



University of Belgrade, Technical Faculty in Bor



ECO TRUTH

30th International Conference Ecological Truth
& Environmental Research
2023

Proceedings

Editor
Prof. Dr Snežana Šerbula





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PROCEEDINGS

30th INTERNATIONAL CONFERENCE

ECOLOGICAL TRUTH AND ENVIRONMENTAL RESEARCH – EcoTER'23

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Publisher: University of Belgrade, Technical Faculty in Bor

For the publisher: Prof. Dr Dejan Tanikić, Dean

Printed: University of Belgrade, Technical Faculty in Bor, 100 copies, electronic edition

Year of publication: 2023

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ISBN 978-86-6305-137-9

CIP - Каталогизacija u publikaciji
Narodna biblioteka Srbije, Beograd

502/504(082)(0.034.2)

574(082)(0.034.2)

INTERNATIONAL Conference Ecological Truth & Environmental Research (30 ; 2023)

Proceedings [Elektronski izvor] / 30th International Conference Ecological Truth & Environmental Research - EcoTER'23, 20-23 June 2023, Serbia ; organized by University of Belgrade, Technical faculty in Bor (Serbia) ; co-organizers University of Banja Luka, Faculty of Technology – Banja Luka (B&H) ... [et al.] ; [editor Snežana Šerbula]. - Bor : University of Belgrade, Technical faculty, 2023 (Bor : University of Belgrade, Technical faculty). - 1 elektronski optički disk (CD-ROM) ; 12 cm

Sistemska zahteva: Nisu navedeni. - Nasl. sa naslovne strane dokumenta. - Preface / Snežana Šerbula. - Tiraž 100. - Bibliografija uz svaki rad.

ISBN 978-86-6305-137-9

a) Животна средина -- Зборници б) Екологија – Зборници

COBISS.SR-ID 118723849



**30th International Conference
Ecological Truth and Environmental Research – EcoTER'23**

is organized by:

**UNIVERSITY OF BELGRADE
TECHNICAL FACULTY IN BOR (SERBIA)**

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PREFACE

The 30th international conference Ecological Truth & Environmental Research – EcoTER'23 kept three areas in focus: ecology, environmental protection and sustainable development. The conference will be held on Mt Stara Planina in hotel Stara Planina, Serbia, 20–23 June 2023. The monograph is published on the occasion of the 30th anniversary of the conference. On behalf of the scientific and organizing committee, it is a great honor and pleasure to wish all the participants a warm welcome to the conference.

The monograph is published on the occasion of the 30th anniversary of the conference.

We hope to convey the message of the conference, which is that a transformation of attitudes and behavior would bring the necessary changes. This is also an opportunity for the participants who are experts in this field to exchange their experiences, expertise and ideas, and also to consider the possibilities for their collaborative research.

The 30th international conference Ecological Truth & Environmental Research – EcoTER'23 is organized by the University of Belgrade, Technical Faculty in Bor, and co-organized by the University of Banja Luka, Faculty of Technology, the University of Montenegro, Faculty of Metallurgy and Technology – Podgorica, the University of Zagreb, Faculty of Metallurgy – Sisak, the University of Pristina, Faculty of Technical Sciences – Kosovska Mitrovica and the Association of Young Researchers, Bor.

These Proceedings 103 papers from the authors coming from the universities, research institutes and industries in 11 countries: Australia, USA, Brazil, Spain, Portugal, Libya, Italy, Bulgaria, Bosnia and Herzegovina, North Macedonia, and Serbia.

As a part of this year's conference, the 5th Student Session – EcoTERS'23 is being held. We appreciate the contribution of the students and their mentors who have also participated in the conference.

The support of the Gold donor and their willingness and ability to cooperate has been of great importance for the success of the EcoTER'23. The organizing committee would like to extend their appreciation and gratitude to the Gold donor of the conference for their donation and support.

We appreciate the effort of all the authors who have contributed to these Proceedings. We would also like to express our gratitude to the members of the scientific and organizing committees, reviewers, speakers, chairpersons and all the conference participants for their support to the EcoTER'23. Sincere thanks go to all the people who have contributed to the successful organization of the EcoTER'23.

Prof. Snežana Šerbula,

President of the scientific and organizing committee

PRELIMINARY ECOLOGICAL STATUS ASSESSMENT OF THE GROŠNICA RIVER BASED ON PHYTOBENTHOS

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Abstract

The research on the Grošnica River was conducted to obtain data on benthic algae diversity and provide a preliminary assessment of water quality due to the absence of prior studies. Benthic algae sampling and analysis were carried out in May 2022. In five selected localities, a total of 28 taxa of benthic algae were detected: Cyanobacteria (3), Rhodophyta (1), Chlorophyta (2), Ochrophyta (Xanthophyceae) (1), and Bacillariophyta (21). A preliminary assessment of the ecological status was carried out according to the guidelines of the Water Framework Directive and national legislation, using the IPS diatom index. In addition, literature data on the indicator properties of observed macroalgae were examined. Based on the obtained values at localities L1, L2, L3 (upper course), a good ecological status was determined, while at locality L4 (middle course) a moderate ecological status was determined, and in at locality L5 (lower course) a good ecological potential of the Grošnica river was determined. The occurrence of massive growth of macroalgae Cladophora glomerata and Vaucheria sp. in the middle (L4) and especially in the lower reaches of the river (L5) indicates an increased amount of nutrients and deterioration of water quality.

Keywords: water quality, benthic algae, diatoms, macroalgae, ecological status assessment.

INTRODUCTION

The Grošnica River flows through the municipality of Kragujevac along its entire course. It is 18 km long and flows from the spring called Hajdučka voda (800 m altitude) in the Gledić Mountains to its confluence with the Lepenica River (187 m altitude). It is the most densely networked river in the Kragujevac basin (1429 m/km²) [1]. The establishment of a dam on the Grošnica River in 1938 led to the formation of the Grošnica reservoir, which serves as a source of drinking water for a portion of Kragujevac city. Above the dam, many smaller ones have been built on the river to protect against sediment deposition and to slow down the erosion process [2]. According to the National Regulations [3,4], the Grošnica River is classified as a TYPE 3 water body (small and medium-sized rivers, up to 500 m altitude, dominated by large substrate granulation). Although it is a significant tributary of the Lepenica River, it has been poorly studied in terms of water quality [5–9].

According to the Water Framework Directive [10], the National Law [11] and Regulation [4], the assessment of ecological status for this type of water body is based on physical and

chemical parameters and biological elements (phytobenthos and macroinvertebrates). The use of phytobenthos (especially diatoms) is recommended for assessing the ecological status of surface waters, due to the significant bioindicator properties of this community. Although they are not included in national legislation, the use of other groups of benthic algae (non-diatom) as an addition to existing methods is significant. This approach would yield more precise insights into water quality, especially the trophic status [12].

The aim of this study is to present the diversity of benthic algae in the Grošnica River with an assessment of the river's ecological status/potential in accordance with WFD [10], National Law [11] and Regulations [3,4].

MATERIALS AND METHODS

Field research of the Grošnica River was conducted in May 2022 at five localities: L1 - upstream of the small dams (N 43°53'38.9", E 20°54'27.3", 426 m a.s.l.); L2 - downstream of the small dams (N 43°53'58.5", E 20°54'55.1", 387 m a.s.l.); L3 - Trešnjevak (N 43°54'08.3", E 20°54'58.4", 394 m a.s.l.); L4 - Grošnica (N 43°57'34.0", E 20°52'31.1"E, 232 m a.s.l.); L5 - near the confluence with the Lepenica River (N 43°59'32.4", E 20°53'13.7", 194 m a.s.l.). In the upper stream (localities L1, L2), the Grošnica River flows through a forested, sparsely populated area where no pollutants have been identified. In the middle and lower stream, it flows through villages and the industrial part of the city (localities L3, L4, L5).

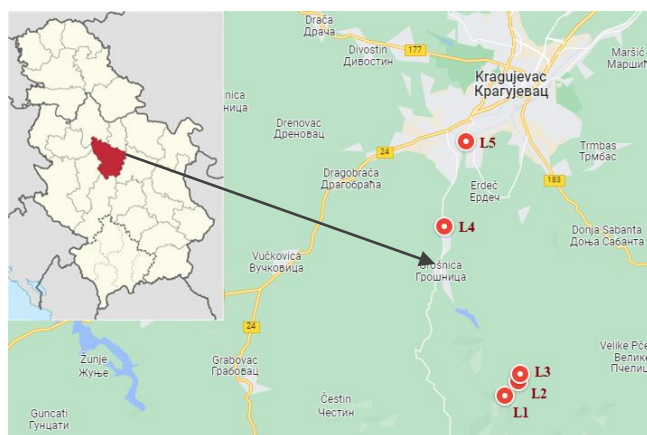


Figure 1 The Grošnica River Basin with position of investigated localities at the Grošnica River: L1 - upstream of the small dams; L2 - downstream of the small dams; L3 - Trešnjevak; L4 - Grošnica; L5 - near the confluence with the Lepenica River

Hydro-morphological, physical, and chemical water characteristics were recorded at all mentioned localities, and phytobenthos samples were collected. Physical and chemical parameters (Table 1) were measured directly using set of field laboratory photometer system "AQUALITIC AL450", according to the standard SRPS EN 5667 (1–9) [13].

Sampling in the field, preparation of samples, identification, and quantification of diatoms and macroalgae were carried out in accordance with the methodology presented in Simić *et al.*

[14]. Based on the qualitative and quantitative analysis of diatoms, the IPS (*Pollution Sensitivity Index*) [15] diatom index was calculated in the OMNIDIA software.

The category of surface waters was determined according to Regulations [3,4,16]. The channel and banks of the Grošnica River have been arranged (significantly modified) at location L5. Accordingly, the ecological status was assessed at localities L1–L4, and ecological potential at locality L5.

RESULTS AND DISCUSSION

The measured physical and chemical parameters of the Grošnica River localities are presented in Table 1.

Table 1 Physical and chemical water parameters of the Grošnica River

Metric	/	Locality	L1	L2	L3	L4	L5
Water temperature (°C)			11.5	13.1	13.1	21.7	21.2
Conductivity (µS/cm ³)			380	380	380	450	530
Water hardness (CaCO ₃) (mg/L)			180	190	190	210	320
pH (0-14)			7.97	8.13	8.13	8.33	7.93
Oxygen concentration (mg/L)			10.33	10.33	10.33	14.6	12.37
Oxygen saturation (%)			99.2	99.2	99.2	171.6	133

Qualitative analysis of the phytobenthos in the Grošnica River in May 2022 recorded a total of 28 taxa, classified into five divisions: Cyanobacteria (3), Rhodophyta (1), Chlorophyta (2), Ochrophyta (Xanthophyceae) (1), and Bacillariophyta (21) (Table 2).

Of all the recorded taxa, the greatest diversity was observed within the division Bacillariophyta (21 species). The highest number was observed at locality L2 (13), while the lowest number of species was found at L1 (6). Quantitative analysis showed that the most dominant species of diatoms at L1 was *Gomphonella olivacea*, at L2 *Cymbella* sp., at L3 *Encyonema lange-bertalotii*, at L4 *Ulnaria ulna*, and at L5 *Cocconeis peduculis*.

Four macroalgae (*Audouinella pygmaea*, *Cladophora glomerata*, *Stigeoclonium tenue*, *Vaucheria* sp.) and two microalgae (*Phormidium breve*, *Chroococcus* sp.) forming macroscopic aggregations were found at the surveyed localities. Of all the recorded macroalgae, only *C. glomerata* was found at all localities, but with significant differences in coverage, length, and color of the filaments. Its coverage was <5% at L1 and L2, 10% at L3 (with filaments length up to 30 cm), 30% at L5, while at L4 it reached a maximum of 80–90% coverage of the riverbed surface (with filaments length up to 1 m). The color change was related to the amount of epiphytic diatoms (*Cocconeis placentula* and *Gomphonema* sp.) that covered the filaments. The green algae *S. tenue* formed macroscopic aggregations on rocky substrates, as well as on filaments of *C. glomerata* at L4. It occurred in traces, with coverage less than 1%. Mats of the macroalgae *Vaucheria* sp. were registered with coverage of 10% at L3 and 70% at L5. The red algae *A. pygmaea* was found at L2, in traces with coverage <1%. The cyanobacterium *P. breve* formed blue-green macroscopic aggregations on rocks at L2 and L3. Orange macroaggregations of the microalga *Chroococcus* sp. were also observed at L3.

Table 2 List of taxa recorded along the Grošnica River

Taxa	/	Locality	L1	L2	L3	L4	L5
Cyanobacteria							
<i>Phormidium breve</i> (Kütz. ex Gomont)				+	+		
Anagnostidis & Komarek							
<i>Spirulina</i> sp.				+			
<i>Chroococcus</i> sp.					+		
Rhodophyta							
<i>Audouinella pygmaea</i> (Kütz.) Weber Bosse				+			
Chlorophyta							
<i>Cladophora glomerata</i> (Linnaeus) Kütz.			+	+	+	+	+
<i>Stigeoclonium tenue</i> (C. Agardh) Kütz.						+	
Ochrophyta (Xanthophyceae)							
<i>Vaucheria</i> sp.					+		+
Bacillariophyta							
<i>Cocconeis peduculis</i> Ehrenb.							+
<i>Cocconeis placentula</i> Ehrenb.			+	+		+	+
<i>Cyclotella meneghiniana</i> Kütz.						+	+
<i>Cymbella lanceolata</i> (C. Agardh) C. Agardh				+	+		
<i>Cymbella</i> sp.			+	+	+		
<i>Cymbella affinis</i> Kütz.				+			
<i>Diatoma vulgare</i> Bory					+	+	+
<i>Encyonema</i> sp.				+	+		
<i>Encyonema leibleinii</i> (Agardh) Silva et al.				+	+		
<i>Encyonema lange-bertalotii</i> Krammer				+	+	+	
<i>Gomphonema olivaceoides</i> var. <i>densestriata</i>						+	
<i>Gomphonella olivacea</i> (Hornem.) Rabh.			+	+			+
<i>Gyrosigma attenuatum</i> (Kütz.) Rabenh.				+	+		
<i>Meridion circulare</i> (Grev.) C. Agardh					+	+	
<i>Melosira varians</i> C. Agardh				+	+	+	+
<i>Navicula tripunctata</i> (O. F. Müll.) Bory			+	+	+		
<i>Navicula viridula</i> (Kütz.) Ehrenb.							+
<i>Nitzschia sigmoidea</i> (Nitzsch) W.Sm.			+	+	+	+	
<i>Rhoicosphenia abbreviata</i> (C. Agardh)			+		+		+
<i>Surirella brebissonii</i> Krammer and Lange-				+		+	
<i>Ulnaria ulna</i> (Kütz.) Compère						+	+
Total number of taxa: 28			7	17	16	12	11

By comparing the values obtained by calculating the IPS diatom index [15] at the surveyed localities and the limit values of the classes from the National Regulation [4] for TYPE 3 water bodies, a good ecological status was determined at localities L1, L2, and L3, a moderate ecological status at L4, and good ecological potential at locality L5 of the Grošnica river (Table 3). Estimations of water quality of this river based on algae as indicators were carried out prior to the implementation of the WFD [5–7] and indicated the second class of water quality (β -mesosaprobic). After the implementation of the National Law [11], the Serbian Environmental Protection Agency (SEPA) conducted a water quality assessment of this river, whose results, based on the IPS index values, indicate the second class in the upper course of

the river (year 2015/16) and the third class of ecological status in the lower course of the river (year 2020) [8,9].

Table 3 Ecological status/potential* assessment of the Grošnica River based on diatom community

Metric	/	Locality	L1	L2	L3	L4	L5*
IPS index			15.9	15.6	15.7	13.2	14.5
Ecological status/potential* assessment			II	II	II	III	II*
Class of ecological status/potential*			good	good	good	moderate	good*

Detected macroalgae can also provide some insight into the water quality status of the Grošnica River. Species *C. glomerata*, an indicator of β -mesosaprobic water according to Sladeček [17], was found in both localities with good and moderate ecological status, with an increasing coverage in areas where the status is worse and where organic pollution is present (L4). The species *S. tenue*, which is known to tolerate significant organic pollution and heavy metal loading [18] and is considered to be an indicator of α -mesosaprobic water [17], was also found at the L4 locality. *Vaucheria* sp. thalli were massively developed in class II water (L3, L5). Generally, species of this genus inhabit weakly polluted streams and rivers, but they can be found in polluted water and in that case, they occur together with *Cladophora* species [19], which was observed in this study. It is generally accepted that red algae inhabit clean, well-aerated, and organic-poor waters [20]. The presence of the red alga *A. pygmaea* only in the upper reaches of the river (L2), where a good ecological status (class II) was determined, confirms this.

CONCLUSION

The ecological status/potential of the Grošnica river, determined according to Regulations [3,4] based on the IPS diatom index, worsens from the upper to the lower course and its confluence with the river Lepenica. The ecological status is assessed as good (class II) in the section passing through sparsely populated areas (localities L1, L2, L3), moderate (class III) in the middle course in the settlement of Grošnica (locality L4). At locality L5, a good (class II) ecological potential has been determined. The extensive development of macroalgae at localities L4 (*C. glomerata*) and L5 (*C. glomerata* and *Vaucheria* sp.), as well as the presence of the species *S. tenue* at locality L4, indicate an increased amount of nutrients in the water, but further research is necessary to determine the exact cause of this phenomenon. In order to obtain a more precise assessment of the ecological status of the Grošnica river in the future, it is necessary to use all biological elements (phytobenthos, macroinvertebrates, macrophytes, fish) and physico-chemical parameters of water quality according to recommendations of WFD [10].

ACKNOWLEDGEMENT

Work on this paper was supported by Ministry of Science, Technological Development and Innovation of Republic of Serbia (451-03-47/2023-01/200122).

REFERENCES

- [1] Milanović A., Hidrogeografska studija reke Lepenice, Geografski institut „Jovan Cvijić“, SANU, Beograd (2007), p.138, ISBN: 978-86-80029-38-2.
- [2] Baračkov Z., Ekološka proučavanja naselja dna Grošničke reke, PMF, Kragujevac (1973).
- [3] Službeni glasnik Republike Srbije 96/2010, Pravilnik o utvrđivanju vodnih tela površinskih i podzemnih voda.
- [4] Službeni glasnik Republike Srbije 74/2011, Pravilnik o parametrima ekološkog i hemijskog statusa površinskih voda i parametrima hemijskog i kvantitativnog statusa podzemnih voda.
- [5] Grupa autora, Stanje, problemi, mogućnosti i mere zaštite i unapredjenja životne sredine na području regiona Šumadije i Pomoravlja, PMF, Kragujevac (1986).
- [6] Grupa autora, Studija zaštite životne sredine i razvoja ekoloških sistema grada Kragujevca do 2010. godine, PMF, Kragujevac (1993).
- [7] Simić S., Makroalge u tekućicama brdsko-planinskih područja Srbije (Doktorska disertacija), Biološki fakultet, Beograd (2002).
- [8] Agencija za zaštitu životne sredine, Rezultati ispitivanja kvaliteta površinskih i podzemnih voda – 2020, Beograd (2020).
- [9] Agencija za zaštitu životne sredine, Izveštaj o statusu površinskih voda Srbije u 2015. i 2016. godini, Beograd (2018).
- [10] WFD, Water Framework Directive- Directive of the European Parliament and of the Council 2000/60/EC - Establishing a Framework for Community Action in the Field of Water Policy (2000).
- [11] Službeni glasnik Republike Srbije 30/2010, Zakon o vodama.
- [12] Stancheva R., Sheath G., Knowl. Manage. Aquat. Ecosyst. 417 (2016) 1–15.
- [13] SRPS EN 5667 (1-19):2017, Kvalitet vode – Uzorkovanje.
- [14] Simić S., Rakonjac A., Čabrić K., *et al.*, Kragujevac J. Sci. 45 (2023) 1–22.
- [15] Cemagref, Etude des methods biologiques d'appréciation quantitative de la qualité des eaux, Rapport Q.E. Lyon, Agence de l'eau Rhône-Méditerranée-Corse-Cemagref, Lyon, France (1982).
- [16] Denić Lj., Čađo S., Đurković A., *et al.*, Status površinskih voda Srbije, Ministarstvo poljoprivrede i zaštite životne sredine, Agencija za zaštitu životne sredine, Beograd (2015).
- [17] Sládeček V., Arch. Hydrobiol. –Beih. Ergebn. Limnol. 7 (1973) 1–218.
- [18] Kaštovský J., Hauer T., Geriš R., *et al.*, Atlas sinic a řas České republiky 2, Jihočeská univerzita v Českých Budějovicích, České Budějovice (2018), p.480, ISBN: 978-80-7568-125-6.
- [19] Entwistle J., Mar. Freshw. Res. 40 (5) (1989) 471–489.
- [20] Eloranta P., Kwandrans J., Oceanol. Hydrobiol. Stud. 33 (1) (2004) 47–54.