



INTERMEDIATE ENVIRONMENTAL MONITORING REPORT AFTER WORKS n° 2

FUTOG – SUMMARY OF RESULTS

Introduction

The main objective of this environmental report after works is to address the base values of the main parameters identified during the elaborations of the EMRbW. These values were established during the Inception Phase and will serve as the base for evaluation of effects of river training and works to the environment.

According to the ToR, the first report will be submitted 6 months after the beginning of the DNP, covering effects of river training works. And second report must be submitted by the S&EM Services Contractor 12 months after the beginning of the DNP, covering effects of both river training and dredging works), identifying all changes in environmental parameters compared to the base values identified in the Environmental Monitoring Report Before Works, also arguing the reasons for these changes, as well as their long-term impact to the integrity of the affected areas.

Works begun at Futog on August 21st 2018 and officially ended 8th November 2019. So that after twelve months this report has the purpose to the status of environment at the end of the Defect Notification Period. The Environmental Monitoring Report after works n° 2 covers the following fields:

- Hydromorphology
- Sediment and water quality
- Waste
- Biology
 - Phytoplankton
 - Macrozoobenthos
 - Vegetation (*Limosella aquatica*)
 - Birds (*Charadrius dubius* and *Riparia riparia*)
 - Fish (*Acipenser ruthenus*)
- Development of vegetation and riparian areas
- Protected Areas and Ecological Networks

The table below shows the works to be carried out in the critical sector Futog and their exact location according to the Final Design:

N°	Name of critical sector	Type of works	Chainage from	to
		Detached groyne	1263+350	
		Chevron	1262+700	

The report shows the status of environment once completed twelve months since the finalization of works, according to ToR statements.

Description of work site

Construction works were performed on two locations within the subsector Futog 2, on the right side of the Danube River – construction of detached groyne and chevron, dredging work will not finally executed.



Construction works were started at the upstream location, and just after approximately one month they were started at the downstream location.

Floating barge with construction material (position 2 at Figure 1) was used as a temporary storage for solid material like steel armature (reinforcement bar) and new rolls of geotextile are into the foil Floating office (position 3 at Figure 1)

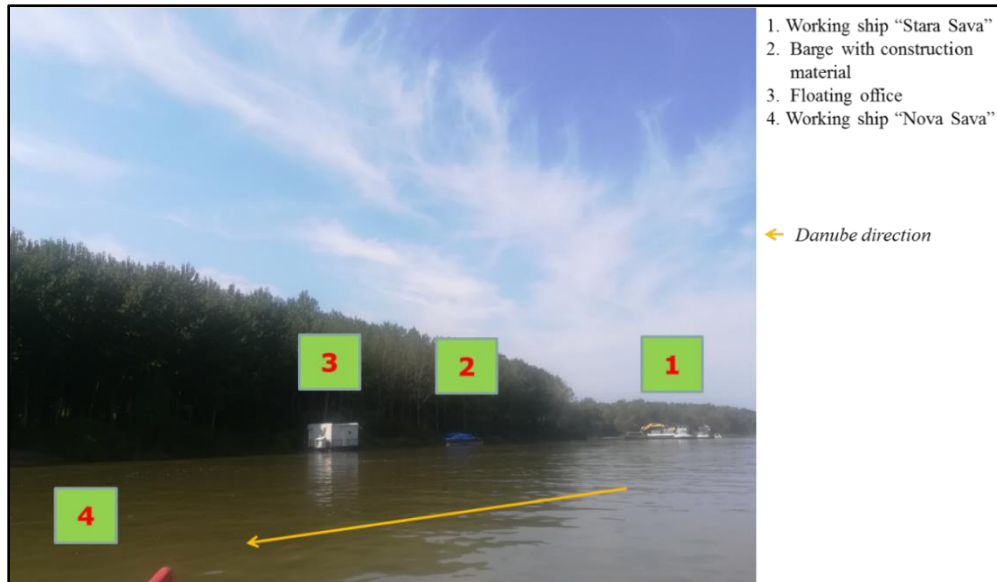


Figure 1 Display of construction sites and auxiliary objects within the Futog critical sector (Futog 2 subsector)

Status of the works after 12 months (August 2018 to August 2019)

As works ended last 8th November 2019, there is no activity associate to the project on this sector.

Project context

River stretch Futog is located upstream from Novi Sad, second most populated town in Serbia. Its position is between gauging stations Novi Sad and Backa Palanka.



Hydromorphology

The executed works have a notable impact on navigational conditions, and its positive effects will fix the riverbed in the future. The adverse effects are minimal or almost unperceivable. River depths in the vicinity of constructions are increased but within limits of usual morphological dynamic. The riverbed in the vicinity of the constructions has been stabilized, and no significant alternation has not been expected.



During the whole period of consideration, water levels were moderate without hydrological extremes.

From the experiences from previous years, the water levels during the winter season will be moderate. Equally, the development of the sandbars in the central part of the stretch could not be predicted easily. However, it could be expected that the sedimentation process continues and additionally affects the navigation in this part of the river, nevertheless how water stages will be developed.

Water quality monitoring

Detailed Monitoring plan for both water and sediment quality was created in accordance with monitoring plan from the Inception Report but also in accordance with currently valid dynamic plan and prediction that working period are going to be longer than it was planned.

During the works execution phase, five regular monitoring campaigns were carried out, one at the beginning of September (07/09/2018), second in the middle of November (23/11/2018) and third in the middle of February (19/02/2019), fourth in the middle of May (13/05/2019) and fifth at the end of August (29/08/2019). During all campaigns, sampling was performed at the position located about 100 m downstream from the works. In the second, third and fourth regular campaigns sample were taken downstream of the last construction site. Sampling and further analyses were performed by accredited laboratory Anahem from Belgrade

In the meantime, 13 water samples in five campaigns were taken for additional screening analyses. Samples were taken upstream and downstream of the construction sites in 22/10/2018 (just for the detached groyne), 30/10/2018 (both for detached groyne and chevron), 19/02/2019 (upstream from the detached groyne and downstream from the chevron), 14/03/2019 (both for detached groyne and downstream for chevron) and 29/08/2019 (upstream and downstream for chevron).

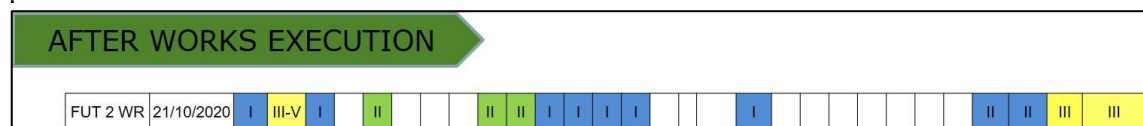
After works execution is finished, in phase of monitoring state on the location after that, until now, it has been performed two regular sampling and analyses campaign of the Danube River water on Futog location, in accordance with the Intention Monitoring Plan, as well as the ToR. Sampling was performed downstream from the constructed objects, on date 14/05/2020 and 21/10/2020, and full scope of analyses was carried out.

Sediment monitoring

After works execution was finished, in phase of monitoring state on the location, after that and until now, it has been performed two regular and sediment sampling and analyses campaigns on Futog location, in accordance with the Intention Monitoring Plan, as well as the ToR Sampling was performed downstream from the constructed objects, on date 14/05/2020 and 21/10/2020.

Review of water and sediment quality results

Results obtained during the **second regular sampling campaign, performed in the phase after works execution is finished**, is carried out on 21/10/2020 show that quality of the Danube River at location Futog, downstream from the work construction site predominantly corresponds to the quality of water class I, except for parameters nitrates, total nitrogen and BOD, which correspond to quality water of the II class. Water of the taken sample belongs to the class II for the coliform bacteria of fecal origin and the total coliform, while it belongs to the class II for intestinal enterococci and aerobic heterotrophs.





Also, results of the sediment quality obtained during regular monitoring campaigns, **within the phase after works executed**, performed on 14/05/2020 and 21/10/2020, show that all parameters values are below target values and most of them are not even detected, i.e. that they are on the natural background.

Waste

During this period there has been no activity on the sector, therefore it has not been necessary to control whether there were discharges into the river from the boats.

Phytoplankton

This is typical phytoplankton community structure for this season, characterized by low primary production. Community structure was uniform along depth gradient and among localities

Macrozoobenthos

Mussels were represented by one genus and one species.

In the river sediment downstream of chevron four individuals of Asian clam (*Corbicula fluminea*) has been recorded. Upstream of groyne were no mussels. Due to very high-water level, no one individual of mussels has been found along the riverbank.

The following figure presents only one found mussel species downstream of chevron from sediment.

Sector	<i>Unio</i> sp.	Other species
Sector 19 Futog	<i>Unio tumidus</i>	<i>Corbicula fluminea</i>

Birds

Bird population was scarce in qualitative sense. Mallard (*Anas platyrhynchos*) were dominated in number, with predominantly males. Two individuals of Great Cormorant (*Phalacrocorax carbo*) were in flight. Several individuals of European herring gull (*Larus argentatus*) floated on the water.

Not any individual of migratory birds *Charadrius dubius* and *Riparia riparia* have been found.

Sector	<i>Charadrius dubius</i>	<i>Riparia riparia</i>	Other species
Sector 19 - Futog	--	--	<i>Phalacrocorax carbo</i> <i>Anas platyrhynchos</i> <i>Larus argentatus</i>

Fishes

In the standing net in the area of old groynes 13 fish species was found. Sterlet was not found. In pulling the net in the zone between old and new groynes and chevron following species were found: *Abramis brama*, *Ballerus ballerus*, *Ballerus sapa*, *Blicca bjoerkna*, *Rutilus rutilus* and *Vimba vimba*. By electrofishing in the same zone three species were found: *Alburnus alburnus*, *Gobio obtusirostris* and *Aspius aspius*. In the standing net in the zone of chevron was not fishes. Near the chevron no one individual of Sterlet have been found.



Sector	<i>Acipenser ruthenus</i>	Other species
Sector 19 – Futog	--	<i>Abramis brama</i> (12) <i>Ballerus ballerus</i> (3) <i>Ballerus sapa</i> (7) <i>Blicca bjoerkna</i> (14) <i>Barbus barbus</i> (1) <i>Carassius gibelio</i> (3) <i>Condrostoma nasus</i> (2) <i>Cyprinus caprio</i> (1) <i>Hypophthalmichthys molitrix</i> (1) <i>Rutilus rutilus</i> (5) <i>Vimba vimba</i> (10) <i>Esox lucius</i> (2) <i>Sander lucioperca</i> (2) <i>Alburnus alburnus</i> (14) <i>Gobio obtusirostris</i> (1) <i>Aspius aspius</i> (1)

Macrovegetation

Vegetation are developed by floors. Chervil (*Anthriscus* sp.) and Bedstraw (*Galium* sp.) are very numerous in ground floor. This species has wide distribution in the part of island closer to groyne. Blackberry (*Rubus* sp.) and False indigo-bush (*Amorpha fruticosa*) dominates in floor of shrubs. False indigo bush is numerous in the belt close to the riverbank, while Blackberry dominate deeper in the forest habitat and has many individuals. In upper part of island Blackberry is outgrown and form dense populations, in comparison to “cultured” fields. Mostly of herbaceous and shrub plants are with green leaves, but some perennials are in preparation for winter hibernation. Forest plants, such as *Populus* and *Salix*, has regular seasonal development, with preserved humus and forest layer and root system.

Sector	Species: <i>Limosella aquatica</i>	Other species
Sector 19 Futog	--	<i>Populus euroamericana</i> <i>Populus alba</i> <i>Salix alba</i> <i>Quercus</i> sp. <i>Tilia</i> sp. <i>Fraxinus americana</i> <i>Amorpha fruticosa</i> <i>Rubus caesius</i> <i>Anthriscus</i> sp. <i>Erigeron annuus</i> <i>Vitis aestivalis</i> <i>Vitis rotundifolia</i> <i>Galium aparine</i> <i>Fraxinus excelsior</i> <i>Robinia pseudoacacia</i>



		<p><i>Solanum dulcamara</i> <i>Symphotrichum lanceolatum</i> <i>Chelidonium majus</i> <i>Acer saccharinum</i> <i>Ranunculus repens</i> <i>Plantago major</i> <i>Ranunculus sceleratus</i> <i>Ulmus</i> sp. <i>Morus rubra</i> <i>Stellaria media</i> <i>Acer negundo</i> <i>Urtica dioica</i></p>
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Plants

Not any individual of species *Limosella aquatica* and *Lindernia palustris* have been found.

Sector	Species: <i>Limosella aquatica</i> Species: <i>Lindernia palustris</i>
Sector 19 Futog	No results

Development of vegetation

Herbaceous plants are represented by species from families *Salicaceae*, *Fagaceae*, *Malvaceae*, *Oleaceae*, *Fabaceae*, *Rosaceae*, *Apiaceae*, *Asteraceae*, *Vitaceae*, *Rubiaceae*, *Solanaceae*, *Papaveraceae*, *Sapindaceae*, *Ranunculaceae*, *Plantaginaceae*, *Ulmaceae*, *Moraceae*, *Caryophyllaceae* and *Urticaceae*. Based on recent and previous surveys, families *Salicaceae*, *Sapindaceae*, *Asteraceae* and *Rosaceae* dominate in number of species present on island. Regular development is expressed in height and spatial sense. Due to high water level, some semiaquatic plant species near water line has favourable conditions for growth, but some terrestrial species are in a high percentage covered by water, which makes their growth difficult.

Riparian areas

Vegetation are developed by floors. Blackberry and Bedstraw form very dense populations due to large number of individuals on confined habitat. Birds are occurred by three genera, and Mallard is dominant species in number of individuals. Fungi are present by Tinder fungus (*Fomes fomentarius*). Invertebrate animals are represented by Mussels and Insects (*Graphosoma italicum*, family *Pentatomidae*). Amphibians are represented by Pool frog (*Pelophylax lessonae*). Water entered in part of habitat closer to chevron and covered mostly of plant species which previously were on dry terrain. Height of such water layer is around 10-15 cm. High water level influences on riparian habitats and terrestrial plant species.

Sector	Species
Sector 19 Futog	Amphibia (Anura) – <i>Pelophylax lessonae</i> Insecta (Hemiptera) – <i>Graphosoma italicum</i> Fungi (Polyporaceae) – <i>Fomes fomentarius</i>



Protected areas

In addition, the selected quarry is located inside the National Park Fruška Gora. The mentioned EIA concluded that not any impact could be expected in the National Park due to the fact that the quarry is currently active for some other uses. During this period, negative effect over the National Park of "Fruška Gora" due to the activities of this project have not been observed.

Ecological network

According to Regulation on ecological network ("Official Gazete RS" No. 102/2010), one area (as part of ecological network), relatively close to work zone, is mentioned as ecological corridor of international importance in the Republic of Serbia. This is Monument of nature "Marsh forest on Mačkov sandbank" in the Beočin municipality. Area of protected zone is 4 ha and Danube bank length in protected zone is 0.5 km. Previous and ongoing activities on the critical sector Futog does not show negative effect on the mentioned area.

Summary of results

After field surveys during November 2017, February, March, July, August, October and November 2018, February, May, August and October 2019, May and October 2020, the following target species have been found in sector Futog:

Sector	Macrozoo benthos (<i>Unio sp</i>)	Fishes (<i>Acipenser ruthenus</i>)	Plants (<i>Limosella aquatica</i>)	Plants (<i>Lindernia palustris</i>)	Birds <i>Riparia riparia</i>	Birds <i>Charadrius dubius</i>
Nov 2017	-	-	-	≈10 individuals	-	-
Feb 2018	-	-	-	-	-	-
March 2018	-	-	-	-	-	-
July 2018	-	-	-	-	-	-
Aug 2018	-	-	-	-	-	-
Oct 2018	1	-	-	-	-	-
Nov 2018	--	-	-	-	-	-
Feb 2019	1	-	-	-	-	-
May 2019	1	-	-	-	-	-
August 2019	1	-	-	-	-	-
October 2019	-	2 individuals	-	-	-	-
May 2020	5-7	-	-	-	-	-
October 2020	--	--	--	-	-	--

Summary of main impacts in the sector during this period

On this sector was defined the construction of some river training structures and dredging works. These activities included dredging in the central part of the river between km 1266 and km 1265



of approx. 157,456.90 m³ sediment and the construction of a detached downstream facing groyne at km 1263.35 and a chevron at km 1262.8-1262.7 both located along the right bank. Training structures have been built in the defined location, however, technical decision after several analysis concluded that dredging works were not necessary at this moment.

Several monitoring has been executed during construction phase, which results have been compared with surveys carried out in October-November 2020 in order to compare the status of environment twelve months after works finalization.

Regarding water and sediments, after this period it is possible to conclude that there are no significant effect over these parameters. The obtained results during field surveys in October-November are significantly similar to the previous ones. This can be interpreted as the works have not been affected the quality of water and sediments in the vicinity of critical sector of Futog.

From the point of view of biology, the results show that the nature has not been affected by the works, which confirm the conclusion obtained in previous reports.

Bearing in mind that works were being executed from the water, the riparian vegetation existing in the riverbanks have not suffered any impact except a little dust deposited on leaves. This impact cannot be avoided because mainly depends on wind direction. However, it is not significant and the general status of riparian habitat remains in good conditions.

None of individuals of protected species of plants had been affected during those months and wildlife seemed not to be impressed by the presence of machinery and workers. Protected species of birds have not been detected in Futog in any of the field surveys.

Finally, although one individual of *Unio turmidus* were found in water sediments, the place is located near 100 m downstream the work site.

This survey after twelve months without works disturbances shows how the environment in vicinity of structures remains in the same conditions as was addressed in monitoring made before works.

Protective and corrective measures

As works on critical sector Futog finished in November 2020, there is no need to apply protective or corrective measures.

Conclusions & Recommendations

Once complete one year after works finalization, monitoring surveys show that environment in the vicinity of new structures have not been affected. As established in Terms of Reference a final survey must be done in order to prepare the Final Environmental Report after works, once the six critical sectors will be completed around August 2021. This final survey will permit definitely conclude that this sector remains with the same nature conditions.

Works that are being executed in another sector will be assess in different report.