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WORK EXPERIENCE

01/06/1990 – CURRENT Sarajevo, Bosnia and Herzegovina
PROFESSOR OF BIOLOGY UNIVERSITY OF SARAJEVO

Full professor at the University of Sarajevo - Faculty of Science, Dept. of Biology

Courses:

Department of Biology: Ecological Engineering, Urban Ecology, Social Ecology, Remote Sensing
Department of Geography: Biogeography, Soil and Vegetation in Physical Planning.

Head of the Ichthyology and Fishing Center
Vice Dean for International Cooperation and Quality Assurance
Editor in Chief - Annals of the Institute of Biology of the University of Sarajevo (AIBUS)

EDUCATION AND TRAINING

2005 Sarajevo, Bosnia and Herzegovina
PH D IN BIOLOGY University of Sarajevo - Faculty of Science, Department of Biology

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1998 Budapest, Hungary

MASTER OF ENVIRONMENTAL SCIENCE AND POLICY Central European University, Dept. of the Environmental Sciences and Policy

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1990 Sarajevo, Bosnia and Herzegovina
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LANGUAGE SKILLS

Mother tongue(s): **BOSANSKI**

Other language(s):

	UNDERSTANDING		SPEAKING		WRITING
	Listening	Reading	Spoken production	Spoken interaction	
ENGLISH	C2	C2	C2	C2	C2

Levels: A1 and A2: Basic user; B1 and B2: Independent user; C1 and C2: Proficient user

● **DIGITAL SKILLS**

Microsoft Office | Google Drive | Zoom | Outlook | Google Docs | Skype | Remote Sensing | QGIS | Good command of Geographic Information System(GIS) on ArcGIS 10.2

● **ADDITIONAL INFORMATION**

PUBLICATIONS

[Assessment of fish communities from biotic type 6 in Black Sea Basin in Bosnia and Herzegovina](#) – 20

22

Annals of the Institute of Biology - University of Sarajevo (AIBUS) 44: 1-13

Fish are very sensitive to changes in damming of rivers, fragmentation and destruction of habitats, and changes in physical and chemical parameters. Changes in species diversity are a signal indicating that a significant and, as a rule, long-term change in one or more factors has occurred in the aquatic ecosystem. This in long term could lead to reduction of diversity and significant changes in the structure and dynamics of aquatic ecosystems. Biomonitoring of ichthyofauna is a very important element in the ecological assessment of water quality since changes in the structure of the fish community reflect changes in the quality of water in freshwater systems. The grouping of fish into ecological guilds has greatly improved our understanding of the impact of anthropogenic activities on fish and their communities. Therefore, the fish guilds represent the basis for ecological assessment based on the preferences of each recorded species in relation to tolerance, habitats, nutrition, reproduction and migrations. The results of the analyses of the structure of fish communities at 166 sites in biotic type 6 in the waters from the Black Sea Basin in Bosnia and Herzegovina have shown that the greatest influence on the distribution of different fish species has water temperature, flow, dissolved oxygen, and pH value. Obtained results clearly indicate an inverse relationship between altitude and the level of fish biodiversity. Values of applied diversity indices stress that fish communities in a river system usually follow a pattern of increasing species richness and diversity from upstream to downstream.

Đug, S., Gajević, M., Vesnić, A., Korjenić, E., Mušović, A., Šljuka, S., Škrijelj, R.

[A contribution to knowledge of the distribution of the species *Seseli tomentosum* Vis. in Bosnia and Herzegovina](#)

– 2022

Annals of the Institute of Biology - University of Sarajevo (AIBUS) 44: 24-30

Species *Seseli tomentosum* Vis. is an endemic and endangered species. It is an extremely poorly researched species in Bosnia and Herzegovina. The first recorded information about the appearance of this species in Bosnia and Herzegovina dates from 1967. This paper presents the chronology and spatial distribution of the species *Seseli tomentosum* Vis. in Bosnia and Herzegovina.

Boškailo, S., Đug, S., Trakić, S., Boškailo, S., Lagumdžija, E., Šuman, L., Mujaković, Z.

[Melissopalynological potential of chestnut \(*Castanea sativa* Mill.\) in Bosnia and Herzegovina](#) – 2022

Annals of the Institute of Biology - University of Sarajevo (AIBUS) 44: 61-70

Tame chestnut (*Castanea sativa* Mill.) is a woody plant species from the family *Fagaceae*. Chestnut belongs to the group of honey-bearing plants with a high production of pollen and nectar, and honey is characterized by specific chemical and organoleptic properties and a high content of minerals. Its biogeographical distribution is limited to only three areas on the territory of Bosnia and Herzegovina. The aim of the work is to determine the distribution and representation of the pollen of this honey plant in honey samples originating from Bosnia and Herzegovina. For research purposes, 100 honey samples were collected directly from the producer. Based on the micromorphological characteristics of the pollen grains, honey plants, and the exact number of their pollen grains were identified. A total of 4520 chestnut pollen grains were identified in 40 analyzed melissopalynological profiles of honey. It was concluded, that the specific geographical and ecological distribution of chestnuts in the territory of Bosnia and Herzegovina directly affects the melissopalynological composition of the samples, as well as the botanical characteristics of the honey.

Bakić, V., Muratović, E., Trakić, S., Đug, S.

Distribution, chorology and predictive modelling of the species *Pueraria montdana* var. *lobata* (Willd.) Sanjappa & Pradeep in Bosnia and Herzegovina

– 2022

Works of the Faculty of Agriculture and Food Sciences University of Sarajevo, LXVI, 72/1: 57-69

Pueraria, or kudzu (*Pueraria montana* var. *lobata* (Willd.) Sanjappa & Pradeep) is a plant from the legume family (Fabaceae) and is characterized as a dangerous invasive species. It inhabits neglected, open, bright habitats in urban areas (neglected arable fields, railroad tracks, etc.) and the edges of forests. In many countries it is characterized as a dangerous invasive species. Due to the great danger of jeopardizing autochthonous diversity, the goal was to create a model of predictive distribution based on ecological factors in the territory of Bosnia and Herzegovina. Data on distribution were taken from available literature sources and own field research. The model was created on the basis of climatic backgrounds in the form of raster layers taken from the WorldClim database, which are adjusted to the same resolution, size and coordinate reference system in a resolution of about 1x1 km. In addition to climatic variables, the following raster layers were used: 20 m DEM, hydrological map, geological map, pedological map, traffic-geographical map and CLC 2018. The obtained results indicate the distribution of the given species in the area of the Neretva river basin, and the possibility of its spread, which is why it is necessary to implement adequate preventive measures. The variable Bio_9 (Mean temperature of the driest quarter) has statistically significantly the greatest impact on the habitat suitability of a given species.

Boškailo, A., Đug, S., Trakić, S., Drešković, N., Muratović, E., Boškailo, S., Miličević, M.

A preliminary study of morphometric characteristics and reproductive potential of the fish species *Cottus gobio* Linnaeus, 1758 on selected sites from Bosnia and Herzegovina

– 2021

Veterinaria, 70 (3), 293-310

The bullhead - *Cottus gobio* Linnaeus, 1758 is the only species from the Cottidae family in Bosnia and Herzegovina and it inhabits the Una, Vrbas, Bosna, Drina river basins and the upper flow of the Neretva river. There are no reliable sources containing data on this species from this area. Threats that are most commonly caused by chemical water pollution have led to local extinction, and the range of the species is currently fragmented with numerous isolated populations. The aim of this study was to assess the interpopulation variability of selected morphometric parameters and fertility of bullhead from different sites of the Una and Drina rivers in Bosnia and Herzegovina. The results of this study indicate that there is no statistically significant interpopulation variability of morphometric parameters and reproductive performance of *Cottus gobio* species in the waters of Bosnia and Herzegovina. A significant influence of ecological factors on the reproductive potential of the species *Cottus gobio* was recorded, especially in females, where a negative correlation with water temperature was established. Research on this scientifically neglected species should certainly be continued with the aim of better understanding and elucidating the causes of its geographical specificity and variability.

Selma Pilić, Mahir Gajević, Adi Vesnić, Senad Šljuka, Enad Korjenić, Samir Đug, Aldijana Mušović

After the *Pinna nobilis* l. mass mortality event in Bosnia and Herzegovina – A proposal for remediation of biofiltration services in marine ecosystem

– 2021

Veterinaria, Vol. 70 (3): 351-363

The Mass Mortality Event (MME) of endemic bivalve *Pinna nobilis* occurred in the Mediterranean Sea and brought this species to the brink of extinction. So far, the etiology of the disease was determined to be multifactorial. Apart from a wide spectrum of pathogenic microorganisms as a key factor, the indirect role is played by climate changes, ie. the increase in sea water temperature, which rises sensitivity of *P. nobilis* toward pathogens. In terms of conservation measures, the IUCN guidelines are species- oriented and recommend in situ and ex situ conservation. In this study, we examined 10,920 m² of seabed in the territorial waters of Bosnia and Herzegovina (B&H) and confirmed the occurrence of MME with 100% mortality rate. Based on estimated Total Number of Individuals (TNI), the filtration capacity as an ecosystem service for the turbidity control in the Bay was assessed. Herein, we present a potential method for the assessment of ecosystem damages caused by the loss of fan shells and their biofiltration service. Our results showed that 58583 ± 27879 individuals were lost, which corresponds to the biomass of 11.47 t ± 6.41 t (± 55.87%). Hourly filtration potential (PRF) of *P. nobilis* is 68722.11 ± 38396.86 (± 55.87%) 95% CI, meaning that all populations could filter the entire sea water in the Neum Bay (0.2 km³) in a period of 78-275 days. We also determined the Compensation Ratio (CR) for bivalve shell *Ostrea edulis*, i.e. how many individuals of *O. edulis* are required to replace the function of one *P. nobilis* in terms of filtration capacity, which is CR = 2.72 ± 0.30 (11.03%). This paper provides a new approach to the MME of *P. nobilis* indicating

urgent need for the marine ecosystem remediation and replacement of the lost ecosystem service by cultivation of compensatory species.

Čelebičić, M., Trakić, S., Đug, S. Viteškić, V.

Vegetation of alpine screes on Bjelašnica Mt.—syntaxonomy and ecology – 2021

Ecologica Montenegrina 42: 62-84

We analysed vegetation of calcareous screes in the alpine belt of Bjelašnica Mt.(Western Balkan) by the Central European phytosociological method. In total, 69 relevés were submitted to numerical analysis in R ver. 3.5. 2.(UPGMA clustering with chord distance). The obtained cluster dendrogram showed differentiation in nine associations, of which *Festuco xanthinae—Valerianetum montanae* Trakić et al. ass. nov. and *Drypido spinosae—Seslerietum wettsteinii* Trakić et al. ass. nov. are new ones. In lower section of the alpine belt we described new subassociation *Pseudofumarietum leiospermae helictochloetosum* Trakić et al. subass. nov. which raises questions about ecological preferences of the alliance *Corydalion ochroleucae*. We also neotypified the association *Drypidi—Heracleetum orsinii* Redžić et al. ex Trakić et al. and made correction for *Pseudofumarietum leiospermae* Lakušić et Redžić 1991 nom. corr. The observed high diversification of the alpine screes on Bjelašnica Mt. is based upon its ecological heterogeneity and transitional position in the Dinarides.

Trakić, S., Bakić, V., Đug, S.

Biomonitoring of aquatic ecosystems – 2020

Đug, S., Drešković, N., Trožić Borovac, S., Mušović, A., Vesnić, A., Trakić, S., Gajević, M., Bešta Gajević, R., Šljuka, S., Mirić, R., Korjenić, E., Škrijelj, R.

The manuscript "Biomonitoring of aquatic ecosystems" is written on 343 pages in B5 format. The text is accompanied and supplemented by extremely rich, successfully incorporated and representative factual material: 14 thematic maps, 134 pictures, eight graphs and 16 tables. The content of the extensive manuscript is presented through several more extensive chapters (11), each of which includes a smaller or larger number of consistently connected sections and an appropriate number of special smaller units: General aspects and integrative approach, Biomonitoring, Bioindicators, Hydrological characteristics of Bosnia and Herzegovina, Physical and chemical parameters water quality, Phytobenthos and phytoplankton, Aquatic macrophytes, Zoobenthos, Ichthyofauna, Microbiology, and Ecotoxicology. At the end, there is also an index of terms. The literature list consists of 240 bibliographic units.

Publisher: University of Sarajevo, pp. 343.

Long-Term Trends in the Structure and Dynamics of the Fish Communities in Buško Blato Reservoir

– 2020

Croatian Journal of Fisheries, 78 (2): 69-78

Buško Blato Reservoir, the third largest hydro accumulation in Europe, is situated in the south-eastern part of the karstic Livanjsko Polje Valley. This aquatic ecosystem is distinguished by a very rich ichthyofauna and the presence of four endemic fish species. Numerous studies focus on ichthyological researches of Buško Blato Reservoir. Its ichthyofauna has been exposed to changes in ecological factors, which in turn reflected on the structure and composition of fish populations. The main objective of this paper was to assess the current state and predict future trends in the ichthyofauna structure and dynamics based on the field data and comprehensive analyses of literature data. The results of the research indicated the presence of 11 fish species from four families, which is the largest number of fish species ever recorded in this ecosystem. *Sander lucioperca*, *Lepomis gibbosus*, *Pseudorasbora parva* and *Tinca tinca* were recorded for the first time in this ecosystem, while some previously recorded species were not found. The results of the analyses clearly indicate the presence of natural interspecific competition and significant level of threats to the endemic fish species caused by human activities.

Mušović, A., Škrijelj, R., Gajević, M., Kalamujić Stroil, B., Vesnić, A., Mitrašinović-Brulić, M., Đug, S.

Inter-population variability in morphology and reproduction of *Alburnus alburnus* (Linnaeus, 1758) from Bosnia and Herzegovina

– 2020

Genetics Applications, Vol. 4, No. 1, pp.18-30. *The Official Publication of the Institute for Genetic Engineering and Biotechnology University of Sarajevo.*

Inter-population variability in morphological traits and fecundity of *Alburnus alburnus* (Linnaeus, 1758) from Bosnia and Herzegovina was analysed in this study. The results of the analyses based on 21 standard measurements and six meristic characters have shown the highest variation between distance between pelvic (ventral) fins and anal aperture. Analysis of variance (ANOVA) indicate statistically significant differences between six populations. Differences among meristic characters have been tested by Multiple Comparisons Kruskal-Wallis. Obtained results indicate statistically significant difference among samples for number of branched rays for caudal fin (KA/Ca), lateral line scales (Le) and a number of gill rakers (Rac). Discriminant function analysis indicate characters that had the strongest effect on the geographical variation between *A. alburnus* samples from Bosnia and Herzegovina. Characters with the strongest discriminant power are: preanal distance, length of pectoral fin, length of the ventral (pelvic) fin, minimum body height, caudal fins branched rays, and pelvic fins branched rays. Values for weight of the gonads and gonadosomatic index (GSI) have not shown any statistically significant difference among observed bleak populations. Regression analysis has been used to estimate the relations between GSI and standard length, body, and gonads weight. The gonadosomatic index has shown positive, non substantial, relationship to gonads weight.

Pilić, S., Mušović, A., Gajević, M., Škrijelj, R., Đug, S., Vesnić, A.

Utilization of *Mentha aquatica* L. for removal of fecal pathogens and heavy metals from water of Bosna river, Bosnia and Herzegovina

– 2019

International Journal of Phytoremediation, 21:8, 807-815

The aim of the present study was to investigate the potential of *Mentha aquatica* L. for phytoremediation of water contaminated with heavy metals and fecal pathogens from Bosna river. The water was treated with *M. aquatica* for 5, 10, and 15 days consecutively after which it was analyzed for the various physicochemical and microbiological parameters.

The initial concentration of cadmium (Cd) ranged from 3.644 to 6.108 µg/l, while lead (Pb) varied between 0.1 and 1.386 µg/l. After treatment, *M. aquatica* accumulated significant amounts of cadmium (Cd) and lead (Pb) with the highest removal rates of 96.49% for Cd and 45.72% for Pb. Values of several physicochemical parameters were decreased after 15 days treatment period.

All water samples were analyzed for enumeration of aerobic heterotrophic bacteria, total coliforms, and fecal coliforms by the membrane filtration. Removal efficiency was greater than 80% for microbiological parameters. The concentration of heavy metals was determined in different plant parts and subsequently, the translocation factor was determined. In *M. aquatica* plant parts, concentrations of Pb and Cd were increased after 15 days of treatment. Our results demonstrated that *M. aquatica* could be good candidates for the removal of fecal pathogens and heavy metals present in surface water.

Dahija, S., Bešta-Gajević, R., Jerković-Mujkić, A., Đug, S., Muratović, E.

Molecular-genetic diversity of the endangered Dalmatian barbelgudgeon, *Aulopyge huegelii* from the Buško Blato reservoir

– 2019

Genetica 2019 Aug;147(3-4):269-280. doi: 10.1007/s10709-019-00069-z. Epub 2019 Jun 1.

A number of studies investigating different aspects of IUCN endangered species, *Aulopyge huegelii* Heckel, 1843 (Dalmatian barbelgudgeon) biology have been conducted, but data on molecular genetics are lacking. The goal of this survey was to assess the genetic structure of the *A. huegelii* population from the Buško Blato reservoir, based on four mitochondrial DNA regions and five microsatellite loci. Excluding cytochrome b, more than one haplotype has been detected in all sequenced mtDNA regions, most of which had not been previously described. A total of seven composite haplotypes were detected. Nucleotide diversity was relatively low for all coding genes but slightly higher for the control region. Microsatellite analysis revealed a relatively high value of major allele frequency, lower values of observed and expected heterozygosity, as well as a moderately reduced number of alleles and genotypes in three of the five observed loci. Although with a clear trend of decline, the level of genetic diversity is still sufficient to ensure the subsistence of the population if the stressors are removed. Otherwise, the loss of heterozygosity will continue, possibly to the point of a complete eradication of the Dalmatian barbelgudgeon from the Buško Blato reservoir.

Belma Kalamujić Stroil, Aldijana Mušović, Rifat Škrijelj, Semir Dorić, Samir Đug, Naris Pojskić

Cave type localities of Bosnia and Herzegovina with reference to Natura 2000 areas – 2019

University of Sarajevo - Faculty of Science and Biospeleological society in Bosnia and Herzegovina. ISBN: 978-9926-453-18-3; 978-9958-0990-1-4

Lada Lukić Bilela, Adi Vesnić, Damir Basara, Slavko Polak, Samir Đug

Endangered Fish Species in Balkan Rivers: their distributions and threats from hydropower development

– 2018

Riverwatch & EuroNatur, 162 pp.

We reviewed the potential impact of large-scale hydropower expansion on the conservation status and extinction threat of 113 freshwater fish species on the Balkan Peninsula. Each of these species is listed in one of three IUCN threat categories and/or listed in one or more annexes of the European Habitats Directive or Bern Convention. For 81 of these species, GIS-based distribution maps have been overlaid with distributions of existing hydropower facilities (ca. 1,000), those in construction (ca. 180), or those planned (ca. 2,800) to explicitly demonstrate the spatial dimension of potential habitat loss. Based on these plans, we predict that up to 49 freshwater fish species are faced with either the threat of extinction or loss of between 50 and 100% of their Balkan distribution. Of these, eleven endemic species are threatened with extinction, seven will become critically endangered, and the number of endangered species will double to twenty-four. For 68 of 69 endemic species, habitat losses are estimated between 30 and 100%, resulting in increased levels of endangerment for essentially the entire endemic fauna. Additionally, the four migratory sturgeon species would essentially lose their potential for rehabilitation in the lower Danube if additional dams were constructed there.

Weiss, S., Apostolou, A., Đug, S., Marčić, Z., Mušović, A., Oikonomou, A., Shumka,

Status of endangered fish species *Aulopyge huegelii* Heckel, 1843 (Teleostei: Cyprinidae) in the Buško Blato reservoir, Bosnia and Herzegovina

– 2018

Iranian Journal of Ichthyology, Vol. 5, No. 3., 212-231

The Dalmatian barbelgudgeon, *Aulopyge huegelii* is a stenoendemic fish species restricted to the area of west Bosnia and part of Dalmatia. Its global IUCN species status is “endangered (EN)” according to the “B1ab (iii, v)” criterion. There are not enough reliable sources containing data on this species, particularly in the recent period. As primarily a groundwater fish, it was exceptionally well adapted to environmental conditions in the Buško Blato reservoir. Based on the recent findings, the status of this species has changed over the past several years. The main objective of this study was to characterise and determine the current status of the monotype species *A. huegelii* from the Buško Blato reservoir, through the analysis of its selected morphological and ecological features. During field research, we have gathered 88 individuals of *A. huegelii*, at just four neighboring sites. A significant decrease in its population number is evident in comparison to previous studies. The results have shown its retreat into a small part of the reservoir which is connected with the groundwater system as its primary habitat, in order to escape from predators: the four new allochthone species in this ecosystem. Comparing the results with previous studies, it could be concluded that the Dalmatian barbelgudgeon is “returning” to its original morphological form i.e. groundwater fish form. All this could in perspective have significant consequences on the survival of the population of this species in the Buško Blato reservoir.

Aldijana MUŠOVIĆ, Samir ĐUG, Naris POJSKIĆ, Belma KALAMUJIĆ STROIL, Adi VESNIĆ, Rifat ŠKRIJELJ

Guide to BiH habitat types according to the EU Habitats Directive – 2015

Prospect C&S s.a.. Rue du Prince Royal 83, 1050 Brussels, Belgium

In Bosnia and Herzegovina, there is no single classification of habitat types, nor a map that could be the basis for selecting habitat types of European importance, and fulfilling the obligations arising from the Habitats Directive. Therefore, the preparations went the other way: with the help of experts, a reference list of habitat types from Annex I of the Habitats Directive, which are present in Bosnia and Herzegovina, was prepared. The first list and review with an assessment of the threat of European habitat types was prepared within the framework of the WWF project “Living Heart of Europe”, and this manual is its superstructure in terms of application for the next steps of harmonization during the process of entering the European Union, as well as the basis for the selection of ecological areas of the Natura 2000 network in Bosnia and Herzegovina, and the further implementation of measures to maintain a suitable state of preservation. Who is the manual intended for? First of all, experts in the fields of biology, ecology, forestry and agriculture. When it comes to the interpretation of specific types of habitats, it is extremely important that all participants have a unified picture of these types and an understanding of their development and dynamics. It is the basis of professional communication in the area of habitat protection.

Đorđije Milanović, Jugoslav Brujić, Samir Đug, Edina Muratović i Lada Lukić Bilela

The Red List of the Flora in the Federation of Bosnia and Herzegovina, Book 2 – 2013

Funded by: Federalno Federalno ministarstvo okoliša i turizma

The project of creating the Red List of Flora, Fauna and Fungi in the Federation of Bosnia and Herzegovina has resulted in completely new data on the state of flora in the Federation of Bosnia and Herzegovina. Although the analysis was based on the proposal of the Red List prepared by Šilić, after an intensive analysis of the existing literature and field research, the status of the largest number of taxa was recategorized. A total of 199 literary sources were processed.

S Đug, E Muratović, N Drešković, A Boškailo, S Dudević

Applying the inverse distance weighting and kriging methods of the spatial interpolation on the mapping the annual precipitation in Bosnia and Herzegovina

– 2012

International Environmental Modelling and Software Society (iEMSS)
International Congress on Environmental Modelling and Software Managing Resources of a Limited Planet, Sixth Biennial Meeting, Leipzig, Germany
R. Seppelt, A.A. Voinov, S. Lange, D. Bankamp (Eds.) <http://www.iemss.org/society/index.php/iemss-2012-proceedings>

Two methods of the spatial interpolation [Inverse Distance Weighting (IDW) and the Kriging], often used in the Geographical Information System (GIS), have been applied on the mapping of the annual amount of precipitation in Bosnia and Herzegovina. For that purpose the monthly precipitation data obtained from meteorological network in the period 1960-2011. The validation of the analyzed data has been carried out by using 20-meter resolution Digital Elevation Model (DEM). The methods, which are suitable for the spatial interpolation for Bosnia and Herzegovina area, particularly for the orographic regions, were analyzed. First, the IDW linear interpolator was considered. However, in the mountain region, this method can give unrealistic results („Bulls Eyes“ effect). Namely, this effect leads to occurrence of the isohyets, which are closed around the meteorological station that is not acceptable in analysis of the pluviometric regime in the real relief. In contrast to this method the Kriging method is much more acceptable because of its (i) adaptability to the relief configuration, (ii) fast data processing and (iii) high precision in calculating the precipitation and corresponding climate indexes for the high resolution of the grid cell. An acceptable annual pluviometric model with the 50x50 m resolution has been obtained by the application of the Kriging method, which was applicable at the local spatial scale, particularly in the orographic regions. More precisely, the designed annual pluviometric model is characterized by the high precision in the areas with the pronounced relief dynamics, where the energetic classes are above 6th category.

Nusret Drešković & Samir Đug

Mount Dinara – 2012

Mount Dinara. In: Erg, B., Vasilijević, M., McKinney, M. (eds.). (2012) Initiating effective transboundary conservation: A practitioner's guideline based on the experience from the Dinaric Arc. Gland, Switzerland and Belgrade, Serbia: IUCN Programme Office for South-Eastern Europe. ix+98pp.

The Dinaric Arc of the Western Balkans is one of the most exciting regions in Europe with a great potential for exercising regional and transboundary cooperation. Ever since the launch of the Dinaric Arc Initiative in 2004, numerous cooperation and development programmes, initiatives and site-specific projects have been implemented, many of which have been aimed at creating regional cooperation platforms and strengthening transboundary cooperation. The Finnish Development Cooperation in the Western Balkans stands out as a prominent programme in the region, with the Environment for People in the Dinaric Arc project successfully catalysing the necessary political support and action on the ground.

Lada Lukić-Bilela, Roman Ozimec, Davorin Marković and Samir Đug

Natura 2000 in Bosnia and Herzegovina – 2011

Center for Environmentally Sustainable Development Sarajevo, pp. 456.

The aim of this publication is to present a comprehensive overview of all species and habitats from Appendix I and II of the Directive on the Protection of Natural Habitats and Wild Fauna and Flora, which are present in Bosnia and Herzegovina, and are of interest to the entire European Union and for them, it is necessary to set aside important areas for conservation within the NATURA 2000 ecological network.

The Natura 2000 ecological network is a biological connection of ecologically significant areas (natural, nearly natural and protected natural areas) and their buffer zones, which are secured by ecological corridors. Buffer zones are spaces whose function is to protect central zones and corridors from harmful external influences on biodiversity, such as air and water pollution, soil drying, fires, etc. Corridors are of exceptional importance, because they should ensure the interconnection of central areas, and provide species populations with adequate conditions for propagation, migratory movements, and genetic exchange. From the point of view of biological diversity, it is important to point out that Bosnia and Herzegovina extends through three biogeographical regions, including different types of relief, and different geological, hydrological, pedological and climatological areas.

Drešković, N., Đug, S., Stupar, V., Hamzić, A., Lelo, S., Muratović, E., Lukić-Bilela, L., Brujić,

The establishment of protected nature areas in Sarajevo Canton and the possibility of their ecotourism valorization

– 2006

Annales. Series historia et sociologia, volume 16, issue 1, 233-246.

Official reports of the cantonal ministry of economy on tourism trends within Canton Sarajevo reveal that ecotourism potentials in the area of the examined canton have not been entirely evaluated yet. Of 80,280 registered tourists that visited the canton in 2002, non-urban municipalities (Ilijas, Trnovo, Hadzici, and Vogosca) were visited by 17,715 tourists, accounting for only 21% of the total number of visitors. Considering that these municipalities are geographically the largest yet demographically the least populated, it can be concluded that their natural potentials are poorly exploited for ecotourism purposes; this statement is further confirmed by the fact that the largest portion of the established protected natural areas (approximately 71 %) is situated in these municipalities. Adding the sparsely populated and urbanized peripheral areas of the municipality of Ilidza (with the natural monument at the spring of the river Bosna - 'Vrelo Bosne') that were also visited by a relatively low number of tourists (approximately 13,000), a clear picture of negative ecotourism trends in the canton emerges.

Aiming to enhance the protection of nature and the development of tourism in the natural protected areas, their management has been conceded to the public forestry company 'Sarajevosume'. In addition, significant efforts have been invested into the protection of mounts Igman, Bjelasnica, and Trebevic through their inclusion into the network of protected natural areas in the canton, following the principle of nucleus, island, and corridor.

Samir Đug & Nusret Drešković

CONFERENCES AND SEMINARS

02/12/2019 – 04/12/2019 – Montreal, Canada

Meeting of Ad Hoc Technical Expert Group on Invasive Alien Species Organizer

[Secretariat of the Convention on Biological Diversity](#)

Website

<http://www.cbd.int/doc/?meeting=IAS-AHTEG-2019-01>

Position: Expert from Eastern European Group: Mr. Samir Đug (Bosnia and Herzegovina)

The Ad Hoc Technical Expert Group on Invasive Alien Species addressed matters not covered by the assessment of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). Building on the work of the moderated online forum, and knowledge and experience accumulated in various sectors, the Ad Hoc Technical Expert Group provided advice or developed elements of technical guidance on management measures on invasive alien species to be implemented by broad sectors to facilitate achieving Aichi Biodiversity Target 9 and beyond:

- (a) Methods for cost-benefit and cost-effectiveness analysis which best apply to the management of invasive alien species;
- (b) Methods, tools and measures for identification and minimization of additional risks associated with cross-border e-commerce in live organisms and the impacts thereof;
- (c) Methods, tools and strategies for the management of invasive alien species as it relates to prevention of potential risks arising from climate change and associated natural disasters and land-use changes;
- (d) Risk analysis on the potential consequences of the introduction of invasive alien species on social, economic and cultural values;
- (e) Use of existing databases on invasive alien species and their impacts, to support risk communication.

25/09/2017 – 29/09/2017 – Rome, Italy

Italy – FYR of Macedonia Second Field Visit in the frame of the Project Component “Strengthening Biodiversity Conservation through Capacity Building in the FYR of Macedonia” With the participation of a delegation from BiH

Study visit

Position: Biodiversity expert

16/06/2014 – Pula, Croatia

The final conference of METRIS PLUS project in Pula

Position: The coordinator of the project experts

We site: <http://metrisplus.eu/en/news/the-final-conference-of-metris-plus-project-in-pula/>

The final conference of METRIS PLUS project was held on 16th June 2014 in Pula. Organizers were Istrian development agency IDA d.o.o. and Region of Istria. Conference gathered partners and associates of the project, experts in field of wastewater treatment, representatives of local and regional governments and businessmen.

The conference is organized with the aim of presenting the project results and their applications, as well as examples of good practice in the field of wastewater treatment.

In the first part of the conference, Tea Gobo, the project manager of METRIS PLUS, and project expert Davor Mandic, an associate at IDA (in METRIS), presented the project and the results achieved in the implementation or pilot plant for wastewater treatment plants set up in the camp Stupice in Premantura. The coordinator of the project experts Samir Đug, from Sarajevo Faculty of Science and Mathematics, presented the final report on the work of experts and the results of the project. Project expert Sanja Martinez from the Faculty of Chemical Engineering and Technology Zagreb, held a presentation on "Corrosion and Protection of water supply and sewerage systems." The second part of the conference, was eddicated to examples of good practice in relation to the wastewater treatment systems and methods of remediation of contamination. There were two presentations: "Construction of fecal sewerage system in the Municipality of Medulin by Jadran Project", which was held by Edo Krajcar from Albanež Company Ltd. and "Eco-innovative methods for purification of oil pollution," Sandi Orlic with the RBI.

07/10/2013 – 11/10/2013 – Ancona, Italy

Study visit to Regional development agency Marche Region (Italy) within the project METRIS PLUS: „Pilot action ecological research: Preparation of the concept and prototype of eco innovative facility for waste water treatment“. Adriatic IPA.

Study visit

Position: The coordinator of the project experts

Metris plus

About the project:

The aim of the project is to improve the research and innovation capacities of the Adriatic cross-border area through joint research projects and the cooperation of institutions in the public, private, academic and research sectors.

Applicants: Istrian Development Agency (HRV), SVIM – Regional Development Agency of the Marche Region (Ita),

UIP - University Development Center and Incubator of Primorska (Slovenia), SERDA – Sarajevo Regional Development Agency (BiH), ALMA MONS - Regional Agency for the Development of Small and Medium Enterprises, Novi Sad (Serbia)

Partners:

Technical College in Pula, Polytechnic Studies and Faculty of Mechanical Engineering and Shipbuilding of the University of Zagreb.

Activities:

Project management and coordination of cross-border activities; communication and dissemination activities and dissemination of knowledge; analysis of the state of wastewater treatment plants in the regions included in the partnership; coordination of joint cross-border activities; defining research methodology and targeted eco-innovations; pilot activity and - research in the field of environmental protection: creation of a concept and prototype of an eco-innovative waste water purifier with built-in metal parts and monitoring; transfer of knowledge and experience; internal evaluation and quality assurance.

30/10/2012 – 02/11/2012 – Istanbul, Turkey

IUCN Red List Training Wokshop Position: Biodiversity expert

A Red List Training workshop for the Mediterranean Biodiversity Assessments for plants and dung beetles was held from 30 October to 2 November 2012 in Istanbul, Turkey. The workshop was organized by the IUCN Centre for Mediterranean Cooperation in collaboration with IUCN Red List Unit (Cambridge, UK).

The workshop involved 22 plant experts and 4 dung beetle experts from 14 different countries of the Mediterranean who were trained in the use and application of IUCN Red List Categories and Criteria. It was a fruitful opportunity to discuss the species lists, the next steps in the project and for the experts to get to know each other.

This training workshop was held in the framework of the "Mediterranean Biodiversity Assessment - II" which aims to assess the extinction risk of Mediterranean butterflies, saproxylic beetles, dung beetles, anthozoa and monocotyledon plants.

24/01/2011 – 30/01/2011 – Thessaloniki, Greece

Specialized workshop: "International training of trainers on the use of remote sensing and GIS for validating habitat maps & on data organization in compliance with the NATURA 2000 reporting requirements". Position: Biodiversity expert

Greek Biotope/Wetland Center,
Thessaloniki, Greece

10/07/2007 – 14/07/2007 – London, UK

Study visit - The Kingston University, London, UK, within TEMPUS program EU TEMPUS Programme: SM-SCM. London, Paris, Graz, Sarajevo, 2006. – 2008.

Upgrading and developing of GIS course in accordance with strategic reform of higher education.

Member of the expert team from BiH for the preparation of the syllabus and textbook for the GIS course at the Department of Geography, Faculty of Science and Mathematics in Sarajevo.

06/03/2007 – 10/03/2007 – London, UK

Study visit - The Kingston University, London, UK, within TEMPUS program EU TEMPUS Programme: SM-SCM. London, Paris, Graz, Sarajevo, 2006. – 2008.

Upgrading and developing of GIS course in accordance with strategic reform of higher education.

Member of the expert team from BiH for the preparation of the syllabus and textbook for the GIS course at the Department of Geography, Faculty of Science and Mathematics in Sarajevo.

06/02/2007 – 10/02/2007 – Paris, France

Study visit - Paris-Sorbonne University, France within TEMPUS program EU TEMPUS Programme: SM-SCM. London, Paris, Graz, Sarajevo, 2006. – 2008.

Upgrading and developing of GIS course in accordance with strategic reform of higher education.

Member of the expert team from BiH for the preparation of the syllabus and textbook for the GIS course at the Department of Geography, Faculty of Science and Mathematics in Sarajevo.

26/01/2003 – 13/02/2003 – Wädenswil, Switzerland

Study visit to Hochschule Wädenswil, Switzerland Project SCOPES "Scientific cooperation between Eastern Europe and Switzerland".

Institutional Partnerships „Environment for 21st century - creation and development of environmental curricula".

18/11/2001 – 24/11/2001 – Berchtesgaden, Germany

Study visit to GIS Center in National park Berchtesgaden, Germany EUROPARC Expertise Exchange

06/10/2000 – 13/10/2000 – Fairbanks, Alaska, USA

Special forestry workshop: University of Alaska Fairbanks Position: Biodiversity expert

21/06/2000 – 27/06/2000 – Copenhagen, Denmark

Study visit: The University of Copenhagen within TEMPUS program Biodiversity expert specialisation

19/09/1998 – 24/09/1998 – Berchtesgaden, Germany

Study visit to GIS Center in National Park Berchtesgaden, Germany EUROPARC Expertise Exchange

25/02/1998 – 28/02/1998 – Krkonose National Park, Czech Republic

Topical Workshop: Computer Aided Management Planning EUROPARC Expertise Exchange

PROJECTS

2023 – 2027

Restoration of wetland complexes as life supporting systems in the Danube Basin (Restore4Life).

HORIZON-MISS-2022-OCEAN-01

Funded by: EU HORIZON-MISS-2022-OCEAN-01

Position: Member of UNSA expert team

Description: Restore4Life demonstrates the multiple socio-economic benefits generated by a holistic and transdisciplinary approach for the restoration of freshwater and coastal wetlands in the Danube basin that will contribute to new blue-green infrastructure supporting regional climate change resilience and mitigation. Restore4Life engages in 4 demonstration sites and 6 monitoring sites all across the Danube basin to make evident that increased delivery of key ecosystem services, as water and pollutant retention, carbon sequestration and tourism opportunities as well as improved resilience of water-dependent habitats will produce multiple socio-economic synergies that also provide opportunities for sustainable businesses and investments. Implementation of activities basically aiming to restore lateral connectivity in riverine corridors will be supported by a Restore4Life long term wetland restoration service/ Restore4Life Wetland Reconstruction Accelerator that combines timely integrative wetland management with a novel level of societal engagement. The Accelerator will provide tested indicators, monitoring approaches and decision support to identify adapted and future-oriented restoration goals, techniques and holistic road maps. Citizens and stakeholders will be empowered to engage in the co-design of projects by establishing stakeholder communities of practice, by twinning of similar projects at different realization stage, citizen science, thematic mobile apps and the use of multiple communication channels with special focus on visual, hands-on interactive information flow that promotes emotional links to water shaped environment. The various tools generated by Restore4Life also including handbooks for business audiences and targeted restoration roadmaps will secure the efficient replication of restoration activities in associated regions. In collaboration with similar mission activities, Restore4Life thus efficiently supports integrative social and economic transitions.

2022 – 2023

Citizen Scientist: Assessment of Water Pollution Impacts in the Drina River Basin

Funded by: OSCE Mission to Bosnia and Herzegovina

Position: UNSA project team leader

Description: In co-operation with the Faculty of Natural Science and Mathematics of the University of Sarajevo and the Faculty of Technology in Zvornik, University of East Sarajevo, the Office of the Coordinator of OSCE Economic and Environmental Activities (OCEEA) is implementing the project "Citizen Scientist – Assessing the Impact of Water Pollution in the Drina River Basin". The project aims to raise public awareness on environmental issues and prompt action in protecting an important transboundary water resource by involving citizens, local officials, CSOs and youth groups in a series of water sampling activities at selected locations along the River Drina. In addition to providing local stakeholders with direct insight into the causes and consequences of human activity on the natural environment, the project aims to produce the first comprehensive ecological analysis of the River Drina since the 1970s as well as the first microplastics analysis of a river in BiH. The project contributes to the realization of HoM-Environmental Project 2022, Result 2, "Citizen Awareness and action on the environment is strengthened". By bringing together people from different ethnic backgrounds and across administrative divides, the project also helps to increase trust and social cohesion.

2020 – 2022

Preparation of the Nomination file for inscription on the UNESCO world heritage list property:

Complex of travertine waterfalls and cascades on the river Una in Martin Brod - National park "Una"

Funded by: Federal ministry of the environment and tourism

Position: Member of expert team

Description: Travertine complex in the river Una in Martin Brod includes the largest complex of waterfalls and cascades in the National park „Una“, formed in the whole area downstream from the exit of the canyon in Martin Brod valley to the mouth of the river Unac. This unique natural complex is distinguished by outstanding natural values and high biodiversity level. The property contains superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance. Unique and incomparable aquatic and semi-aquatic landscapes which create complexes of travertine waterfalls and cascades in the river Una situated in Martin Broad valley are distinguished by remarkable, not only in the region, but worldwide hydrological and geomorphological elements of extraordinary natural beauty and aesthetic landscape values.

Link <https://whc.unesco.org/en/tentativelists/6400/>

2020 – 2022

Development of master curricula in ecological monitoring and aquatic bioassessment for Western Balkans HEIs " – ECOBIAS (ref. no. 609967-EPP-1-2019-1-RS-EPPKA2-CBHE-JP).

Co-funded by: the Erasmus+ Programme of the European Union

Position: Project coordinator for Bosnia and Herzegovina

Description: ECOBIAS aim to develop and improve knowledge/skills/technical resources of Partner Country HEIs in ecological monitoring and freshwater bioassessment in line with national and EU policy. The specific

objectives of the project are to: Develop and implement the advanced master curricula in Ecological Monitoring and Aquatic Bioassessment in the WB HEIs in line with the Bologna requirements and national accreditation standards; Develop and implement LLL courses for the environmental monitoring sector in line with EU Water Framework Directive in the WB HEIs; Equip seven laboratories for ecological monitoring and bioassessment of freshwater ecosystems in the WB HEIs; Develop regional academic network in order to organize and promote regional cooperation in Ecological Monitoring and Aquatic Bioassessment.

Link <https://www.ecobiaserasmus.com/>

2020 – 2022

Educational Capacity for Risk Management of Non Native Aquatic Species in the Western Balkan Region (Albania, Bosnia and Herzegovina, Montenegro) (ref.no. 619384-EPP-1-2020-1-TR-EPPKA2-CBHE-JP)

Co-funded by: the Erasmus+ Programme of the European Union

Position: member of expert team

Description: The project aims to strengthen the Educational Capacity for Risk Management of Non Native Aquatic Species in the Western Balkan Region (Albania, Bosnia and Herzegovina, Montenegro) by promoting the education of stakeholders and higher education students and stimulate cooperation among the target countries. At the same time, it aims to strengthen cooperation between the consortium partners but also between stakeholders and higher education institutes.

2019

Updating of biotic typology, boundaries of ecoregions and subcoregions, reference conditions and biological parameters for the assessment of water conditions

Funded by: Sava river basin agency

Position: Habitat expert

Project description: The Water Management Plan for the Sava river basin in the Federation of BiH (2016-2021) (RBM plan) was adopted.

As one of the research and study measures defined by the Program of Measures from the Management Plan, which should be implemented during the first RBM planning cycle, is measure 61: Update the first management plan, i.e. conduct research/studies related to missing data, namely: biotic typology, borders of ecoregions and subcoregions, reference conditions. For the purposes of developing the first RBM plan, the available biological data related to the identification of reference conditions with an emphasis on aquatic macroinvertebrates were analyzed in detail. Other biological elements of quality were not taken into account primarily due to the lack of relevant data for those groups.

In order to implement this measure, the Agency for the Water Area of the Sava River, Sarajevo, launched a project to validate the biotic typology of defined river types, defined reference conditions, and define the values of biological quality parameters, which are used in the calculation of the ecological state of surface waters in the area of the Sava River Basin. in the Federation of Bosnia and Herzegovina. On the basis of collected data (based on previous measurements of their qualitative and quantitative composition and statistical analysis of data from earlier research and data obtained through multivariate analyses, cluster analyses, expert assessments, experiences of other countries, etc.), and all according to Appendix V of the ODV and the Guide for the overall approach to the classification of the ecological state and ecological potential - ECOSTAT), the goals that this project aims to achieve are:

1. Verification (confirmation and/or corrections) of the preliminary biotic typology of watercourses with biological/ecological data;
2. Revision of the boundaries of ecoregions and subcoregions given in the "Decision on the characterization of surface and underground waters, reference conditions and parameters for the assessment of water conditions and water monitoring" (Official Gazette of the Federation of Bosnia and Herzegovina, number 01/14);
3. Selection of adequate indices for biological elements of quality: phytoplankton, macrozoobenthos, macrophytes and fish of surface terrestrial waters necessary for the classification of the ecological state of waters, i.e. it is necessary to define reference values and limit values for high, good, moderate, weak and bad water conditions
4. Creation of an operational list of fees for all biological parameters of water quality according to the criteria of the Framework Directive on Water (2000/06/EC) and the Law on Water (Official Gazette of FBiH No. 70/06).
5. Creation of a list of indicators for the saprobic index and sensitive taxa for phyto-benthos and aquatic

2018 – 2019

Inventory and geographic interpretation of invasive species in the Federation of Bosnia and Herzegovina

Funded by: Federal ministry of the environment and tourism

Position: Project coordinator and expert for habitats

Description: Main objective of the project is preparation of inventory and geographic interpretation of distribution of invasive species in Federation of Bosnia and Herzegovina. A comprehensive analysis of relevant literature data and field investigation assists in preparation of the list of invasive species and development of GIS database.

For the purpose of creating a list of invasive species and forming a database, within the project are realized comprehensive researches and reviews of available existing literature such as: scientific research literature (scientific and professional articles, books, scientific monographs), scientific and professional research studies and essays, scientific and technical projects, etc., and accompanying exemplar field research with the aim of confirming literature-determined invasive species and adequate analytical-statistical processing of data on invasive species, the state of their population, abundance area etc.

Link https://www.fmoit.gov.ba/upload/file/okolis/Invazivne_vrste_F_BiH_Dorada_Decembar_2019.pdf

2019

Ichthyological investigations in the river Sava basin in the Federation of BiH

Funded by: Sava river basin agency

Position: Habitat expert

Project description: Monitoring of surface waters in accordance with the recommendations of the Framework Directive on Water 2000/60/EC (ODV) includes investigation of fish fauna. Also, the ichthyofauna investigation is an integral part of measures 65. (Ecological and chemical monitoring of all water bodies at least once within the first RBM cycle) and 66. (Establishment of methods of sampling, analysis and status assessment) of the draft Water Management Plan for the water area of the river Sava in FBiH. In order to realize this, it is necessary to carry out as much research as possible. Fish are one of the biological elements of quality that, among other things, well indicate hydromorphological pressures on surface waters. Fishery research is important due to the implementation and incorporation into national legislation of the Directive on the quality of fresh waters that require protection or improvement in order to ensure the life of fish (78/659/EEC).

2018

Ichthyological investigations in the river Sava basin in the Federation of BiH

Funded by: Sava river basin agency

Position: Habitat expert

Project description: Monitoring of surface waters in accordance with the recommendations of the Framework Directive on Water 2000/60/EC (ODV) includes investigation of fish fauna. Also, the ichthyofauna investigation is an integral part of measures 65. (Ecological and chemical monitoring of all water bodies at least once within the first RBM cycle) and 66. (Establishment of methods of sampling, analysis and status assessment) of the draft Water Management Plan for the water area of the river Sava in FBiH. In order to realize this, it is necessary to carry out as much research as possible. Fish are one of the biological elements of quality that, among other things, well indicate hydromorphological pressures on surface waters. Fishery research is important due to the implementation and incorporation into national legislation of the Directive on the quality of fresh waters that require protection or improvement in order to ensure the life of fish (78/659/EEC).

2017 – 2018

Endangered Fish Species in Balkan Rivers: their distributions and threats from hydropower development

Funded by: Riverwatch & EuroNatur.

Position: Expert for GIS, habitats and environmental impacts – Bosnia and Herzegovina

Description: Objective of the project is revision of potential impacts of the construction of hydropower plants on conservation status and level of threat for 113 freshwater fish species on the Balkans. Each of fish species is enlisted in one of three IUCN categories or it is enlisted in one or several Annexes of The European Habitats Directive or Bern Convention. For 81 species, a GIS distribution map is provided with 2 distribution of existing hydropower plants (approx. 1,000), those under construction (approx. 180), or those planned (approx. 2,800) to explicitly show the spatial dimension of potential habitat loss. Based on the results of the analysis, the level of endangerment of freshwater fish species in the Balkans is predicted.

Link https://www.researchgate.net/publication/324602387_Endangered_Fish_Species_in_Balkan_Rivers_their_distributions_and_threats_from_hydropower_development

2017

Assessment of the potential impacts in the changes of the working regime of hydropower plant Jablanica on biological quality elements in waters

Funded by: Hydropower plants on Neretva, Jablanica

Position: Project coordinator and expert for phytoplankton, phytobenthos and aquatic macrophytes.

Description: Main objective of the project is analysis of actual state of fish populations in the reservoirs on the river Neretva. It includes assessment of the impacts in the changes of the water regime during the work of hydropower plants on the biological quality elements, that is phytoplankton, phytobenthos, aquatic macrophytes, macroinvertebrates and fish species. The entire research activity, from field sampling through laboratory processing, and final statistical data processing, is harmonized with the recommendations of the Water Framework Directive -WFD, 2000/60/EC).

2017

Ichthyological investigations in the river Sava basin in the Federation of BiH

Funded by: Sava river basin agency

Position: Habitat expert

Project description: Monitoring of surface waters in accordance with the recommendations of the Framework Directive on Water 2000/60/EC (ODV) includes investigation of fish fauna. Also, the ichthyofauna investigation is an integral part of measures 65. (Ecological and chemical monitoring of all water bodies at least once within the first RBM cycle) and 66. (Establishment of methods of sampling, analysis and status assessment) of the draft Water Management Plan for the water area of the river Sava in FBiH. In order to realize this, it is necessary to carry out as much research as possible. Fish are one of the biological elements of quality that, among other things, well indicate hydromorphological pressures on surface waters. Fishery research is important due to the implementation and incorporation into national legislation of the Directive on the quality of fresh waters that require protection or improvement in order to ensure the life of fish (78/659/EEC).

2016 – 2017

Biological and landscape diversity of travertine watercourses in the Federation of Bosnia and Hercegovina (rivers Una, Pliva, Trebižat): actual state and protection measures.

Funded by: Environmental Protection Fund of the Federation of Bosnia and Herzegovina

Position: Project coordinator and expert for habitats and aquatic macrophytes

Project description: The project was conceived in accordance with the Environmental Protection Strategy and the Action Plan of the Federation of Bosnia and Herzegovina. The goal of the project is to evaluate the natural values of travertine formations in the FBiH on the rivers Una, Pliva and Trebižat, based on the inventory of species from different systematic groups with special reference to characteristic bioindicators from the groups Arthropoda, Chiroptera, Spongia, Pisces, Cyanophyta, Bacillariophyceae, Chlorophyta, Musci, Hepaticae, Pteridophyta, Angiospermae with an assessment of the conservation status. Identification of the stages in the development of tufa according to groups of tufa-forming organisms, and to create a cadastre and accompanying GIS database and cataloging of tufa formations with associated life communities in FBiH, and a proposal for protection measures. The researches assessed the general hydromorphological conditions in the immediate watersheds of the mentioned watercourses as a basis for defining anthropogenic pressures on the investigated watercourses.

2015 – 2016

Analysis of the condition and proposal of protection measures for all recorded individual monuments of natural heritage, with analysis of the condition and review of the category of protected areas of Sarajevo Canton

Funded by: Cantonal Institute for the Protection of Cultural, Historical and Natural Heritage Sarajevo.

Position: Expert for vegetation and habitats.

Project description: The goal of the project is the analysis and assessment of the state of the identified natural monuments based on the following criteria: representativeness, geological, pedological, hydrological, biological, ecological diversity, assessment of traditional and ambient-aesthetic values. Identification of habitat types in the area covered by each individual nature monument. As part of the project, extensive photo documentation of the natural heritage was created, which will be used for the preparation of the database of the Nature Monument of Sarajevo Canton.

2015 – 2016

Development of the program for revitalization of fish communities for »Hidroelektrane na Neretvi« Jablanica

Funded by: Hydropower plants on Neretva, Jablanica

Position: Project coordinator and expert for phytoplankton, phytobenthos, macrophytes and habitats.

Project description: Based on the "Act on Freshwater Fisheries HNK/Ž" Narodne novine no. 4 dated 28.04. In 2014, owners and users of hydropower facilities are obliged to carry out a revitalization program for endangered fauna whose habitat has been significantly reduced and migration routes disrupted. This program was carried out in cooperation with the authorized employees of the Neretva HPP Branch and sports fishermen's organizations in the fishing zones of the municipalities of Konjic, Jablanica, Prozo-Rama and Mostar. Examinations of the biological elements of water quality included a detailed analysis of the biological elements of water quality: that is, phytoplankton, phytobenthos, macrophytes, macroinvertebrates and ichthyofauna. The capacity of aquatic ecosystems to establish populations of indigenous fish species in the investigated part of the Neretva river basin was determined. An action plan

for the revitalization of indigenous species in natural watercourses and reservoirs has been drawn up. Criteria were developed for measuring the success of revitalization with an emphasis on the ecological perspective. A proposal of measures for the implementation of the revitalization and monitoring program with the program of continuous stocking was given.

2014 – 2015

Ecological baseline survey in the area affected by facilities of HPP Vranduk

Funded by: Javno preduzeće Elektroprivreda Bosne i Hercegovine d.d. Sarajevo.

Position: Project coordinator and expert for habitats and vegetation

Description: Ecological baseline survey in the area affected by facilities of HPP Vranduk has been carried out in order to fulfill the conditions defined in the environmental permit for construction of Hydropower plant Vranduk. Since construction of the power plant could have significant impacts on the flora, the fauna, and vegetation in its surroundings, it was necessary to carry out detailed and comprehensive analysis of all elements of biodiversity.

Main objective and goal of the investigation of the baseline state of the flora, the fauna and vegetation includes determination of physical-chemical and biological features of the river Bosna in investigated area, as well as qualitative and quantitative analysis of the fauna (macroinvertebrates, ichthyofauna, amphibians and reptiles) in surroundings of the planned power plant (5 km), river banks between dam and engine room (7 km) and downstream river bed from engine room to the settlement Nemila (3 km). Besides, the analysis of ornithofauna and bats which are present there during whole year or only during certain seasons has been carried out. Within the analysis of the flora and vegetation, detailed phytocoenological investigations have been carried out in order to identify dominant types of plant communities and potential presence of invasive plant species. Mapping of habitat types, dominant plant communities, and habitats of invasive plant species has been carried out on the basis of the results of those investigations. The analysis of potential presence of protected and/or endangered species of the flora and the fauna has been carried out for all elements of biodiversity.

2014

Program for the revitalization of living communities of watercourses Kalašnica (Raštelički potok), Bijela, Crna (Gunjanski potok), and Lepenica in the subsection Lepenica – Suhodol and Suhodol – Tarčin of the corridor Vc

Funded by: JP Autoceste F BiH.

Position: Project coordinator and expert for phytobenthos, macrophytes and habitats

Project description: Investigations of fish diversity in watercourses affected by the construction of the highway on the Lepenica-Suhodol and Suhodol-Tarčin subsection of the corridor Vc highway were carried out with the aim of better understanding the total biodiversity in this area. Testing of biological elements of water quality included the rivers Kalašnica, Bijela, Crna and Lepenica. During the research, a relatively low species diversity of fish was noted, and the presence of a total of five species from three families was registered: Salmonidae, Cyprinidae and Cottidae. Despite the relatively low species diversity, we can state that it is a satisfactory diversity of ichthyofauna, taking into account that the investigated localities are located in the upper reaches of the rivers, which belong to the salmonid regions of the rivers. The results of phytobenthos, aquatic macrophytes and zoobenthos analyzes show that watercourses in the researched area are characterized by a relatively good ecological status, as indicated by macrophytes and ichthyopopulations. The moderate ecological status for phytobenthos is the result 6 above all of the uncontrolled discharge of wastewater from households directly into watercourse

2013 – 2014

Support to the implementation of the Birds and Habitat Directive in Bosnia and Herzegovina

Funded by: EU IPA – SIDA

Position: Expert for habitats from Annex I and plant species from Annex II of the Habitat Directive and vegetation

Description: The overall objective of the project is to contribute to environmentally sustainable economic development by bringing the country closer to EU environmental standards, through strengthening administrative structures and fostering the approximation with the environmental acquis requirements. The purpose is to support the BiH institutions in approximation of EU Birds and Habitats Directives, more specifically transposition and implementation of the Directives' provisions through the Entities' Nature Protection Laws. The project also supports initial steps for starting with the development of a NATURA 2000 network and its corresponding implementing strategy and management plans. The project consists of the following tasks: Development of NATURA 2000 proposal and consultation process; Drafting of Guidelines for the preparation of NATURA 2000 management plans; Development of the management plan for three proposed pilot NATURA 2000 sites; Preparation of Regulations/Ordinances to support establishment of NATURA 2000 network; Elaboration of the NATURA 2000 information system; Raising public awareness.

2013

The Second National Communication (SNC) of Bosnia and Herzegovina under the United Nations Framework Convention on Climate Change (UNFCCC)

Funded by: GEF

Position: Member of the expert team

Description: The Second National Communication (SNC) of Bosnia and Herzegovina under the United Nations Framework Convention on Climate Change (UNFCCC) has been adopted by the BiH Council of Ministers and entity governments and submitted to the UNFCCC Secretariat in Bonn.

United Nations Development Programme with GEF financial support and in partnership with the UNFCCC focal point for Bosnia and Herzegovina, RS Ministry for Spatial Planning, Civil Engineering and Ecology successfully completed the BiH Second National Communications on Climate Changes.

The development and submission of this report does not only present fulfillment of BiH's obligation as UNFCCC signatory; SNC also serves as a significant strategic document for sustainable development, as well as a link between environment protection, climate changes and key socioeconomic development issues. With an assistance of more than 30 local experts and active involvement of relevant institutions, SNC has resulted in an updated GHG inventory verified in line with international standards. The document also provides an updated assessment of climate changes impact in BiH and recognizes areas with the highest potential for GHG mitigation. With identification of priority adaptation and mitigation measures, SNC has created a base for further BiH's development towards sustained economic growth, which at the same time, contributes to eradicating poverty and improving human welfare without further damage to the environment. At the Rio summit in June 2012, the global leaders recognized this new development pattern under the name of Green Economy.

2012 – 2014

METRIS Plus – Boosting Research and Innovation Potential of the Adriatic Cross-border

Funded by: Adriatic IPA.

Position: The coordinator of the expert team in the project

Description: Project METRIS PLUS is approved for funding under the second component of the IPA Adriatic Cross-Border Cooperation Programme (Priority 1 Economic, Social and Institutional Cooperation, Measure 1.1. Research and Innovation). Lead partner is the Istrian Development Agency and partners are Region of Istria, SVIM Regional Development Agency of Marche Region (Italy), UIP University development center and university incubator of Primorska (Slovenia), SERDA Sarajevo Regional Development Agency (BiH), Alma Mons –Regional Agency for the Development of Small and Medium size Enterprises, Novi sad (Serbia).

2012 – 2013

Valorisation of the cave Megara on the Mt. Bjelašnica (municipality of Hadžići)

Funded by: Municipality of Hadžići and SeeNet: A Trans Local
Network for Cooperation between Italy and South East Europe

Position: Biodiversity expert

Description: Preparation of topo maps and conceptual design for conservation of the cave Megara. Phase I was related to comprehensive research by a multidisciplinary expert team was completed on November 1, 2011. Phase II of the project included preparation of a topographical plan and conceptual design for the restoration and arrangement of the Megara cave.

Link <https://docplayer.org/103226986-Valorizacija-pecine-megara-na-planini-bjelasnici-opcina-hadzici-izrada-topografskog-nacrta-i-idejnog-rjesenja-sanacije-i-uredjenja-pecine-megare.html>

2012 – 2013

Forest and Mountain Protected Areas Project Number: BA-FMPAPTF091919-CQ-21-S-12/FBiH "Creating a red list of endangered plants, animals and fungi in the Federation of Bosnia and Herzegovina"

Funded by: Federal Ministry of Environment and Tourism

Position: Head of working group for the flora

Project description: The Government of the Federation of Bosnia and Herzegovina has committed itself to the sustainable use of natural resources and the protection of biodiversity. This obligation was transferred through the implementation of the Law on Nature Protection ("Official Gazette of FBiH" number: 33/03), and the Federal Environmental Protection Strategy. The goal of this project is to create capacities for further effective protection of the biological diversity of the FBiH through the evaluation of the current situation and the creation of educational materials. This goal needs to be achieved through the evaluation of the existing species status, on the basis of which the red list of plants, animals and fungi of the Federation of Bosnia and Herzegovina will be drawn up. As part of the project, the collection and analysis of data on endangered plants and animals of FBiH was carried out; classification into endangered categories according to the latest official IUCN criteria; presentation and public discussion on the proposed lists of endangered plants, animals and fungi of FBiH; and creation of a list of threatened plants, animals and fungi of FBiH. The red list for each species contains the name of the species {Latin (professional) name with the name of the author and the year of its census, the vernacular name and the English name}; IUCN threat category (at local or regional level); and the IUCN vulnerability criteria.

2011

Second Environmental performance review: Bosnia and Herzegovina

Funded by: Governments of Austria, the Netherlands and Switzerland

Position: Member of expert team

Description: This is the second EPR of Bosnia and Herzegovina published by UNECE. The report takes stock of the progress made by Bosnia and Herzegovina in the management of its environment since the country was first reviewed in 2004. It assesses the implementation of the recommendations in the first review (Annex I). It also covers nine issues of importance to Bosnia and Herzegovina concerning policymaking, planning and implementation, the financing of environmental policies and projects, and the integration of environmental concerns into economic sectors, in particular water management, waste management and forestry

Link https://unece.org/DAM/env/epr/epr_studies/Synopsis/Bosnia_and_Herzegovina_ECE.CEP.162.synopsis_english.pdf

2010 – 2011

Spatial plan of the Federation of Bosnia and Herzegovina. Natural heritage of the Federation of Bosnia and Herzegovina. Existing condition and concept of spatial development

Funded by: Ministry of Spatial Planning of the Federation of Bosnia and Herzegovina.

Position: Expert for natural heritage and protected areas.

Description: The Spatial Plan of FBiH is, after the Constitution of the State of BiH, the most important strategic development document, which determines the long-term goals and measures of spatial development in accordance with the planned overall economic, social and historical development of importance for the Federation of BiH.

2010 – 2011

Defining the reference conditions of surface waters in the Sava river basin in the Federation of Bosnia and Herzegovina according to the criteria of the Framework Directive on Water (2000/60/EC) and the Law on Water (Official Gazette FBiH, no. 70/06)

Funded by: Sava river basin agency

Position: Expert for phytobenthos and aquatic macrophytes.

Project description: The aim of the project is to define the reference conditions for classifying the ecological state and the permissible limit values of chemical quality parameters for classifying the chemical state of water bodies of surface waters, which is one of the measures from Operational Objective 15: Development of a Water Management Plan for the Water Area of the Sava River and Water area of the Adriatic Sea. This operational goal, as such provided by the Water Law of the Federation of Bosnia and Herzegovina, articles 31 and 32, had to be realized as a prerequisite for all activities leading to the achievement and maintenance of a good state or good ecological potential of surface and underground waters.

2009

The Initial National Communication (INC) of Bosnia and Herzegovina under the United Nations Framework Convention on Climate Change (UNFCCC).

Funded by: GEF

Position: Member of the expert team

Description: The Initial National Communication (INC) of Bosnia and Herzegovina under the United Nations Framework Convention on Climate Change (UNFCCC) has been adopted by the BiH Council of Ministers and entity governments and submitted to the UNFCCC Secretariat in Bonn. In accordance with the guidelines of the UN Framework Convention on Climate Change, which was signed by Bosnia and Herzegovina in 2000, the UNDP CO in BiH, organised, with the financial support of GEF, the selection of an expert team and 50 local experts from 14 relevant fields, who participated in the preparation of the Initial National Communication of Bosnia and Herzegovina in a professional way and in line with the international standards. Each UNFCCC signatory state has an obligation to submit its national reports to the UNFCCC Secretariat. By preparing, verifying and submitting its INC, Bosnia and Herzegovina has become a full participant in the global process of deliberation on climate change adaptation and mitigation.

Link https://unfccc.int/sites/default/files/resource/INCBiH_ENG.pdf

2008 – 2011

Europe's Living Heart: Preserving B&H's natural heritage using EU-tools (II – IV phase)

Funded by: WWF office in Sarajevo

Position: Biodiversity expert

Description: Project support administration in preparation for the future Natura 2000 site nomination. This project started in July 2009 and will last until the end of June 2011. Activities included preparation for field mapping in BiH which was held in spring, selection of the areas for field mapping and selection of experts that will define habitat types from the Annex I list of EU Habitat Directive. They completed the habitat and species mapping necessary for the future site nomination in BiH for the Natura 2000 network.

A database is compiled on the basis of desktop studies to fully complete and review the entire list of species and habitats from Annexes I and II of Habitat Directive registered in BiH. Europe's Living Heart project is supported by WWF Mediterranean Programme and WWF Norway, and is financed by the Norwegian Government.

2008 – 2010

Spatial plan of the area of special features of importance for the Federation of Bosnia and Herzegovina "Una River Basin" 2008 - 2028

Funded by: Federal Ministry of Spatial Planning, Sarajevo.

Position: Flora and vegetation expert

Project description: Spatial plan of the Federation of Bosnia and Herzegovina for the period 2008-2028. year is a binding document for the regulation of spatial planning in the territory of the Federation of Bosnia and Herzegovina. The spatial plan consists of a textual and graphic part. The textual part contains: (1) general and special goals of spatial development, (2) projection of spatial development, (3) projection of the development of spatial systems, 4) decision on the implementation of the spatial plan, while the graphic part contains 14 digital graphic attachments that can be used in geoinformation system (GIS). Digital graphic attachments are made on a digital topographic map 1:200000.

2005 – 2011

Investigation of surface water quality in the area of the Sava river basin in the Federation of BiH: defining the types of surface water - drawing up a typology of surface water in Bosnia and Herzegovina (on the part of the Federation of BiH)

Funded by: Sava river basin agency

Position: Expert for aquatic macrophytes

Project description: The aim of the project is to define the types of surface water - drawing up a typology of surface water in Bosnia and Herzegovina (on the part of the Federation of Bosnia and Herzegovina) for the Sava river basin. According to the Water Framework Directive, the achievement of ecological goals is also measured by the ecological state of surface waters, and in order to determine it, it is necessary to determine the ecological type (ecotype) of surface waters. Surface waters are spatially distributed into types-units, which according to predetermined criteria have specific ecological characteristics.

HONOURS AND AWARDS

09/2015

Award for Support and Contribution – ICOEST - Environmental Science and Technology In recognition of valuable support and contribution to the Internaional Conference on Environmental Science and Technology (ICOEST) held on 09 - 13 September 2015 in Sarajevo, Bosnia and Herzegovina

04/2012

The award for the science at XXIV International book fair held from April 18 to 23 2012 in Sarajevo for the book: NATURA 2000 in Bosnia and Herzegovina – XXIV International book fair Sarajevo The award for the science at XXIV International book fair held from April 18 to 23 2012, in Sarajevo for the book: Drešković, N., Đug, S., Stupar, V., Hamzić, A., Lelo, S., Muratović, E., Lukić-Bilela, L., Brujić, J., Milanović, Đ., Kotrošan, D. (2011) NATURA 2000 in Bosnia and Herzegovina. Centar za okolišno održivi razvoj. Sarajevo. pp. 456.

MANAGEMENT AND LEADERSHIP SKILLS

Head of the Ichthyology and Fishing Center (CIR)

Head of the Ichthyology and Fishing Center (CIR)

Web Site: <http://www.pmf.unsa.ba/cir/indeks.htm>

The Ichthyology and Fishing Center (CIR) is situated at the Faculty of Science Sarajevo. Our research spans a range of studies including fish populations and communities, aquatic habitats, and the biological processes that occur in complex aquatic ecosystems. Through intensive field and laboratory research and technical knowledge, we provide necessary information and advice of crucial importance to protect, conserve, and manage aquatic resources of Bosnia and Herzegovina.

Aquatic biodiversity forms an important part of our natural heritage and is an essential economic resource. Through its work the Center seeks to better understand aquatic resources and their ecosystems, to assist resource managers in making sound decisions that build sustainable fisheries, recover endangered and threatened species, and sustain healthy ecosystems and habitats in the country.

The Ichthyology and Fishing Center (CIR) offers a wide spectrum of expertise which include fisheries management studies, plans for revitalization of fish communities, expertise in the case of ecological accidents, and educative workshops.

In our laboratories, besides analyses of biological quality elements, we carry out physical - chemical water analyses, microbiological analyses and ecotoxicological analyses.

Vice Dean for International Cooperation and Quality Assurance
University of Sarajevo - Faculty of Science

Vice Dean for International Cooperation and Quality Assurance for the mandate period 2020 - 2024

Editor in Chief: Annals of the Institute of Biology of the University of Sarajevo (AIBUS)