Strasbourg, 23rd November 2022 **T-PVS/Files(2022)72**

CONVENTION ON THE CONSERVATION OF EUROPEAN WILDLIFE
AND NATURAL HABITATS

Standing Committee

42nd meeting
Strasbourg, 28 November – 2 December 2022

_____

Possible File no. 2020/9: Possible negative impact of hydro-power plant development on the Neretva River (Bosnia and Herzegovina)

- REPORT OF THE ON-SPOT-APPRAISAL -

17 – 21 October 2022

Document prepared by
apl Prof. Dr. Gregory Egger

_____

Table of Contents

1. Introduction

The Neretva River and its tributaries are in a near-natural state, which nowadays is rarely found in Europe. With about 70 hydropower projects planned in the entire river basin, the Neretva is one of the most threatened river systems in Europe.

In October 2020, NGOs[1] filed a complaint[2] to the Bern Convention Secretariat, concerning the permission of the 35MW "Ulog" hydropower plant and the hydroelectric system (HES) "Gornja Neretva"[3] in the Upper Neretva River in Bosnia and Herzegovina. The planned HES "Gornja Neretva" and the dam of the "Ulog" hydropower plant, that is already under construction are located in the area of the candidate Emerald Network site no. BA0000002 "Gornji tok Neretve"[4].

The complainants state that "…*the authorities failed to assess the impact of the projects on the candidate Emerald site and did not take the necessary protection and conservation measures in order to maintain the ecological characteristics of the candidate Emerald sites until its full inclusion in the Emerald Network"*[2].

Following the decision by the 41st Standing Committee of the Bern Convention in December 2021, an on-the-spot-appraisal and meeting with the stakeholders was carried out in October 2022. The objectives of this mission[5] were to 1) collect information about the species and habitats, 2) assess the possible impacts of the hydropower plants, 3) assess the current state of play of the construction at the sites, 4) collect information about the EIAs for the planned hydropower projects and 5) collect information on the study towards the proclamation of certain sites as protected areas at State and entity level, and on synergies between these processes and development of the Emerald Network.

This report identifies the impacts of the planned hydropower plants in the Upper Neretva River[6] on protected resources in the candidate Emerald site BA0000002, from which recommendations can be derived.

2. The Upper Neretva River

The Neretva is a large karst river flowing through Bosnia and Herzegovina and Croatia into the Adriatic Sea. In its upper reaches (upstream from Konjic) it is still in a pristine condition and free flowing, while the midsection, has already been altered for hydropower use. The hydrological regime is determined by precipitation in the winter months and snowmelt in spring. In summer, low water prevails for the most part (Figure 1).

The Upper Neretva River has a mountain stream character with occasional side channels and back waters surrounded by riparian alder forests. Coarse substrate dominates the riverbed and fine sediments are rare[7]. At the gauging station in the settlement Ulog, the mean annual discharge is 11,56 m^3/s, the minimum annual discharge is 0,45 m^3/s and the maximum annual discharge 193,84 m^3/s.[8]

Until the settlement in Glavatičevo, the Upper Neretva is fed by 13 right and 11 left tributaries.

---

[1] Centre for Environment, Aarhus Centre in Bosnia and Herzegovina, EuroNatur, RiverWatch, CEE Bankwatch Network and ClientEarth.
[2] Complaint Form to the Bern Convention Secretariat (22/10/2020): T-PVS/Files(2021)06 + Annex.
[3] a chain of 7 small hydropower plants with a total installed capacity of 15.01MW, on the upper Neretva River and its tributaries.
[4] proposed as ASCI in 2005 (Standard data form: https://natura2000.eea.europa.eu/Emerald/SDF.aspx?site=BA0000002&release=5&form=Clean)
[5] Mission Terms of Reference (T-PVS/Files(2022)02): https://rm.coe.int/files02-2022-tor-neretvariver-bosniaherzegovina-final/1680a5ed94
[6] hydropower projects planned along the tributaries are referred to but not described in detail within the scope of this report.
[7] Knook, V.G.; Weiss, S.; Singer, G. (Eds) (2022): Science Week 2022, Neretva River, Bosnia and Herzegovina, Preliminary Report for River Watch and EuroNatur
[8] personal correspondence with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina, email on 1st November 2022, attached file:1.0 HPP Ulog information.docx

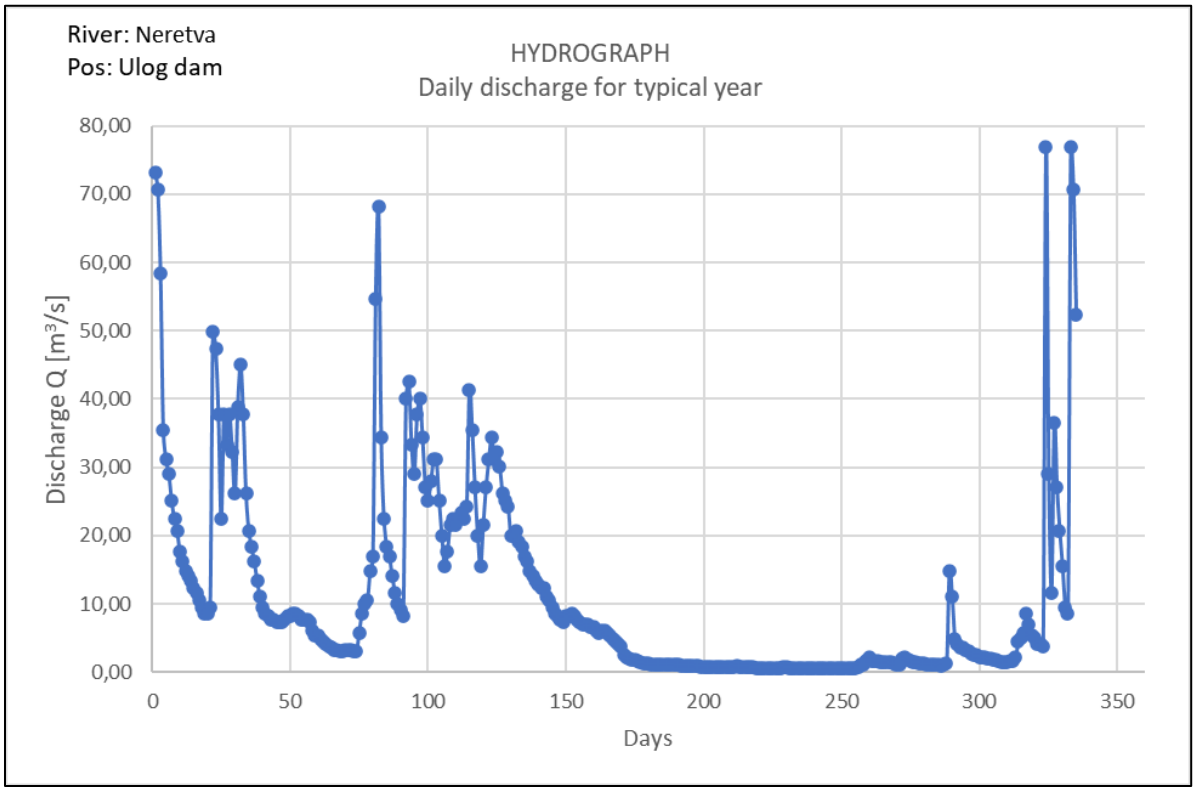

Figure 1 *Hydrograph at gauging station Ulog*[9].

3. Candidate Emerald Network site BA0000002

The Emerald Network of Areas of Special Conservation Interests (ASCI) aims to conserve wild flora and fauna and their natural habitats. It was created by the Council of Europe as part of its work under the Bern Convention in 1989. Within the EU the Bern Convention is implemented through the Habitats Directive (92/43/EEC) and the Birds Directive (2009/147/EC) in the Natura 2000 network[10]. In 2011 the Bern Convention Standing Committee adopted a list of 29 nominated candidate Emerald sites in Bosnia and Herzegovina (of which 12 are located in the Neretva River basin[11]), including site no. BA0000002 "Gornji tok Neretve", that was already proposed as an ASCI in October 2005[12], within which the hydropower projects of concern are located.

The site has an area of 21,419 ha and encloses the Upper Neretva River from the source until a few kilometres upstream of Konjic[13]. In Table 1 and Table 2 the nominated species and habitats according to the Standard data form and Emerald Network Database are listed.

[9] personal correspondence with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina, email on 1st November 2022, attached file:1.0 HPP Ulog information.docx provided by EFT

[10] Standing Committee of the Bern Convention (1989): Recommendation No. 16 (1989) of the standing committee on areas of special conservation interest (Adopted by the Standing Committee on 9th June 1989); https://rm.coe.int/1680746c25

[11] BA0000001, BA0000002, BA0000003, BA0000004, BA0000005, BA0000006, BA0000007, BA0000008, BA0000012, BA0000023, BA0000024 and BA0000025

[12] Council of Europe (2020): Convention on the conservation of European wildlife and natural habitats – 40th meeting of the Standing Committee to the Bern Convention – List of officially nominated candidate Emerald Network sites (December 2020): T-PVS/PA(2020)09, 4. December 2020; https://rm.coe.int/updated-list-of-officially-nominated-candidate-emerald-sites-2020/1680a080d4

[13] Standard data form, site no BA0000002: https://natura2000.eea.europa.eu/Emerald/SDF.aspx?site=BA0000002&release=5&form=Clean

In Summer 2022 a diverse team of scientists from 7 countries set out to the upper Neretva River where data was collected to investigate the biodiversity of this area. In the preliminary report[14] the first results to the topics aquatic insects, terrestrial insects, reptiles and amphibians, fish, mammals, birds, vegetation, subterranean fauna, food web structure and trophic diversity in zoobenthos, ecosystem functional diversity, greenhouse gases, and physical stream habitats, are given. More detailed analyses are currently ongoing.

Table 1 *Species listed in Resolution 6 of the Bern Convention with remarks to occurrence in Appendices I, II or III for site BA0000002 according to the Standard data form*

Species			Species code	Appendix I	Appendix II	Appendix III
Birds	1	Alcedo atthis	A229		x	
	2	Aquila chrysaetos	A091			x
	3	Ardea purpurea	A029		x	
	4	Ardeola ralloides	A024		x	
	5	Ciconia ciconia	A031			
	6	Circaetus gallicus	A080			
	7	Circus aeruginosus	A081			
	8	Egretta garzetta	A026		x	
	9	Ixobrychus minutus	A022		x	
	10	Nycticorax nycticorax	A023		x	
Mammals	1	Canis lupus	1352		x	
	2	Myotis capaccinii	1316			
	3	Myotis emarginatus	1321			
	4	Myotis myotis	1324			
	5	Rhinolophus blasii	1306			
	6	Rhinolophus euryale	1305			
	7	Rhinolophus ferrumequinum	1304			
	8	Rhinolophus hipposideros	1303			
	9	Ursus arctos	1354		x	
Reptiles	1	Emys orbicularis	1220		x	
	2	Testudo hermanni	1217		x	
Amphibians	1	Bombina variegata	1193		x	
Fish	1	Rhodeus sericeus amarus	1134			
Invertebrates	1	Cerambyx cerdo	1088		x	
	2	Euphydryas aurinia	1065		x	
	3	Euphydryas maturna	1052		x	
	4	Lucanus cervus	1083			x
	5	Lycaena dispar	1060		x	
	6	Morimus funereus	1089			
	7	Osmoderma eremita	1084		x	
	8	Rosalia alpina	1087		x	
Plants	1	Aquilegia kitaibelii	1473	x		

[14] Knook, V.G.; Weiss, S.; Singer, G. (Eds) (2022): Science Week 2022, Neretva River, Bosnia and Herzegovina, Preliminary Report for River Watch and EuroNatur; available at: https://balkanrivers.net/uploads/files/3/NSW-PreliminaryReport-Final-Web.pdf

Species			Species code	Appendix I	Appendix II	Appendix III
	2	Cypripedium calceolus	1902	x		
	3	Eryngium alpinum	1604	x		

Table 2 *Habitats listed in Resolution 4 for site no BA0000002 according to the Emerald Network - Access database*[15]

Habitat code	EUNIS code	EUNIS name	Habitats directive code
34.5	E1.3	Mediterranean xeric grassland	6220
41.1	G1.6	*Fagus* woodland	9110, 9140
41.4	G1.A4	Ravine and slope woodland	9180
41.7	G1.7	Thermophilous deciduous woodland	91M0, 9250
44.1	F9.1 and G1.11	Riverine shrub and *Salix* woodland	3230, 3240, 91E0
44.3	G1.21	Riverine *Fraxinus - Alnus* woodland, wet at high but not at low water	91E0
65	H1	Terrestrial underground caves, cave systems, passages and waterbodies	8310

Species and habitats that are not listed in the Standard data form and database of the candidate Emerald site BA0000002 but could be affected by the hydropower projects are listed in Table 3 and 4.

Table 3 *Species not listed in the Standard data form of the nominated Emerald site BA0000002*

Species			**IUCN Status**	**Listed in**	**Occurrence**	**Source (see note)**
Birds	Cinclus cinclus	White-throated dipper	LC		Upper Neretva	16
	Motacilla alba	White wagtail	LC	Bern Convention (Appendix II)	Upper Neretva	16,17
Mammals	Lutra lutra	Eurasian otter	NT	Bern Convention (Resolution 6, Appendix II), CITES (Appendix I)	Upper Neretva	16, 18
	Lynx lynx	Lynx	LC	Bern Convention (Resolution 6), CITES (Appendix II)	Valleys of the Upper Neretva	16, 18
	Rupicapra rupicapra balcanica	Balkan chamois	LC	Bern Convention (Resolution 6)	Valleys of the Upper Neretva	16
Reptiles	Dinarolacerta mosorensis	Mosor rock lizard	VU	Bern Convention (Appendix III)	Upper Neretva	16, 17, 18
Fish	Alburnus albidus	White bleak	VU	Bern Convention (Resolution 6), Habitats directive (Appendix II)	Neretva between Konjic and Ulog	18

[15] European environmental agency (2022): Emerald – Access Database. https://www.eea.europa.eu/data-and-maps/data/emerald-network-data-1/#METADATA

[16] Annex I: Reply to the Report of the authorities of Bosnia and Herzegovina to the Standing Committee of the Bern Convention regarding the complaint no. 2020/9. Center for Environment (FoE Bosnia & Herzegovina), Aarhus Centre in Bosnia and Herzegovina, RiverWatch, EuroNatur, CEE Bankwatch Network, ClientEarth

[17] Complaint Form to the Bern Convention Secretariat (22/10/2020), Annex I: List of species and habitats

[18] Drešković, N.; Đug, S.; Stupar, V.; Hamzić, A.; Lelo, S.; Muratović, E.; Lukić-Bilele, L.; Brujić, J.; Milanović, D.; Kotrošan, D. (2011): Natura 2000 in Bosnia and Herzegovina, WWF Mediterranean Programme Europes Living Heart, Sarajevo

Species			IUCN Status	Listed in	Occurrence	Source (see note)
	Barbatula barbatula	Stone loach	LC		Upper Neretva	19
	Chondrostoma knerii	Dalmatian nase	VU	Habitats directive (Appendix II)	Neretva between Konjic and Ulog	18
	Cottus gobio	Sculpin	LC	Bern Convention (Resolution 6), Habitats directive (Appendix II)	Upper Neretva	18, 19
	Phoxinus phoxinus	Minnow	LC		Upper Neretva	19
	Salmo farioides	Adriatic brown trout	NE	Bern Convention (Resolution 6), Habitats directive (Appendix II)	Upper Neretva	
	Salmo marmoratus	Marble trout	LC	Bern Convention (Resolution 6), Habitats directive (Appendix II)	Neretva downstream of Ulog	18,20
	Salmo obtusirostris	Softmouth trout	EN	Habitats directive (Appendix II)	Neretva between Glavaticevo and Ulog	16, 18
Invertebrates	Austropotamobius pallipes	White-clawed crayfish	EN	Bern Convention (Resolution 6, Appendix III), Habitats directive (Appendix II)	Upper Neretva	21

Notes on the occurrence of the species listed:

- In the Upper Neretva River four fish species were found: *Salmo farioides*, *Cottus gobio*, *Phoxinus phoxinus* and *Barbatula barbatula*. With mitochondrial DNA-analysis, the caught trout species could be identified as an endemic species of *Salmo farioides*, the Adriatic line of the brown trout[22].
- *Salmo obtusirostris* was found 20-25 km upstream of Glavatičevo. *Salmo marmoratus* evidently occurs downstream of Ulog[23]. The presence upstream of Ulog is still questionable but not entirely ruled out[24].

[19] Study on Protection of Upper Neretva River, Excerpts related to ichthyofauna, 2022 (correspondence with Redzib Skomorac, email 02.11.22)
[20] personal correspondence with Steven Weiss and Kurt Pinter on 2nd November 2022

Knook, V.G.; Weiss, S.; Singer, G. (Eds) (2022): Science Week 2022, Neretva River, Bosnia and Herzegovina, Preliminary Report for River Watch and EuroNatur
[21] Trožić-Borovac, S. (2011). Freshwater crayfish in Bosnia and Herzegovina: the first report on their distribution. Knowledge and Management of Aquatic Ecosystems, (401), 26.
[22] Study on Protection of Upper Neretva River, Excerpts related to ichthyofauna - Salmo farioides, 2022 (correspondence with Redzib Skomorac, email 02.11.22)
[23] personal correspondence with Steven Weiss and Kurt Pinter on 2nd November 2022

Knook, V.G.; Weiss, S.; Singer, G. (Eds) (2022): Science Week 2022, Neretva River, Bosnia and Herzegovina, Preliminary Report for River Watch and EuroNatur
[24] eDNA samples were taken downstream of the construction site Ljusići, results are still pending; according to local fishermen, S. marmoratus can be caught everywhere along the upper Neretva

Table 4 *Habitats not listed in the Standard data form*[25]

EUNIS code	EUNIS name	Habitats directive code
H 3.2	Basic and ultra-basic inland cliffs	8210
C 3.55	Sparsely vegetated river gravel banks	3220 and 3240
E 5.4	Moist or wet tall-herb and fern fringes and meadows	6430
E 2.2	Low and medium altitude hay meadows	6510

4. Description of the (planned) hydropower plants in the Upper Neretva River basin

In the upper part of the Neretva River, located in the candidate Emerald site BA0000002, ten hydropower plants are planned. For the 35 MW hydropower plant Ulog downstream of the village Ulog in Republika Srpska, construction has already started. Upstream of the Ulog plant, the hydroelectric system (HES) Gornja Neretva consisting of 7 hydropower plants with a total capacity of 15.01 MW is being planned. The project was split into two phases. Phase I includes the three uppermost power plants in the district Gacko, Phase II the four following plants in the district Kalinovik. The hydropower projects Glavatičevo and Bjelimići downstream of the Ulog plant in the Federation of Bosnia and Herzegovina have been rejected and are currently dormant (Table 5). Baseline data is given in Tables 7 – 9.

Table 5 *List of (planned) hydropower plants in the Upper Neretva*[26]*: HES Gornja Neretva, hydropower plant Ulog and hydropower plants Glavatičevo and Bjelimići*

HPP Name	Status	Municipality	EIA status 2022
Gornja Neretva RS 7 - Igaščica	planned	Gacko	EIA Phase 1, voided by court; new EIA imminent
Gornja Neretva RS 6 - Mjedenik			
Gornja Neretva RS 5 – Krupac (Grebenac) -Ušće			
Gornja Neretva RS 4 – (Vrelo) Krupac	planned	Kalinovik	EIA Phase II, valid
Gornja Neretva RS 3 - Trnovica			
Gornja Neretva RS 2 - Plačikus			
Gornja Neretva RS 1 - Uloški Buk			
Ulog	under construction	Kalinovik	EIA approved
Gornja Neretva - Glavatičevo	project dormant	Konjic	-
Gornja Neretva - Bjelimići	project dormant	Konjic	-

It should be mentioned that there are twelve more hydropower plants planned along the Neretva tributaries Jezernica and Ljuta, of which six are located within the candidate Emerald site BA0000002 (Table 6).

Table 6 *List of planned hydropower plants along the Upper Neretva tributaries Ljuta and Jezernica*[22]

HPP Name (tributary)	Status	Municipality	EIA status 2022
Gvozdnica 1 (Jezernica)	planned	Kalinovik	unclear
Gvozdnica 2 (Jezernica)			
Jezerac (Jezernica)			

[25] Annex I: Reply to the Report of the authorities of Bosnia and Herzegovina to the Standing Committee of the Bern Convention regarding the complaint no. 2020/9.Center for Environment (FoE Bosnia & Herzegovina), Aarhus Centre in Bosnia and Herzegovina, RiverWatch, EuroNatur, CEE Bankwatch Network, ClientEarth

[26] https://docs.google.com/spreadsheets/d/1kEphtGesZlwUPveZZQMnW5pchZVzCHzKzImhzqggWio/edit#gid=499443839

HPP Name (tributary)	Status	Municipality	EIA status 2022
Jezernica (Jezernica)			
Ljuta-Dindo (Ljuta)	planned	Konjic	valid EIA, sued at supreme court
Ljuta-Donje Luko (Ljuta)	cancelled		cancelled

4.1. HPP Ulog

Table 7 *Baseline data for HPP Ulog provided by EFT*[27]

Baseline data HPP "Ulog"	
Dam/sill type	Dam without closure
Height of dam (m)	53 m including 10 m foundation
Head (m)	120
Derivation/pipeline length (m)	2758 m (length of diversion tunnel and penstock)
Length of reservoir at max/mean/min flow (m)	4800 / 3400 / 1700
Number of turbines	3
Turbine type	2 Francis turbines (17,3 MW) and 1 small 174kW turbine
Max. amount of water derivated (m^3/s)	35
Spillway overflow (m^3/s)	Q_{1000}= 545
Absolute minimum flow (m^3/s)	0,512
Environmental flow (% of $Q_{average}$)	Environmental flow regime is based on 95% probability of minimum mean-monthly flow
Input flow = Output flow?	YES
Can sediments pass the dam?	NO, management of deposited gravel is not planned
Is management of deposited fine sediment within the reservoir planned?	NO, reservoir flushing is not planned
Passable for fish?	NO

4.2. HES Gornja Neretva

Table 8 *Baseline data for the 7 power plants of the HES "Gornja Neretva" provided by the investor Marvel d.o.o.*[28]

Baseline data HES "Gornja Neretva"	Igaščica	Mjedenik	Krupac-Ušće	Krupac	Trnovica	Plačikus	Uloški buk
	GN 7	GN 6	GN 5	GN 4	GN 3	GN 2	GN 1
Dam/sill type	Tyrolean weir	Dam without closure	Dam without closure	Tyrolean weir	Dam without closure	Dam without closure	Dam with closure
Height of dam (m)	0,70	1,50	5,00	0,70	1,80	8,00	-
Head (m)	59,50	43,00	30,00	84,00	27,50	33,61	60,00
Derivation/pipeline length (m)	1430	2172	1008	1030	1798	2058	717 (tunnel)

[27] personal correspondence with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina; email on 1st November 2022, attached file:1.0 HPP Ulog information.docx

[28] personal correspondence with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina, email on 1st November 2022, attached file: Odgovori na pitanja HES Gornja Neretva.pdf

Baseline data HES "Gornja Neretva"	Igaščica	Mjedenik	Krupac-Ušće	Krupac	Trnovica	Plačikus	Uloški buk
	GN 7	GN 6	GN 5	GN 4	GN 3	GN 2	GN 1
Length of reservoir (m)	0	25	180	0	50	450	6200
Number of turbines	2	2	2	2	2	2	2
Turbine type	Francis	Francis	Francis	Francis	Francis	Francis	Francis
Absolute minimum flow (m^3/s)	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Environmental flow (% of $Q_{average}$)	11	11	11	11	11	11	11
Input flow = Output flow?	YES						NO
Can sediments pass the dam?	NO, Sediment management planned						
Is management of deposited fine sediment within the reservoir planned?	NO, Only in the settling tank - several times a year						NO
Passable for fish?	YES, fish ladder						NO

4.3. HPPs Glavatičevo and Bjelimići

Table 9 *Baseline data for the hydropower plants Glavatičevo and Bjelimići*[29]

Baseline data	HPP Glavatičevo	HPP Bjelimići
Dam/sill type	Dam without closure	Dam without closure
Mean flow at profile (m^3/s)	33,16	27,80
Height of dam (m)	51	113
Number of turbines	3	2
Turbine type	Kaplan	Francis
Discharge capacity (m^3/s)	72,00 (3x24)	110,00 (2x55)
Total volume of the reservoir (hm^3)	15,200	106,548

5. Summarised statement to the EIA reports and state of play

5.1. HPP Ulog

The weaknesses of the EIA report for the hydropower plant Ulog were identified as follows:

- Environmental baseline data used in the EIA report is outdated and partially not comprehensible, therefore the projects impacts could only be insufficiently assessed
- Proposed mitigation measures are insufficient or not feasible
- Power lines were not included in the EIA but assessed separately, failing to assess the cumulative environmental impacts of the project.

[29] personal correspondence with Amir Variščić (Udruženje za zaštitu okoline, Zeleni Neretva, Konjic), email on 24th October 2022, attached file: presentation about hydropower plants in the upper Neretva "HE na Nerevtvi i HE Ulog.pdf"

State of play[30,31]:
The concession contract for the hydropower plant Ulog was signed in November 2009 by the Ministry of Industry, Energy and Mining and the investor EFT. In July 2011 the environmental permit was issued. The construction permit, issued by the Ministry for Spatial Planning, Construction and Ecology in April 2003, was issued for all HPP Ulog facilities and infrastructure except for the reservoir. Following the deadly incidents in July 2013 at the construction site, the works were put on hold. In April 2016 the investor applied for the renewal of the environmental permit. The decision was extended by the Ministry[32]. In 2017 the Ministry was notified about changes of the Ulog project (design, location of dam, pipeline, etc.) by the investor EFT. The Ministry notified the investor that the existing environmental permit remains in force. In February 2018 the Ministry issued the amendment of the construction permit due to minor technical changes in accordance with relevant regulations. The investor announced in December 2019 that the construction work would commence in the 2nd quarter of 2020. The construction permit for the reservoir was issued in February 2022. At the time of writing (November 2022), construction work is ongoing, and it is estimated to be completed in a little more than a year.

5.2. HES Gornja Neretva

The HES Gornja Neretva project was divided between the two districts Gacko and Kalinovik as *"…the investor faced difficulties in obtaining urban-technical conditions for all projects…"*[33]. Phase 1 included the three uppermost hydropower plants Igaščica, Mjedenik and Grebenac-Ušće in the Municipality of Gacko, whilst Phase 2 included the four hydropower plants Uloški Buk, Plačikus, Trnovica and Grebenac-Krupac in the Municipality of Kalinovik. Apart from the fact that two separate EIAs were performed for Phase 1 and Phase 2 power plants, that failed to assess the cumulative impacts of the hydropower-chain, the following weaknesses of the EIAs can be listed:

- Contradictory project information
- Outdated and insufficient environmental baseline data used
- Proposed mitigation measures are insufficient and not feasible
- Missing assessment of the planned power lines
- Cumulative effects of the whole HES Gornja Neretva project, together with the HPP Ulog project were not assessed.

State of play[30]:

Phase I:
In November 2014 the EIA for Phase 1 was approved (decision no. 15.04-96-66/14), with the sidenote that it would expire in two years if the approval for construction is not secured by then. The investor Marvel d.o.o. requested an extension of the EIA approval in November 2016, which was given by the Ministry. In 2018 and 2019 the investor again requested a renewal of the decision which was refused each time. The Ministry stated that Marvel d.o.o. should restart the EIA process, based on the preliminary EIA. Despite the expired decisions, construction permits for all three power plants were received in July 2018[34]. A new request was made by the investor after the refused renewal of the EIA decision. In April 2020 the Ministry issued the decision (no. 15.04-96-165/19) that no EIA would be needed. This decision was challenged in court in January 2021, following a complaint submitted by the Center for Environment in May 2020, resulting in the voiding of the Ministries screening decision. A

[30] Complaint Form to the Bern Convention Secretariat (22/10/2020), Annex II: Description of the Upper Neretva hydropower projects, p 1
[31] Information provided by the operator EFT on 22nd November 2022: Document from EFT to the Ministry of Spatial Planning, Construction and Energy
[32] Available at: https://drive.google.com/file/d/13STMvJ4njgJMXyo46STEh68P5TtjxPAN/view
[33] Complaint Form to the Bern Convention Secretariat (22/10/2020), Annex II: Description of the upper Neretva hydropower projects, p 2
[34] https://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mgr/Servisi/Pages/default.aspx

new EIA for Phase I and a new permit need to be obtained by the investor. In October 2022 during the on-the-spot appraisal, the investor gave the information that the EIA for Phase I is about to be completed and presented to the relevant Ministry in early November.

Phase II:
In January 2017 the EIA was approved (decision no. 15.04-96-62/16) by the Ministry and in November 2018 the environmental permit (decision no. 15.04-96-72/18) with a validity of 5 years was obtained[35]. The Center for Environment requested the cancellation of the EIA approval in a complaint to the court of the Banja Luka District in February 2017. In March 2018 the court dismissed the case. In response to a request by the Aarhus Center in March 2020, the Ministry confirmed that no construction permits have been issued. After the Center for Environment obtained new relevant data in summer 2020, the EIA for Phase II should be reviewed in court again.

5.3. HPPs Glavatičevo and Bjelimići

No environmental impact assessments have been implemented for the hydropower plants Glavatičevo and Bjelimići.

State of play[36]*:*
A new spatial plan for the Herzegovina-Neretva Canton was adopted in 2021 where the HPPs Glavatičevo and Bjelimići are included but marked with a note that the projects are questionable for construction due to environmental reasons. The Federal Ministry never received a request for these projects by the competent institutions, therefore no permits have been issued so far.

6. Impacts of hydropower plants on protected resources

6.1. HPP Ulog

According to the environmental permit issued by the Ministry in July 2011 no hydropeaking operation mode will be performed[37]. This statement must be questioned against the backdrop that a large dam and reservoir are planned, indicating a storage power plant[38]. To operate a run-of-river power plant without hydropeaking, a cheaper weir structure or smaller dam with a correspondingly extended derivation stretch would have probably sufficed. For the evaluation of impacts of the hydropower plant Ulog, an operation mode without hydropeaking (as stated by the HPP operator) is of fundamental importance. If hydropeaking will be performed, contrary to all claims, this will have far-reaching consequences for aquatic species, especially fish[39].

[35] https://www.vladars.net/sr-SP-Cyrl/Vlada/Ministarstva/mgr/Documents/%D0%95%D0%94%20%20%D0%A5%D0%95%D0%A1%20%D0%93%D0%BE%D1%80%D1%9A%D0%B0%20%D0%9D%D0%B5%D1%80%D0%B5%D1%82%D0%B2%D0%B0%20%D0%A4%D0%B0%D0%B7%D0%B0%202%20%D0%9C%D0%B0%D1%80%D0%B2%D0%B5%D0%BB%20%D0%9A%D0%B0%D0%BB%D0%B8%D0%BD%D0%BE%D0%B2%D0%B8%D0%BA%20_433055912.pdf

[36] personal correspondence with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina; email on 1st November 2022, attached file: answers to questions_neretva river 25-10-2022

[37] Information provided by the operator EFT on 22nd November 2022: Document from EFT to the Ministry of Spatial Planning, Construction and Energy

[38] CDM Project 9529: Hydropower plant Ulog: https://cdm.unfccc.int/Projects/DB/Germanischer1358940257.67/view

[39] Saltveit, S. J.; Halleraker, J. H.; Arnekleiv, J. V. & Harby, A. (2001). Field experiments on stranding in juvenile Atlantic salmon (Salmo salar) and brown trout (Salmo trutta) during rapid flow decreases caused by hydropeaking. Regulated Rivers: Research & Management: An International Journal Devoted to River Research and Management, 17(4- 5), 609-622.
Schmutz, S.; Bakken, T. H.; Friedrich, T.; Greimel, F.; Harby, A.; Jungwirth, M.; Melcher, A.; Unfer, G. & Zeiringer, B. (2015). Response of fish communities to hydrological and morphological alterations in hydropeaking rivers of Austria. River research and applications, 31(8), 919-930.
Holzapfel, P.; Leitner, P.; Habersack, H.; Graf, W. & Hauer, C. (2017). Evaluation of hydropeaking impacts on the food web in alpine streams based on modelling of fish-and macroinvertebrate habitats. Science of the Total Environment, 575, 1489-1502.

6.1.1.Reservoir

The reservoir will have the following impacts:

- Loss of huge areas of the natural aquatic and floodplain zone of the Neretva River;
- Formation of a non-populatable zone: In the area of the temporarily dry area in the reservoir bottom (upstream area of the reservoir) with short-term water level fluctuations, creating habitats that cannot be colonised by plants and animals;
- Siltation of the interstices of riverbed within the reservoir.

These interventions affect habitats and species on the candidate Emerald site BA0000002 as follows:

- C 3.55 Sparsely vegetated river gravel banks (Habitats directive code 3220): one of the few existing larger areas with gravel bars and pioneer vegetation – an area of high importance for the candidate Emerald site – will be flooded and destroyed by the reservoir;
- F 9.1 Riverine shrub (Habitats directive code 3240): existing small-scale areas will be destroyed by the reservoir;
- G 1.11 Riverine *Salix* woodland and G1.21 Riverine *Fraxinus - Alnus* woodland, wet at high but not at low water (Habitats directive code *91E0): large areas of high importance for the candidate Emerald site will be lost;
- H 3.2 Basic and ultra-basic inland cliffs (Habitats directive code 8120): parts of the cliffs will be destroyed by flooding the area;
- E 5.4 Moist or wet tall-herb and fern fringes and meadows (Habitats directive code 6430), E 2.2 Low and medium altitude hay meadows (Habitats directive code 6510), G1.A4 Ravine and slope woodland (Habitats directive code 9180): parts will be flooded and destroyed by the reservoir;
- Significant habitat loss for rheophilic species: through the reservoir a large area of riverine habitats will be lost. The new lentic habitat is not suitable for the native aquatic species which require clean, cold, oxygen rich and fast flowing waters[40,41]. The reduced flow velocity in the reservoir will lead to accumulation of fine sediments and consequently the loss of suitable spawning grounds for gravel spawning species[42]. Furthermore, the amount of dissolved oxygen will be reduced, temperature fluctuations will be more pronounced, and the water quality will change through the accumulation of organic matter[43].
  Affected species: white-clawed crayfish (*Austropotamobius pallipes*), Adriatic brown trout (*Salmo farioides*), sculpin (*Cottus gobio*), minnow (*Phoxinus phoxinus*), stone loach (*Barbatula barbatula*) and eventually marble trout (*Salmo marmorata*)[44];
- Loss of feeding and breeding habitats of bird species of natural rivers such as: common kingfisher (*Alcedo atthis*), white-throated dipper (*Cinclus cinclus*), white wagtail (*Motacilla alba*) and grey wagtail (*Motacilla cinerea*);
- Flooding of meadows will impact the large copper butterfly (*Lycaena dispar*).

6.1.2.Dam

The dam will have the following impacts:

- Disruption of the longitudinal river continuum;
- Disruption of the bed-load transport; dam acts as a "sediment-trap";

[40] Study on Protection of Upper Neretva River, Excerpts related to ichthyofauna, 2022 (correspondence with Redzib Skomorac, email 02.11.22)
[41] Trožić-Borovac, S. (2011). Freshwater crayfish in Bosnia and Herzegovina: the first report on their distribution. Knowledge and Management of Aquatic Ecosystems, (401), 26.
[42] Bjornn, T.C.; Reiser, D. W. (1991): Habitat requirements of salmonids in streams. In American Fisheries Society Special Publication 19 (837), p. 138.
[43] Schmutz, S., & Moog, O. (2018). Dams: ecological impacts and management. In Riverine ecosystem management (pp. 111-127). Springer, Cham.
[44] Occurrence of the latter species is claimed by local fishermen, but not yet verified.

- Fine sediments are retained to a large extent because the reduced flow velocity leads to sedimentation within the reservoir;
- Extensive loss of hydrodynamics in the river downstream of the power plant: flood peaks > 35m³/s are retained in the reservoir;
- Total loss of small-scale floods that have the highest impacts on stream morphology and morphodynamics. This also results in a drastic reduction of successional processes (progression and retrogression) of bank and floodplain vegetation.

These interventions affect habitats and species on the candidate Emerald site BA0000002 as follows:

- C 3.55 Sparsely vegetated river gravel banks (Habitats directive code 3220): significant reduction in quality and quantity of this habitat type because of reduced hydro- and morphodynamics;
- F 9.1 Riverine shrub (Habitats directive code 3240): enhanced progressive succession towards riparian forest due to reduced hydro- and morphodynamics;
- G 1.11 Riverine *Salix* woodland and G1.21 Riverine *Fraxinus* - *Alnus* woodland, wet at high but not at low water (Habitats directive code *91E0): development towards climax forest, long-term loss of riparian forests due to the lack of flooding;
- Habitat fragmentation and hindered upstream migration to potential spawning habitats for the Adriatic brown trout (*Salmo farioides*);
- Split of fish populations.

6.1.3.Residual flow stretch

The residual flow stretch will have the following impacts:

- Strongly reduced discharge (up to 90% immediately after the dam at the beginning of the residual flow stretch) almost the whole year; the only exception are periods of extreme low flow situations; here, the residual flow regulation plans a minimum flow of 0.52 m^3/s
- Complete loss of morphodynamics due to lacking bed-load transport.

These interventions affect habitats and species on the candidate Emerald site BA0000002 as follows:

- Loss of aquatic habitats because of a reduced wetted area;
- C 3.55 Sparsely vegetated river gravel banks (Habitats directive code 3220): total loss due to lacking hydro- and morphodynamics;
- F 9.1 Riverine shrub (Habitats directive code 3240): medium to long-term loss due to lacking hydro- and morphodynamics;
- G 1.11 Riverine *Salix* woodland and G1.21 Riverine *Fraxinus* - *Alnus* woodland, wet at high but not at low water (Habitats directive code *91E0): long term loss due to lacking hydrodynamics;
- Reptiles and amphibians that inhabit side channels and backwaters and are dependent on seasonal flooding will lose their habitats, such as the European pond turtle (*Emys orbicularis*) and yellow-bellied toad (*Bombina variegata*).

6.1.4.Infrastructure: streets, pipelines, power lines and buildings

The construction of infrastructure (powerlines and access roads to the dam and powerhouse) will have the following impacts:

- Habitat loss due to destruction;
- Fragmentation of habitats;
- Large-scale anthropogenic disturbance of Emerald site.

These interventions affect habitats and species on the candidate Emerald site BA0000002 as follows:

- H 3.2 Basic and ultra-basic inland cliffs (Habitats directive code 8120): will be partially destroyed;
- G1.6 Fagus woodland (Habitats directive code 9110, 9140): will be partially destroyed;
- G1.7 Thermophilous deciduous woodland (Habitats directive code 91M0, 9250) will be partially destroyed;
- Species that avoid human presence and are possibly disturbed by construction work: brown bear (*Ursus arctos*), grey wolf (*Canis lupus*) and lynx (*Lynx lynx*).

6.2. HES Gornja Neretva

For the chain of seven hydropower plants of the HES Gornja Neretva project, the overall impacts are listed.

6.2.1.Reservoirs

The reservoirs will have the following impacts:

- Loss of huge areas of the natural aquatic and floodplain zone of the Upper Neretva River;
- Formation of a non-populatable zone: In the area of the temporarily dry area in the reservoir bottom (upstream area of the reservoir) with short-term water level fluctuations, creating habitats that cannot be colonised by plants and animals;
- Siltation of the interstices of riverbed within the reservoir.

These interventions affect habitats and species on the candidate Emerald site BA0000002 as follows:

- A large part of C 3.55 Sparsely vegetated river gravel banks (Habitats directive code 3220) and F 9.1 Riverine shrub (Habitats directive code 3240): will be flooded and destroyed by reservoirs;
- G 1.11 Riverine *Salix* woodland, G1.21 Riverine *Fraxinus* - *Alnus* woodland, wet at high but not at low water (*91E0) and G1.A4 Ravine and slope woodland (Habitats directive code 9180): will be partially flooded and destroyed by reservoirs;
- H 3.2 Basic and ultra-basic inland cliffs (Habitats directive code 8120): parts of the cliffs will be destroyed by flooding the area;
- E 5.4 Moist or wet tall-herb and fern fringes and meadows (Habitats directive code 6430) and E 2.2 Low and medium altitude hay meadows (Habitats directive code 6510): parts will be flooded and destroyed by the reservoir;
- Significant habitat loss for rheophilic species: white-clawed crayfish (*Austropotamobius pallipes*), Adriatic brown trout (*Salmo farioides*), sculpin (*Cottus gobio*) minnow (*Phoxinus phoxinus*) and stone loach (*Barbatula barbatula*);
- Loss of feeding and breeding habitats of bird species of natural rivers such as: common kingfisher (*Alcedo atthis*), white-throated dipper (*Cinclus cinclus*), white wagtail (*Motacilla alba*) and grey wagtail (*Motacilla cinerea*);
- Flooding of meadows will impact the large copper butterfly (*Lycaena dispar*).

6.2.2.Dams

The dams will have the following impacts:

- Disruption of the longitudinal river continuum;
- Disruption of the bed-load transport; dams act as a “sediment-trap”;
- Fine sediments are retained to a large extent because the reduced flow velocity leads to sedimentation within the reservoir;

- Loss of hydrodynamics in the river downstream of the power plants: flood peaks are retained in the reservoirs;
- Loss of small-scale floods that have the highest impacts on stream morphology and morphodynamics. This also results in a drastic reduction of successional processes (progression and retrogression) of bank and floodplain vegetation.

These interventions affect habitats and species on the candidate Emerald site BA0000002 as follows:

- C 3.55 Sparsely vegetated river gravel banks (Habitats directive code 3220): significant reduction in quality and quantity of this habitat type as a result of reduced hydro- and morphodynamics;
- F 9.1 Riverine shrub (Habitats directive code 3240): enhanced progressive succession towards riparian forest due to reduced hydro- and morphodynamics;
- G 1.11 Riverine *Salix* woodland and G1.21 Riverine *Fraxinus - Alnus* woodland, wet at high but not at low water (Habitats directive code *91E0): development towards climax forest, long-term loss of riparian forests due to the lack of flooding;
- Habitat fragmentation and hindered upstream migration to potential spawning habitats for the Adriatic brown trout (*Salmo farioides*);
- Split of fish population.

6.2.3.Residual flow stretches

The residual flow stretches will have the following impacts:

- Strongly reduced discharge (up to 90%) almost the whole year;
- Complete loss of morphodynamics due to lacking bed-load transport.

These interventions affect habitats and species on the candidate Emerald site BA0000002 as follows:

- Loss of aquatic habitats because of a reduced wetted area;
- C 3.55 Sparsely vegetated river gravel banks (Habitats directive code 3220): total loss due to lacking hydro- and morphodynamics;
- F 9.1 Riverine shrub (Habitats directive code 3240): medium to long-term loss due to lacking hydro- and morphodynamics;
- G 1.11 Riverine *Salix* woodland and G1.21 Riverine *Fraxinus - Alnus* woodland, wet at high but not at low water (Habitats directive code *91E0): long term loss due to lacking hydrodynamics.

6.2.4.Infrastructure: streets, pipelines, powerlines, and buildings

The construction of infrastructure will have the following impacts:

- Habitat loss due to destruction;
- Fragmentation of habitats;
- Large-scale anthropogenic disturbance of Emerald site.

These interventions affect habitats and species on the candidate Emerald site BA0000002 as follows:

- Especially the access road planned along the entire course of the river is to be regarded as particularly negative as it intersects almost the whole of the Upper Neretva valley;
- H 3.2 Basic and ultra-basic inland cliffs (Habitats directive code 8120);
- G1.6 Fagus woodland (Habitats directive code 9110, 9140);
- G1.7 Thermophilous deciduous woodland (Habitats directive code 91M0, 9250);

- Species that avoid human presence and are possibly disturbed by construction work: brown bear (*Ursus arctos*), grey wolf (*Canis lupus*) and lynx (*Lynx lynx*).

6.3. HPP Glavatičevo and Bjelimići

6.3.1.Reservoir

The reservoirs will have the following impacts:

- Loss of huge areas of the natural aquatic and floodplain zone of the Neretva River;
- Formation of a non-populatable zone: In the area of the temporarily dry area in the reservoir bottom (upstream area of the reservoir) with short-term water level fluctuations, creating habitats that cannot be colonised by plants and animals;
- Siltation of the interstices of riverbed within the reservoir.

These interventions affect habitats and species on the candidate Emerald site BA0000002 as follows:

- In general, the hydropower plants Glavatičevo and Bjelimići would have tremendous effects on the area, as the entire valley bottom will be destroyed;
- C 3.55 Sparsely vegetated river gravel banks (Habitats directive code 3220): areas of high importance for the candidate Emerald site will be flooded and destroyed by the reservoir;
- F 9.1 Riverine shrub (Habitats directive code 3240): existing small-scale areas will be destroyed by the reservoir;
- G 1.11 Riverine *Salix* woodland and G1.21 Riverine *Fraxinus - Alnus* woodland, wet at high but not at low water (Habitats directive code *91E0): large areas of high importance for the candidate Emerald site will be lost;
- H 3.2 Basic and ultra-basic inland cliffs (Habitats directive code 8120): parts of the cliffs will be destroyed by flooding the area;
- E 5.4 Moist or wet tall-herb and fern fringes and meadows (6430), E 2.2 Low and medium altitude hay meadows (Habitats directive code 6510), G1.A4 Ravine and slope woodland (Habitats directive code 9180): parts will be flooded and destroyed by the reservoir;
- Significant habitat loss for rheophilic species: softmouth trout (*Salmo obtusirostris*), marble trout (*Salmo marmorata*), Adriatic brown trout (*Salmo farioides*), sculpin (*Cottus gobio*), minnow (*Phoxinus phoxinus*) and stone loach (*Barbatula barbatula*). Risk long-term loss of endemic soft mouth trout that inhabits the unimpacted river stretch between Konjic and Ulog;
- Loss of feeding and breeding habitats of bird species of natural rivers such as: common kingfisher (*Alcedo atthis*), white-throated dipper (*Cinclus cinclus*), white wagtail (*Motacilla alba*) and grey wagtail (*Motacilla cinerea*);
- Flooding of meadows will impact the large copper butterfly (*Lycaena dispar*).

6.3.2.Dam

The dams will have the following impacts:

- Disruption of the longitudinal continuum;
- Disruption of the bed-load transport, dam acts as a “sediment-trap”;
- Fine sediments are retained to a large extent because the reduced flow velocity leads to sedimentation;
- Total loss of flood dynamics in the river downstream of the power plant: flood peaks are retained in the reservoir;
- Total loss of small-scale floods that have the highest impacts on stream morphology and the surrounding vegetation.

These interventions affect habitats and species on the candidate Emerald site BA0000002 as follows:

- C 3.55 Sparsely vegetated river gravel banks (Habitats directive code 3220): significant reduction in quality and quantity of this habitat type because of reduced hydro- and morphodynamics;
- F 9.1 Riverine shrub (Habitats directive code 3240): enhanced progressive succession towards riparian forest through reduced hydro- and morphodynamics;
- G 1.11 Riverine *Salix* woodland and G1.21 Riverine *Fraxinus - Alnus* woodland, wet at high but not at low water (Habitats directive code *91E0): development towards climax forest, long-term loss of riparian forests due to the lack of flooding;
- Habitat fragmentation and hindered upstream migration to potential spawning habitats for salmonids (*Salmo obtusirostris, Salmo marmorata, Salmo farioides*);
- Split of fish population.

6.3.3.Infrastructure

The construction of infrastructure will have the following impacts:

- Habitat loss due to destruction;
- Fragmentation of habitats;
- Large-scale anthropogenic disturbance of Emerald site.

As a result of the newly constructed pipelines, powerlines and access roads to the dams and powerhouses, the following habitats and species will be partially destroyed and disturbed:

- H 3.2 Basic and ultra-basic inland cliffs (Habitats directive code 8120);
- G1.6 Fagus woodland (Habitats directive code 9110, 9140);
- G1.7 Thermophilous deciduous woodland (Habitats directive code 91M0, 9250).

6.4. Cumulative effects

The cumulative impacts of the hydropower plant Ulog and the HES Gornja Neretva (affecting 30 km of the river – from around 8 km from the source to 38 km from the source) would have far-reaching consequences for the species and habitats of the candidate Emerald site. If permission is granted for the construction of the hydropower plants Glavatičevo and Bjelimići, it would lead to a complete deterioration of the Upper Neretva River system and the disappearing of habitats and species therein.

In detail, additionally to the effects of the individual HPPs, the cumulative impacts would result in an almost complete loss of the natural aquatic and floodplain zones of the Upper Neretva River within the Emerald site BA0000002; in addition, the downstream natural habitats will also be severely impacted.

Adding to the effects of the individual HPPs there are cumulative effects for the following reasons:

- Almost complete loss of morphodynamics due to lacking bed-load transport because of complete disruption of the longitudinal river continuum;
- Substantial change in grain size composition downstream of the Upper Neretva River, because of the complete disruption of the bed-load transport and almost complete disruption of fine sediments;
- Extensive loss of hydrodynamics in the river downstream;
- Large-scale anthropogenic disturbances of the candidate Emerald site.

These cumulative interventions affect additionally to the individual HPPs, habitats and species in the candidate Emerald site BA0000002 and downstream of the Upper Neretva River as follows:

- In the medium to long term, significant loss of C 3.55 Sparsely vegetated river gravel banks (Habitats directive code 3220) and F 9.1 Riverine shrub (Habitats directive code 3240);
- In the long term, almost complete loss of G 1.11 Riverine *Salix* woodland and G1.21 Riverine *Fraxinus - Alnus* woodland, wet at high but not at low water (*91E0);
- In the medium term, complete loss of reophilic species such as white-clawed crayfish (*Austropotamobius pallipes*), Adriatic brown trout (*Salmo farioides*), sculpin (*Cottus gobio*), minnow (*Phoxinus phoxinus*), stone loach (*Barbatula barbatula*) and the endemic species marble trout (*Salmo marmorata)* and softmouth trout (*Salmo obtusirostris*);
- In the medium term, complete loss of bird species of natural rivers such as common kingfisher (*Alcedo atthis*), white-throated dipper (*Cinclus cinclus*), white wagtail (*Motacilla alba*) and grey wagtail (*Motacilla cinerea*);
- In the medium term, complete loss of reptiles and amphibians that inhabit side channels and backwaters and are dependent on seasonal flooding such as the European pond turtle (*Emys orbicularis*) and the yellow-bellied toad (*Bombina variegata*);
- Severe degradation of the large copper butterfly (*Lycaena dispar*);
- Severe degradation of species that avoid human presence and are possibly disturbed by construction work such as brown bear (*Ursus arctos*), grey wolf (*Canis lupus*) and lynx (*Lynx lynx*).

7. Recommendations

1) Halt the construction of the hydropower plant Ulog until the following recommendations are implemented and complied with:

   a) Officially declare "Gornji tok Neretve" (BA0000002) as an adopted Emerald Network site.

   b) Develop a new regulation of a residual flow regime based on scientifically founded studies as the current regulation is inadequate: the regulation should be aligned with the ecological requirements of the important flagship species like Adriatic brown trout (*Salmo farioides*), sculpin (*Cottus gobio*), minnow (*Phoxinus phoxinus*), stone loach (*Barbatula barbatula*) and eventually marble trout (*Salmo marmorata*).

   c) Ensure that no hydropeaking operations will be performed as stated in the environmental permit[45]; Should hydropeaking still be performed, the operation must be stopped immediately.

   d) Elaborate mitigation measures for the destroyed habitats such as C 3.55 Sparsely vegetated river gravel banks (Habitats directive code 3220, F 9.1 Riverine shrub (Habitats directive code 3240), G 1.11 Riverine *Salix* woodland and G1.21 Riverine *Fraxinus - Alnus* woodland, wet at high but not at low water (Habitats directive code *91E0), E 5.4 Moist or wet tall-herb and fern fringes and meadows (Habitats directive code 6430), E 2.2 Low and medium altitude hay meadows (Habitats directive code 6510), G1.A4 Ravine and slope woodland (Habitats directive code 9180).

   e) Implement an absolute ban on fish stocking[46].

   f) Formulate monitoring measurements for the affected species and habitats.

2) Prohibit implementation of the hydro-electric system Gornja Neretva (both Phase I and Phase II) and cancel the granted concessions, due to the profound negative impact, very long stretch of the

[45] Information provided by the operator EFT on 22nd November 2022: Document from EFT to the Ministry of Spatial Planning, Construction and Energy

[46] Weiss, S. & Schmutz, S. (1999). Performance of hatchery-reared brown trout and their effects on wild fish in two small Austrian streams. Transactions of the American Fisheries Society, 128(2), 302-316.

Upper Neretva River affected and additional negative cumulative effects, that are deemed incompatible with the objectives of the candidate Emerald Network site BA0000002. Remove the concerned projects from the Spatial plan.

3) Prohibit implementation of the currently dormant hydropower plant projects Glavatičevo and Bjelimići due to the profound negative impact, very long stretch of the Upper Neretva River affected including downstream effects and additional negative cumulative effects, that are deemed incompatible with the objectives of the candidate Emerald Network site BA0000002. Remove the concerned projects from the Spatial plan.

4) Concerning planned hydropower plants along the Upper Neretva tributaries, halt all planning and permitting of the projects until the area is officially declared as an adopted Emerald Network site.

5) Perform detailed assessments of potentially affected protected resources (habitats and species) as the current available data situation does not allow any detailed statements on the environmental impacts, thus it is strongly assumed that the deterioration will be dramatic.

6) Following the rapid official proclamation of Gornji tok Neretve" (BA0000002) as a protected area (point 1.a): formulate a management plan for this Emerald Network site.

7) Implement a ban on development of further hydropower plants in the candidate Emerald Network site BA0000002 and all other candidate Emerald sites in the Neretva river basin (BA0000001, BA0000002, BA0000003, BA0000004, BA0000005, BA0000006, BA0000007, BA0000008, BA0000012, BA0000023, BA0000024 and BA0000025).

8) Improve the collaboration with relevant NGOs, scientists, academia, local communities and other affected stakeholders in this and other similar future projects.

9) Establish an official Focal Point for the Bern Convention on the state level.

8. References

Annex I: Reply to the Report of the Government of Republika Srpska to the Standing Committee of the Bern Convention regarding the complaint no. 2020/9; Center for Environment (FoE Bosnia & Herzegovina), Aarhus Centre in Bosnia and Herzegovina, RiverWatch, EuroNatur, CEE Bankwatch Network, ClientEarth

Bjornn, T.C.; Reiser, D. W. (1991): Habitat requirements of salmonids in streams. In American Fisheries Society Special Publication 19 (837), p. 138.

Complaint Form to the Bern Convention Secretariat (22/10/2020)

Complaint Form to the Bern Convention Secretariat (22/10/2020), Annex I: List of species and habitats

Complaint Form to the Bern Convention Secretariat (22/10/2020), Annex II: Description of the Upper Neretva hydropower projects

Council of Europe (2020): Convention on the conservation of European wildlife and natural habitats – 40th meeting of the Standing Committee to the Bern Convention – List of officially nominated candidate Emerald Network sites (December 2020): T-PVS/PA(2020)09, 4. Dezember 2020; https://rm.coe.int/updated-list-of-officially-nominated-candidate-emerald-sites-2020/1680a080d4

Drešković, N.; Đug, S.; Stupar, V.; Hamzić, A.; Lelo, S.; Muratović, E.; Lukić-Bilele, L.; Brujić, J.; Milanović, D.; Kotrošan, D. (2011): Natura 2000 in Bosnia and Herzegovina, WWF Mediterranean Programme Europes Living Heart, Sarajevo

European environmental agency (2022): Emerald – Access Database. https://www.eea.europa.eu/data-and-maps/data/emerald-network-data-1/#METADATA

Holzapfel, P.; Leitner, P.; Habersack, H.; Graf, W. & Hauer, C. (2017). Evaluation of hydropeaking impacts on the food web in alpine streams based on modelling of fish-and macroinvertebrate habitats. Science of the Total Environment, 575, 1489-1502.

Knook, V.G.; Weiss, S.; Singer, G. (Eds) (2022): Science Week 2022, Neretva River, Bosnia and Herzegovina, Preliminary Report for River Watch and EuroNatur

Saltveit, S. J.; Halleraker, J. H.; Arnekleiv, J. V. & Harby, A. (2001). Field experiments on stranding in juvenile Atlantic salmon (Salmo salar) and brown trout (Salmo trutta) during rapid flow decreases caused by hydropeaking. Regulated Rivers: Research & Management: An International Journal Devoted to River Research and Management, 17(4- 5), 609-622.

Schmutz, S.; Bakken, T. H.; Friedrich, T.; Greimel, F.; Harby, A.; Jungwirth, M.; Melcher, A.; Unfer, G. & Zeiringer, B. (2015). Response of fish communities to hydrological and morphological alterations in hydropeaking rivers of Austria. River research and applications, 31(8), 919-930.

Schmutz, S. & Moog, O. (2018). Dams: ecological impacts and management. In Riverine ecosystem management (pp. 111-127). Springer, Cham.

Standard data form – candidate Emerald site BA0000002: https://natura2000.eea.europa.eu/Emerald/SDF.aspx?site=BA0000002&release=5&form=Clean

Standing Committee of the Bern Convention (1989): Recommendation No. 16 (1989) of the standing committee on areas of special conservation interest (Adopted by the Standing Committee on 9th June 1989); https://rm.coe.int/1680746c25

Study on Protection of Upper Neretva River, Excerpts related to ichthyofauna, 2022 (correspondence with Redzib Skomorac, email 02.11.22)

Trožić-Borovac, S. (2011). Freshwater crayfish in Bosnia and Herzegovina: the first report on their distribution. Knowledge and Management of Aquatic Ecosystems, (401), 26.

Weiss, S. & Schmutz, S. (1999). Performance of hatchery-reared brown trout and their effects on wild fish in two small Austrian streams. Transactions of the American Fisheries Society, 128(2), 302-316.

Personal correspondences:

personal correspondence with Amir Variščić (Udruženje za zaštitu okoline, Zeleni Neretva, Konjic), email on 24th October 2022, attached file: presentation about hydropower plants in the Upper Neretva "HE na Nerevtvi i HE Ulog.pdf"

personal correspondence with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina; email on 1st November 2022, attached file:1.0 HPP Ulog information.docx

personal correspondence with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina, email on 1st November 2022, attached file: Odgovori na pitanja HES Gornja Neretva.pdf

personal correspondence with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina; email on 1st November 2022, attached file: answers to questions_neretva river 25-10-2022

personal correspondence with Steven Weiss and Kurt Pinter on 2nd November 2022

Annex I: Programme of the on-the-spot appraisal

- DRAFT PROGRAMME -

Date	Activity
Monday 17 October	Arrival of mission team to Sarajevo
Tuesday 18 October	**11am – 1pm:** Meeting with Ministry of foreign trade and economic relations of Bosnia and Herzegovina, and other relevant governmental stakeholders *1pm – 2pm: Lunch* **2pm – 4pm:** Meeting with Center for Environment, Aarhus Centre and other relevant NGOs **4pm – 5pm:** Meeting with an Investor representative to provide technical overview of the HPP projects
Wednesday 19 October	***Morning***: early departure to Ulog, Site visit of HPP Ulog, and HES Gornja Neretva, SHPP Uloški Buk, etc ***Afternoon***: Meetings with local stakeholders (e.g. fishermen) in Ulog Visit of areas around Nedavić village and Luko village
Thursday 20 October	***Morning***: Meetings with local stakeholders (one local NGO, local government, etc) Site visit of HPP Glavaticevo and HPP Bjelimici ***Afternoon***: return to Sarajevo for collective concluding meeting with Ministry of foreign trade and economic relations, Center for Environment and other relevant governmental and NGO stakeholders
Friday 21 October	Departure of mission team

Annex II: Participants List

TUESDAY 18.10.2022

Meeting at MoFTER

Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
Pantelija Mićić
Rada Milisav
Ranka Bogdanović

Ministry of Spatial Planning, Construction and Ecology of Republika Srpska
Ljiljana Stanišljević
Željka Stojičić

Ministry of Energy and Mining of Republika Srpska
Milan Baštinac

Republic Institute for Protection of Cultural, Historical, and Natural Heritage of Republika Srpska
Dejan Radošević

Republika Srpska Inspectorate
Mlađen Lakić
Zaharije Kujačić

Federal Ministry of Environment and Tourism (Federation of Bosnia and Herzegovina)
Zineta Mujaković
Zlata Grabovac
Adla Kahrić

Energy Community Representative
Alexandra Bujaroska

Meeting with NGO Representatives

Centre for Environment
Redžib Skomorac
Aleksandra-Anja Dragomirović
Vladimir Topić
Arhus Centre in Bosnia and Herzegovina
Nina Kreševljaković
Emina Veljović
CEE Bankwatch
Andrey Ralev

Meeting with representatives of Marvel doo.
Savo Lalović,
Zdravko Gutović,
Nada Samardžić.

WEDNESDAY 19.10.2022

HPP Ulog site visit (on behalf of EFT Group):
Danilo Milosevic
Svetomir Prokic
Goran Minic
Uros Bojanic

Meeting with NGO and other stakeholders' representatives in the Village of Ulog
Fishermen Association "Ulog" from Kalinovik
Boban Škrkar
Centre for Environment
Redžib Skomorac
Vladimir Topić
CEE Bankwatch
Andrey Ralev

THURSDAY 20.10.2022
Meeting with local government and stakeholders in Konjic
Federal Ministry of Environment and Tourism (Federation of Bosnia and Herzegovina)
Zineta Mujaković
Zlata Grabovac
Adla Kahrić

Meeting with NGO Representatives
CSO "Zeleni-Neretva" from Konjic
Amir Variščić
Naid Gagula
Federation of rafting agencies/association from Konjic
Teufik Nikšić
Organizations of sports fishermen from Konjic
Hrabren Kapić
Centre for Environment
Redžib Skomorac
Vladimir Topić
CEE Bankwatch
Andrey Ralev

Concluding meeting at MoFTER
Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
Rada Milisav
Ranka Bogdanović

Ministry of Spatial Planning, Construction and Ecology of Republika Srpska
Ljiljana Stanišljević
Željka Stojičić

Ministry of Energy and Mining of Republika Srpska
Milan Baštinac

Republic Institute for Protection of Cultural, Historical, and Natural Heritage of Republika Srpska
Dejan Radošević

Republika Srpska Inspectorate
Zaharije Kujačić

Centre for Environment
Redžib Skomorac
Aleksandra-Anja Dragomirović