/	/	3000	40	/	/	/	/	/	/	/	/	/	
MDK 2	/	/	29	1	194	0.33	16	11	317	178	/	1	/	/	/	/	/	/	/	/	/	/	/	/	/	1000	10	/	/	/	/	/	/	/	/	/	
MDK 1	/	/	15	0.4	51	0.2	16	11	51	52	0.02	1	/	/	/	/	/	/	/	/	/	/	/	/	/	50	10	5	10	0.01	0.7	0.002	/	/	/	/	
Limit values for the status and trend of sediment quality assessment (Annex 3, Table 1 of Regulation)																																					
Remed. Value	/	/	55	12	380	10	190	210	530	720	1															40	5000	4000	4000	2000	4000	4000	4000				
MDK	/	/	42	6.4	240	1.6	110	44	310	430	200	0.1	0.4	3	11	0.5	6	3	0.1	8	2	10	3000														
Target value	/	/	29	0.8	100	0.3	36	35	85	140	20	0.001	0.003	0.003	0.1	0.005	0.06	0.03	0.001	0.08	0.02	1	50	10	5	10	0.01	0.7	2E-04								
Bačka Palanka	BP WL	Baseline, 2017	69	0.35	1.5	<0.1	4.3	<0.01	2.5	3.9	3	14	<0.016	0.245	<0.001	<0.003	<0.003	0.037	<0.001	<0.001	<0.001	<0.002	<0.003	0.282	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1426	99	0.8	0.2		
Susek	SUS 1 SR SUS 2 SR SUS 3 SM SUS 4 SM	Baseline, 2017 Baseline, 2017 Baseline, 2017 Baseline, 2017																																			0.7 0.2 0.2 0.3
Futog	FUT 1 SM FUT 2 SM	Baseline, 2017 Baseline, 2017																																			0.3 0.4
Novi Sad, upstream	NS SM	Baseline, 2017																																			0.5
Novi Sad, downstream	NS DOWN SM NS DOWN SR	Baseline, 2017 Baseline, 2017																																			0.5 0.4
Arankina Ada	AA 1 SM AA 2 SR	Baseline, 2017 Baseline, 2017																																			2 0.4
Čortanovci	ČOR 1 SL ČOR 2 SL	Baseline, 2017 Baseline, 2017																																			0.8 0.3
Beška	BEŠ 1 SL BEŠ 2 SM	Baseline, 2017 Baseline, 2017																																			0.5 1.8
Slankamen	SLAN SR	Baseline, 2017																																			0.6
Tisa	TISA SR	Baseline, 2017																																			5.8
Preliv	PREL SM	Baseline, 2017																																			0.2
Zemun	ZEM SR	Baseline, 2017	57	4.3	4.9	0.3	35	0.04	25	25	12	80	<0.016	0.02	<0.001	<0.003	<0.003	0.01	<0.001	0.03	0.01	<0.002	<0.003	0.07	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	18110	69	21.5	9.5		

- Measured concentrations of copper and nickel exceeded the target values in the sample taken in Zemun (right side) - sediment is slightly polluted
- In almost all samples polycyclic aromatic hydrocarbons (PAHs) are detected but noticed concentrations do not exceed target values – not detected in Čortanovci 2 (left side), Novi Sad, upstream and Novi Sad, downstream (midpoint)
- It could be concluded that concentrations of pollutants in all analysed sediment sample are at the level of the natural background and all of them can be displaced without any special protection measures

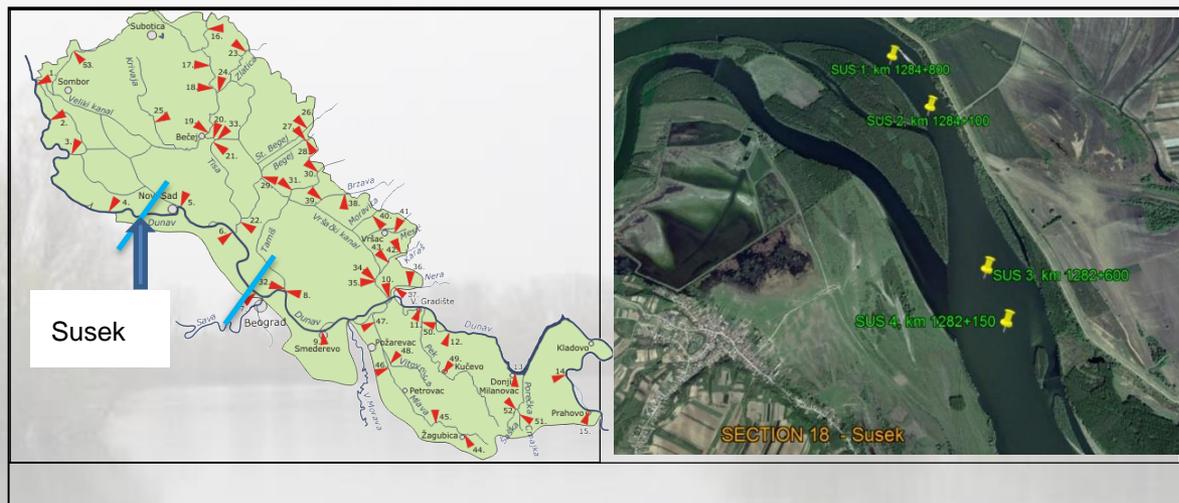
UPSTREAM FROM THE PROJECT AREA

No other results for sediments

Profile	Code of water body or sampling points	Monitoring system and campaign	Priority and priority hazardous substances
Bačka Palanka			
	BP WL	Baseline, 2017	lead (II), cadmium (II)
	BP WR	Baseline, 2017	

PROJECT AREA – SECTION 18 (SUSEK)

No other results for water



VALUE OF THE WATER QUALITY PARAMETERS

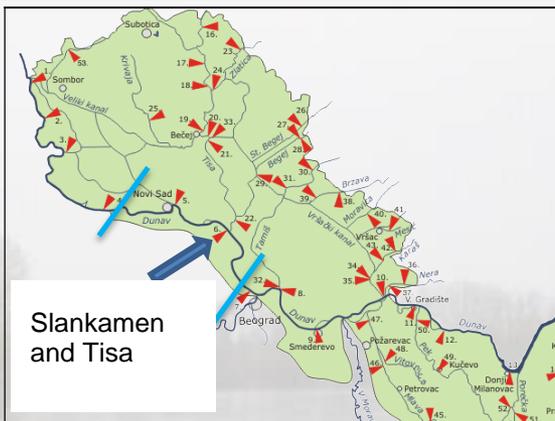
Profile	Code of water body or sampling points	Monitoring system and campaign	VALUE OF THE WATER QUALITY PARAMETERS																												
			General Parameters		Oxygen regime				Nutrients				Salinity				Metals				Organic substances		Microbiological parameters								
			pH value	Suspended matters	Dissolved oxygen (O2)	Percentage of saturation of water by oxygen	BOD 5	COD from K2Cr2O7	COD from KMnO4	Total Organic Carbon (TOC)	Total nitrogen (N)	Nitrates (NO3-N)	Nitrites (NO2-N)	Amonium ion (NH4-N)	Total phosphates (P)	Orthophosphates (PO4-P)	Chlorides (Cl-)	Sulphates (SO4--)	Total soluble salts	Electroconductivity	Arsenic (As)	Boron (B)	Copper (Cu)	Zinc (Zn)	Chromium (Cr)	Iron (Fe)	Manganese (Mn)	Phenolic index (C2H5OH)	Petroleum hydrocarbons	Anionic active substances	Fecal coliforms
mg/l	mg/l	%	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µS/cm	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	mg/l	mg/l	mg/l	cfu/100	cfu/100	cfu/100	cfu/100 ml	
Susek	SUS 4 WL	Baseline, 2017	I	II	I	II	II	III	II	III	III	I	I	I	I	I	I	I	I	I	I	I	I	II	I			II	II	III	III
	SUS 4 WM	Baseline, 2017	I	III	I	II	II	III	II	II	II	I	I	I	I	I	I	I	I	I	I	I	I	I	I			III	III	I	II
	SUS 4 WR	Baseline, 2017	I	I	I	II	II	III	II	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II	I			III	II	I	III

UNPROJECT AREA – INTERSECTION – NOVI SAD, upstream and downstream

Profile	Code of water body or sampling points	Monitoring system and campaign	Priority and priority hazardous substances
Novi Sad, upstream			
	NS WM	Baseline, 2017	
	JDS 32, middle	JDS 3, 2013	
	D8, right	SEPA, 2013	
		SEPA, 2014	1xPb-diss. (III-IV), 1xNi-diss. (III-IV)
		SEPA, 2015	1x Ni-diss. (III/IV)
		SEPA, 2016	
Novi Sad, downstream			
	NS DOWN WL	Baseline, 2017	lead (III)
	NS DOWN WM	Baseline, 2017	
	NS DOWN WR	Baseline, 2017	
	JDS 33, middle	JDS 3, 2013	

No other results for sediments.

UNPROJECT AREA – INTERSECTION – SLANKAMEN and TISZA (on Tisza River)



Profile	Code of water body or sampling points	Monitoring system and campaign	VALUE OF THE WATER QUALITY PARAMETERS																													
			General Parameters		Oxygen regime				Nutrients				Salinity			Metals				Organic substances			Microbiological parameters									
			pH value	Suspended matters	Dissolved oxygen (O ₂)	Percentage of saturation of water by oxygen	BOD 5	COD from K ₂ Cr ₂ O ₇	COD from KMnO ₄	Total Organic Carbon (TOC)	Total nitrogen (N)	Nitrates (NO ₃ -N)	Nitrites (NO ₂ -N)	Ammonium ion (NH ₄ -N)	Total phosphates (P)	Orthophosphates (PO ₄ -P)	Chlorides (Cl ⁻)	Sulphates (SO ₄ ⁻)	Total soluble salts	Electroconductivity	Arsenic (As)	Boron (B)	Copper (Cu)	Zinc (Zn)	Chromium (Cr)	Iron (Fe)	Manganese (Mn)	Phenolic index (C ₂ H ₅ OH)	Petroleum hydrocarbons	Antionic active substances	Fecal coliforms	Total coliforms
mg/l	mg/l	%	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µS/cm	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	mg/l	mg/l	mg/l	cfu/100	cfu/100	cfu/100	cfu/100 ml	
Slankamen	SLAN WM	Baseline, 2017	I	I	I	II	II	III	II	III	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	II	III	III	III
	JDS 34, middle	JDS 3, 2013	I	III-V	III	I	II	II	IV	III	III	I	I	I	I	I	I	I	II	I	II	I	I	I	I	I	I	II	III	III	III	
	D7, right	SEPA, 2013	II-IV	III-V	II	I	II	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	I	III	I	II	I	III	II	II	II	
		SEPA, 2014	II-IV	III-V	II	I	II	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	I	III	I	II	I	III	II	II	II	
		SEPA, 2015	II-IV	III	II	I	II	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	I	III	I	II	I	III	II	II	II	
	SEPA, 2016	II-IV	III-V	II	I	II	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	I	III	I	II	I	III	II	II	II		
Tisa	TISA WM	Baseline, 2017	I	I	I	III	II	II	I	IV	I	I	I	I	I	I	I	I	I	I	I	I	II	I	I	I	I	III	III	II	II	
	JDS 35, middle	JDS 3, 2013	I	I	I	I	II	II	II	III	IV	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	III	III	II	II	
	TIS_1, right	SEPA, 2013	I	III-V	III	I	II	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	IV	III	III	I	III	III	II	II	II	
		SEPA, 2014	I-V	I-IV	III	I	II	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	IV	III	III	I	III	III	II	II	II	
		SEPA, 2015	I-V	III-V	III	I	II	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	IV	III	III	I	III	III	II	II	II	
	SEPA, 2016	I-V	III-V	III	I	II	II	II	II	II	II	II	II	II	I	I	I	I	I	I	I	V	III	III	I	III	III	II	II	II		

UNPROJECT AREA – INTERSECTION – SLANKAMEN and TISZA (on Tisza River)

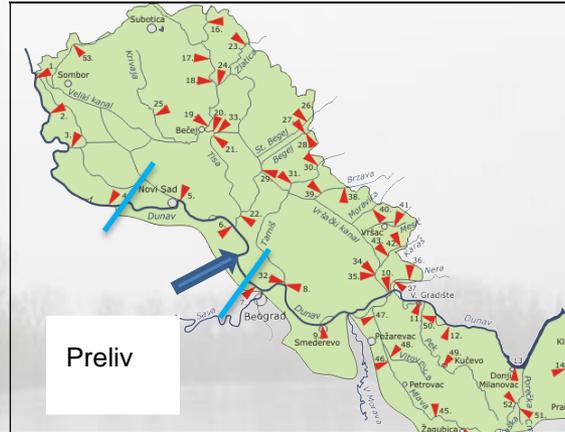


Profile	Code of water body or sampling points	Monitoring system and campaign	Priority and priority hazardous substances
Slankamen	SLAN WM JDS 34, middle D7, right	Baseline, 2017 JDS 3, 2013 SEPA, 2013 SEPA, 2014 SEPA, 2015 SEPA, 2016	1xPb-diss. (III-IV), 4xNi-diss. (III-IV)
			Benzo(a)piren 1x (III/IV),
Tisa	TISA WM JDS 35, middle TIS_1, right	Baseline, 2017 JDS 3, 2013 SEPA, 2013 SEPA, 2014 SEPA, 2015 SEPA, 2016	lead (III)
			1xPb-diss. (III-IV), 9xNi-diss. (III-IV) 3x Ni-diss. (III/IV), 1x Benzo(b)fluoranten (>LOQ) , 1x Benzo(k)fluoranten (>LOQ) Benzo(a)piren 1x (III/IV),

MDK AND VALUE OF THE SEDIMENT QUALITY PARAMETERS

Profile	Code of water body or sampling points	Monitoring system and campaign	DM		OC		Metal Content								PCBs	Polycyclic aromatic hydrocarbons (PAHs)										Oils		Pesticides				TOC	Granulometric composition												
			Determination of the dry matter content	Determination of the content of organic matter by loss by ignition	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Mercury (Hg)	Copper (Cu)	Nickel (Ni)	Lead (Pb)	Zinc (Zn)	Polychlorinated biphenyls (PCBs) (total) (PCB 28, 52, 101, 118, 138, 153 and 180)	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Chrysen	Phenanthrene	Indeno (1,2,3-cd) pyrene	Fluoranthene	Naphthalene	Benzo (g, h, i) perylene	Benzo (k) fluorantene	PAHs (total)	Mineral oils	DDT (total)	Cyclodial pesticides	HCH (total)	Alpha-endosulfane	Hepachlor	Hepachlor epoxide	Total organic carbon (TOC)	Sand (2 - 0.05 mm)	Powder (0.05 - 0.002 mm)	Clay (<0.002 mm)										
			%																								mg/kg											µg/kg				mg/kg	%		
Limit values for the sediment quality assessment for dredging of sediment from the watercourses (Annex 3, Table 2 of Regulation)																																													
MDK 4	/	/	29	6.3	194	6.7	82	63	317	268	1	40	/	/	/	/	/	/	/	/	/	/	/	5000	4000	4000	2000	4000	4000	4000	/	/	/	/											
MDK 3	/	/	29	3.9	194	1.1	39	14	317	268	0.2	10	/	/	/	/	/	/	/	/	/	/	3000	40	/	/	/	/	/	/	/	/	/	/											
MDK 2	/	/	29	1	194	0.33	16	11	317	178	/	1	/	/	/	/	/	/	/	/	/	/	1000	10	/	/	/	/	/	/	/	/	/	/											
MDK 1	/	/	15	0.4	51	0.2	16	11	51	52	0.02	1	/	/	/	/	/	/	/	/	/	/	50	10	5	10	0.01	0.7	0.002	/	/	/	/												
Limit values for the status and trend of sediment quality assessment (Annex 3, Table 1 of Regulation)																																													
Remed. Value	/	/	55	12	380	10	190	210	530	720	1											40	5000	4000	4000	2000	4000	4000	4000	4000															
MDK	/	/	42	6.4	240	1.6	110	44	310	430	200	0.1	0.4	3	11	0.5	6	3	0.1	8	2	10	3000					1	68	0.002															
Target value	/	/	29	0.8	100	0.3	36	35	85	140	20	0.001	0.003	0.003	0.1	0.005	0.06	0.03	0.001	0.08	0.02	1	50	10	5	10	0.01	0.7	2E-04																
Slankamen	SLAN SR D7, right	Baseline, 2017 SEPA, 2012	67	0.3	1.5	<0.1	6.3	<0.01	3.1	5.1	3.6	17	<0.016	0.039	0.012	<0.003	0.01	0.038	<0.001	0.079	0.016	<0.002	<0.003	0.194	<10	<1.0	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1436	99	0.4	0.6									
			/	9.16	<12	0.8	52	0.2	32	38	18	215	<11.4	1.5	/	12.6	/	/	10.6	43	<1	<1	9.1	/	<134	<1.0	/	<3.0	/	<1.0	<1.0	26800	/	/	/										
Tisa	TISA SR	Baseline, 2017	69	0.88	2.1	0.3	9.1	0.02	9.9	8.6	7.7	41	<0.016	0.005	0.004	0.006	0.005	0.006	<0.001	<0.001	<0.001	<0.002	<0.003	0.026	<10	<1.0	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	5206	88	6.2	5.8									

PROJECT AREA – SECTION 24 (PRELIV)

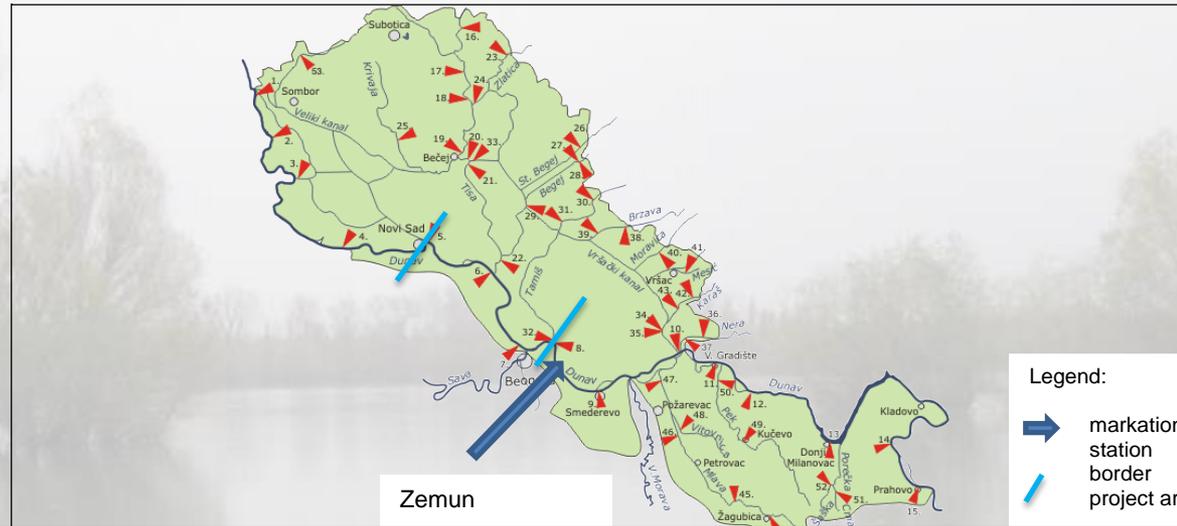


Profile	Code of water body or sampling points	Monitoring system and campaign	VALUE OF THE WATER QUALITY PARAMETERS																												
			General Parameters		Oxygen regime				Nutrients					Salinity			Metals					Organic substances		Microbiological parameters							
			pH value	Suspended matters	Dissolved oxygen (O2)	Percentage of saturation of water by oxygen	BOD 5	COD from K2Cr2O7	COD from KMnO4	Total Organic Carbon (TOC)	Total nitrogen (N)	Nitrates (NO3-N)	Nitrites (NO2-N)	Amonium ion (NH4-N)	Total phosphates (P)	Orthophosphates (PO4-P)	Chlorides (Cl-)	Sulphates (SO4--)	Total soluble salts	Electroconductivity	Arsenic (As)	Boron (B)	Copper (Cu)	Zinc (Zn)	Chromium (Cr)	Iron (Fe)	Manganese (Mn)	Phenolic index (C2H5OH)	Petroleum hydrocarbons	Anionic active substances	Fecal coliforms
mg/l	mg/l	%	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µS/cm	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	mg/l	mg/l	mg/l	cfu/100	cfu/100	cfu/100	cfu/100 ml
Preliv	PREL WL	Baseline, 2017	I	I	I	II		II	III	I		III	II	I	I			I	I	I	I	I	I	II	I			II	II	III	IV
	PREL WM	Baseline, 2017	I	I	I	II		II	III	I		I	II	I	I			I	I	I	I	I	I	II	I			II	I	III	III
	JDS 36, middle Belegiš	JDS 3, 2013	I	III-V	II			II	III			II	III	I	I			I	I	I	I	I	I	II	I			II	I	III	III

PROJECT AREA – SECTION 24 (PRELIV)

Profile	Code of water body or sampling points	Monitoring system and campaign	MDK AND VALUE OF THE SEDIMENT QUALITY PARAMETERS																																		
			DM	OC	Metal Content							PCBs	Polycyclic aromatic hydrocarbons (PAHs)							Oils	Pesticides				TOC	Granulometric composition											
			Determination of the dry matter content	Determination of the content of organic matter by loss by ignition	As	Cd	Cr	Hg	Cu	Ni	Pb	Zn	Polychlorinated biphenyls (PCBs) (total) (PCB 28, 52, 101, 118, 138, 153 and 180)	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Chrysen	Phenanthrene	Indeno (1,2,3-cd) pyrene	Fluoranthene	Naphthalene	Benzo (g, h, i) perylene	Benzo (k) fluorantene	PAHs (total)	Mineral oils	DDT (total)	Cyclodial pesticides	HCH (total)	Alpha-endosulfane	Heptachlor	Heptachlor epoxide	Total organic carbon (TOC)	Sand (2 - 0.05 mm)	Powder (0.05 - 0.002 mm)	Clay (<0.002 mm)		
					%	mg/kg																					µg/kg				mg/kg	%					
Limit values for the sediment quality assessment for dredging of sediment from the watercourses (Annex 3, Table 2 of Regulation)																																					
MDK 4	/	/	29	6.3	194	6.7	82	63	317	268	1	40	/	/	/	/	/	/	/	/	/	/	5000	4000	4000	2000	4000	4000	4000	/	/	/	/				
MDK 3	/	/	29	3.9	194	1.1	39	14	317	268	0.2	10	/	/	/	/	/	/	/	/	/	/	3000	40	/	/	/	/	/	/	/	/	/				
MDK 2	/	/	29	1	194	0.33	16	11	317	178	/	1	/	/	/	/	/	/	/	/	/	/	1000	10	/	/	/	/	/	/	/	/	/				
MDK 1	/	/	15	0.4	51	0.2	16	11	51	52	0.02	1	/	/	/	/	/	/	/	/	/	/	50	10	5	10	0.01	0.7	0.002	/	/	/	/				
Limit values for the status and trend of sediment quality assessment (Annex 3, Table 1 of Regulation)																																					
Remed. Value	/	/	55	12	380	10	190	210	530	720	1															40	5000	4000	4000	2000	4000	4000	4000				
MDK	/	/	42	6.4	240	1.6	110	44	310	430	200	0.1	0.4	3	11	0.5	6	3	0.1	8	2	10	3000					1	68	0.002							
Target value	/	/	29	0.8	100	0.3	36	35	85	140	20	0.001	0.003	0.003	0.1	0.005	0.06	0.03	0.001	0.08	0.02	1	50	10	5	10	0.01	0.7	2E-04								
Preliv	PREL SM	Baseline, 2017	78	0.4	2.5	<0.1	6.6	<0.01	2.8	6.7	4.2	23	<0.016	0.07	<0.001	<0.003	<0.003	0.03	<0.001	<0.001	0.01	<0.002	<0.003	0.11	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	1523	99	0.8	0.2		
	BP1 - PREL	EIA invest, 2012	/	/	3.3	<0.1	11	<0.01	2.8	12	4.2	40	n.d.	n.d.	n.d.	n.d.	<0.003	0.03	n.d.	0.008	n.d.	<0.006	n.d.	n.d.	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	/	/	/	/		
	BP2 - PREL	EIA invest, 2012	/	/	4	<0.1	27	<0.01	15	21	13.4	117	n.d.	0.043	n.d.	n.d.	0.034	n.d.	n.d.	0.063	n.d.	n.d.	0.005	n.d.	n.d.	0	n.d.	0	n.d.	<0.01	<0.70	<0.0002	/	/	/	/	

DOWNSTREAM FROM THE PROJECT AREA



Legend:

- ➔ marking for the station
- border of the project area

Profile	Code of water body or sampling points	Monitoring system and campaign	VALUE OF THE WATER QUALITY PARAMETERS																												
			General Parameters		Oxygen regime				Nutrients				Salinity			Metals				Organic substances		Microbiological parameters									
			pH value	Suspended matters	Dissolved oxygen (O2)	Percentage of saturation of water by oxygen	BOD 5	COD from K2Cr2O7	COD from KMnO4	Total Organic Carbon (TOC)	Total nitrogen (N)	Nitrates (NO3-N)	Nitrites (NO2-N)	Amonium ion (NH4-N)	Total phosphates (P)	Orthophosphates (PO4-P)	Chlorides (Cl-)	Sulphates (SO4--)	Total soluble salts	Electroconductivity	Arsenic (As)	Boron (B)	Copper (Cu)	Zinc (Zn)	Chromium (Cr)	Iron (Fe)	Manganese (Mn)	Phenolic index (C2H5OH)	Petroleum hydrocarbons	Anionic active substances	Fecal coliforms
mg/l	mg/l	%	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	µS/cm	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	µg/l	mg/l	mg/l	mg/l	cfu/100	cfu/100	cfu/100	cfu/100 ml
Zemun	ZEM WR	Baseline, 2017	I	I	I	II	II	III	II	II	III	I	II	I	I	I	I	I	I	I	I	I	I	II	I	I	I	IV	III	III	IV
	D6, right	SEPA, 2013	II-IV	III-V	III	I	II	I	I	II	I	I	II	I	I	I	I	I	I	I	I	I	I	II	II	I	I	I	I	I	I
		SEPA, 2014	II-IV	III-V	III	I	II	III	I	II	III	I	II	I	I	I	I	I	I	I	I	I	I	II	II	I	I	I	I	I	I
		SEPA, 2015	II-IV	III	III	I	II	I	I	II	III	I	II	I	I	I	I	I	I	I	I	I	I	II	II	I	I	I	I	I	I
		SEPA, 2016	II-IV	III-V	III	I	II	I	I	II	III	I	II	I	I	I	I	I	I	I	I	I	I	II	II	I	I	I	I	I	I

DOWNSTREAM FROM THE PROJECT AREA

Profile	Code of water body or sampling points	Monitoring system and campaign	Priority and priority hazardous substances
Zemun	ZEM WR D6, right	Baseline, 2017 SEPA, 2013 SEPA, 2014 SEPA, 2015 SEPA, 2016	lead (II), cadmium (II) 1xbenzo(b)fluoranten(>LOQ) 1xPb-ras(III-IV), 1xCd-ras(III-IV)

Profile	Code of water body or sampling points	Monitoring system and campaign	MDK AND VALUE OF THE SEDIMENT QUALITY PARAMETERS																																
			DM OC		Metal Content						PCBs		Polycyclic aromatic hydrocarbons (PAHs)							Oils		Pesticides				TOC		Granulometric composition							
			Determination of the dry matter content Determination of the content of organic matter by loss by ignition		Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Mercury (Hg)	Copper (Cu)	Nickel (Ni)	Lead (Pb)	Zinc (Zn)	Polychlorinated biphenyls (PCBs) (total) (PCB 28, 52, 101, 118, 138, 153 and 180)	Anthracene	Benzo (a) anthracene	Benzo (a) pyrene	Chrysen	Phenanthrene	Indeno (1,2,3-cd) pyrene	Fluoranthene	Naphthalene	Benzo (g, h, i) perylene	Benzo (k) fluorantene	PAHs (total)	Mineral oils	DDT (total)	Cyclodial pesticides	HCH (total)	Alpha-endosulfane	Heptachlor	Heptachlor epoxide	Total organic carbon (TOC)	Sand (2 - 0.05 mm)	Powder (0.05 - 0.002 mm)	Clay (<0.002 mm)
		%		mg/kg															µg/kg				mg/kg		%										
Limit values for the sediment quality assessment for dredging of sediment from the watercourcs (Annex 3, Table 2 of Regulation)																																			
MDK 4	/	/	29	6.3	194	6.7	82	63	317	268	1	40	/	/	/	/	/	/	/	/	/	/	5000	4000	4000	2000	4000	4000	4000	/	/	/	/		
MDK 3	/	/	29	3.9	194	1.1	39	14	317	268	0.2	10	/	/	/	/	/	/	/	/	/	/	3000	40	/	/	/	/	/	/	/	/			
MDK 2	/	/	29	1	194	0.33	16	11	317	178	/	1	/	/	/	/	/	/	/	/	/	/	1000	10	/	/	/	/	/	/	/	/			
MDK 1	/	/	15	0.4	51	0.2	16	11	51	52	0.02	1	/	/	/	/	/	/	/	/	/	/	50	10	5	10	0.01	0.7	0.002	/	/	/			
Limit values for the status and trend of sediment quality assessment (Annex 3, Table 1 of Regulation)																																			
Remed. Value	/	/	55	12	380	10	190	210	530	720	1											40	5000	4000	4000	2000	4000	4000	4000						
MDK	/	/	42	6.4	240	1.6	110	44	310	430	200	0.1	0.4	3	11	0.5	6	3	0.1	8	2	10	3000			1	68	0.002							
Target value	/	/	29	0.8	100	0.3	36	35	85	140	20	0.001	0.003	0.003	0.1	0.005	0.06	0.03	0.001	0.08	0.02	1	50	10	5	10	0.01	0.7	2E-04						
Zemun	ZEM SR D6, right	Baseline, 2017 SEPA, 2012	57	4.3	4.9	0.3	35	0.04	25	25	12	80	<0.016	0.02	<0.001	<0.003	<0.003	0.01	<0.001	0.03	0.01	<0.002	<0.003	0.07	<10	<1.0	<1.0	<1.0	<0.01	<0.70	<0.0002	18110	69	21.5	9.5
			/	7.54	<12	1	110	0.3	25	85	20	228	<1-2.2	3.3	/	5.6	/	/	3.6	60.5	<1	2.9	6.3	/	82	<1.0	/	<3.0	/	<1.0	<1.0	22500	/	/	/

Field surveys

November 2017



February-March 2018

Field surveys

February – March
2018



Main species description – Unio crassus

Unio crassus (eng. Thick Shelled River Mussel) is strictly protected species in Serbia and also is included in the European Union list of species of special community interest (92/43/EEC).

In its development, it reaches a size of 35-45 x 40-70 x 20-28 mm.

The armour is dark, most often black, sometimes with green shades, an ellipsoidal shape. It lives in clean waters, on the sandy and rocky bottom of the river.

Lifespan is 20-30 years. Small shells are very sensitive to any pollution of water and need lots of oxygen.

Today *Unio crassus* is before extermination. Water pollution, drying up the puddles and extinction of the parasitized fish have led to the question of the survival of these animals.

Nowadays, it is about putting an end to industrial projects that endanger their habitats.



Main species description – Unio pictorum

Unio pictorum (eng. Painter's Mussel) has name "painting shell" which dates from the time when painters used the shells to mix paints. Variable colors are often greenish-yellow or brown.

There are no very prominent teeth. Sizes 30-40 x 70-100 x 23-28 mm (height), but exceptions are long up to 140 mm.

This species lives in rivers, sometimes can be found in lakes and channels, but mostly in lowlands. *U. pictorum* lives on a sandy surface usually at a depth of 6 m and avoids mud and rocky bottom.

Survival is threatened by water pollution. It is forbidden to extract this kind of shells if they are smaller than 8 cm.



Main species description – Unio tumidus

Unio tumidus (eng. Swollen River Mussel) has color which vary from brown to greenish with yellow shades.

The dimensions of this shell are 25-40 x 50-80 x 23-35 mm (height). Some specimens are up to 120 mm.

This species lives in slow rivers, sleeves and lakes. It is also in artificial lakes and ponds and prefer sandy bottom and slowly moving water.

U. tumidus lives up to 9 m depth and avoids rocky areas and silts; also, requires cleaner water that has plenty of oxygen, compared to other types of shellfish.

Today this species is before extinction because it is threatened by water pollution, as well as man.



Main species description – Limosella aquatica

Limosella aquatica (eng. Water Mudwort) is a widespread species of flowering plants in the figwort family native to much of the temperate world where it grows in many types of wet habitat.

This is characteristic and very typical plant of the exposed mud on the draw-down zones of lakes and reservoirs, silt bars and banks in rivers, wet tracks and temporary pools, shallow still or slowly flowing waters, muddy or sandy shorelines, areas with fluctuating water levels and lakeshores subject to daily water level fluctuations.

It is usually associated with nutrient-rich sites or soils with high organic content. *L. aquatica* is semiaquatic and partly submersed or floating in the water, fleshy annual herb forming low tufts in muddy substrate.



Main species description – Acipenser ruthenus

Acipenser ruthenus (eng. Sterlet) may reach 16 kg in weight and 100 to 125 cm in length.

This species is quite variable in coloration, but usually has a yellowish ventral side. It is distinguishable from other European species of sturgeons by the presence of a great number of whitish lateral scutes, fringed barbels and an elongated and narrow snout, highly variable in length.

Spawning occurs from the middle of April to the beginning of June. Females may lay from 15.000–44.000 eggs, at water temperatures preferably in range 12–17 °C.

Sterlets require relatively large ponds with good water conditions and may be entangled in plants such as blanket weed.

Acipenser ruthenus represent a smallest species from family Acipenseridae in Danube River. In Danube, it is breeding during the April and May, on 8-19 °C, until 10 m.



This species is protected in Serbia and is protected by CITES (Appendix II).

Main species description – Charadrius dubius

Charadrius dubius (eng. Little Ringed Plover) is a small bird. Adult have gray-brown back and wings, white belly and white breasts with black ribbon on the neck.

Their habitats are open gravel near to freshwater lakes, including recesses (holes, slopes) in them, river islands and riverbanks.

They nest on the ground, between stones with little or no vegetation. Nesting pairs have also been recorded on flat graveled roof. The nest is a shallow scrape on loose sand, dry mud or on flat, bare rocks surrounded by mud or sand, sometimes amongst sparse vegetation in the vicinity of water, and often on small islands or adjacent farmland.

During the incubation period both male and female take turns incubating the eggs. *Charadrius dubius* search for food on mud or sludge surfaces, usually in their close surroundings and by sight.



Main species description – Riparia riparia

Riparia riparia (eng. Sand martin) is a small, slender bird with long wings, a slightly notched tail and a distinctive dark band across the breast.

Sand martins may feed alone or in large flocks, usually over water or open ground, and often associate with other swallow species.

The breeding season of the sand martin runs between April and August. It is a highly social species, nesting in colonies that may number from 10 to nearly 2.000 pairs.

The sand martin nests in burrows, which are typically crowded together in a natural or artificial bank, usually in fairly loose soils that are easy to burrow into, and near large bodies of water that give plenty of flying space. The burrows are mostly built in the upper part of the bank, to avoid ground predators..



Main species - Status

- ✓ River Mussel *Unio crassus* declined during the 20th century everywhere in Europe due to deteriorating water quality, habitat fragmentation and host fish limitation.
- ✓ This species is strictly protected in Serbia by the Rulebook on the proclamation and protection of strictly protected and protected wild plant, animal and fungi species, “The Official Gazette of the Republic of Serbia” No. 5/2010 and 47/2011
- ✓ According to IUCN Red list, it is endangered species and it is included in the European Union list of species of special community interest (92/43/EEC). According to the IUCN Red list, *U. tumidus* and *U. pictorum* are Least Concern species.
- ✓ Plant *Limosella aquatica* lives on sandy and gravel islets, as they exists on critical sectors on Danube River.
- ✓ Populations of this plant on critical sectors are important on the national level and, according to previously mentioned rulebook, it is a protected species in Serbia.
- ✓ According to the IUCN Red list, it is a Least Concern species.



U. pictorum



U. tumidus



U. crassus



Main species Status

- ✓ Fish *Acipenser ruthenus* is, according to the IUCN Red list, vulnerable species. According to previously mentioned rulebook, it is protected in Serbia and is protected by CITES (Appendix II).



- ✓ Bird *Charadrius dubius* in Europe has a trend of a mild decline in population number. According to previously mentioned rulebook is strictly protected species in Serbia, where their population is also in decline, and is protected by the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention).
- ✓ According to the IUCN Red list, it is a Least Concern species

Bird *Riparia riparia* according to the IUCN Red list is a Least concern species and according to domestic regulation is strictly protected. Their population in Serbia is in mild decline



Methodology – mussels

Samples were taken by using stainless steel “hand bucket” (on the motor boat) up to 7 m depths from water sediment. After getting out of the water, samples were partially dried in order to reduce the mass of the sediment, after which mussel individuals were separated and identified.



Methodology – plants

Phytocenological records have been implemented according to Braun-Blanquet methodology and LEAFPACS protocol. Semiaquatic records has been taken according to LEAFPACS field protocol (Willby *et. al.*, 2009; Gunn *et al.*, 2010), in the line with Pan European standard for sampling macrophytic vegetation (15460: 2007 Water quality-Guidance standard for the surveying of macrophytes) (CEN, 2007).

According to field procedure, a tour of entire river habitat along the river bank in order to get insight in diversity and distribution of *Limosella aquatica* has been performed. In line with results of field tour, representative 100 m along sectors has been selected within which recording has been performed. Along the 100 m sector, on every 20 m record has been taken in area of 1-9 m² on depths from 25, 50 and >75 cm.

Methodology – fishes

For the estimation of the fish fauna, networks of 10 x 3 m and fine mesh (30 mm) are used. Five sets are made in the riparian zone of the River, comprising an approximate area of 150 m². The section of the habitat where this type of fishing is applied are vary depending on the size of the habitat. The sampling efforts are measured in seconds (maximum 1000). At the same time, geographic (coordinates), ecological and physical and chemical characteristics of existing aquatic environments (including photographic records) are recorded.

Maintenance of networks at the desired level of water is made possible by domination buoys over weights or vice versa. Standing nets can be single-layer or three-layer interlocking meshes. Nets were thrown to the bottom and they stood there for a day. Nets then were taken out, Sterlet was counted and after that all individuals has been returned to the water.

Methodology – birds

Line transects involve the observer continually walking and recording all contacts either side of the track walked. In order to identify more and more common types of an area, it is necessary to allocate a certain number of transects per field, bearing in mind that different dwellings are approximately equally present.

Transects 100 m long in rich bird areas can be chosen, up to 1000 m in poor areas. It is important that the transects are sufficiently distant from each other (at least 150-200 m) so that the birds that were disturbed in the first one will not be counted again in the second, and that each transect will be covered at about the same speed at approximately the same time.

If it is necessary to estimate the population density per unit of area of a particular habitat, it is important to limit the recording of birds only to those observed within a certain distance, for example, all birds that are seen/heard within a 50 m wide strip left and right from the route are recorded in a kind, gender and age. In open habitats, birds can be recorded inside, for example, bands 100 m wide, 50 m to the left and right of the viewer; that is, continue to record all observed birds, but with the indication whether it is in or out of the transect.

Results – mussels

Unio sp. – During the field survey carried out in November 2017, February and March 2018, one individual downstream of the critical sector Preliv and two on the sector Susek were found.

In addition, some species from non-target genera were also found. Slightly downstream of the critical sector Preliv, *Corbicula* sp. (two individuals), *Dreissena polymorpha* (five) and *Sinanodonta woodiana* (two) were found in Zemun's part of the Danube. On the sector Beška, *Sinanodonta woodiana* (one) and *Corbicula* sp. (around 50 individuals) were found. On the sector Susek, *Sinanodonta woodiana* (one individual), dozens of *Dreissena polymorpha* and couple of *Dreissena rostriformis bugensis* were found.



Results – *Limosella aquatica*

Two individuals of this semiaquatic plant were found in the wider area of the critical sector Čortanovci, in the Koviljsko-Petrovaradinski rit.



Results – *Acipenser ruthenus*

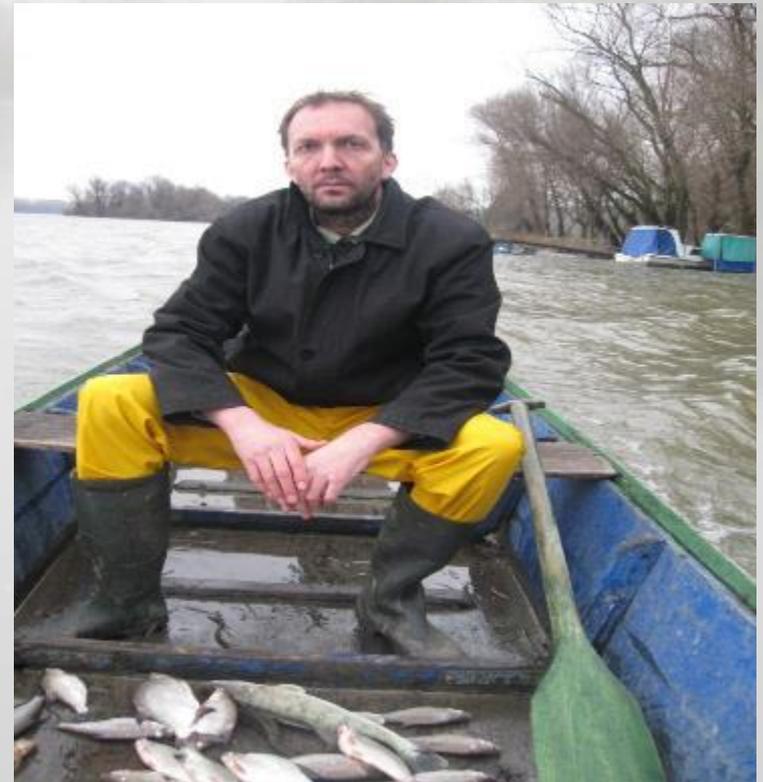
Five individuals of *Acipenser ruthenus* were found on the sector Preliv and four on the sector Beška.

Species from non-targeted fish genera were also found – three individuals of *Perca fluviatilis* (European perch) on the sector Preliv and one individual of *Zingel zingel* (Common zingel) on the sector Beška.



Results - *Acipenser ruthenus*

On the critical sectors Čortanovci and Arankina Ada no one individual of *Acipenser ruthenus* was found. Species from other genera are: *Rutilus rutilus* (Common Roach) – 2, *Perca fluviatilis* (European Perch) – 2, *Stizostedion lucioperca* (Pike-perch) - 1 and *Abramis bjoerkna* (Silver Bream) – 18.



Results – *Acipenser ruthenus*

On the critical sector Susek, one individual of *Acipenser ruthenus* was found and no one individual on the sector Futog. Species from non-targeted genera in these two sectors are: *Barbus barbus* (Common Barbel) – 1, *Zingel streber* (Streber) – 4, *Abramis bjoerkna* (Silver Bream) – 8, *Abramis sapa* (White-eye Bream) – 4, *Perca fluviatilis* (European Perch) – 1, *Rutilus rutilus* (Common Roach) – 1, *Lota lota* (Burbot) - 2 and *Chondrostoma nasus* (Common Nase) – 3.



Results – *birds*

No one individual of *Charadrius dubius* and *Riparia riparia* has been found.



Results – Summary

Sector	Mussel (<i>Unio sp</i>)	Fish (<i>Acipenser ruthenus</i>)	Plant (<i>Limosella aquatica</i>)
Susek	2	1	
Futog			
Arankina Ada			
Čortanovci			2
Beška		4	
Preliv	1	5	

Thank you for your attention

