The Book of Abstracts and Programme

7th International Symposium of Ecologists – ISEM7

4-7 October 2017
Sutomore, Montenegro

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International Symposium of Ecologists – ISEM *is, now for a period of 15 years, bi-annual platform for interactions between the researchers who are dealing with the subjects of fundamental and applied ecology.*

Participants at the upcoming ISEM7 conference will debate about the issues of the modern ecology and environmental science of the recent times.

Channels of communication between the researchers this October in Sutomore at the ISEM7 will cover the following thematic areas: Biodiversity Research & Conservation, Fundamental and Applied Ecology, Sustainable Development & Planning, Forestry and Agroecology, Ecological Education, Eco-Eco interactions discussing the ecological and economic aspects, and finally the policy issues and related ecological – environmental regulations.

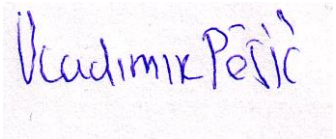
The program will include invited and plenary lectures that will be presented by well-known Experts with the professional backgrounds of the listed research areas. Out of the Conference Research Presentations, the Organizers will arrange also exhibition/s of drawings, photos, but will also present interesting collections of research and promotional material.

Finally, the Organizers of the ISEM7 are very well aware that the complete success of operation of such events is also depending on effective relaxed social and professional interactions. In relation to that you may find in the Conference Schedule the time reserved for the social events, such as Joint dinners including the dancing party, as well as the visit of the attractive neighborhood next to the coast of the always sunny and blue Adriatic Sea and the Skadar Lake.

And to conclude with the testimonial of R. A. Baker from the previous ISEM Conference:

„These meetings have been marked by their friendliness and informality, in addition to providing a platform for the exchange of information. They have also been international (not the "international participation" often advertised) with a good mix of people from all over the world, all of whom seemed to have got on well together".

We wish you welcome, excited and eagerly looking forward to see you soon,



Professor Vladimir PESIC, Conference General Chair
On behalf of the good team of the 7th International Symposium of Ecologists – ISEM7

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THE PROGRAMME

October 4th, 2017 (Wednesday)

09:00-11:00 15:00-17:00	Registration
11:00-11:30	Opening ceremony
11:30-12:00	Welcome cocktail
15:30-19:00	Working sessions

October 5th, 2017 (Thursday)

09:00-11:00 15:00-17:00	Registration
09:00-13:00	Working sessions
13:00-14:00	Lunch break
14:30-19:00	Conference excursion (Skadar Lake)

October 6th, 2017 (Friday)

09:00-11:00 15:00-17:00	Registration
09:30-12:30	Working sessions
13:00-14:00	Lunch break
15:30-18:00	Working sessions
18:00-19:00	Final discussion and conclusions
20:00	Gala dinner (live music and tasting of traditional and typical products)

October 7th, 2017 (Saturday)

10:00-18:00	Post conference excursion

BIODIVERSITY RESEARCH AND CONSERVATION

Wednesday, October 4th, 2017

Invited lecture

15:30-16:00 **Ljiljana Tomović**: **Do we need population studies & conservation of Reptiles at the central Balkans".**

Oral Presentations
(Chairman: Igor Dovgal and Ljiljana Tomović)

16:00-16:10 *Suzana Malidžan, Ante Vujić, Snežana Radenković*: **The significance of the canyons in the preservation of diversity in Montenegro**

16:10-16:20 *Snežana Dragićević, Vera Biberdžić, Snežana Vuksanović, Ilinka Ćetković*: **View on bryophyte investigation of the Šasko Lake (Ulcinj, Montenegro) with emphasis on some interesting taxa**

16:20-16:30 *Milica Stanišić, Urban Šilc, Filip Kűzmič, Danka Caković, Danijela Stešević*: **Flora of Grahovsko polje (Montenegro)**

16:30-16:40 *Tanja Šnjegota, Siniša Škondrić, Nada Šumatić, Ljiljana Topalić-Trivunović*: **Contribution to the flora of the *Robinia pseudoacacia* forests in Lijevče polje**

16:40-16:50 *Dovgal I.V., Ivanova E. & Sergeeva N.G.*: **Records of ciliate *Loricophrya bosporica* (Ciliophora, Suctorea) in different extremal communities**

16:50-17:00 *Alexandra Gubanova, Oksana Garbazey, Elena Popova and Denis Altukhov*: **Report on occurrence of the non-indigenous copepod *Pseudodiaptomus marinus* Sato, 1913 in the Sevastopol Bay (Black Sea)**

17:00-17:10 *Vladimir Pešić & Peter Glöer*: **Diversity and Conservation Status of Mollusks of Skadar Lake**

17:10-17:20 *Vernes Zagora, Slađana Gvozdenović, Dušan Jelić*: **Preliminary data on distribution of the Karst Viper (*Vipera ursinii macrops*) in Montenegro**

17:20-17:30 *Aliki Panou, Dušan Varda, Luigi Bundone*: **The Mediterranean Monk Seal, *Monachus monachus*, in Montenegrokernan**

18:00-19:00 ***Poster Presentations***

Sead Hadžiablahović: **Aquatic Vegetation Diversity of the Skadar Lake in Montenegro**

Aurora Dibra: **The project investments in North Albania as a tool to approach and implement the objectives of National Strategy of Biodiversity**

Ilinka Ćetković, Branka Knežević, Suzana Malidžan: **Contribution to the research of macromycetes of Montenegro**

Jelena Rakočević: **Epilithic diatoms of Crno Lake (Montenegro)**

Shadananan Nair: **Biodiversity Conservation in the Western Ghats Mountain Forest under a Changing Climate**

Olga Jakovljević: **Species diversity of epilithic diatom communities in the Radovanska River (eastern Serbia)**

Suzana Patceva, Tatjana Loshkoska: **Benthic Diatom Algae in the watershed of River Black Drim and River Sateska**

Larisa Ryabushko, Daria Balicheva, Vitaly Ryabushko: **Microphytobenthos Diatoms of the Black Sea: Biodiversity and Ecology**

Boris Radak: ***Teloschistes chrysophthalmus* - a new species of lichenized fungi in Montenegro**

Dalibor Vladović, Božena Mitić: **Analysis of family Plantaginaceae from Carl Studniczka's herbarium**

Boris Radak, Bojana Bokić, Goran Anačkov: **Dense-flowered orchid *(Neotinea maculata)* - a new species for flora of Montenegro**

Danka Caković, Danijela Stešević, Mihailo Jovićević: **New chorological data for some rare plants in Montenegro**

Ranko Perić, Siniša Škondrić, Jelena Knežević: **First confirmed record of *Carex limosa* L. (Cyperaceae) and community *Caricetum limosae* Br.-Bl. for Nevesinjsko polje (Bosnia and Herzegovina)**

Danijela Stešević, Danka Caković: **Some notes on alien flora of the Salinas in Montenegro**

Srdjan Pejović, Milan Gazdić, Milena Lakićević and Danka Caković: **Floristic composition and ecological analyses of the mountain forests in the Management unit Stitovo (Maganik Mt, Montenegro)**

Marina Patsyuk: **First findings of naked Amoebae in soils of Zhytomyr Polyssia (Ukraine)**

Biljana Budzakoska-Gjoreska & Sasho Trajanovski: **A Comparative study on the density of Gastropoda from Lake Ohrid for the period 1963-2016**

Krzysztof Pabis, Robert Sobczyk, Jacek Siciński, Bjorn Serigstad: **Distibution and diversity of polychaete fauna on the Gulf of Guinea continetal margin (Ghana`s coast)**

Mihaela Cristescu: **Nocturnal Lepidoptera from the entomological collection of Natural Scriences Museum Complex Galați (Romania)**

M. Zeki Yildirim, Serap Koşal Şahin, M. Emre Gürlek: **Hydrobiids of Turkey**

Dejan Dmitrović, Goran Šukalo, Vladimir Pešić: **The fauna of snails (Gastropoda: Hydrobiidae) in springs of Vrbas river basin (NW Bosnia and Herzegovina): survey of investigations**

Stoe Smiljkov, Radmila Ilieska, Dimitar Gusheski, Marija Chabuleva, Filip Gjorgjioski: **Hirudinoid fauna (Annelida: Hirudinea) in Dojran Lake – Republic of Macedonia**

Natalia Munteanu-Molotievskiy, Anna Moldovan: **Beetle species diversity in steppe ecosystems of the Republic of Moldova**

Milaim Musliu, Halil Ibrahimi, Astrit Bilalli, Murtezan Ismaili: **Five new records for the caddisfly fauna (Insecta: Trichoptera) of Macedonia**

Astrit Bilalli, Halil Ibrahimi, Milaim Musliu, Linda Grapci-Kotori and Agim Gashi: **New records for the caddisfly fauna (Insecta: Trichoptera) of Macedonia**

Halil Ibrahimi, Aleksandra Gligorović, Bogić Gligorović, Dejan Kulijer: **Expansion of *Harmonia axyridis* (Pallas, 1773) in the South-eastern Europe and impact on other Coccinellid species**

Pınar Gülle, İskender Gülle: **A new *Lebertia* (Parasitengona: Lebertiidae) record for Turkey: *Lebertia excellens* Lundblad, 1956**

Tihomir Stefanov, Georgi Popgeorgiev: **Distribution patterns and conservation status of the species from genus *Alburnoides* (Pisces, Cyprinidae) in Bulgaria**

Cecilia Serban, Catalin Razvan Trif, Adrian Ene: **Assessing the populations of protected rodents in a natural ecosystem**

Marina Talevska, Sonja Trajanovska, Biljana Budzakoska-Gjoreska, Sasho Trajanovski: **Biodiversity of macrophytes and macroinvertebrates from Lake Prespa**

Edyta Stępień: **Changes in the vegetation of the Krąpiel River (NW Poland) under the influence of dredging**

Andrzej Zawal, Aleksandra Bańkowska, Anna Nowak, Grzegorz Michoński: **Distribution of water mites (Hydrachnidia) in different types of waters in Barlinecko-Gorzowski Landscape Park**

Przemysław Śmietana: **Status of occurrence and history of noble crayfish Astacus astacus L. restocking in Poland**

Bogić Gligorović, Vladimir Pešić and Aleksandra Gligorović: **A contribution to the knowledge of fauna aquatic and semi aquatic heteroptera (*Gerromorpha* and *Nepomorpha*) in Montenegro, Bosnia and Herceovina and Albania**

Aleksandra Gligorović, Vladimir Pešić and Bogić Gligorović: **Contribution to the knowledge of ladybird (Coccinellidae) in Montenegro**

Bogić Gligorović, Marina Vilenica and Dejan Kulijer: **New data on distribution of species *Caliaeschna microstigma* (Schneider, 1845) and *Cordulegaster heros* Theischinger, 1979 in, Albania, Bosnia and Herceovina, Croatia, Montenegro and Macedonia**

Trajce Talevski, Jovica Leshoski & Elena Talevska: **The length and weight growth of Ohrid nase *Chondrostoma ohridanus* Karaman, 1924 from Lake Ohrid and Lake Debar**

Fahrettin Küçük, Salim Serkan Güçlü, İskender Gülle, Deniz İnnal: **Inlandwater Fishes Diversity and Endemism of Turkey**

Radoslav Dekić, Jasna Friščić, Maja Manojlović , Svjetlana Lolić, Dragojla Golub: **Ichthyofaunal diversity of the Drinjača catchment area**

Boban Stanković: **The survey of bird fauna of Jagodina region (Serbia)**

Olivera Marković, Mirko Đurović: **Occurrence of the invasive crustacean species along the Montenegrin coast (South Adriatic)**

*SUSTAINABLE DEVELOPMENT AND PLANNING * ECOLOGICAL EDUCATION * ECOLOGICAL ECONOMICS * ENVIRONMENTAL LAW*

Wednesday, October 4th, 2017

Oral Presentations
(Chairman: Nikola Milović and Ivana Vojinović)

15:30-15:40 *Ivana Vojinović:* **The impact of global economic growth on the environment as a public good**

15:40-15:50 *Nikola Milović & Mijat Jocović:* **Environmental sustainability in the Europe 2020 competitiveness indexand the position of Montenegro**

15:50-16:00 *Branko Anđić & Danijela Stešević:* **Project teaching in biology and its impact on the knowledge and motivation of students in primary school**

16:00-16:10 *Banu Tepe*: **An Ecologist thought stream in interaction of Woman and Environment: "Ecofeminizm"**

16:30-17:30 ***Poster Presentations***

Miomir Jovanović & Aleksandra Despotović: **Agriculture and Ecological Economics**

Dijana Radević, Svetlana K. Perović: **Guidelines for physical regeneration of informal settlements into environmentally sustainable solutions on the example of Cape Town**

Bojana Cerović: **A Creative Ecological Connector, as a Model for Reidentification the Central Fragment of Podgorica**

Rosslan Lozev: **Critical Design Practices for Sustainable Design and Its Evolution**

Borko Vulikić, Snežana Dragojević, Saša Popović: **Analysis of the capacity development needs of staff engaged in Montenegro protected areas system**

Nicoleta Nicolau & Carmen Gache: **Educational extracurricular project: to know more, to be better (Romania)**

Arzu Morkoyunlu Yüce, Şebnem Erkebay, Gönül Konakay: **The Effect of Education on Environmental Awareness**

Jelena Jovanović, Zdravko Krivokapić, Aleksandar Vujović, Sanja Peković: **Approach of Environmental Management System based on Standard ISO 14001:2015**

Velimir Rakočević: **New forms of criminal deeds against environment in Montenegrin criminal legislature**

FUNDAMENTAL AND APPLIED ECOLOGY

Thursday, October 5th, 2017

Invited lecture

9:00-9:30 *Daniel P. Molloy*: **An International Collaborative Project Documenting the Parasites of Dreissena *spp.* Mussels throughout Eurasia**

Oral Presentations
(Chairman: Spase Shumka and Marko Miliša)

9:30-9:40 *Marko Miliša*: **Mountain streams: Chuck Norris or Dejan Savićević?**

9:40-9:50 *Anton Lyakh, Evgenija Dmitrieva, Maryana Popyuk, Olga Shikhat, Alexandr Melnik:* **A geometric morphometric approach to the analysis of the shape variability of the haptoral attachment structures of *Ligophorus* species (Platyhelminthes: Monogenea)**

9:50-10:00*Spase Shumka and Goce Kostoski*: ***Dreissena* invasion: Predictable Patterns Driven by Invasion History - towards cascade reservoirs of Drini River in the northern Albania**

10:00-10:10 *Ivana Pozojević, Vladimir Pešić &Sanja Gottstein:* **Surviving the dry phase: Water mite (Acari: Hydrachnidia) adaptations to flow intermittency in karst rivers**

12:00-13:00 ***Poster Presentations***

Ivana Markotić, Marko Ćaleta, Branko Glamuzina: **Length-Weight Relationship and Condition Factor of Endemic Fish *Phoxinellus pseudalepidotus* (Cyprinidae) from Mostarsko Blato (Neretva River Basin, Bosnia and Herzegovina)**

Avdul Adrović, Dragojla Golub, Radoslav Dekić*:* **Distribution of an invasive fish species *Pseudorasbora parva* (Telostei: Cyprinidae) in Bosnia and Herzegovina**

Alexandra Gubanova, Oksana Garbazey, Elena Popova and Denis Altukhov: **Report on occurrence of the non-indigenous copepod *Pseudodiaptomus marinus Sato,* 1913 in the Sevastopol Bay (Black Sea)**

Aurora Zylaj, Artenisa Peçulaj, Sajmir Beqiraj: **Assessment of macrozoobenthos and environmental quality in the Albanian part of Macro Prespa Lake**

Oleg Kukushkin & Igor Dovgal: **Sexual dimorphism of morphometric parameters in *Pseudopus apodus* (Reptilia: Sairia: Anguidae) from Crimea steppe population**

Dragana Milošević, Trajče Talevski, Nikola Pejović, Bojan Adžić and Drago Marić: **Reproductive isolation between two sympatric species from genus *Rutilus* from Lake Skadar (Montenegro)**

*Guseska Dafina, Tasevska Orhideja, Kostoski Goce, Guseski Dimitar: **Temporal variations of Zooplankton Crustacea (Copepoda, Cladocera) biomass from pelagial zone oF Lake Ohrid***

Goce Kostoski, Orhideja Tasevska, Dafina Guseska, Elizabeta Veljanoska Sarafiloska: **Crustaceans as water quality bioindicators in the littoral zone of Lake Prespa**

Orhideja Tasevska, Goce Kostoski, Dafina Gušeska, Maria Špoljar, Elizabeta Veljanoska Sarafiloska, Suzana Patčeva, Jovica Lešoski: **Spatial and seasonal pattern of zooplankton in Streževo reservoir (Macedonia)**

Ana Mitrovski-Bogdanović, Petar Radojičić: **Detection of morphological variations in wing size and wing shape of three aphid parasitoid species *Aphidius absinthi* Marshall, *Aphidius rosae* Haliday and *Aphidius urticae* Haliday (Hymenoptera: Braconidae: Aphidiinae) by geometric morphometrics method**

Antonina Khanaychenko: **Copepod – *Diatoms* Wars: Example of *Oithona davisae* and *Cylindrotheca closterium***

Daria Litvinyuk and Vladimir Mukhanov: **Examining the link between live/dead zooplankton ratio and microbial activity in Sevastopol Bay (The Black Sea)**

Vladimir Mukhanov, Lyudmila Manzhos, Lilia Smirnova and Olga Rylkova: **Long-term (2001-2014) dynamics of potentially toxic and harmful phytoplankton in Sevastopol Bay (The Black Sea)**

Sergeeva N.G., Ürkmez D.: **Current views about diversity and distribution of the deep-water meiobenthos at the Turkish shelf (The Black Sea)**

Marta Dimitrova, Mattia Brambilla, Boris Nikolov: **Breeding density and habitat preferences of Sombre Tit (*Poecile lugubris*) in a karst environment**

Ralitsa Tsekova & Rosslan Lozev: **The earthworms study from closed uranium mining facilities in Buhovo Region, Bulgaria**

V. Sirbu, Madalina Adascalitei, I. Sandu & Cristina Manea: **The analysis of some anatomic characteristics of human populations in the North-eastern part of Romania used in forensic biology**

Ana Savić, Miodrag Djordjević, Milan Djordjevic, Marina Jušković: **Using invertebrate FFG analysis to determine ecosystem attributes in the Nišava River (Serbia)**

Blagoja Trajchevski, Trajce Talevski: **Seasonal variations of length-weight relationship and gross energy content of Ohrid Roach**

Sofia Mazlumyan, Natalya Boltachova: **Long - term variations in macrobenthos diversity at the Istanbul Strait's (Bosporus) outlet area of the Black Sea**

Radoslav Dekić, Jasna Friščić, Svjetlana Lolić, Biljana Lubarda, Maja Manojlović: **Morphometric characteristics of *Delminichthys ghetaldii* (Steindachner, 1882) from different habitats**

Sonja Trajanovska, Marina Talevska, Biljana Budzakoska Gjoreska & Sasho Trajanovski: **Morphological variability, distribution and ecology of *Nitellopsis obtusa* (Desv. in Loisel.) J. Groves 1919 from lakeOhrid**

Anja Palandačić, Bettina Riedel, David Ramler, Harald Ahnelt, Ernst Mikschi: **The influence of the habitat on morphological species delimitation characters: example of *Phoxinus* (Cyprinidae)**

Margareta Simina Rafaila-Stanc: **Exploatation of animal food resources in 2-7th centuries AD settlements in Dobrudja (Romania): archaeozoological data**

Pajtim Bytyqi, Ferdije Zhushi Etemi, Linda Grapci Kotorri, Osman Fetoshi, Murtezan Ismaili: **Monitoring the Water quality of river Lepenci based on macroinvertebrate fauna**

Special Session
"Rock-dwelling snails from ecology to phylogeny"

Thursday, October 5th, 2017

Invited Lecture
10:30-11:00 *Luise Kruckenhauser,* ***Elisabeth Haring,*** *Barbara Tautscher, Luis Cadahía, Laura Zopp, Michael Duda, Josef Harl, Helmut Sattmann*: **Anatomical and biological peculiarities in Cylindrus obtusus (Pulmonata: Helicidae) an endemic land snail from the Eastern Alps**

Oral Presentations
(Chairman: Helmut Sattmann and Elisabeth Haring)

11:00-11:10 *Michael Duda:* **Terrestrial snails adapted to rocks and boulders**
11:10-11:20 *Katharina Mason, Elisabeth Haring, Sonja Bamberger, Helmut Sattmann, Luise Kruckenhauser & Zoltan Fehér:* **Phylogenetic reconstructions of the rock-dwelling land snail genus Montenegrina**

11:20-11:30 *Jovana Marković, Anđela Bulatović, Elisabeth Haring, Helmut Sattmann, Katharina Mason, Michael Duda, Sonja Bamberger, Zolten Fehér, Vesna Vukašinović-Pešić, Vladimir Pešić*: **Population size in Montenegrina subcristata in the area of Virpazar (Montenegro)**

11:30-11:40 *Anđela Bulatović, Jovana Marković, Elisabeth Haring, Helmut Sattmann, Katharina Mason, Michael Duda, Sonja Bamberger, Zolten Fehér, Vesna Vukašinović-Pešić, Vladimir Pešić*: **Dispersion patterns of Montenegrina subcristata in the area of Virpazar (Montenegro)**

NATURAL RESOURCES MANAGEMENT

Friday, October 6th, 2017

Invited Lecture

9:30-10:30 ***Igor S. Zonn****, Andrey G. Kostianoy, Aleksander V. Semenov:* **Mediterranean Regional Encyclopedias**

Oral Presentations
(Chairman: Andrey G. Kostianoy and Mustafa Türkmen)

10:30-10:40 *Andrey G. Kostianoy, Ilya V. Serykh, Yanvarby A. Ekba:* **Climate variability of extreme air temperature events in the Eastern Black Sea**

10:40-10:50 *Olga Lavrova, Marina Mityagina, Andrey Kostianoy, Mikhail Strochkov:* **Satellite Monitoring of the Black Sea Ecological Risk Areas**

10:50-11:00 *Lebedev S.A., Kostianoy A.G., Bedanokov M.K., Akhsalba A.K., Berzegova R.B.*: **Climate Changes of the Temperature of the Surface and Level of the Black Sea by the Data of Remote Sensing at the Coast of the Krasnodar Krai and the Republic of Abkhazia**

11:00-11:20 Coffe Break

11:20-11:30 Slavoljub Mijović: **Theoretical Basis for a Non-Expensive Experiment for Proving or not Green-House Effect**

11:30-11:40 Yalçın Tepe, Erhan Şengün: **Determination of the Seasonal Water Quality of Aksu Creek (Giresun), Turkey**

11:40-11:50 *Aysun Türkmen, Hatice Rumeyse Delice*: **The Analysis Of Protein, Lipid, Moisture, Ash And Heavy Metal Some Fish Species Consumed In Giresun**

11:50-12:00 *Mustafa Türkmen, Derya Tozluoğlu Bodur*: **Heavy Metals In Wild Mushrooms From Black Sea Region**

12:00-12:10 *Dušan Bugarin, Miloje Šundić, Amina Idrizović and Neda Mimica-Dukić:* **Effects of ecological factors on the chemical composition of essential oils of *Eucalyptus camaldulensis* (Myrtaceae) from Montenegro coast**

12:10-12:20 *Jelena Marković, Milena Stoši, Milica Matavulj*: **Subchronic acrylamide exposure induces inducible nitric oxide synthase expression in endocrine pancreas**

12:20-12:30 *Duško Vujačić, Goran Barovic, Velibor Spalević*: **Condition of Natural Resources of the Regional Park Dragišnica and Komarnica with the Assessment of their Sustainable Valorization**

12:30-12:40 *Irina Repina*: **Methane emission from small lakes of estuarial and lagoon type**

15:30-16:30 ***Poster Presentations***

Mijat Božović & Rino Ragno: **Prolonged and Fractionated Steam Distillation Methodology for Essential Oil Extraction**

Bedanokov M.K., Berzegova R.B., Kuizheva S.K.: **Atmospheric Disturbances in the Mountains Flow and the Problem of Flight Safety in the Mountains of the Republic of Adygea**

Sirotyuk E.A., Zhemadukova S.R.: **Maykop City Soil Quality Determination Based on the Analyses of Soil Algae and Cyanobacteria Content**

Toroyan R., Takh I.P.: **Spatial Distribution of Heavy Metals Content in the Belaya River Ecosystem**

Kiseleva S.V., Korinevich L.A., Lebedev S.A.: **The Republic of Adygea Renewable Energy Potential Assessment**

Nevila Bushati, Gjyzepina Celi: **Monitoring of bacteriological water parameters from drilling and wells of Shkoder city**

A. Neziri, E. Marku: **Assessment organochlorine pesticides in Velipoja ground waters**

Maša Vučinić, Dejan Jančić, Slađana Krivokapić: **Accumulation of heavy metals in the leaf of *Plantago lanceolata* L.**

Nataša Sekulić, Slađana Krivokapić, Branka Knežević, Snežana Dragićević, Dijana Đurović: ***Lichen Candelaria concolor*** **(Dicks.) Stein as bioindicator of air pollution in Podgorica (Montenegro)**

Irina Serikova, Yuriy Tokarev,Vladyslav Evstigneev, Yuliya Bryantseva: **Sensitivity of the Black sea bioluminescence field structure to sea surface temperature anomalies**

Gojko Nikolić,Zoran Sušić: **Application of modern technologies of data collection in the geoecological research**

Elizabeta Veljanoska-Sarafiloska, Lenče Lokoska: **Organochlorine pesticide residues,**

organic matter and lipolytic bacteria in sediment samples from two natural lake's in Macedonia, Lake Ohrid and Lake Dojran

Vlatko Kastratović, Dijana Đurović, Slađana Krivokapić, Željko Jaćimović, Miljan Bigović: **Temporal and spatial distribution of zinc in the lake ecosystems**

Lence Lokoska, Suzana Patceva & Elizabeta Veljanoska-Sarafiloska: **Water quality of river Crn Drim**

Olga Mashukova, Yuriy Tokarev, Ekaterina Skuratovskaya: **Heavy metals influence on the ctenophores *M. leidyi* and *B. ovata* bioluminescence**

Liudmila Smyrnova, Elena Katunina, Anatoly Rjabinin, Iren Anninskaja: **The Impact of Atmospheric Precipitation (rainfalls) on the Sea-Surface Microlayer in the Sevastopol Coastal Waters (Crimea, The Black Sea)**

Carmen Gache: **Monitoring of waterfowls during the wintering time in the ROSPA0063 Buhusi – Bacau – Beresti Dam Lakes (Romania)**

N. S. Chelyadina, M. A. Popov, E.V. Lisitskaya, N.V.Pospelova, V.N. Popovichev: **The ecological condition of coastal waters off the Heracles Peninsula (Crimea, the Black Sea)**

Jelena Marković, Dijana Lađinović, Renata Kovač, Milica Matavulj: **Effects of acrylamide subchronic treatment on porto-biliary spaces of Kiernan in rat liver**

Jovica Leshoski, Suzana Patcev: **Evaluation of water quality in littoral zone of Prespa Lake by using phytoplankton as an indicator**

*Milena Tadić :***Nutrients as an indicator of the quality of waste water**

Milena Tadić, Pavle Đurašković: **Influence of communal waste waters discharge on local sea ecosystem**

Ana Perošević, Danijela Joksimović, Dijana Đurović, Ivana Milašević, Slavka Stanković: **Assessment of metal pollution in Boka Kotorska Bay**

Vesna Vukašinović-Pešić, Nada Blagojević, Snežana Vukanović: **Determination of essential and toxic elements in Montenegrin honeys**

Snežana Vukanović, Jelena Mutić, Nada Blagojević, Vesna Vukašinović-Pešić: **Content of major and trace elements in *Origanum vulgare L.* and *Origanum heracleoticum L.* and their extracts**

Jelena Rakočević, Danijela Šuković, Drago Marić: **Bioaccumulation of trace elements in muscle tissue of six fish species from Skadar Lake (Montenegro)**

Laura Shumka: **Experimental Application of the Antibiotic on the Deteriorated Mural Frescoes of the Post byzantine churches in central Albania**

Duško Vujačić, Goran Barović, Velibor Spalević: **Physical - geographical Characteristics of Lower Zeta**

Biljana Damjanović-Vratnica, Andrej Perović, Svetlana Perović: **Antimicrobial activity of fennel (Foeniculum vulgare Mill.) seeds essential oil**

Elif Neyran Soylu, Faruk Maraşlıoğlu: **Seasonal Dynamics and Community Composition of Epilithic Diatoms in Yağlıdere Stream (Giresun-Turkey)**

Faruk Maraşlıoğlu, Elif Neyran Soylu, Serdar Bektaş: **Temporal and spatial variations in the attached algae of Mert Stream (Samsun, Turkey)**

Emilija Nenezić: **Stereological analysis of the thyroid gland in alcoholic rats**

FORESTRY AND AGROECOLOGY

Friday, October 6th, 2017

Oral Presentations
(Chairman: S.H.R. Sadeghi and Velibor Spalević)

9:30-9:40 *S.H.R. Sadeghi:* **Soil Erosion in Iran: State of the Art, Tendency and Solutions**

9:40-9:50 *Abdulvahed Khaledi Darvishan, Morteza Behzadfar, Velibor Spalević, Patrick Kalonde, Abdessalam Ouallali, Sabri el Mouatassime:* **Calculation of Sediment Yield in the S2-1 Watershed of the Shirindareh River Basin, Iran**

9:50-10:00 *Palma Orlović-Leko, Šimunić Ivan, Jelena Dautović, Irena Ciglenečki*: **Quality of surface water in the agricultural district Lonja field (Croatia)**

10:00-10:10 *Vukša Marina, Jokić Goran, Blažić Tanja, Đedović Suzana, Stojnić Bojan*: **Combating harmful rodents in forest plantations oak saplings**

17:00-18:00 ***Poster Presentations***

Nedeljko Latinović, Jovana Čampar, Bojana Drobnjak and Jelena Latinović: **Powdery mildew of zucchini *(Cucurbita pepo* L.) in a greenhouse in Montenegro**

Jelena Latinović, Boris Mandrapa, Nedeljko Latinović: **Significant damages caused by Alternaria leaf spot on Savoy cabbage in Montenegro**

Milena Moteva, Velibor Spalević: **Land Consolidation in Bulgaria – Useful Foreign Lessons in Efficient Land-Use Management**

Sanja Škondrić, Sandra Bijelić: **Morphological variability of sweet chestnut (*Castanea sativa* Mill.) in the municipality of Kozarska Dubica (Republic of Srpska)**

Marko Bodružić, Milun Krstić, Zoran Govedar: **The thinnings proposal in artificially established stand of Weymouth Pine (*Pinus strobus* L.) in the area of Čelinac in Republic of Srpska**

Margarita Mondeshka, Milena Moteva, Arseni Karanov, Velibor Spalević, Nadezhda Yarlovska: **Developing Ecosystem Indicators for Characterization of the Water Budged Processes and Assessment of the Conditions in the Agroecosystems**

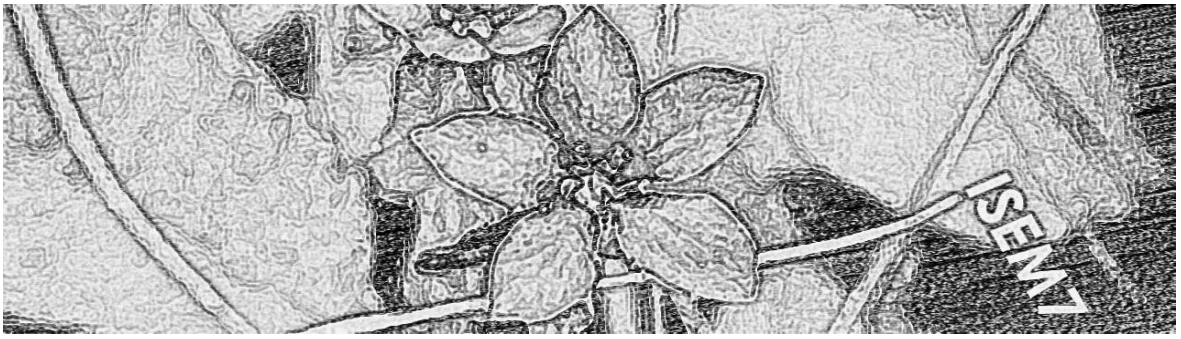
Patrick Kalonde, Velibor Spalević, Shareef Mgwira: **The Assessment of the Soil Erosion and Runoff in Katete river Catchment. Malawi.**

Odalović Aleksandar, Hadžić Aida: **The technology of production of jams in Montenegro**

Photo Exhibition

October 5th, 2017 (Thursday)
20:00-22:00

Mehmet Zeki Yildirim"**Spring on the Taurous Mountains**"



BIODIVERSITY RESEARCH AND CONSERVATION

The significance of the canyons in the preservation of diversity in Montenegro

Suzana Malidžan
Natural History Museum of Montenegro, Montenegro
Ante Vujić
Department of Biology and Ecology, Faculty of Sciences, University of Novi Sad, Serbia
Snežana Radenković
Department of Biology and Ecology, Faculty of Sciences, University of Novi Sad, Serbia

Abstract
The paper presents data of hoverflies fauna in the canyons in Montenegro (Canyons of the rivers Mrtvica, Moraca, Tara, Komarnica and Susica with the Škrka basin). It is characterized by great biodiversity of hoverflies, as well as by large number of endemic, relict, rare and endangered species, due to the specifics geological, geomorphological, soil, climate and other environmental factors. Canyons were refuges for many species during unfavorable conditions in the geological history, the routs of spreading their range, and geographically isolated areas where new species were eventually created. That is why they represent the important refuge centers, centers of diversification, speciation and endemism.

View on bryophyte investigation of the Šasko Lake (Ulcinj, Montenegro) with emphasis on some interesting taxa

Snežana Dragićević
Natural History Museum of Montenegro, Montenegro
Vera Biberdžić
Natural History Museum of Montenegro, Montenegro
Snežana Vuksanović
Natural History Museum of Montenegro, Montenegro
Ilinka Ćetković
Natural History Museum of Montenegro, Montenegro

Abstract
The briological flora of the Šasko Lake with the surroundings (Ulcinj) has been studied for the first time. This paper reports 33 taxa (26 mosses and 7 liverworts) including two interesting species, *Fontinalis antipyretica* and *Physcomitrella patens*, which are present in the Bryophyte red list of Serbia and Montenegro. In the Red Data Book of European Bryophytes, *Fontinalis antipyretica* has status of species at low risk of endangerment (LR). Also, populations of registered *Riccia* species are generally not numerous and do not have a wide distribution in Montenegro.

Flora of Grahovsko polje (Montenegro)

Milica Stanišić
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Danka Caković
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Danijela Stešević
Department of Biology, Faculty of Natural Sciences and Mathematics, University of Montenegro, Džordža Vašingtona bb, ME- 81 000 Podgorica, Montenegro

Abstract

Investigations of the flora of Grahovsko polje were carried out in the period from February 2014 to September 2016. The collected plant material was analysed in terms of taxonomy, ecology and chorology. In the area of second largest karst field in Montenegro, 553 taxa of ranks species and subspecies were registered. The taxa are classified in 305 genera and 80 families. The results of the analysis of the flora show a significant presence of plant species from families *Asteraceae* (10.3%), *Poaceae* (9.9%) and *Fabaceae* (8%). The genera with the largest number of taxa are *Trifolium* and *Geranium* (1.8% each). In the biological spectrum hemicryptophytic and therophytic life forms are dominant (38.2% and 27.1%, respectively), while in terms of chorological structure, the most frequent appearance have species of Eurasian (41.4%) and Mediterranean-Submediterranean chorological type (32.9%). Endemic flora is presented with 3.8%, while alien flora is presented with 4.2% taxa. In the investigated area 20 species protected by law were registered.

Contribution to the flora of the *Robinia pseudoacacia* forests in Lijevče polje

Tanja Šnjegota[1], Siniša Škondrić[1], Nada Šumatić[2], Ljiljana Topalić-Trivunović[3]
[1] Faculty of Sciences, University of Banja Luka, Mladena Stojanovića 2, 78000 Banja Luka, Republic of Srpska, Bosnia and Herzegovina
[2] Faculty of Forestry, University of Banja Luka, Vojvode Stepe Stepanovića 75a, 78000 Banja Luka, Republic of Srpska, Bosnia and Herzegovina
[3] Faculty of Technology, University of Banja Luka, Vojvode Stepe Stepanovića 73, 78000 Banja Luka, Republic of Srpska, Bosnia and Herzegovina

Abstract
This paper presents results of research of *Robinia pseudoacacia* forests flora in the Lijevče polje during one vegetation season. The presented research comprise nine localities, former floodplain forests of *Quercus robur* and mixed forests of *Quercus robur* and *Quercus petraea*, where *R. pseudoacacia* forests are in different phase of development. The research revealed a total number of 85 taxa, belonging to 40 families. All collected taxa belong to *Angiospermae,* with 87.06 % of *Magnoliopsida* and 12.94 % of *Liliopsida*, while the families with the largest number of species are *Compositae* (10) and *Ranunculaceae* (8). In the biological spectrum the most dominant plant life forms are hemicryptophyte (49.4%), geophyte (23,5 %) and therophyte (15,3 %), as well. The most widespread groups of floral elements in the areal spectrum are the Mediterranean (27 %) and Eurasian (22 %) groups. Furthermore, the researched flora contains species which are indicators of primary forest, secondary meadow and tertiary ruderal ecosystems, specifying its progradational/degradational character.

Records of ciliate Loricophrya bosporica (Ciliophora, Suctorea) in different extremal communities

Dovgal I.V., Ivanova E. & Sergeeva N.G.
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Abstract

Suctorian ciliate *Loricophrya bosporica* was found both in hydrogen-sulfide zone of the Black Sea (the Bosporus outlet area) on nematode *Desmoscolex* cf. *minutus* and in methane enriched sediments of the Ria Formosa lagoon (the Atlantic coast of Southern Portugal) on nematode *Metachromadoroides remanei*.

In hydrogen-sulfide zone of the Black Sea the combined effect of lack of oxygen and the presence of H2S is characteristic. At the same time the Ria Formosa lagoon sediments may be characteristic as the hypoxic (periodically anoxic) methane seepage environment.

As observed the suctorian species is not specific to a particular nematode, but prefers the host species with the well-sculptured cuticle. However, the finds of *L. bosporica* in habitats with deficiency of oxygen and the presence of methane and hydrogen sulfide may be indicative about prevalence of the species to extreme conditions.

Report on occurrence of the non-indigenous copepod*Pseudodiaptomus marinus* Sato, 1913 in the Sevastopol Bay (Black Sea)

Alexandra Gubanova, Oksana Garbazey, Elena Popova and Denis Altukhov
Institute of Marine Biological Research RAS, Sevastopol, Russian Federation

Abstract

Introduction of non-indigenous species to the marine ecosystems is one of the actual environmental problems in modern marine biology. The Black Sea is one of the most affected areas by alien invasions. The accidental introduction of predatory ctenophores *Mnemiopsis leidyi* and *Beroe ovata*; copepods *Acartia tonsa* and *Oithona brevicornis* caused sharp changes of zooplankton community and ecosystem of the Black Sea. A new for the Black Sea non-indigenous species of copepods *Pseudodiaptomus marinus* Sato, 1913 was initially discovered in a sampletaken during a routine plankton survey started in 2002 in Sevastopol Bay. Both females and copepodite stages of new specieswere found on September 22.

P. marinus was described from the coast of Northern Japan, and considered tobe native to the Northwestern Pacific Ocean, but in the last 50 years it has successfully colonized new areas worldwide. It is a typical estuarine coastal copepod, livingin shallow eutrophic inshore waters. The species tolerant to awide range of salinity (2.5–35 ppt) and temperature (5–28° C).Thus, *P. marinus*is suitably adapted to relatively low salinities and wintertemperatures of the Black Sea. Maximum abundance of collected individuals was recorded at November 11 (1373 ind./m3). In December it's number sharply decreased. Recent sampling not provided evidence that *P. marinus* is still present in the Sevastopol Bay. The possible re- introduction of the new species in the Black Sea is discussed.

Preliminary data on distribution of the Karst Viper (*Vipera ursinii macrops*) in Montenegro

Vernes Zagora[1], Slađana Gvozdenović[1], Dušan Jelić[2]
[1] Montenegrin Ecologist Society, Bulevar Sv. Petra Crnjanskog 73, 81000 Podgorica, Montenegro,
[3]Croatian Institute for Biodiversity, Lipovac I, no 7, 10000 Zagreb, Croatia
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Abstract
Karst Viper lives exclusively on alpine meadows and barren land. It is a relict species, while the subspecies *macrops* is endemic to the Balkan Peninsula. The precise distribution of this vulnerable European viper is still not precisely defined in Montenegro, although throughout the region scientists have been researching and protecting this species for over a decade. Due to the impact of the economic expansion and the increase of tourism in Montenegro, especially in the species' habitat, it was realized that it was imperative to locate and to protect populations of this species. Furthermore, due to the lack of information, the Montenegrin law does not recognize the Karst Viper as an endangered species. By protecting this species, this mountainous region is being simultaneously protected, in particular its remarkably beautiful alpine meadows. In this study were found three new locations of the Karst Viper on Lovćen mountain, one location on Prokletije mountain, two locations on Sinjajevina mountain, one location on Krnovo and reconfirmation on Lukavica Mountain after 30 years. All localities where Karst viper is confirmed were described and main threats to the populations of this species observed on those localities have been recorded.

Aquatic Vegetation Diversity of the Skadar Lake in Montenegro

Sead Hadžiablahović
Environmental and Nature Protection Agency of Montenegro, IV Proleterske 16, Podgorica, Montenegro
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Abstract

During the phytocoenological investigation of aquatic vegetation of Skadar Lake the twenty nine associations from Classes *Charetea*, *Lemnetea* and *Potametea* were registered.

The Classis *Charetea* is presented with the following associations: *Charetum globularis*, *Charetum vulgaris, Nitellopsidetum obtusae*, *Nitelletum opacae* and *Nitelletum gracilis*.

The Classis *Lemnetea* is presented with four associations: *Spirodel(etum)a polyrhiza(e)*, *Lemno minoris-Riccietum fluitantis, Lemno-Utricularietum* and *Hydrocharitetum morsus-ranae*.

The Classis *Potametea* is presented with the following twenty associations: *Ceratophylletum demersi*, *Nupharetum pumilae*, *Nymphaeo albae-Nupharetum luteae*, *Nymphaeetum albae*, *Nymphoidetum peltatae*, *Potamo natantis-Polygonetum natantis*, *Trapetum natantis*, *Ceratophyllo demersi-Vallisnerietum spiralis*, *Najadetum marinae*, *Najadetum minoris*, *Potametum lucentis*, *Potametum denso-nodosi*, *Potametum pusilli*, *Sparganio emersi-Potametum pectinati*, *Potametum perfoliati*, *Potamo pectinati-Myriophylletum spicati*, *Hippuridetum vulgaris* var. *fluviatilis*, *Ranunculetum trichophylli*, *Parvo-Potamo-Zannichellietum pedicellatae* and *Potametum crispi*.

The following associations were registered for the first time for the territory of Montenegro: *Spirodeletum polyrhizae, Lemno minoris-Riccietum fluitantis, Hydrocharitetum morsus-ranae, Ceratophylletum demersi, Nymphaeetum albae, Nupharetum pumilae, Ceratophyllo demersi-Vallisnerietum spiralis, Potametum pusilli, Sparganio emersi-Potametum pectinati, Potamo pectinati-Myriophylletum spicati* and *Parvo-Potamo-Zannichellietum pedicellatae*.

The project investments in North Albania as a tool to approach and implement the objectives of National Strategy of Biodiversity

Aurora Dibra
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Abstract

The high diversity of ecosystems and habitats enables the sustainability of high levels of biological diversity in Albania**.** Although Albania is rich in habitat and species diversity, the country is facing loss of biodiversity as a result of synergistic effect of numerous ecological factors. Land conversion resulting in the habitat loss, fragmentation, and degradation is arguably the single most significant factor responsible for the endangerment of species in North Albania. Habitat loss and degradation come primarily as the result of deforestation and desertification of arable land.. Most of river parts in Albanian coastal lowland are in eutrophic to polytrophic conditions due to the high content of nutrients, nitrogen and phosphorus. Strong erosion in deforested watershed areas contributes to the high amount of total suspended soil indicators. Overexploitation and unsustainable use of Biodiversity are mainly related to unsustainable forestry, fisheries and hunting activities. The paper is presenting and analyzing through case studies the results of some projects and other new investments plans linked with the biodiversity Conservation in North Albania. Albania has a new Strategy for the Biodiversity some actions plans in North Albania aims the direct investments in rehabilitation of natural habitats and the reduction of factors that influence the biodiversity degradation. Also some plans for investments in a sustainable use of land and services in the ecosystems in North Albania are presented.

Contribution to the research of macromycetes of Montenegro

Ilinka Ćetković
Natural History Museum of Montenegro, Montenegro
Branka Knežević
Capital city Podgorica, Secretariat of Spatial Planning and Environment, Montenegro
Suzana Malidžan
Natural History Museum of Montenegro, Montenegro

Abstract
This paper provides an overview of research of macromycetes in Montenegro during 2012. The research covered several areas – Ljubišnja, Durmitor, Krnovo, National Park "Skadarsko jezero" and hinterland of Velika plaža (Long Beach), Ulicinj. For some of the localities only literature, rather scarce, data had been previously known. In this regard, results of the research can be considered as significant contribution to the knowledge of this group of organisms.

Epilithic diatoms of Crno Lake (Montenegro)

Jelena Rakočević
University of Montenegro, Faculty of Natural Sciences and Mathematics, Biology Department, 81000 Podgorica, Montenegro

Abstract

The aim of this study was to assess the diversity and structure of the epilithic diatom community from Crno Lake (Montenegro) and to estimate the usefulness of this community in the ecological assessment of mountain lakes in this region in order to contribute to the development of an applicable diatom-based methodology for water-quality monitoring in this country. This study was the first investigation of epilithic diatoms in Montenegrin lakes. Epilithic diatom samples were collected from six sites in summer 2016. A total of 150 diatom taxa (from 47 genera) was identified and 39 taxa were recorded for the first time in Montenegro. Majority of registered diatom species were alkaliphilous polyoxybionts (i.e. adapted to high alkalinity and oxygen-saturated water). *Achnanthidium minutissimum*, *Achnanthidium gracilimum*, *Amphora pediculus*, *Cyclotella cyclopuncta*, *Cymbella laevis*, *Denticula tenuis*, *Encyonema minutum*, *Encyonema silesiacum*, *Encyonopsis microcephalla*, *Epithemia sorex*, *Navicula cryptotenella* and *Pseudostaurosira brevistriata* were present as dominant diatom taxa. In order to relate the diatom assemblages to water quality, several diatom indices were selected (TI, TDI, TDIL, IBD, IPS, SI). Accordingtothecalculatedvalues of diatom indices trophic level of investigatedsiteswas in range from oligotrophy to mesotrophy. In case of organic pollution of the lake water, thecalculatedvalues of saprobic indices indicated thesame saprobic category for allinvestigatedsites – water quality class I (i.e. unpolluted to very slightly polluted water). Selected diatom indices, if implemented in Montenegro, would provide a valuable addition to the Montenegrin suite of tools for the biological monitoring of water quality.

Biodiversity Conservation in the Western Ghats Mountain Forest under a Changing Climate

Shadananan Nair
Nansen Environmental Research Centre (India), India

Abstract

Changing climate together with environmental degradation and unsustainable use of resources spoils the biodiversity of the Western Ghats Mountain forest of India. The Ghats is a recognized global biodiversity hot spot. Existence of many rare medicinal plants, herbs, precious trees, and hundreds of endemic species of wildlife is threatened. Encroachment and introduction of plantation crops depleted vast area of natural forests. Poachers widely destroyed precious trees such as sandal, rosewood and teak. Hydropower projects submerged large areas of forests. Increasing rainfall seasonality and intensity result in the erosion of the already degraded soil. Because of long dry season and falling groundwater storage, seasonal plants become extinct. Forest fire becomes common. Strong winds uproot big trees. Shift in regional climate may affect the biodiversity significantly. Rules and regulations to protect the forests become farce because of weak administration, corruption and vested political interference.Sustainable utilization of forest products may boost the current economic development and help alleviating poverty of the tribals. Present paper assesses the impact of climate change and environmental degradation on the Western Ghats forest. Current policies and strategies related to climate, forest and environment have been critically reviewed to suggest guidelines for an appropriate adaptation strategy.

Species diversity of epilithic diatom communities in the Radovanska River (eastern Serbia)

Olga Jakovljević
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Abstract
The main goal of this study was to present the diversity of diatom communities from the Radovanska River. It is 21,5 km long mountainous stream in the east of the Republic of Serbia. The sampling was conducted during six seasons from five localities along the Radovanska River. Benthic diatoms were collected from the stones by scraping with a toothbrush. Diatom frustules were cleaned (the organic content was removed) using the standard method with concentrated sulfuric acid (H_2SO_4), potassium permanganate ($KMnO_4$) and oxalic acid. A taxonomically diverse diatom flora was identified including 207 diatom taxa belonging to 51 genera. *Navicula* (30), *Nitzschia* (20) and *Gomphonema* (17) were the most species rich genera, followed by *Fragilaria* (12) and *Cymbella* (10). *Achnanthidium minutissimum*, *Amphora pediculus*, *Cocconeis placentula* var. *lineata*, *Denticula tenuis*, *Meridion circulare* and *Nitzschia denticula* were dominant taxa. According to the frequency of the taxa, *Achnanthidium minutissimum*, *A. pyrenaicum*, *Amphora pediculus*, *Cocconeis placentula* var. *lineata*, *C. pseudolineata*, *Gomphonema elegantissimum*, *Meridion circulare*, *Planothidium dubium*, *P. frequentissimum*, *P. lanceolatum* and *Reimeria sinuata* were the taxa that occurred at the most investigated sites. Detailed floristic analysis of the epilithic diatoms has not been conducted before in the Radovanska River.

Benthic Diatom Algae in the watershed of River Black Drim and River Sateska

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Abstract

The Black Drim is a river that flows out of Lake Ohrid in Struga, Macedonia. After about 56 km it crosses the border to Albania and it merges with the White Drin in Kukes to form the Drin, which flows into the Adriatic Sea. Globochica is artificial lake on the River Black Drim located about 20 km northwest of Struga. Debar Lake - Spilje is artificial lake built in the valley of the river Black Drim located nearby town of Debar.

River Sateska is the largest tributary of Lake Ohrid but it is not a natural tributary of the Lake. In 1962 River Sateska was deliberately diverted into the lake to reduce siltation in downstream reservoirs.

Investigations for the diatom flora along the River Black Drim, Lakes Globochica and Debar and along the River Sateska were carried out during 2016 at 12 sampling sites to record the possible presence of invasive diatom species.

During the investigations a total of 78 taxa belonging to 19 genera were identified. Order Centrales was only represented by 4 species and order Penales 74 species. More species per site were identified along River Black Drim in comparison with River Sateska.

Based on the investigations, the sampling sites along the River Black Drim were characterized by the presence of species that dominate mesotrophic to eutrophic indicators.

Oligotrophic taxa predominated in the diatom assemblage at the sampling site Sini Viroj along the River Sateska. Presence of these diatom taxa indicated the best water trophic state at this sampling site.

Some poly-hypertrophic taxa were evidenced at sampling site St. Petka and more or less have been present in the other sampling sites downstream the River Sateska, with the exception of site Mesheishta. Visually, there have been noticed negative anthropogenic impact at the aforementioned sites.

During the investigations there were not registered invasive diatom species. All of the identified species are present in Lake Ohrid and its catchment area.

Microphytobenthos Diatoms of the Black Sea: Biodiversity and Ecology

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Abstract

Benthic diatoms actively inhabit various natural and anthropogenic substrates in the sea. The species composition of the Black Sea and some issues of their ecology are studied.

The aim of the work is to provide a comparative analysis of species composition and quantitative distribution for different ecotopes of the Black Sea.

The methodology essence of studying is the using of unified sampling methods, qualitative and quantitative processing, and appropriate analysis of the material.

In the microphytobenthos of the Black Sea 351 taxa of Bacillariophyta were found, 70-80% of them are benthic forms. In epilithon 140 taxa were discovered, 241 - in epiphyton of macrophytes, 141 - in epizoon of mussels, 10 - on the skin of dolphins and 194 – in periphyton of anthropogenic substrates. Czchekanowsky-Sörensen coefficient of floristic similarity varied from 54 to 64%. Seasonality has been established in the distribution of diatoms, with peaks of abundance in all ecotopes in the spring and maximum for the epiphyton of macrophytes. Quantitative data of diatoms in the periphyton depend on the timing and season of exposure of the substrate in the sea, in epizoon of shells the mussel *Mytilus galloprovincialis* Lam. - from the size and age structure of the mollusk community.

Teloschistes chrysophthalmus - a new species of lichenized fungi in Montenegro

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Abstract

Genus *Teloschistes* belongs to family Teloschistaceae, which is one of the largest families of lichenized fungi in the world. This genus consists of about 30 species of foliose and fruticose lichens, mainly distributed in the tropics and subtropics regions but occurring in the temperate zones. One of geographically widespread species is *Teloschisteschrysophthalmus*, broadly distributed in the South Hemisphere, reaching Central Europe and Winnipeg and Ontario in North America on the north. In Montenegro this species was registered for the first time in 2001 on the bark of *Pyruscommunis* on the slopes of Blizanstik hill in the vicinity of Merdari village, Luštica peninsula. After that, presence of this species was being reconfirmed several times, in 2002, 2004, 2015 and 2016 on numerous localities across the peninsula, from Radovići village to Žanjica cove. It grows in the scrub on bark of different plants - *Pyruscommunis*, *Myrtuscommunis*, *Pinushalepensis*, *Phillyrealatifolia* and *Pistaciaterebinthus*. In the 2012 year this species was registered above the Valdanos cove, also in the scrub on the *Phillyrea latifolia* branches, which has been confirmed every year since then. Populations of this species are declining throughout Central Europe and North America due to habitat destruction and air pollution, so this discovery is important for its survival in Europe.

Dense-flowered orchid (*Neotinea maculata*) - a new species for flora of Montenegro

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Abstract

Genus *Neotinea* comprises four species (*N. lactea*, *maculata*, *tridentata* and *ustulata*) distributed in Europe, north Africa and western Asia, while is the center of species diversity in the Mediterranean. Dense-flowered orchid (*Neotineamaculata*) is usually self-pollinating, sometimes cleistogamous geophytic orchid that inhabits diverse types of habitats - grasslands, garrigues, scrubs and forests with populations of few to hundreds specimens. It has a Mediterranean-atlantic distribution, from Canary Islands to Syria with rather isolated relic populations in western Ireland and on the Isle of Man. This paper represents the first report of this species in Montenegro. Previously, it has been registered in surrounding countries - Croatia, Albania and Greece, so discovery of this species in Montenegro did not come as a big surprise. We found few individuals near the stream on the oak forest's edge (*Quercuspubescens* forest) in the vicinity of village Čanj in 2016 year. Given that, this is the only known locality - of this species in Montenegro so far, further researches and preservation of its habitat are of great importance.

Analysis of Family Plantaginaceae from Carl Studniczka's Herbarium

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Abstract

We analysed family Plantaginaceae (orders: Antirhineen, Plantagineen and Globularieen) with total of 189 herbarium sheets. According to the labels, the majority of herborized material was collected in the area of Austria (44 sheets). Most herbarium sheets belong Flora Dalmatiens (38) - including Flora von Dalmatien and Flora Süddalmatiens collections. In reference to the part of Studniczka's herbarium which has already been analysed, there are one collection which is mentioned for the first time. Following botanist or collectors of herbal material are mentioned for the first time, and there are: Geisenheyner, Hochstetter, Kemp H., Schneller and Wahlstedt. Most herbarium sheets were collected by Studniczka himself (102). In this part of the herbarium there are 23 herbarium sheets from Montenegro.

First confirmed record of *Carex limosa* L. (Cyperaceae) and community *Caricetum limosae* Br.-Bl. for Nevesinjsko polje (Bosnia and Herzegovina)

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Abstract
During the field investigation of wetland flora and vegetation conducted on carstic terrains of Nevesinjsko polje (Bosnia and Herzegovina) we discovered few hundred individuals of *Carex limosa* L. This arctic-boreal relic species is remarkably rare in Southeastern Europe with only several known records across Balkans and one supposed record for Bosnia and Herzegovina. Its habitat in Nevesinjsko polje can be characterised as an open, transitional peat-bog with pronounced *Sphagnum* turfs on top of which *C. limosa* forms almost homogenous, species-poor stands described as community *Caricetum limosae* Br.-Bl. In this paper is presented the full information about the first confirmed account of *C. limosa* and community *Caricetum limosae* for Nevesinjsko polje (Bosnia and Herzegovina) with some basic data concerning the phytogeographical significance and conservation implications of this record.

Some notes on alien flora of the Salinas in Montenegro

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Abstract

During the vegetation season 2016th intensive floristic and vegetation surveys of salinas in Ulcinj and Tivat (Montenegro) were conducted. The part of the research was focused on alien species. As it was expected, this habitat type is not prone to plant invasion. In both Salinas only one species (Symphyotrichum squamatum (Spreng.) G. L. Nesom) was reported in typical halophytic communities. In Ulcinj Salina along the paths between the basins with salty water domination of Erigeron sumatrensis Retz. was observed. Other Erigeron species were also reported: Erigeron canadensis L., Erigeron annuus (L.) Desf. and E. bonariensis L., but with less abundance (Erigeron canadensis > Erigeron annuus > E. bonariensis). On the most trampled part of the paths Euphorbia maculata grows. In Tivat Saline sparse individuals of Ailanhtus altissima was noticed as the part of vegetation along the path-side. Considering the fact that populations of alien species are stil not abundant, eradication measures would be easily doable. Both sites have status of protection: the Tivat Salina is Nature Reserve, while the Ulcinj Salina is Monument of Nature. This is crutial reason, why control of alien species should me included in the managment plan.

New chorological data for some rare plants in Montenegro

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Abstract
In this paper we will present new chorological data for seven rare species, collected during floristic research in different parts of Montenegro. Besides the distribution data for each taxa will be given information about habitats, ecology as well as estimation of IUCN category. The following taxa will be analyzed: *Epipogium aphyllum* Sw., *Asyneuma canescens* (Waldst. & Kit) Griseb & Schenk, *Veronica scutellata* L., *Vicia oroboides* Wulfen, *Euphrasia minima* DC., *Tragopogon dubius* Scop. And *Gymnospermium scipetarum* E. Mayer & Pulević.

Floristic composition and ecological analyses of the mountain forests in the Management unit Stitovo (Maganik Mt, Montenegro)

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Abstract

This paper deals with the forest plant community of bark pine (*Pinus heldreichii* Christ) , beech (*Fagus moesiaca* (Domin & Maly) Czecz.) and fir (*Abies alba* Mill). The study was based on data collected from 87 sample plots on the territory of management unit "Štitovo", which is located in the municipality of Nikšić in the central part of Montenegro. Research of vegetation made by the Braun-Blanquet methodology. Within the research area were collected 183 plant species. Three associations are set apart on the basis of floristic composition and site conditions, 34 sample plots were association *Pinetum heldreichii mediterraaneo montanum Blec et Lksic.1969*, 28 were *Fagetum moesiacae montanum Jov.1976*, and 25 were *Abieti-Fagetum moesiacaeB.Jov.1976*. For each association are made spectrum of life forms and spectrum of areal types. Within association *Pinetum heldreichii mediterraaneo montanum Blec et Lksic .1969,* spectrum of life forms shows that hemicryptophytes are the most frequent (57,28 %), followed by chamaephyta (18,45 %), phanerophyta (15,53), geophyta (7,77%), terophyta (1%). Also, hemicryptophytes are the most frequent (49,18 %) in association *Fagetum moesiacae montanum Jov.1976,* but with a slightly lower percentage, folowed by phanerophyta (24,59%), geophyta (14,75%), chamaephyta (8,20%), terophyta (3,28%). Within association *Abieti-Fagenion moesiacae B.Jov. 1976* hemicryptophytes (44%), phanerophyta (32%), geophyta (12%), chamaephyta (10%), terophyta (2%). Spectrum of floristic elements shows that Mediterranean and Central European floristic elements are the most frequent.

First findings of Naked Amoebae in Soils of Zhytomyr Polyssia (Ukraine)

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Abstract

Naked amoebae are known to be the most abundant inhabitants of aquatic and soil ecotopes. In 2015–2016 we studied the species composition of naked amoebae in soils of Central Ukrainian Polyssia. The identified species are: *Biomyxa vagans* Leidy 1879, *Naegleria gruberi* Schardinger, 1899, *Vahlkampfia* sp., *Sappinia diploidea* Hartmann & Nägler, 1908, *Thecamoe bastriata* Penard, 1890, and *Deuteroa moebamycophaga* Pussard, Alabouvette, Lemaitre & Pons, 1980. These species according to the current taxonomic system of naked amoebae belong to four classes, four families and six genera. The most common species are *N. gruberi*, *Vahlkampfia sp., T. striata,* found in 75 % collected samples. The rarest, in our case, is *S. Diploidea* which is supposedly capable of sexual reproduction. The found species belong to the eruptive, orthotactic and striate morphotypes.

A Comparative study on the density of Gastropoda from Lake Ohrid for the period 1963-2016

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Abstract

The changes in the density of the Gastropoda, as well as in other groups from the benthic fauna, have seasonal character and have been considered as natural annual phenomenon closely related with the ecological conditions and the physiological adaptation of the respective organisms. But, how these changes have been reflected in the overall population density over the period of several decades? This was a question we have tried to answer in the research we have conducted in the period 2015-2016 on the profile HBI-Radozda in Lake Ohrid. Thus, by monthly sampling dynamic, on 10 depth sampling points (from 0-50 m) the density changes of Gastropoda have been followed. The results have confirmed the monthly changes whereby 2 maximums in the density of Gastropoda populations have been registered: in April and May-in spring period. The comparisons between the density data obtained in 1963/64, 1998/99, 1999/2000, 2000/2001, 2005/2006 and the most recent ones (2015-2016) have shown a trend of decreasing in the general density of Gastropoda from Lake Ohrid.

Distibution and diversity of polychaete fauna on the Gulf of Guinea continetal margin (Ghana`s coast)

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Abstract

Polychaetes are a group of marine invertebrates, which are considered very good indicators of environmental changes on oceanic floor. Until present polychaete fauna of the Western Africa was mainly an object of taxonomic studies. There are only few ecological research about polychaetes (and benthic fauna in general) from this region. Therefore, there is a huge gap in knowledge about species composition as well as factors influencing diversity and distribution patterns.

Gulf of Guinea is an open bay located in the western part of Africa. Material was collected on 9 transects located along Ghana`s coast. On each transect samples were collected at 6 stations, from shallow part of the shelf (25 m) to the deeper parts of continental slope (1 000 m). Four van Veen grab (0,2 m^2) samples were collected at each station. Sediment was washed on standard sieves (mesh size 0,3 mm). Over 11 000 individuals (53 families) were found in the studied material. In our preliminary analysis of this large collection we analyzed polychaete abundance and diversity (family level data) and their patterns of distribution on the background of various physico-chemical factors (e.g. depth, organic matter content, sediment grain size).

Nocturnal Lepidoptera from the entomological collection of Natural Scriences Museum Complex Galați (Romania)

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Abstract

The scientific heritage of Museum Department of the Natural Sciences Museum Complex Galați has over 83.000 pieces, of which more than 70.800 are entomological heritage. Lepidoptera Order represents almost 30% from the entomological heritage. The Lepidoptera speciemens come from acquisitions, changes, donations and field research made by the specialists of the museum over time.

In the present paper are processed data for 111 nocturnal lepidoptera species from the acquisition dr. Marin Voicu and also from field research made in Galați, Buzău, Tulcea, Constanța, Vrancea, Prahova, Braşov counties.

The present paper aims to valorize and to highlight the scientific importance of the entomological heritage of the museum and to create a data base that can be useful to complete the literature with faunistical data.

Hydrobiids of Turkey

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Abstract
Considering the studies related to the Hydrobiidae in Turkey, it can be seen 57 species belong to 23 genera were determined. These are: *Potamopyrgus* (1species) *Hydrobia* (5s), *Pseudamnicola* (9s), *Pyrgorientalia* (1s), *Kirelia* (2s), *Falsipyrgula* (3s), *Horatia* (1t), *Pseudorientalia* (1s, 2 ssp), *Falsibelgrandiella* (1s), *Tefennia* (1s), *Orientalina* (1s), *Turkorientalia* (1s), *Sheitanok* (1s), *Hydrobia* (5s), *Graecoanatolica* (7s), *Heleobia* (1s), *Belgrandiella* (3s), *Sadleriana* (4s, 1ssp), *Islamia* (3s), *Lithoglyphus* (1s), *Bythinella* (6s), *Anadoludamnicola* (1s, 2ssp) and Sivasi (1s). The zoogeographical feautures have discussed.

The fauna of snails (Gastropoda: Hydrobiidae) in springs of Vrbas river basin (NW Bosnia and Herzegovina): survey of investigations

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Abstract
Freshwater snails of the Hydrobiidae family mainly inhabit underground waters and springs. The number of springs in the Vrbas river basin is large, and assemblages of snails from the Hydrobiidae family is poorly explored in this area. The aim of this work is the integration of previous knowledge about the diversity and distribution of spring snails from this family in the Vrbas river basin. The data from the literature have been analyzed as well as the author's data obtained during the years of researches. For the first time, there is a unified knowledge of the diversity of this group of snails in springs in this area. Research findings suggest that the springs of the Vrbas river basin contain nine species of snails from the Hydrobiidae family. Representatives of five species are known only from the springs of the Vrbas river basin and they are probably stenoendemics. The most widespread distribution has *Bythinella schmidti* (Küster, 1852), which is often the most frequent and most abundant species of this family in the springs. The ecology of these species is not sufficiently known, especially for the endemics, as well as the factors of endangerment, so it is necessary to continue started researches.

Hirudinoid fauna (Annelida: Hirudinea) in Dojran Lake – Republic of Macedonia

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Abstract

As the main subject of our research conducted during 2016, were the representatives of the class Hirudinea (leeches), 15 species from 3 different families were discovered in the Dojran Lake. Samples were collected with ordinary hidrobiological nets and then determining to the lowest taxonomic category – species.

The dominanat family is Glossiphonidae, with its representatives: *Glossiphonia complanata, Glossiphonia heteroclita, Glossiphonia heteroclita f. hyaline, G. heteroclita f. papillosa, G. heteroclita f. striata, Hemiclepsis marginata, Haementeria costata, Helobdella stagnalis, Batracobdella paludosa, Theromyzon tessulatum*, then the Erpobdellidae family, represented by: *Erpobdella octoculata, Erpobdella testacea, Dina lineata* and the last is Hirudinidae family with *Hirudo medicinalis* and *Haemopis sanguisuga*.

As the research was conducted many times throughout the years, the greates diversity of species was discovered in 1975, when all 15 species were found.

The dominant representative in each research is *Erpobdella octoculata*, and the least known species is *Glossiphonia heteroclita f. striata*, found only once in 1975.

Beetle species diversity in steppe ecosystems of the Republic of Moldova

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Abstract

Temperate grasslands are considered regional biodiversity hotspots and thus of high conservation value. Steppe ecosystems in the Republic of Moldova are seriously threatened. Actual steppe communities cover 1.9 % of the country's total area, being preserved in small and isolated areas unsuitable for agriculture. Despite the conservation value of steppe-like grassland of the Republic of Moldova, little is known about beetle community structure. This study aims to assess the fauna of beetles their species diversity and assemblages in steppe ecosystems.

Sampling covered 2 sites from Balti steppes (Pelinia and Vranesti) and three from Bugeac steppes (Stefanesti, Bugeac and Ciumai). Specimen capture was carried out using pitfall traps. Sampling took place every ten days, with a few exceptions due to unforeseeable circumstances.

During the field research, a total of 560 species of beetles were collected, belonging to 98 species. Collected beetles were compared and Shannon and Pielou's evenness indices were calculated as a measure of diversity within the habitat. Obtained values for species richness and evenness index highlighted the necessity of conservation actions towards maintaining these steppe habitats.

The work was supported by Rufford Small Grant, The Rufford Foundation.

Five new records for the caddisfly fauna (Insecta: Trichoptera) of Macedonia

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Abstract
The caddisfliy fauna of Macedonia is still insufficiently known. We collected adult caddisfly specimens with entomological net and ultraviolet light trap during June 2017 in a spring area of streamlet in Brodec village in Macedonia (before, in and above the village) which belongs to the Karadak Mountains. During this investigation we found 17 species belonging to the following families: Limnephilidae, Rhyacophilidae, Phylopotamidae, Sericostomatidae, Glossosomatidae, Goeridae, Polycentropodidae, Psychomyiidae and Beraeidae. Five species are first records for the caddisfly fauna of Macedonia: *Rhyacophila laevis* Pictet, 1834, *Synagapetus iridipennis* McLachlan, 1879, *Limnephilus vittatus* (Fabricius, 1798), *Plectrocnemia brevis* McLachlan, 1871 and *Tinodes kimminsi* Sykora, 1962.

Species found for the first time in Macedonia during this investigation are rare and with limited distribution in the Balkan Peninsula, under the continuous threat from anthropogenic activities such as illegal and legal logging, water intake from spring areas, pollution of rivers etc.

This investigation contributes to the knowledge on distribution of caddisflies in Karadak Mountains in Macedonia which was almost completely unknown until recently.

New records for the caddisfly fauna (Insecta: Trichoptera) of Macedonia

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Abstract

Knowledge about the aquatic insect order Trichoptera in Macedonia is still very limited. We collected adult caddisfly specimens with entomological net and ultraviolet light trap during June 2017 in a spring area of streamlet in Tanushë village which belongs to the Karadak Mountains shared by Kosovo, Macedonia and Serbia. During this investigation we found 16 species belonging to the following families: Limnephilidae, Rhyacophilidae and Phylopotamidae. Six species are first records for the caddisfly fauna of Macedonia: *Drusus* cf. *osogovicus* Kumanski, 1980, *Stenophylax permistus* McLachlan, 1895, *Grammotaulius nigropunctatus* (Retzius, 1783), *Rhyacophila fischeri* Botosaneanu, 1957, *Potamophylax fules* Oláh and Ibrahimi, 2013and *Glyphotaelius pellucidus* (Retzius, 1783).

Drusus osogovicus is found for the first time outside Bulgaria during this investigation. Other species found for the first time in Macedonia during this investigation are rare and with limited distribution in the Balkan Peninsula, under the continuous threat from anthropogenic activities such as illegal and legal logging, water intake from spring areas, pollution of rivers etc.

This investigation contributes to the knowledge on distribution of caddisflies in Macedonia and Balkan Peninsula and highlights the Karadak Mounitains as an important hotspot of caddisfly diversity.

Expansion of *Harmonia axyridis* (Pallas, 1773) in the South-eastern Europe and impact on other Coccinellid species

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Abstract

Amongst the alien coccinellids in Europe *Harmonia axyridis* has spread most rapidly in a wide variety of habitats across Europe. It has a high dispersive potential and survivorship ability, becoming thus very often the predominant species at the expense of native coccinellid species. In this paper we report first records of *Harmonia axyridis* from the Republic of Kosovo. We also report new record sites of this species from Albania, Greece, Macedonia and Montenegro. The species is reported from 17 localities in Kosovo and 11 localities all over Montenegro, making it one of the most widespread coccinellid species in these countries. Seven coccinellid species were found associated with harlequin ladybird in Kosovo: *Adalia (Adalia) bipunctata* (Linnaeus, 1758), *Ceratomegilla (Ceratomegilla) undecimnotata* Schneider & D. H., 1792, *Chilocorus bipustulatus* (Linnaeus, 1758), *Coccinella (Coccinella) septempunctata* Linnaeus, 1758, *Coccinula quatuordecimpustulata* (Linnaeus, 1758), *Hippodamia (Hippodamia) variegata* Goeze, 1777, *Propylea quatuordecimpunctata* (Linnaeus, 1758) and *Psyllobora vigintiduopunctata* (Linnaeus, 1758). Populations of these species are expected to be negatively impacted by the spread of *Harmonia axyridis* during the incoming period. Harlequin ladybird was found in different habitats and altitudes from practically zero altitude up to one- thousands-seven-hundred meters (1700m).

A new Lebertia (Parasitengona: Lebertiidae) record for Turkey: *Lebertia excellens* Lundblad, 1956

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Abstract
In this study, the morphological characteristics, measurements, habitat and distribution information for *Lebertia excellens* Lundblad, 1956 a new record for the Turkish fauna from Burdur, are presented.

Distribution patterns and conservation status of the species from genus *Alburnoides* (Pisces, Cyprinidae) in Bulgaria

Tihomir Stefanov, Georgi Popgeorgiev

Abstract

Distribution models are made for all three species from genus *Alburnoides*in Bulgaria. The models are generated on the basis of deductive parameters calculated from the data of real locations in ArcGIS 10.2. environment including relief modeling, river slope, altitude, etc.According to the data obtained by the modeling, the area of the potential habitats of all three species is calculated. Based on that analysis particular conservation implications are proposed for each species.

Assessing the populations of protected rodents in a natural ecosystem

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Abstract

The study aims at determining the distribution of protected rodent species of interest to the community, *Spermophilus citellus* (Linnaeus, 1766) (Sciuridae Family) and *Mesocricetus newtoni* (Nehring, 1898) (Cricetidae Family), in the site of community interest ROSCI 0060 The Agighiol Hills, located in southern Romania.

Studied area present the specific ecosystems of steppe and silvosteppe, overlapping over the ecoregion Plateau Dobrogea. The site has an area of 1,433 hectares andaverage altitudes of 100-150 m.

The observations took place between April and October 2013. The study methods were based on remote sensing and direct observation methods using binoculars, accompanied by catch attempts for individuals reported in low visibility habitats (steppe grasses with high herbs), indirect methods of analysis the different signs of their activity (traces, identification of active and inactive galleries).

Spermatophilus citellus in the site has a favorable conservation status, of the 13 identified populations, 40% have an abundance of 40-15 ind / ha. The study of identification and monitoring for the species *Mesocricetus newtoni* were not expected, so far no individual of the species has been collected, if their presence was reported by villagers who have adjacent lands in the protected area.

Biodiversity of macrophytes and macroinvertebrates from Lake Prespa

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Abstract

Lake Prespa is the second largest lake in R. Macedonia and is situated in the south-western part of the country. It is a transboundary lake shared between Greece, Albania and R. Macedonia.

Inthe littoralregionofLakePrespaare present differentpopulations ofmacrophytevegetation which represent food and shelter for many macroinvertebrates.

In this paper are presented researches on biodiversity of macrophytes and macroinvertebrates from 4 localities in the Macedonian coastline of Lake Prespa: Oteshevo, Ezerani, Krani and Nakolec. Researches were performed during thesummer period of 2016 year.

Obtained results show that in the researched localities were evidenced 33 different macrophytes which belonging to15 families (Poaceae, Typhaceae, Cyperaceae, Sparganiaceae, Alismataceae, Polygonaceae, Lemnaceae, Potamogetonaceae, Halorhagaceae, Ceratophyllaceae, Najadaceae, Hydrocharitaceae, Lentibulariaceae, Ranunculaceae and Characeae).

Concerning the macroinvertebrates, 26 species have been identified from 8 systematic groups (Turbellaria, Oligochaeta, Hirudinea, Gastropoda, Bivalvia, Isopoda, Amphipoda and Insecta). The populations of the following species: *Limnodrilus hoffmeisteri*, *Dreissena presbensis, Gammarus triacanthus prespensis, Pyrgohydrobia prespaensis* and *Chironomus plumosus* significantly predominate over the other species identified in the samples from researched localities.

Also the results show that in researched localities there isdifferences in diversity of macrophytes, and also of macroinvertebrates that are result of different ecological conditions present in researched localities, especially from level of nutrients. Namely, in localities (Oteshevo and Ezerani) where the input of various nutrients is great there was evidenced high diversity of macrophytes and also of macroinvertebrates in relation to the localities (Krani and Nakolec) where input of nutrients is lower.

Distribution of water mites (Hydrachnidia) in different types of waters in Barlinecko-Gorzowski Landscape Park

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Abstract
Researches were made in 2000 year from April to October. Samples were taken at monthly intervals, and their distribution in water types corresponded to the share of these waters in the hydrological structure of the Park. In total 5249 individuals belonging to 71 species of water mites were collected.

The whole collected material was dominated by eurytopic mostly inhabiting small reservoirs species follow by lake-inhabiting, reophilic and reobiotic, acidophilous and spring water-inhabiting species. Such a set of species is characterized by pleated areas with large numbers of lakes, poor in peatbogs and small reservoirs, for which belong the B-GLP area.

In lakes noticed 62 species of water mites with a total of 4769 individuals, in peatbogs were 23 species with 259 individual, in rivers 12 species with 79 individuals, and in small reservoirs 8 species with 142 individuals.

Status of occurrence and history of noble crayfish *Astacus astacus* L. restocking in Poland

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Abstract

Noble crayfish (*Astacus astacus* L.) was a common and widespread freshwater crustacean species in Poland in beginning of XX century. Since this time a relatively rapid decreasing of noble crayfish abundance has been reported. For example, in Pomerania (NW Poland - the area covering almost one fourth of Polish territory and characterized by the best described history of noble crayfish distribution dynamics) in 1900 over 474 lake populations were reported, while in 1960 this number dropped to 135.

Nowadays, *Astacus astacus* has status of critically endangered species, with only 27 survived wild populations survived in this region. As a result, it can be conclude that it is too late to only protect the species, which needs to be rescued now.

First active protection actions of noble crayfish on present Polish territory were reported already in 1902, but contemporary analysis of their results showed that they were unsuccessful. As moderately successful can be described the project "Active protection of indigenous crayfish species in Poland", realized in the years 1999-2001. All mentioned activities were based on the restocking system with the use of adult specimens trapped out from abundant populations and then transported to new lakes or rivers. At the present, due to weak conditions of survived populations, this method is not reasonable anymore.

From this reason, the method utilising a breeding restocking material was elaborated at the Institute for Research on Biodiversity of the University of Szczecin in Poland. The method allows to increases the crayfish survival rate during the first year of life (YOY) from 5% (in the wild) to 95% (under the breeding conditions). The surplus of YOY is designed for restocking purposes. About 7000 individuals of *Astacus astacus* bred in this way are released to the Pomeranian lakes (3-5) annually.

Changes in the vegetation of the Krąpiel River (NW Poland) under the influence of dredging

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Abstract
The paper presented the impact of dredging on the vegetation of a small lowland river Krąpiel River (NW Poland). The species composition, species richness, origin, live strategies and ecological factors were analysed.

The dredging eliminated sensitive species and phytocoenoses. The higher species richness was observed. The number of alien species and apophytes has increased. On the other hand, the dredging eliminated sensitive species and phytocoenoses. The role of terophytes in flora has increased. There was also a marked increase in the share of species representing the type R life strategy and the mixed C-R strategy.

The length and weight growth of Ohrid nase Chondrostoma ohridanus Karaman, 1924 from Lake Ohrid and Lake Debar

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Abstract
Lake Ohrid is the oldest lake in Europe. River Crn Drim outflowfrom Lake Ohrid and in it is built artificial lake "Spilje"- Lake Debar. Ichthyofauna of these lakes has great significance because there are great number of endemic fish species.

Ohrid nase is frequent fish in the freshwaters. It represents one of the most economically important species. Fish growth determination (length and weight) is a very good indicator of the state of a given aquatic ecosystem.
The samples of Ohrid nase, *Chondrostoma ohridanus* Karaman,1924were collected from Lake Ohrid and Lake Debar in period 2015 - 2017.

In this paper were determined age (by microscoping of scales), and growth of Ohrid nase, Chondrostoma ohridanus (length and weight). Also were determined the length per year, annual increase in cm, annual increase in percent, length growth rate (Cl), length growth constant (Clt) and length growth coefficient (K). Also were calculated annual weight growth of Ohrid nase, annual increase in grams and annual increase in percent.

This research shows that there are certain differences in the growth of the Ohrid nase from Lake Ohrid and Lake Debar which indicates that in those lakes have different ecological conditions.

Inland water Fishes Diversity and Endemism of Turkey

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Abstract

Turkey is one of the few terrestrial parts of geographically located between three continents with high biological diversity. Turkey's geography consists of Anatolian and Thrace regions, but its ichthyofaunal richness originates from the Anatolian region. Though scientific studies in Anatolia began in the second half of the 1800's, the issue is still not fully clarified. In Thrace, mostly European and Balkanic species are common and there is no endemic species for Turkey fauna.

Anatolia has a geological structure that is consistently active, from the late Miocene period until today when it began to take shape. In addition to the lentic systems consisting of open and closed basins, the geographic isolation created by the lotic systems connected to the seas accelerated the speciation. In this way, nine different ecological region formed.

In this study, the latest status of Turkish inlandwater fishes and the endemism level of taxa have been discussed. According to the latest October 2016 data, the total number of 375 taxa (29 family) in Turkey has reached to 384 with the addition of 8 taxa from this date. The endemism rate in all species was 38.1%.

Number of species and endemism rates according to family; Cyprinidae 18 (23.6% endemic), Nemacheilidae 41 (5% endemic), Cyprinodontidae 14 (3.2% endemic), Cobitidae 19 (2.3% endemic), Salmonidae 14 (2% endemic) and Gobiidae 20 (1.1% endemic) taxa. The regions where endemic species are highest in Anatolia; Central Anatolia and Lake District, Southwest Anatolia, Tigris and the upper basins of the Euphrates, Ceyhan and Seyhan basins.

Ichthyofaunal diversity of the Drinjača catchment area

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Abstract
The last decades witnessed the widespread degradation of the freshwater ecosystems, mainly by anthropogenic activities and improper management. Sustainable water management is possible only if we have knowledge about the ecosystem ecological status, community structure and species diversity. We have investigated ichthyofaunal diversity of rivers of the Drinjača catchment area. Rivers Jadar and Studeni Jadar are main tributaries of the river Jadar, which is the left tributary of the river Drinjača. Electrofishing was performed in December 2016. The highest species diversity was observed in river Drinjača where eight fish species were determinated. In river Jadar we identified six fish species, while in Studeni Jadar only one species was present. All identified fish species were autochthonous, while no allochthonous or invasive fish species were detected. According to saprobic system, Drinjača and Jadar were categorized as β-mesosaprobic (water quality class II) and Studeni Jadar was assessed as oligosaprobic (water quality class I).

The survey of bird fauna of Jagodina region (Serbia)

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Abstract

Bird fauna of Jagodina region was intensivelystudiedfrom1984 to 2015. The paper gives a list of bird species with faunistical status for each species: breeder (resident or migrant), passage migrant, winter visitor and vagrant. Also, for each speciesare giveninformationabout number:very rare, rare, scarce, uncommon, fairly common, common and abundant. Totally 185 bird species were registered and there are also previous data for other 4 species. The numberof species by ordo: Passeriformes 90, Charadriiformes 24, Falconiformes 14, Ciconiiformes 12, Anseriformes 11, Piciformes 8, Gruiformes 6, Strigiformes 5, Coraciiformes 4, Galliformes 4, Columbiformes 3, Podicipediformes 3, Pelecaniformes 2, Cuculiformes 1, Caprimulgiformes 1, Apodiformes 1. From the total number, 99 considered to breed. Of these,58speciesare Passeriformes and 41 non-Passeriformes.Among breeders, 78 strictly protected species by low of RepublicSerbia.The *SPEC categories* (Species of European Conservation Concern)have a 56 breeding species.The relatively high diversity of bird fauna caused by long-term research, various habitats and the Morava-Vardar migratory passway.

The Mediterranean Monk Seal, *Monachus monachus*, in Montenegro

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Abstract

The world population of the endangered Mediterranean monk seal (*Monachus monachus*) is presently estimated to consist of 700 individuals, of which about 250-300 live in the Mediterranean basin. The species' former distribution extended throughout the Mediterranean, the Black Sea and the Atlantic coasts of NW Africa. Nowadays, actively reproducing populations within the Mediterranean basin are found mainly in Greece and Turkey. Apart of these well known populations, the species is considered extinct in most of its former range.

Historically, monk seals were present throughout the coastline of Montenegro. The „last" monk seal was killed in the area of Herceg Novi, Bay of Kotor, in the early 70's. Since this event, no further evidence of monk seal presence had been recorded and the species was thought to be extinct.

In 2013-2015, during a survey for registering marine caves along the entire Montenegrin coast financed by the company Jugopetrol AD, we recorded a total of 14 monk seal sightings from the period 1985-2005 through personal interviews and reports upon articles pulpished in the local media. The sightings covered the period 1985-2005 and the sightings´ locations covered the entire Montenegrin coastline.

The above data are the first verified evidence of the species´ presence in Montenegro after 1970 and indicate at least the transition of animals from neighbouring countries, southern Croatia in particular, where the species´ presence is well known. Absence of seal sightings from an area does not necessarily imply the actual absence of the species itself: it may simply indicate the absence of sufficient monitoring efforts.

We believe that the monk seal may re-colonize the coastline of Montenegro if adequate conservation measures including the establishment of one or more MPAs are implemented. Furthermore, protected terrestrial habitats will act as a corridor for the monk seal´s movements throughout the Adriatic Sea.

Occurrence of the invasive crustacean species along the Montenegrin coast (South Adriatic)

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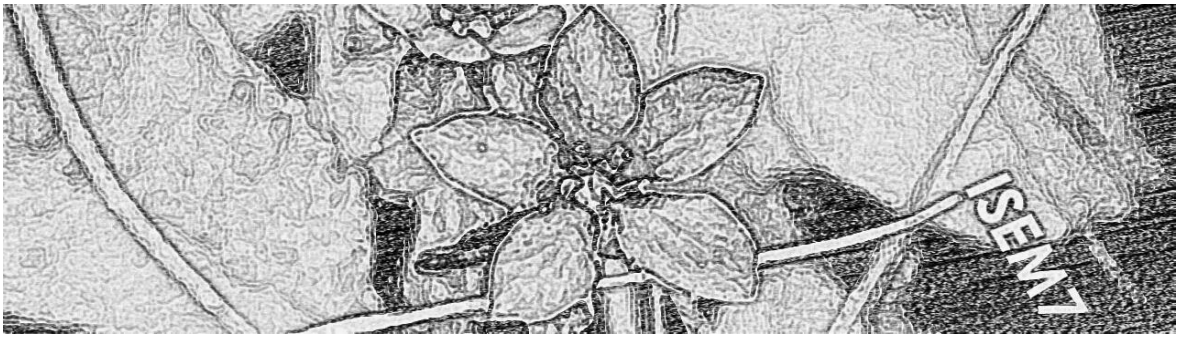
Abstract

The aim of this paper is to review and describe the current status of the two invasive crustacean species along the Montenegrin coast including the Boka Kotorska Bay. Those species are the American blue crab, *Callinectes sapidus* Rathbun, 1896 and the Northern brown shrimp, *Penaeus aztecus* (Ives, 1891). These non-indigenous species are presented in the Montenegro waters from 2013 but concerning the blue crab according to communication with the local fishermen it is observed many years earlier. Recent research reveals that these species are extending its distribution area. The last new records are reported from the Tivat Salina lagoon for the first species and open Montenegrin waters for the second. The invasive potential of these species was estimated using the AS-ISK (Aquatic Species Invasiveness Scoring Kit).



SUSTAINABLE DEVELOPMENT AND PLANNING
** ECOLOGICAL EDUCATION*
** ECOLOGICAL ECONOMICS*
** ENVIRONMENTAL LAW*

The impact of global economic growth on the environment as a public good

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Abstract

The environment, like national defence, general elections and the like, is considered to be a classic public good. The functions and services of the environment do not have the price or do not have the optimum price/market price, which leads to the excessive use or exploitation of these functions or misallocation of resources. Environmental degradation has been recognized as one of the challenges of economic growth only during the last decades of the XX century. On the other hand, globalization is leading to the integration of economic systems and ecosystems in the interdependent system, and puts more emphasis on the pressures that may arise on resources and the environment. In a global economy of XXI century consideration of environmental issues is one of the decisive factors in shaping economic development, with the aim to adapt it to the ecological constraints. It can be seen that phenomena such as global warming, the disappearance of the ozone layer, pollution of the oceans and fresh waters, overuse of groundwater, the extinction of living species, is leading to the focus on the concept of a global common property. It is clear that globalization raises questions of adequate management of common property, which is a particular challenge in reaching agreement amongst many nations. The special place is held by the phenomenon of climate change which causes some controversy and differing interpretations, as a kind of negative externalities in the environment with broad impacts. However, regardless of the threat that further economic growth presents to the planetary ecosystem, it is completely wrong to slow it down. On the contrary. The best defence against climate change in all countries is to have their own development. Only economic development can cope with environmental problems that arise, and can solve them in the long run, or even lead to a revolution in thought and practice which will be oriented towards environmentally oriented systems.

Environmental sustainability in the Europe 2020 competitiveness indexand the position of Montenegro

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Abstract

The European Commission prepared in March 2010 and the EU Council adopted in June 2010 the EU's Development Strategy - Europe 2020. This is the EU's development vision, which should be the framework for Montenegro's development in the next decade. Europe 2020 defines three priorities, 5 objectives and 7 initiatives for the next decade, the application of which is aimed at the long-term growth of the competitiveness of the European Union. The Europe 2020 Competitiveness Report looks at Europe's progress through: smart. Inclusive and sustainable growth. The areas of observation of this report are related to the 7 initiatives that are shared within these three types of growth. Seven key initiatives of the Europe 2020 Strategy presented, with some corrections for research and presentation purposes, can be presented as 7 key pillars. Each individually depends on a number of changing measures that help Europe to progress in individual dimensions of observation. By combining these 7 pillars, the Europe 2020 Competitiveness Index, Europe 2020 Competitiveness Index, is being created. The work is based on the research, of the seventh pillar: Ecological sustainability and the position of Montenegro.

Project teaching in biology and its impact on the knowledge and motivation of students in primary school

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Abstract

Project-based learning (PBL) represents a teaching focused on students' research, which relates to one complex task. During the work on a project, students apply knowledge from several areas, which this form of work gives interdisciplinary character. The aim of this study is to examine the impact of the project teaching on the quality of biological knowledge as well as its impact on pupils' motivation for learning. In the research we used didactic methods of experiment with the parallel groups, group P which is applied project strategies and T group that knowledge acquired by traditional methods of learning. Both groups performed pretest, final test, and retest three months after the end of the experiment. In the study were analyzed parametric statistical standard deviation and the arithmetic mean, as well as their relationship is considered using the test variable with the significance threshold p = 0.5. The results obtained in this study indicate greater efficiency project teaching as compared with the traditional approach, which is reflected in a better average grade and greater motivation of students for the acquisition of knowledge. On the retest was accomplished significant statistical difference between the P and T student group on all the cognitive abilities in favor of the P group.

An Ecologist Thought Stream in Interaction of Woman and Environment: "Ecofeminizm"

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Abstract

Ekofeminism has become an umbrella term for diverse and conflicting set of principles. Many texts compare the term "ecofeminism" to a women tapestry or of a complex quilt made up of diverse ideas and beliefs, yet united together under a common principle of female interaction within the environment. On a very basic level, ecofeminists are unified in the exploration of the commonalities between gender oppression and environmental degradation mainly caused by male Western dominance.

Ecofeminism has always been actively involved in the peace movement, in the antinuclear movement and in the environmental protection movement. Feminism is what helped teach us all that the link between political and industrial. To separate ecology from feminism is to try to separate the body from the head.

Approach of Environmental Management System based on Standard ISO 14001:2015

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Abstract

The ISO 14000 family of standards designed for all organizations, regardless of their activities, provide basic guidance in systematic approach of environmental management. The ISO 14001 standard, which is standard for certification, has undergone significant changes by adopting Annex SL, which represents a base for all new issues of management system standards. The most important changes in the standard are focused on thinking based on Risk management, the obligation to measure and improve environmental performance and taking into account life cycle perspective. The aim of the paper is to point out the changes that ISO 14001: 2015 will bring to organizations that have already certified their environmental management system, as well as on the opportunities that are offered in the field of improving environmental attitudes and establishing an effective and efficient environmental management system. In the paper will also be shown how Balanced Scorecard and AHP method can be used in measurement of environmental performances.

Guidelines for physical regeneration of informal settlements into environmentally sustainable solutions on the example of Cape Town

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Abstract

In the spirit of the multi-polarized urban life of South Africa, one of its major cities, Cape Town, faces threats to the quality of the environment, arising from the invasive spread of informal settlements, so-called slums. Slum dwellers live in unhygienic conditions, in settlements overcrowded with worn residential buildings, without green areas. Huge pressure of slums on free urban land has a growth trend and is considered to be the urban recognition of Cape Town in the next fifty years.

The aim of the paper is to identify the state and to purpose general guidelines for sustainable physical regeneration of typical informal settlements in Cape Town, based on available planning documentation, literature, different data and previous research. The paper focuses on slums in the context of visual perception and it suggests integrative methods that will be oriented towards sustainable urbanization, which promotes homogenization and defragmentation of people and space.

Broadly, the achievement of the goal is perceived and defined through the remodeling of sub-urban settlements, public transport and public spaces, social, economic and ecologic infrastructure.

The paper will clarify a number of limiting factors that represent a barrier to the realization of the vision of Cape Town as an inclusive, equitable and sustainable city, and specific challenges in order to this city, in many ways fascinating, liberate and deserve the epithet of one of the most desirable cities for living.

A Creative Ecological Connector, as a Model for Reidentification the Central Fragment of Podgorica

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Abstract

This paper will present a new, creative and ecological model for the physical transformation of the built environment in a specific case study, the central fragment of Podgorica. Through the urban and architectural project that promotes a holistic, participatory, environmentally sustainable design, the aim is to highlight the need for new forms of transformation of the urban environment, in the context of sustainable development of the modern city.

The paper will identify characteristic places of the central fragment of Podgorica, which can serve as acupuncture points in the process of recognizing space and the development of new creative ecological connector, which presents the principles of ecological design of the built environment. It focuses on the transformation of the street which is the primary element of urban space and the primary locus of social processes. Through the study, street as the focal point of interpretation of urban activities is recognized as insufficiently attractive in the current situation, with the potential to become a new cultural artifact city that promotes new environmental values.

Critical Design Practices for Sustainable Design and Its Evolution

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Abstract

Design plays a main role in crating sustainable civilization, material dimensions of product design, architecture, industry, urban and regional planning, and the intangible dimension of concepts that play a role in sustainable development. Indeed, the imperative for more sustainable development requires a profound rethinking of the design.

The text explores Sustainable Design with a cosmopolitan charge, as it refers not only to the environment but also to the social and political environment. The work traces historically for designers and society as a whole. A complexity of dynamically work and analyzes critical design practices. The transition from "green" to "eco" and to "sustainable" design is a constant expansion of the scope of theory and practice and, to a certain extent, the ever more critical perspective on ecology and design.

The aim is to present the development and interaction between design practices and sustainability issues, following a quasi-chronological model. I briefly present the Sustainable Design approaches, providing information on achievements and potential development guidelines for each approach. The ressarh aims to engage design researchers in a discussion on sustainable design, its development over the last decades and the future.

The Effect of Education on Environmental Awareness

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Abstract

Introduction and goal: The goal is to respond to the demands of university students by identifying how they assess environmental conditions on campus and measure the level of their consciousness in this subject according to departments and sex. 104 students participated in the study.

Material and Methods: In this study a questionarie of 15 questions was applied to day and night shift students in 6 departments of University of Kocaeli, Hereke Ömer İsmet Uzunyol Vocational School campus.

Result: There was no meaningful difference between female and male individuals in the t-test made in terms of general cleaning satisfaction within the campus ($p \leq 0,05$). As a result of ANOVA test on the importance given to personal care there was a meaningfull difference among departments ($p \leq 0,05$)

Analysis of the capacity development needs of staff engaged in Montenegro protected areas system

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Abstract

This paper aims to analyze capacity development needs of protected area staff in Montenegro protected areas system (MPAS). The empirical results drown from four years implementation of the projects ,,Strengthening protected areas system in Montenegro" and ,,Strengthening financial sustainability of protected areas in Montenegro", financed by GEF and implemented by UNDP, have great contribution in terms of specific conclusions and broad range of recommendations for further development of MPAS. Methodological approach is based on capacity building needs qualitative assessments and resulting training programs. There are important conclusions drawn from analysis of the results achieved. Capacity development should be focused on rationally identified needs, appropriate to the participants, professionally designed, delivered and assessed, and is affordable and sustainable. Protected area (PA) managing institutions should have capacity development plans and priorities with allocated budgets for this purposes. Information and data management should be integral part of operations of PA management. Training in biodiversity conservation should focus on management oriented skills rather than academic studies. The focus should be on developing, applying and monitoring the impact of specific measures designed to achieve the defined conservation goals of protected areas.

Educational extracurricular project: to know more, to be better (Romania)

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Abstract

In the Romanian pre-university education system, there was implemented an official non-formal learning week starting from the scholar year 2011 – 2012, under the title "Otherwise school". The legal support is given through the government decision no. 4292/24.05.2011. During this week, the students are going to school or in short visits and trips, being involved in different educational projects and activities. The board and staff of each school, sometimes with the students' parents' participation, decide the types of activity (science and technics, ecological, civic, cultural or sportive) and the entire programme for this week.

We present our experience in this educational concept through one project developed inside our school, under the title "To know more, to be better". The programme includes activities that allow: 1) the development of artistic and creative skills (Romanian folks seams, oil pastels inspired by famous landscapes' paintings, origami and ikebana arts), 2) the active participation in the city's life (ecological activity inside the municipal park), but also 3) to improve and diversify the knowledge about plants and animals' diversity, ecology and ethology through didactic visits meeting the specialists from one botanical and one zoological gardens, respectively, the National Museum of Natural History.

New forms of criminal deeds against environment in Montenegrin criminal legislature

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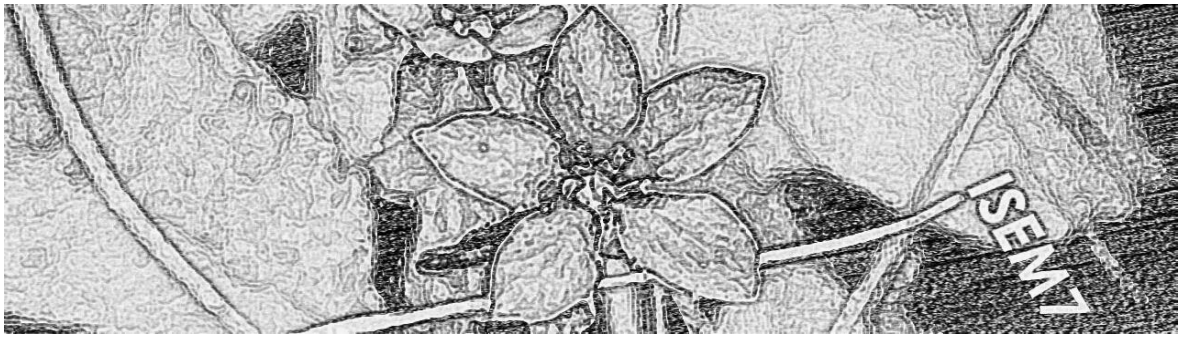
Abstract

Criminal legal protection of environment, that is the right of man to healthy is the subject of research in this work. The contamination of environment represents serious problem on global level since the activites that lead to destruction of natural ecosystems have been enhanced, sea level boosting and damage of ozone layer. In this work criminal-legal aspects of environment protection in Montenegrin legislature in the context of new incriminations in this fieled: a) environment pollution with waste materials, b) the damage of ozon layer, c) illegal construction, putting into operation and work of objects and plants that pollute environment, d) removal and entering of protected natural goods and especially protected herbs and animals and its merchandising, e) removal and entering of dangerous materials. The contens of this work compreses all general and especially particular elements of concretization of all incrimination, that is their exploration by presenting of blanket norms. Criminal -legal analysis of this criminal deeds raises its importance having in mind the fact in this short period from prescribing incriminations there were not publications that handle assigned forms of ecological criminality. Criminal -legal protection of environment has been elaborated even from the aspect of international law.



FUNDAMENTAL AND APPLIED ECOLOGY

An International Collaborative Project Documenting the Parasites of Dreissena spp. Mussels throughout Eurasia

Daniel P. Molloy
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Abstract

North American freshwater ecosystems have been ravaged by high densities of two invasive bivalve species from Eurasia, *Dreissena rostriformis bugensis* and *Dreissena polymorpha*. In addition, the fouling of infrastructures by these bivalves has had an economic impact in the billions of dollars. Unfortunately, there is currently no environmentally safe and economically feasible method of controlling them throughout infested waterbodies. In an attempt to develop such a control agent, a project is now underway examining parasites in Eurasian *Dreissena* populations. Several new parasites have already been discovered and will be evaluated for their virulence and host specificity. It is timely that this ecology conference is being held in Montenegro since a very high priority of this project is to sample the parasites from *Dreissena* spp. endemic to the Balkans (e.g., *D. blanci*, *D. carinata*) and nearby Turkey (e.g. *D. caputlacus*, *D. anatolica*). These latter samples will be particularly valuable because North American dreissenid populations have not likely encountered the parasites from these latter four *Dreissena* spp., and thus infection may prove highly virulent to them. This project is an ambitious and challenging one and the collaborators participating in it will be highlighted in this presentation as their diverse expertise brings valuable contributions to it.

Mountain streams: Chuck Norris or Dejan Savićević?

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Abstract

Disturbances in nature are commonly caused by human activities. When mountain streams are in question, very few are as aggressive as obstructing the flow and contaminating the water. And quarrying does both.

In this experiment we studied the effects of quarry-caused channel broadening and fine sediment input on benthic fauna of a typical Mountain stream in Medvednica mountain, Croatia. Abundances of non-insect macroinvertebrates was severely lowered downstream of the quarry. Diversity also decreased severely along the entire study reach. Insect fauna observed similar effects but they showed higher resilience as their numbers and diversity recovered some 3 km downstream of the quarry. However the diversity and taxa balance was not fully recovered and Chironomidae dominated the assembleges downstream. When focusing on the most sensitive taxa (mayflies, stoneflies and caddisflies) the effect was overwhelming on both the late and early instars with more than ¾ loss. At the 3 km site they did recover to app ⅓ and ½ for abundances of early and late instars respectively in comparison with the control site. We found that siltation (covering the bed), significantly increased temperature and pH value and decreased oxygen content were the cause of these effects. Mountains streams are hence sensitive as a fine 'fantasista' in football in their immediate response but also very resilient as an action hero, especially since the surrounding mountain areas are always able to provide the sources of recovery.

Surviving the dry phase: Water mite (Acari: Hydrachnidia) adaptations to flow intermittency in karst rivers

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Abstract
Water mites have complex life cycles, synchronizing five life stages according to host, prey and habitat availability and, in intermittent rivers, todry periods as well. Six karst intermittent rivers, ranging from zero (sporadically intermittent) to more than 200 days per year with no flow, were analysed in order to assess water mite occurrence along a flow intermittency gradient. In total: 18 water mite species (10 new to Croatia) were recorded. Most intermittent rivers showed that water mite abundances decline with the increased duration of the dry phase. One river showed high abundances despite its relatively long dry period (75 days/year). However, this river dries up only at its middle reach, making water mite recolonization effective from both upper and lower river reaches.Water mites found at sites with highest flow intermittency showed morphological features (swimming setae) typical for lentic habitats (surviving dry phases in separated pools), while rheophilous "hard bodied" mites were found in rivers with least flow intermittency most likely surviving the dry period dormant, buried in the sediment. Different water mite survival strategies in overcoming the dry phase resulted in relatively high species richness, while harsh environmental conditions, caused by flow intermittency, resulted in their low abundances.

Seasonal Dynamics and Community Composition of Epilithic Diatoms in Yağlıdere Stream (Giresun-Turkey)

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Hitit University, Department of Environmental Protection Technologies, Vocational School of Technical Sciences, Turkey[2]

Abstract

We collected epilithic diatoms from the Yağlıdere Stream located in the Turkish province of Giresun between July 2014 and June 2015 to identify and document the monthly changes of epilithic diatom taxa and to compare these changes with each other in different sampling sites. Samples were taken monthly between May 2014 and June 2015. The diatoms were sampled by scraping the upper 25 cm2 surface of the epilithon with a stiff toothbrush and placing the sample into a 250-ml sample bottle. The composition and relative abundance of the diatoms were estimated from acid-cleaned sub-samples at 1000× magnification and then individually counted. Cleaned frustules were mounted on permanent slides using Naphrax resin. Identification and nomenclature were performed based on Krammer and Lange-Bertalot (1986, 1988, 1991a and 1991b). *Fragilaria ulna*, *Cymbella affinis, Navicula gregaria, Cymbella ventricosa, Navicula cryptocephala* and *Nitzschia palea* predominant in terms of relative abundance.*Fragilaria ulna* was found to be the most pollution-tolerant species in each of the sampling stations, and had the highest densities across all stations.

A geometric morphometric approach to the analysis of the shape variability of the haptoral attachment structures of *Ligophorus* species (Platyhelminthes: Monogenea)

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[2]Murmansk Marine Biological Institut, Russia

Abstract

The taxonomy of *Ligophorus* Euzet & Suriano, 1977, like the most of monopisthocotylean monogeneans, relies heavily on the morphology of sclerites of the posterior attachment organ (haptor). Geometric morphometric approach is used to analyse variability and compare the shapes of haptoral structures of these monogeneans. We outline the shapes of the sclerities by cubic Bezier curves and store results in SVG files. Every SVG outline is reduced to a set of harmonics of Elliptic Fourier transform using ElFourier program. Harmonics is the sequence of unique numbers that describe the shape of structures and is invariant with respect to their sizes, rotation and orientation. They allow reconstructing source outline images, finding their average form, analysing variability and comparing shapes in combination with other numerical data like dimensions. We use that approach to investigate intra- and interspecific variability of 400 haptoral structures of 7 representatives of *Ligophorus*, parasitising 4 mullet species from the Black Sea, and to discriminate these monogeneans. This method is perspective for the creation of semiautomatic key for identification of helminthes that are mainly distinguished by the shape and dimensions of the attachment organs. The obtained results and method prospects are discussed.

Dreissena invasion: Predictable Patterns Driven by Invasion History - towards cascade reservoirs of Drini River in the northern Albania

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Abstract
The main purpose of this contribution is to present the current trends of *Dressena* invasion in the three-four decade impoundments and offer hypotheses on predictable patterns driven by invasion based on Lakes data. The affection of bivalves (in an accelerated invasion of tributaries the aquatic cave livings might be considered) is predicted here. Presence, distribution and abundance of *Dreissena* larvae in the plankton of lakes Komani and Fierza, confluence parts of the streams Shala and Curraj were studied in spring and late summer 2015. Quantitative samples were collected in late May and early September from 2 sites in each lake and lower rivers part. We revealed that *Dreissena* larvae were present at different depths of the water column in four lakes sites. It has been assessed that the abundance was almost four of that recorded for the Lake Ohrid and 1, 5 from the data of Presp Lake, respectively in Koman 5800 individuals/m^3 and in Fierza 5500 individuals/m^3. During the autumn the abundance was significantly low with a maximum at the level from 4-0 m. The invasions of *Dreissena* are transforming benthic macroinvertebrate communities in lakes and rivers throughout Europe and in case of north Albanian reservoirs and associated tributaries. Significant changes to these communities are documented typically within a few years to several decades following zebra mussel invasion. These changes almost invariably include increased abundance and richness, and reduced evenness, of mussel-associated macroinvertebrate communities.

Length-Weight Relationship and Condition Factor of Endemic Fish *Phoxinellus pseudalepidotus* (Cyprinidae) from Mostarsko Blato (Neretva River Basin, Bosnia and Herzegovina)

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Abstract

The aim of the present study was to describe the lenght-weight relationship and condition factor of *Phoxinellus pseudalepidotus*, a freshwater fish endemic to the Neretva River Basin, which is classified by the IUCN as vulnerable. Fish sampling was carried out in 2009 by gill nets and „krtol", traditional hunting tool in the area of Mostarsko Blato (Neretva River Basin, Bosnia and Herzegovina). In order to analyze the length-weight relationship and condition factor, a total of 1200 fish were sampled. Since this is an endemic species, most of the specimens were taken back into the water, after performing the length and weight measurements by using standard equipment. The length-weight relationship was described by the equation: $W = a L^b$, while the condition factor was determined by using the equation: $K = 100 (W/L^3)$. Values of the regression coefficient 'b' obtained for the length-weight relationship were respectively 0.491 for all population, 0.491 for females and 0.489 for males, having r^2 values respectively 0.837, 0.843 and 0.821. General condition of the fish was found to be good, as indicated by the mean values of condition factor (1.11 for females and 1.08 for males), which was higher than 1. The present studies provide first hand information about growth pattern and relative conditions of *P. pseudalepidotus* from its in-situ habitat.

Distribution of an invasive fish species *Pseudorasbora parva* (Telostei: Cyprinidae) in Bosnia and Herzegovina

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Abstract
The topmouth gudgeon *(Pseudorasbora parva)* is a small cyprinid fish native to East Asia. In Europe, it was firstly recorded in 1961 in southern Romania and Albania. The first record of *P. parva* in ex Yugoslavia was in 1977 in Šasko Lake (Montenegro). According to the available data, the first occurrence of this species for Bosnia and Herzegovina was observed in 1980s (Sava River Basin). In this study, results of ichthyological research from various localities in Bosnia and Herzegovina, conducted between 1999 and 2016, and available literature data were used to indicate the presence of *P. parva* in Bosnian freshwater systems. *P. parva* is considered as an allochthonous fish species which invasion could pose a threat to the diversity of the native ichthyofauna in Bosnia and Herzegovina.

Report on occurrence of the non-indigenous copepod*Pseudodiaptomus marinus* Sato, 1913 in the Sevastopol Bay (Black Sea)

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Abstract

Introduction of non-indigenous species to the marine ecosystems is one of the actual environmental problems in modern marine biology. The Black Sea is one of the most affected areas by alien invasions. The accidental introduction of predatory ctenophores *Mnemiopsis leidyi* and *Beroe ovata*; copepods *Acartia tonsa* and *Oithona brevicornis* caused sharp changes of zooplankton community and ecosystem of the Black Sea. A new for the Black Sea non-indigenous species of copepods *Pseudodiaptomus marinus* Sato, 1913 was initially discovered in a sampletaken during a routine plankton survey started in 2002 in Sevastopol Bay. Both females and copepodite stages of new specieswere found on September 22.

*P. marinus*was described from the coast of Northern Japan, and considered tobe native to the Northwestern Pacific Ocean, but in the last 50 years it has successfully colonized new areas worldwide. It is a typical estuarine coastal copepod, livingin shallow eutrophic inshore waters. The species tolerant to awide range of salinity (2.5–35 ppt) and temperature (5–28° C).Thus, *P. marinus*is suitably adapted to relatively low salinities and wintertemperatures of the Black Sea. Maximum abundance of collected individuals was recorded at November 11 (1373 ind./m3). In December it's number sharply decreased. Recent sampling not provided evidence that *P. marinus* is still present in the Sevastopol Bay. The possible re-introduction of the new species in the Black Sea is discussed.

Assessment of macrozoobenthos and environmental quality in the Albanian part of Macro Prespa Lake

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Abstract

The aim of this study was the assessment of species composition and quantitative characteristics of the macrozoobenthic community in the Albanian part of Macro Prespa Lake, andof the environmental state of the lake, based on benthic macroinvertebrates as indicators**.**

Sampling has been carried out in two sites, Gollomboç and Liqenas, in October 2013, from 0,5 m to 10 m depth, using the multihabitat transect method. A "kick and swipe" net has been used for sampling in 0,5 m depth, while in 2 m, 4 m, 6 m and 10 m the samples were taken by a box-corer.

A low species richness and low abundance was recorded in the sampling sites. Gastropods were the predominant group regarding the number of species and abundance.

Macrovegetation, especially the algal cover of *Chara*, plays a very important role in the species composition and quantitative characteristics of the macrozoobenthic community in the studied area. The macrozoobenthic community had a low stability and its structure was assessed to be in a "moderate" to "poor" state, based on some stability and diversity indexes.

The environmental quality of the lake was predominated by the "poor" to "bad" status, after the WFD categorization.. Environmental indicators based on benthic macroinvertebrates show a tendency for lake eutrophication, nutrients' enrichment and increased organic pollution.

However, the lake is still a shelter for many benthic macroinvertebrate species of international concern and of interest for conservation, including endemic species and globally threatened species.

Sexual dimorphism of morphometric parameters in Pseudopus apodus (Reptilia: Sairia: Anguidae) from Crimea steppe population

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Abstract
The Giant Glass Lizard (Scheltopusik), *Pseudopus apodus apodus* (Pallas, 1775) has a vast range mainly at Caucasus Isthmus and Central Asia, whereas in Crimean Peninsula the subspecies reaches northwestern boundary of its distribution. We attempted to study of sexual dimorphism in *P. apodus* from the latter region.

The 63 individuals of *P. apodus* (62% of males and 38% of females) were collected during 2012-2016 on Kerch Peninsula (the coastal strip along the Sea of Azov between the capes of Chagany and Khroni), and measured by 12 morphometric parameters (SVL and dimensions of various parts of the head) as well as by 17 indices characterizing the proportions of the head and the body. The Student's test displayed the significant contrasts of means based on all characters and indices (except the body length) between males and females. At the same time the overlapping of the ranges of variability makes impossible a reliably determination of the sex in lizards using separate linear dimensions and indices values.

However, the 97% of males and 100% of females were correctly classified on the basis of attribute "a sex" as a result of discriminant analysis by complex of morphometric parameters (with the exception of SVL) whereas 100% males and females were successfully discriminated using indices. Thus, 10 indices, which provide discrimination in the best way, were selected. The linear classification function for sex determination in the Giant Glass Lizard based on these indices was developed.

Thus, the entire set of characters can be used to study of sexual dimorphism in *P. apodus* populations. However it should be mentioned that obtained results could not be automatically transferred to other populations, since absolute and relative dimensional characters highly likely are depend on the specific conditions of existence of the species in the region, including the duration of the activity period, rates of growth, nutritional spectrum, etc.

Reproductive isolation between two sympatric species from genus Rutilus from Lake Skadar (Montenegro)

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Abstract
Lake Skadar basin is inhabited by two species from genus Rutilus: *R. prespensis* (Karaman, 1924) and *R. albus* Marić, 2010. These fishes have never been reported to hybridize in nature. Seasonal isolation is developed, since no overlap in time of spawning exists. In this study, the oocyte development in the developing oocyte was investigated by light microscopy. Histological features of developmental stages of oocytes were described in detail using light microscopy. The *R. prespensis* and *R. albus* have a group-synchronous ovary, spawns once a year and have relatively short breeding season. The *R. albus* spawns in February, while *R. prespensis* spawn in April-May. The combination of different time and places of spawning is considered to be a powerful barrier to hybridization.

Crustaceans as water quality bioindicators in the littoral zone of Lake Prespa

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Abstract

The assessment of the water quality in the littoral zone of the Lake Prespa in spring 2013 is based on certain indices of zooplankton community: Copepoda and Cladocera species composition, their abundance, diversity, Calanoida/Cyclopoida ratio. On the basis of the relative abundance of the identified species and their saprobic indices, Index of sparobity was calculated.

Seventeen Crustacea species were found in the littoral zone: 12 cladocerans and 5 copepods. The most abundant were indicatory species of eutrophic waters: *Chidorus sphaericus* and *Bosmina longirostris.* Among copepods, Cyclopoidaoccur at higher density than Calanoida. The Shannon-Wiener diversity index for the zooplankton community was 2.06 to 2.56. The saprobity index indicated class II water quality.

According to characteristics of zooplankton, Lake Prespa littoral can be classified as mesotrophic region.

Temporal variations of Zooplankton Crustacea (Copepoda, Cladocera) biomass from pelagial zone oF Lake Ohrid

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Abstract

The biomass of zooplankton Crustacea: Copepoda, Cladocera in Lake Ohrid pelagic zone was studied in the period January 2010 - October 2011.
Eight species (4 Cladocera, 4 Copepoda) were evidenced. It includes *Arctodiaptomus steindachneri*, an endemic calanoid of the Western Balkans and *Cyclops ochridanus* an endemic copepodid.

The Crustacea biomass varied during the investigated period and certain seasonal successions in temporal transpositions of their maximal values were noticed. Regarding the Copepoda group, Calanoida species were dominant during the period of investigation and in the total crustacea biomass they participated with 68%, which confirms that the Lake Ohrid zooplankton has copepodid character. The maximal values were registered in April 2010 (58156 µgr m^{-3}) and in July 20110 (58067 µgr m^{-3}). The Cladocera species participated with 32%.

However, in the summer and autumn period, when in the zooplankton beside autochtonous species were present and allochtonous species, in the total zooplankton biomass both groups Copepoda and Cladocera participated with same percents.

The maximal values of the total crustacean biomass were registered in the autumn period (42341µgr m^{-3} in September 2010 and 46341 µgr m^{-3} in October 2011).

Spatial and seasonal pattern of zooplankton in Streževo reservoir (Macedonia)

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Abstract

The diversity, density and distribution of zooplankton in Streževo Reservoir were studied on the vertical profile from March 2010 until August 2011.

Rotifera was the most abundant group (84%), followed by Copepoda (15%) and Cladocera (1%). The dominant rotifer species was obligatory predator *Asplanchna* with high abundance recorded in the colder period of the year, from autumn up to spring. Prevalence of microfilter-feeders, detritivorous, rotifers *Keratellaquadrata* and *Kellicottia longispina*, was noted during the summer period. Among Copepoda, the nauplii stages were dominant through the all seasons.

Measured seasonal and spatial patterns of the zooplankton assemblage along a vertical profile of Streževo Reservoir were highly associated with trophic level, food availability and biotic interactions in the zooplankton.

Detection of morphological variations in wing size and wing shape of three aphid parasitoid species *Aphidius absinthi* Marshall, *Aphidius rosae* Haliday and *Aphidius urticae* Haliday (Hymenoptera: Braconidae: Aphidiinae) by geometric morphometrics method

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Abstract

This paper examines morphological variability in wing size and wing shape among three closely related species *Aphidius absinthi*, *A. rosae* and *A. urticae*, by the geometric morphometrics. These taxa are characterized by similar morphologically and different ecologically characters. For this study we used left forewings of 52 female specimens. The thirteen specific landmarks were digitalized on each wing. The results of ANOVA and MANOVA demonstrated statistically significant differences in wing size and wing shape among the analyzed species. Canonical Variate Analysis (CVA) revealed that the first canonical axis explained 90.60% of the total variability in wing shape. The main shape changes that discriminate these species are related to the length of the radial sector and stigma shape. In this paper, we confirmed the validity of the wing characters previously used in taxonomic studies of the genus *Aphidius*.

Long-term (2001-2014) dynamics of potentially toxic and harmful phytoplankton in Sevastopol Bay (The Black Sea))

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Abstract

Abundance, biomass and taxonomic composition of potentially toxic and harmful phytoplankton (PTHP) were determined bimonthly at 3 stations in Sevastopol Bay and adjacent coastal waters (the Black Sea) from 2001 to 2014. The list of the PTHP species included:*Dinophysis acuta* Ehrenberg, *D. fortii, Lingulodinium polyedrum* (Stein) Dodge [= *Gonyaulax polyedra* Stein], *Prorocentrum minimum* (Pavillard) Schiller [= *P. cordatum* (Ostenfeld) Dodge], *P. micans* Ehrenberg, *Protoceratium reticulatum* (Claparède et Lachmann) Butschli = *Gonyaulax grindleyi* Reinecke (YTX), *Protoperidinium crassipes* (Kofoid) Balech, *Scrippsiella trochoidea* (Stein) Balech ex Loeblich III, *Pseudo-nitzschia delicatissima* (Cleve) Heiden, *P. pungens* (Grunow ex Cleve) Hasle, *P. seriata* (Cleve) H. et M. Peragallo (= *Nitzschia seriata* Cleve), *Ceratium furca* (Ehrenberg) Claparéde et Lachmann [= *Neoceratium furca* (Ehrenberg) Gomez, Moreira et Lopez-Garcia], *C. tripos* (Muller) Nitzsch [= *Neoceratium tripos* (Muller) Gomez, Moreira et Lopez-Garcia], *Pseudosolenia (Rhizosolenia) calcar-avis* (Schulze) Sunström, *Thalassionema nitzschioides* (Grunow) Mereschkowsky, *Leptocylindrus danicus*, *Skeletonema costatum* (Greville) Cleve, *Chaetoceros curvisetus* Cleve, *C. lorenzianus* Grunow, *Akashiwo sanguinea* (Hirasaka) G. Hansen et Moestrup [= *Gymnodinium sanguineum* Hirasaka], *Gymnodinium simplex* (Lohmann) Kofoid et Swezy, *Heterocapsa triquetra* (Ehrenberg) Stein, *Oxytoxum variabile* Schill (in total, 22 species, including 13 dinoflagellates and 9 diatoms).

Ranking the PTHP species by their peak abundances and biomasses has revealed the 'risk group' including 8 species (*Ch. curvisetus, P. calcar-avis, S. costatum, P. delicatissima, P. cordatum, L. danicus, H. triquetra, S. trochoidea*). Occasionally, their numbers and biomasses exceeded 10^6 cells/L and 1 mg/L (WW), respectively, i.e. could be classified as 'blooms'. Together with *C. furca* and *T. nitzschioides*, the risk species contributed about a half of the PTHP list and were characterized by high occurrence (> 20% of the samples).

Over the last 15 years, no statistically significant trends were found in the abundances, biomasses and average cell sizes of the PTHP species despite some of them demonstrated remarkable abundance reduction (from 10^4 to 10^3 cells/L in *L. danicus*) or growth (from 10^2 to 10^3 cells/L in *P. seriata*), a decrease in the abundance variability (*S. costatum*) or an insignificant increase in their occurrence (*P. minimum*). Thus, no sufficient changes in the PTHP state were revealed over more than a decade. Nevertheless, rare and accidental 'blooms' of the risk PTHP species in the Crimean coastal waters should be detected and monitored as they may increase risks for human health and aquaculture.

The study was partly supported by RFBR, research projects No. 14-44-01584 and 15-04-08768 A.

Examining the link between live/dead zooplankton ratio and microbial activity in Sevastopol Bay (The Black Sea)

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Abstract

It was experimentally shown that more intensive bacteria-driven decomposition of dead zooplankton in Sevastopol Bay reduced the pool of carcasses and, as a result, increased the live-to-dead zooplankton ratio. This finding could explain the earlier obtained evidence of higher fraction of live zooplankton in the heavily polluted and eutrophic bay comparing with the cleaner adjacent waters. In the experiment, a heat-killed batch culture of the copepod *Calanipeda aquaedulcis* was used as a substrate for decomposition by natural microbial communities from the waters of different pollution status (Sevastopol Bay versus adjacent water area). Bacterioplankton abundance and *in situ* decomposition rate of copepod carcasses were shown to be about 3-fold higher in the bay (1.3×10^6 cells ml^{-1} and 0.13 day^{-1}, respectively) while an approximation of zooplankton non-predatory mortality rates gave equal values for both the sites (about 0.046 day^{-1}). The data obtained call for revising the ways of interpreting the results of zooplankton viability assays in their relation to water pollution status. The study was partly supported by RFBR, research project No. 16-34- 01020 mol_a.

Current views about diversity and distribution of the deep-water meiobenthos at the Turkish shelf (The Black Sea)

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Abstract
Taxonomic diversity of meiobenthos communities was studied at the İstanbul Strait of the Black Sea on a transect with a depth range of 75-300 m. The bottom sediments were collected during two cruises in November 2009 onboard RV "Arar" (Turkey) and in April 2010 onboard "Maria S. Merian" (Germany). Data on meiofauna inhabiting both normoxic and extreme conditions (anoxia with hydrogen sulfide) was collected. In the studied area, meiobenthos composition included 26 high level taxa. In addition, 2-3 morphotypes of benthic fauna were recorded as *incertae sedis*, which require further study to determine their taxonomical level. The number of higher taxa varied from 23 to 13-8 when switching from oxygenic conditions (50-125 m) to the anoxic hydrogen sulfide environment (226-300 m). The constant components of meiobenthos included protists (Ciliophora, Gromiidea and soft-shelled Foraminifera), and metazoans were constantly represented by Nematoda and Harpacticoida. Unknown representatives of Foraminifera (hard-shelled and soft shelled), Gromiidea, Gastrotricha, Rotifera, Nematoda etc. were recorded for the first time.

Additionally, a quantitative study on meiofauna was carried out along a transect throughout oxic (90 m), suboxic (120.5 m) and anoxic (203 m) sediments at the western part off Sinop Peninsula, Southern Black Sea. The material was collected by push cores during the Black Sea Leg of the NA012 Expedition of E/V Nautilus in August 2011. Taxa composition of meiobenthos ranged from 5 to 9 major groups. Free-living marine nematodes were numerically dominant taxon at each station. Total abundances decreased in parallel to increasing water depth, hence decreasing oxygen levels. Meiofauna from the anoxic sample included representatives of only Nematoda, Acari, Harpacticoida and hard shelled Foraminifera. Nematoda was dominant at three zones, followed by Harpacticoida in the oxic and suboxic zones. The third prevalent group was Polychaeta in the oxic zone and Hydrozoa in the suboxic zone.

Breeding density and habitat preferences of Sombre Tit (Poecile lugubris) in a karst environment

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Abstract

Goal. Sombre Tit (*Poecile lugubris*) is one of the least studied passerine bird species in Europe, and the least known among Paridae. The aim of the study is to assess its breeding density and habitat preferences in a karst environment.

Methodology. The study took place in 2016 within a limestone terrain in Western Bulgaria. A total of 51 territories were identified by means of point counts and territory mapping. In order to quantitatively describe the habitat structure and the fine-scale land-cover, 17 habitat variables were measured in the field at territory and control plots (the latter were located at 51 unoccupied sites), within a radius approximating the territory size of the species. We built a logistic regression model according to an information-theoretic approach to identify the main predictors of species occurrence.

Results. Five habitat variables drove Sombre Tit occurrence according to the model – solar radiation, number of solitary trees (DBH>10 cm), number of trees (DBH>10 cm) within the 5m-woodland edge, cover of karst and distance to woodland. Those results highlight the ecotonal habits of the species, which occurred within the study area with a mean density of 0.38 pairs/10 ha in a karst-dominated environment with sparse tree cover (solitary trees and patchy woodlots).

Conclusion. Our findings can help improve the monitoring schemes targeted (also) at this species, and may be used to inform the management plans of mosaic landscapes in Natura-2000 zones and other protected areas.

The earthworms study from closed uranium mining facilities in Buhovo Region, Bulgaria

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Abstract

The Lumbricidae communities were determined for three different regions in the Buhovo Mining Area in Bulgaria. A comparison of the number and species identification of the collected earthworms are performed. No significant difference was found between the size and the shape of earthworm communities in different regions.

The work is part of an annual and seasonal investigation of the lumbricus earthworms collected from slightly urbanised areas.

Bulgaria is a country with intensive uranium mining activities. As such, radiological monitoring of closed uranium mining facilities in different regions of the country are both necessary and of a great interest.

The analysis of some anatomic characteristics of human populations in the North-eastern part of Romania used in forensic biology

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Abstract

This paper presents an analysis of some anatomic characteristics of hair and fingerprints in a population in the north-east of Romania. Human hair and fingerprints have been studied using optical and electron microscopy techniques. The hair shaft is unique by its morpho-structural characters in the mammalian world. There are various studies in the literature that analyse it under different aspects, such as dermatology, cosmetics, medicine and legal medicine.

We mention the type of marrow, shape of cuticle scales and the amount of pigment among the anatomic characteristics of the hair. Regarding the fingerprints, we analysed the type, gender differences and defects appearing in the fingerprint design.

The examined individuals were divided into groups, taking into account the morpho-structural aspects analysed by gender, age, place of birth. The data were statistically processed and tried to characterize the populations according to the criteria. These two elements taken in study are used in forensic biology, representing criteria to recognize one person involved in a crime.

Using invertebrate FFG analysis to determine ecosystem attributes in the Nišava River (Serbia)

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Abstract

Environmental anthrophogenic disturbances result in changes of trophic structure in macroinvertebrate communities. Invertebrate FFG analysis is sensitive to both the normal pattern of geomorphic and concomitant biological changes that occur along river systems from headwaters to lower reaches, as well as to alterations in these patterns resulting from human impact. The main aim of the paper is to determine ecosystem attributes, based on values of the FFG ratio, which will serve as a useful assessment of the ecological condition (health) of freshwater communities. Macroinvertebrate samples and physicochemical data were analyzed for 12 localities along the Nišava River in Southeastern Serbia during a one-year period. Even-numbered localities are positioned downstream and odd-numbered upstream of wastewater discharge points. According to values of the FFG ratio the following ecosystem attributes were calculated: autotrophy to heterotrophy index (P/R); coarse particulate organic matter to fine particulate organic matter index (CPOM/FPOM); FPOM in transport to FPOM in storage in sediments (TFPOM/BFPOM); substrate stability (STABLE CHANNEL) and top-down predator control (TOP-DOWN CONTROL). Values of P/R on eleven localities indicated heterotrophic nature of this localities. Based on TFPOM/BFPOM we concluded that on two localities (localities 7 and 11), there is an high saturation with fine organic matter in suspension. Stability of the river channel has the lowest value on the locality 4 (0.03). Also, on this locality, the predator/pray ratio is the most disturbed (1.56, regular values are 0.1-0.2). The CPOM/FPOM ratio indicates that this river has a normal association of the shredders connected to functioning of riparian ecosystem. Data comparison of physico-chemical measuring and FFG analyses, showed that FFG analyses could be useful for determination of ecosystem attributes in this type of ecosystem.

Temporal and spatial variations in the attached algae of Mert Stream (Samsun, Turkey)

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Abstract

In this study, seasonal developments of epilithic algae in Mert Stream have been studied by samples taken monthly between July 2011 and June 2012 from six stations selected. Temperature (C°), pH, conductivity (EC), dissolved oxygen (DO), NO_3-N, NH_4-N, o-PO_4-P were determinated.

The epilithic flora and the frequency of identified species were determined. In the community of epilithic algae, members of Bacillariophyta were dominant and *Cocconeis disculus*, *Cocconeis pediculus, Cyclotella glomerata* H.Bachmann*, Pantocsekiella kuetzingiana* (Thwaites) K.T.Kiss & E. Ács*, Cymbella affinis* Kützing*, Diatoma vulgaris* Bory*, Gomphonema olivaceum* (Hornemann) Brébisson*, Gomphonema calcareum* Cleve*, Navicula veneta* Kützing*, Eolimna minima* (Grunow) Lange-Bertalot*, Ulnaria ulna* (Nitzsch) Compère have been the most frequent species found. In addition to diatoms, *Volvox aureus* Ehrenberg, *Cladophora glomerata* (Linnaeus) Kützing from Chlorophyta, *Closteriumdianae* var. *Minus* Hieronymus, *Closterium leiblenii* Kützing ex Ralfs from Charophyta, *Oscillatoria tenuis* C.Agardh ex Gomont, *Leptolyngbya ectocarpi* (Gomont) Anagnostidis & Komárek, *Pseudanabaena catenata* Lauterborn from Cyanobacteria and *Trachelomonas pulchella* Drezepolski from Euglenophyta have been found in low numbers.

Morphometric characteristics of *Delminichthys ghetaldii* (Steindachner, 1882) from different habitats

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Abstract
Ichthyofauna of Bosnia and Herzegovina is portrayed by considerable species diversity, especially by numerous endemic species. Popovo minnow (*Delminichthys ghetaldii*) is an endemic species which inhabits springs and streams in eastern Herzegovina. The life cycle of these endemic fishes is connected to the karst habitats characterized by significant fluctuation of the water level regime. Analysis of the physiological and morphometric characteristic of endemic species is important because it gives valuable information on the current status of individuals and populations, and indirectly of the environment. In this research we measured the parameters of total and standard body length, weight and Fulton's condition factor in popovo minnows from two different habitats. Samples were collected in field Fatnica during the flooding and in the river Brova. Comparison of the obtained results showed higher values of length and weight in individuals gathered in Fatnica field, while no significant differences in Fulton's condition factor were noticed.

Seasonal variations of length-weight relationship and gross energy content of Ohrid Roach

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Abstract

The aim of this study was to investigate the length-weight relationship and the gross energy content of Ohrid Roach (*Rutilus ohridanus*, Karaman 1924) in two different seasons (May and September). The results showed that in both seasons the Ohrid Roach has isometric growth, but in May the fish has statistically significant higher values for the condition factor, opposite of September when the values for the condition factor are lower. The estimation of gross energy showed statistically significant higher values in September. This findings demonstrate stable growth in the investigated seasons. Seasonality was observed in the condition factor of the fish and its energy content, traits that are influenced by the sexual maturity, feeding activity and intensity, food availability and the variable environmental conditions.

Long - term variations in macrobenthos diversity at the Istanbul Strait's (Bosporus) outlet area of the Black Sea

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Abstract

This work continues a series of studies on deep-water benthos in the Istanbul Strait's (Bosporus) outlet area of the Black Sea. The aim of that study was the analysis of long term changes in diversity and structure of the benthic fauna inhabiting the depth zone where the oxic/anoxic interface zone meets the sea floor. Time comparison interval covers the period from 1958 to 2010. Macrofauna were sampled with box-corer of 0.1 m^2, at depths from 70 to 172 m at 12 stations. Processing of the material in 1958, 1960, 1989 was carried out according to a similar method. The comparative biodiversity of different faunas 1958-1960 and 2010 included as main components the number of species per area unit and evenness. The level of dominance was estimated by indices Simpson and Berger-Parker, species richness - by Margalef and Menhinick indices. Analysis of long term structural modifications performed in benthos communities was made on lognormal model.

A detailed analysis of the structure and distribution of macrobenthos communities in the transitional conditions from oxygen to oxygen-free in the deep water area of the Black Sea area showed that the species richness and abundance of macrobenthos decreases with decreasing oxygen content in the bottom layer of the water mass. Fully structured bottom communities were not detected at oxygen concentrations below 10 μM. The community models reflected structure with distinctive unstable hydrological and morphological features of environmental conditions at the Bosporus outlet area. The most fragile group of rare species decreased in structure of *Terebellides Stroemi - Amphiura stepanovi* community and completely disappeared on the model of the *Modiolula phaseolina* community in 2010. Only a group of dominant species is stable throughout the period of studies from 1958 to 2010.

Morphological variability, distribution and ecology of *Nitellopsis obtusa* (Desv. in Loisel.) J. Groves 1919 from lake Ohrid

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Abstract
Charophyta is a unique group of the complex algae with evolutionary and ecology importance. As an important component of the macrophyte vegetation, especially in the oligotrophic lakes, they form vast meadows covering a huge part of the lakes litoral. Charophyta flora of the Lake Ohrid is comprises by 19 Charophyta species in total, which are significant contributor in maintaining of the Lakes metabolism and balance.

Nitellospis obtusa is one of the 19th registered Charophyta species, and it takes an important part. It is registered for the first time in Macedonia, and in the Ohrid Lake in our researches.

N. obtusa has been registered in 3 out of 59 sampling sites. There are differences and morphological variability of this species in different sites and different depth points.

The influence of the habitat on morphological species delimitation characters: example of Phoxinus (Cyprinidae)

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Ernst Mikschi
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Abstract
Up until 2007, when Kottelat newly described or re-established several *Phoxinus* species, members of this genus in Europe have been regarded as a single species *Phoxinus phoxinus* (Linnaeus, 1758). In the Handbook of European Freshwater Fishes, which is used as a reference book for species identification of fish in Europe, Kottelat and Freyhof (2007) defined three body measurements ratios as the diagnostic characters according to which it should be possible to distinguish between *P. phoxinus* and *P. lumaireul*. However the members of the genus *Phoxinus* are known to inhabit diverse water bodies with different hydrodynamic conditions that have been shown to influence body proportions in fish. Thus, we used landmark-based geometric morphometric methods to quantify the level of morphological variability in genetically uniform *Phoxinus* populations from streams and lakes of Northern Italy and the Danube basin. Our results show, that some of the body measurements ratios are highly influenced by the habitat. Thus, current identification key should be used with caution and further efforts should be made in recognizing stable morphological characters for species delimitation of *Phoxinus* species in Europe.

Exploatation of animal food resources in 2-7th centuries AD settlements in Dobrudja (Romania): archaeozoological data

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Abstract

Archaeozoological quantification (number of identified specimens and minimum number of individuals) aimed at evaluating the relative frequencies of identified species in order to estimate the animal resources and subsistence practices (animal husbandry, hunting, fishing) such as animals used as food in each settlement.

The faunal remains identified in the studied samples (Isaccea, Horia, Niculitel, Adamclisi, Dinogetia, Slava Rusa, Capidava, Jurilovca, Murighiol, Ovidiu) belong to a varied class of animals (mollusc, fish, reptiles, birds, mammals), among which mammals are predominant.

The remains of domestic mammals have the highest proportion (between 85% and 98%) indicating the importance of animal husbandry. Most households had focused on breeding cattle, pig and sheep/goat. The percentage for fish is very small, not more than 5%.

The remains of wild mammals are in small percentages compared with domestic mammals, indicating that hunting was a less important occupancy for these populations. The list of wild mammals is long (15 taxa being identified). Red deer and wild boar appear in all samples and have the highest percentage. Aurochs, beaver, red deer and bear were identified in the samples, but today there are not found in the area.

This work was supported by a grant of Ministry of Research and Innovation, CNCS – UEFISCDI, project number PN-III-P4-ID-PCE-2016-0852, within PNCDI III.

Monitoring the Water quality of river Lepenci based on macroinvertebrate fauna

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Abstract

The rivers in Kosovo are under continuous pressure from various stressor factors affecting their quality.With the aim of evaluating these effects, a biological monitoring of the river Lepenci based on the macroinvertebrate fauna is conducted in spring season.

The river Lepenci basin with a 650km^2 surface lies in the southeastern part of the country and joins the river Vardar in the neighboring country of Macedonia, from where it flows into the Aegean Sea. The main spring of Lepenci generates in Oshlak in Sharri Mountain at an altitude of 2.212 m, but there are also some other smaller springs in this area.

The macroinvertebrates were collected with a hand net in five sampling sites across the river Lepenci, including one of the springs, middle stream and down stream after its main tributary Nerodime joins it in the city of Kacanik. Parallel to the sampling of macroinvertebrates, physic-chemical parameters of water have been measured. Two metrics were used to assess the water status: FBI and EPT richness. Our results show the presence of slight organic pollution even in the spring area, and a significant decline in water quality detected in the sampling sites down stream after heavily polluted tributary Nerodime joined the river.

Diversity and Conservation Status of Mollusks of Skadar Lake

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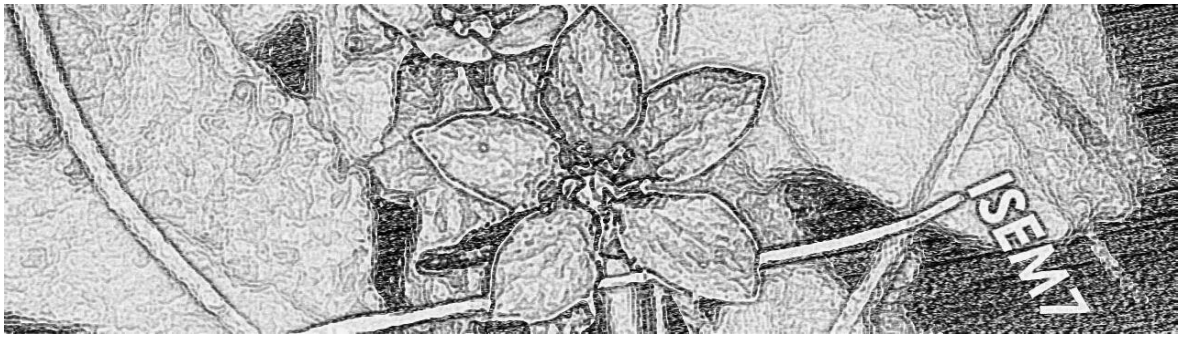
Abstract

Research on aquatic molluscs of Skadar Lake has a long tradition and started with the paper published by Küster in 1843. A total of 53 freshwater mollusc species have been found in the Skadar Lake basin, 10 species of Bivalvia and 43 species of Gasropoda, 15 of them being endemic. Most of the endemic species of Skadar Lake basin are common and relatively unconfined in terms of depths or zones. Point endemics are restricted to a specific environment, associated with subterranean and/or spring habitats. Ongoing process of eutrophication, use for water supply a and the pressures by non-native species were generally recognized as the main treats for molluscs fauna of Skadar lake. The future research on the gastropod fauna of the Skadar Lake should focus on application of molecular methods as well as on the including endemic species in the ongoing national and transboundary conservation programs.



Special Session "Rock-dwelling snails from ecology to phylogeny"

Terrestrial snails adapted to rocks and boulders

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Abstract

Calcareous rocks, cliffs and boulders are an essential habitat for specially adapted land snails. Besides such specialized rock dwelling species, more widespread species, which use a wider range of habitats, can live in rock and boulder landscapes, too. A striking peculiarity of such habitats is their poverty. Most importantly they do not show continuous vegetation which is due to several factors: Temperature and humidity conditions differ strongly between the outer surfaces and interior crevices, between the upper and lower ends of boulders and rocks as well as in a temporal frame (day/night, weather dependent as well as seasonal). The rock faces and rock peaks are exposed to wind and weather and therefore usually subjected to severe fluctuations of temperature and humidity, while within crevices and cavities as well as at slope toes relatively more stable conditions prevail.

Phenology and ecology of rock-dwelling snails can be connected with three basic adaptive strategies. One is to spend the complete live span in caves and deeper debris area, e.g. *Zospeum* spp. or *Oxychilus*spp.. The disadvantage of this strategy is the lack of nutrition. Many rock-dwelling snail species therefore use crevices and holes to sustain extremely hot and dry phases only. In the night or during damp weather they move to the surface to pick lichen or detritus. Other species spend their whole life span on the rock surface and need specific adaptations to deal with drought, heat and radiation, e.g., light colour, strong riffles on shells, and apertures fixed tightly to the rock surface to reduce evaporation.

The structural habitat conditions in rocks and boulder led to special adaptations of the shell shape, too. Some snail species dwelling on rocks and boulders show strongly flattened, disk-shaped shells, which should prevent slipping on steep walls. Another strategy is used by snails with slim, elongated or grain-shaped shells, which enable creeping into crevices and holes.

Specialized habitat adaptations, the isolation of some rocky habitats and, consequently, small and / or fragmented distribution ranges of many rock-dwelling land snails led to the evolution of several endemics. Yet, as extreme they might be, these habitats might have offered stable living conditions over millions of years.

Anatomical and biological peculiarities in *Cylindrus obtusus* (Pulmonata: Helicidae) an endemic land snail from the Eastern Alps

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Abstract
Cylindrus obtusus is a rock associated gastropod endemic in the Eastern Alps. As a specialist of rocky limestone habitats restricted to high elevations, *C. obtusus* has a patchy distribution. Peculiar intraspecific differences were observed in its genital tract: in eastern populations the two mucus glands associated with the love dart sac are highly variable in size, while no variation was observed in western populations. This raised the question whether the reproduction mode of eastern and western populations are different. To test whether these anatomical differences reflect a genetic differentiation, we investigated the mitochondrial *cytochrome c oxidase subunit 1* gene (*COI*) and nine microsatellite loci in samples covering the species´ whole distribution range.

In *COI* sequences, small genetic distances were found (max. 1.7 %). In the westernmost localities, which were glaciated during cold periods of the Pleistocene, variability was extremely low. The phylogeographic analysis revealed a geographic pattern implying that the species has survived the last glaciation within three refuges in the Eastern Calcareous Alps outside or at the border of the formerly glaciated area.

The microsatellite analysis indicated a clear differentiation between populations, implying restricted gene flow. The most peculiar result was the strong evidence for selfing in *C. obtusus* in the easternmost populations. All individuals from those populations are homozygous in all loci, although different alleles were found within populations. This finding is consistent with the high variability of mucus glands in the same populations. Several factors, e.g., specific habitat requirements, patchy distribution and bottlenecks may have influenced and fostered the development of these peculiarities. Yet, it remains unclear why they are found just in the eastern populations and not in western parts of the distribution range, which were populated only after the retreat of the ice sheet presumably by a few pioneering individuals.

Phylogenetic reconstructions of the rock-dwelling land snail genus *Montenegrina*

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Abstract
The extremely diverse land snail genus *Montenegrina* with 29 known species and 106 subspecies has a comparatively small distribution range being restricted to the western part of the Balkan Peninsula. The current systematics of *Montenegrina* is mainly based on conchological traits. In the present study we aimed to elucidate phylogenetic relationships of the genus and to test the congruency with current taxonomy by means of molecular genetic data. We analysed partial sequences of three mitochondrial genes, *cytochrome c oxidase subunit 1*, *16S rRNA*, *12S rRNA* (*COI*, *16S*, *12S*) as well as a short section of two nuclear histone genes (*histone 3* and *histone 4*), including the spacer region (*H3-H4*).

We included nearly 800 individuals assigned to 104 different taxa from 368 localities, covering the whole distribution range. Phylogenetic trees were calculated and compared with the current taxonomic system of *Montenegrina*. Furthermore, the diversity, based on average p-distances, was calculated between and within species as well as between and within populations and clades. The results show a high concordance between traditionally gained taxonomy and the phylogenetic tree. Only in a few cases (around 5%) big discrepancies were found. Possible explanations for these cases are discussed which are connected with ecological requirements, isolation in island like rocky habitats and sporadic merging of populations.

Generally, the phylogenetic analysis revealed high genetic diversity within this rock-dwelling door snail genus and indicates that the large number of taxa, which mostly have very narrow distribution ranges, are not the result of a taxonomic over-splitting, but reflects mostly actual phylogenetic relationships.

Dispersion patterns of the rock - dwelling land species *Montenegrina subcristata* in the area of Virpazar (Montenegro)

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Abstract
Knowledge about biology and ecology of the species of the genus *Montenegrina* is scarce, like in many terrestrial snails. Only some general assumptions related to similar species are existing (e.g. Schilthuizen 1994; Schilthuizen and Lombaerts 1994, 1995; Welter-Schultes 2000). Snails of the genus *Montenegrina*, which includes a large number of taxa (29 species and more than 100 subspecies) are distributed in the southwestern part of the Balkan Peninsula (Fehér and Szekeres 2016). Such knowledge would facilitate to understand evolutionary processes and mechanisms of speciation. In the present study we studies population ecology of *Montenegrina subcristata* during one season. We perrformed a monitoring pilot study in a topotypic population of the subspecies *M. subcristata sublabiata* Wohlberedt 1907, at one site in Virpazar. The aim of this research was to monitor the population, to estimate population size, density and dispersion in a small scale and to record activity patterns. One assumption was that the migration behavior of the snails and also their number would be influenced by microclimatic conditions. We expected that the snails would be quite inactive during warm and sunny days, mostly hidden in crevices while the highest activity should be noticeable after precipitation. Three small areas (A, B and C) were selected at the investigation site where the research is being carried out. At each area, temperature and humidity was monitored at several spots. We started monitoring in April 2017 and it will be performed during one season. First, the snails were searched and registered, counted, and their location on the habitat was documented by photographs as well as via digital maps and translated into a spreadsheet format via a coordinate system. We classified the size and life stage of the snails as juvenile, subadults and adults. Subadults and adults were marked individually with a letter/number code using non-toxic water proof markers. Juvenile individuals were marked with a dot. During each field visit, marked individuals were documented and their position mapped on a photographic map. New individuals were marked. For recpatured individuals distances from the previous place was measured as a dispersive distance. Concerning to dispersion, every new distance from the previous place is calculated as a dispersive distance. After analysis of mark-recapture data, population size, density and dispersion ability of these animals can be determined. Furthermore, dispersion distance can be calculated, when all distances are accumulated. First results show that numbers of newly marked individuals (juvenile, subadults and adults) are quite different between these three

study areas. From April till July we have noticed significant change in the number of the individuals (all categories included) in all areas. As far as their migration is concerned, it is interesting to see that some marked adults from area A were registered on area B and vice versa. Research of this type has not been done in this snail genos before, and thus represents an innovative approach delivering data that may play a basic role for various biological questions in crucial answers.

Estimating population size and density of the rock-dwelling land species *Montenegrina subcristata* using the ''Capture-mark-recapture method'' in the area of Virpazar (Montenegro)

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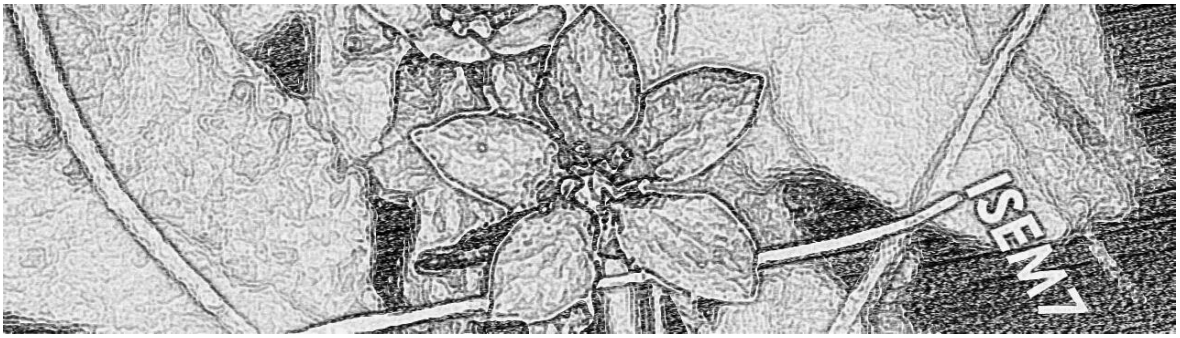
Abstract
Snails of the genus *Montenegrina*, which includes a large number of taxa (29 species and more than 100 subspecies) are distributed in the southwestern part of the Balkan Peninsula (Fehér and Szekeres 2016). Knowledge about biology and ecology of the species of the genus Montenegrina is scarce, like in many terrestrial snails. In the present study focus was on population ecology of *Montenegrina subcristata* during one season. In a topotypic population of the subspecies *M. subcristata sublabiata* Wohlberedt 1907, at one site in Virpazar, a monitoring pilot study was perfomed. The aim of this research was to monitor the population, to estimate population size, density and to record activity patterns. Three points (A, B and C) were selected in the Virpazar area where the research is being carried out.Based on photos, maps of the study sites have been drawn. At each location, temperature and humidity was monitored at several spots. Monitoring started in April 2017 and it will be performed during one season. Size and life stage of the snails were classified as juvenile, subadults and adults.Subadults and adults were marked individually with a letter/number code using non-toxic water proof markers. Juvenile individual were marked with a dot. During each field visit, marked individuals were documented and new individuals were marked.A protocol was established to document the counts and positions of snails. Estimating the size and density of the population should be done by the "Capture, mark, recapture" method (CMR). First results show that numbers of newly marked individuals (juvenile, subadults and adults) are quite different between these three study areas. Area A is the most dominant one, followed by area B and finally area C, which is recognized as the poorest among them. Monitoring is still going on and calculations will be performed at the end of the season. This research can provide comparative data for some similar research on other species.



NATURAL RESOURCES MANAGEMENT

Mediterranean Regional Encyclopedias

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Abstract

The future cannot be understood and explained without studying the historical and geographical past. Speaking about the role of the historical approach, the well-known Russian writer, philosopher A.I. Herzen wrote: "More fully conscious of what has happened, we understand the modern; deep down in the meaning of the past; we disclose the meaning of the future; looking back, we step forward".

This understanding was our motivation for the creation of "Encyclopedias of the Seas and Oceans". The Encyclopedia is a scientific or popular scientific reference publication containing a systematized body of knowledge of the past and the present. There are universal, sectoral, and regional encyclopedias.

In the world there are 87 seas and 5 oceans, each of which has its own history of discovery, exploration and development.

In 2004 we started the project "Russian Seas". Since that time we prepared and published regional encyclopedias of 13 seas washing the shores of Russia. The encyclopedias of the Caspian, Black and Azov, Baltic, White, Barents, Kara, Laptev, East Siberian, Chukchi, Bering, Okhotsk and Japan Seas, as well as the Arctic Ocean have been compiled and published. Simultaneously with their publication, the largest German scientific publishing house "Springer" showed interest in the publication of these encyclopedias in English and created a special book series "Encyclopedia of Seas". To date, the encyclopedias of the Black, Caspian, Aral Seas and the Eastern Arctic Seas (Laptev, East Siberian and Chukchi Seas) have been published.

Cooperation of P.P. Shirshov Institute of Oceanology and S.Yu. Witte Moscow University from Russia with the Institute of Marine Biology and University of Montenegro made it possible to compile and publish "The Encyclopedia of the Adriatic Sea" in Russian edition. The next step is to publish it in "Springer" in English. Our new idea is a compilation of the Encyclopedias of the Mediterranean seas. In addition to the Adriatic Sea we are working on the Ionian, Aegean, and Tyrrhenian seas. The compilation of the "Encyclopedia of the Ionian Sea" has been completed, and the "Encyclopedia of the Aegean Sea" is due to be compiled in 2018. "Springer" Publishing House is ready to continue cooperation on the publication of subsequent Encyclopedias of the Seas.

A.G. Kostianoy was supported by the Russian Science Foundation, grant # 14-50-00095.

Satellite Monitoring of the Black Sea Ecological Risk Areas

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Abstract

Results of multiyear monitoring of zones of persistent ecological risk in the Black Sea are presented. These ones are most affected by oil pollution, raised concentration of suspended particulate matter and harmful algae bloom.

Studies are based on satellite remote sensing data obtained over the Black Sea from 2000 to 2017. Data obtained from radar sensors ERS-2 SAR, Envisat ASAR, Sentinel -1A, -B, Radarsat 2, TerraSAR-X visible and infrared data from Envisat Meris, Landsat-5 TM, Landsat-7 ETM+, Landsat-8 OLI, MSI Sentinel-2A and Terra/Aqua Modis. An analysis of radar data indicated areas most affected by ship spills of bilge waters. Greatest polluted area were found along the main ship routes, near biggest ports and at sites of anchor positions.

It is necessery to separate anthropogenic oil pollution and oil-containing slicks caused by natural hydrocarbon seeps including mud volcanoes, natural gas and oil outflows from the sea bottom, and gas hydrates. The geographical distribution of these slicks is defined by their permanent locations that well correlate with locations of natural hydrocarbon seeps from the sea bottom in this region.

Areas characterized by increased concentration of suspended particulate matter were revealed at maps compiled from Envisat MERIS, MSI Sentinel-2A, OLCI Sentinel-3 data and Landsat colour composites. Among the most notable ones are river plume zones, first of all, those of the Danube River and mountain rivers of Georgia. Results of satellite data processing were used for detecting impacts of various natural factors, such as precipitation, rivers flows, wind-driven water circulation and vortex activity, on suspended matter proliferation. Mapping of zones of maximum propagation of suspended solids in different seasons was performed for the examined areas.

Eutrophication has recently become a very important problem worldwide. It is true also for the Black Sea, especially for its western part.

O. Lavrova and M. Mityagina were supported by the Russian Science Foundation, grant # 14-17-00555. A. Kostianoy was supported by the Russian Science Foundation, grant # 14-50-00095. Investigation of hydrodynamic processes associated with river outflows was performed by M. Strochkov with financial support by the Russian Foundation of Basic Research, grant # 17-05-00715.

Climate variability of extreme air temperature events in the Eastern Black Sea

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Abstract

The Fourth (2007) and fifth (2014) Climate Change Assessment Reports of the Intergovernmental Panel on Climate Change (IPCC) indicate that in the 21st century, climate change will be accompanied by an increase in the frequency, intensity and duration of extreme natural phenomena such as: extreme precipitation or drought and extremely high or low air temperatures. All this will lead to floods, droughts, fires, shallowing of rivers, lakes and reservoirs, desertification, dust storms, melting of glaciers and permafrost, algal bloom of seas and freshwater reservoirs. In turn, these phenomena will lead to chemical and biological pollution of water, land and air. The end result of these events is deterioration in the quality of life of the population, significant financial losses associated with damage to the housing stock, businesses, roads, agriculture and forestry, tourism, and in many cases they result in human losses.

Based on the results of re-analyzes, climatic changes in air temperature in the eastern part of the Black Sea over the period 1950-2015 were studied. For the regions of the coasts of the Krasnodar Territory and Abkhazia, the results of re-analyzes are compared. Based on this comparison, the NCEP/NCAR re-analysis was selected, the results of which are closest to the other data sources studied for the selected region.

According to the NCEP/NCAR re-analysis, climatic changes in the amplitude, frequency and duration of extreme temperature phenomena in the regions of the coasts of the Krasnodar Territory and Abkhazia over the period 1950-2015 were investigated.

Analysis of climatic changes in air temperature and the characteristics of extreme temperature phenomena in the region of the eastern coast of the Black Sea showed an increase in temperature since the mid-1970s, which accelerated in the late 1990s.

Against the backdrop of accelerating temperature growth, there is an increase in interannual variability. The increase in air temperature and interannual variability is accompanied by an increase in the amplitude, number and duration of extreme events with anomalies of the positive sign.

The study was carried out with the financial support of the Russian Foundation for Basic Research within the framework of the scientific project No. 17-55-40015_Abkh_a "Climate changes in the intensity and frequency of extreme hydrological and meteorological phenomena in the coastal zone of the Krasnodar Territory and Abkhazia".

Atmospheric disturbances in the mountains flow and the problem of flight safety in the mountains of the Republic of Adygea

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Abstract

Airflow of mountain systems as a meso -scale atmospheric phenomenon is considered. Non-linear stationary dimensional theoretical model of the flow of the North-West Caucasus mountains, taking into account the features of a real mountain terrain are presented. The results of the calculations of the air flow velocity field and general laws of occurrence and the airflow rotary-wave deformation scale over the mountains are discussed. Flight safety indicators over the mountains of the Republic of Adygea for two types of aircrafts (light-engine and speed) were calculated on the basis of the obtained data.

Atmospheric disturbances in the flow of real mountains of the Republic of Adygea were studied. For this purpose a hydrodynamic model of orographic disturbances of air flow based on the non-linear three-layer analytical model that takes into account layered gaps of stability was developed. At the same time it takes into account the vertical and horizontal atmosphere infinity. Two-dimensional characteristics of real mountains were determined from a geographical map and used in the calculations with high accuracy.

Model calculations were used to obtain motion trajectories and velocity disturbance fields in the troposphere for real range of Lira scale values in the atmosphere. Flight safety over the considered mountainous region was assessed for two types of aircrafts using the obtained disturbances. Location of high-risk areas in the space over the mountains and the way they depend on the properties of incident floatation were determined. It is shown that in certain parts of the space this danger can be critical.

Danger level of orographic disturbances near the earth's surface for the mountains of the Republic of Adygea was assessed for the first time.

he reported study was funded by RFBR according to the research project № 17-55-40015_Abh_a «Climate changes of intensity and frequency of extreme hydrological and meteorological events in the coastal zone of the Krasnodar Territory and Abkhazia»

Maykop city soil quality determination based on the analyses of soil algae and cyanobacteria content

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Abstract
The article gives the research results of Maykop city soil quality by algoindication methods. The findings suggest heavy metals and oil products soil pollution, and the beginning of the destructive process. City center is recognized to be the most unfavorable ecological district. The soil-cyanoalgosinuzii lacksdiatoms – a key indicator of oil contamination of soils and has blue – green algae dominate, resistant to oil products and heavy metals soil contamination

One of the main environmental problems of Maykop is heavy metals and oil products soil contamination. The main contribution to soils contamination level make the city transport and housing economy. The pollutants enter the soil with precipitation and plant litter, deposited from the air, directly absorbed by the moist soil.

The data algological studies suggest that destructive processes began in the Maykop soils. This is evidenced by the composition of the soil-cyano algosynusia and the number of major groups mikrofototrofs. The most disadvantage ecologically is "Central Market" district.

Spatial distribution of heavy metals content in the Belaya River ecosystem

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Abstract

The results of the research of the content and spatial distribution of heavy metals in the system "water – bottom" sediments of the Belaya River have been presented. Quantitative data have been obtained and comparative analysis of the pollution extent of various river ecosystem abiotic environments has been made. It's been shown that the nature of heavy metals vertical distribution in the bottom sediments is connected with the level of pollution and conditions of the river flowage.

Concentration of dissolved and suspended forms of the studied elements (Fe, Mn, Cu, Pb, Zn content, oxidation-reduction potential, pH, turbidity and water temperature) in water samples from different stations of the Belaya River is characterized by heterogeneity. There is a distinct tendency to increase for Fe, Mn, Zn and Cu downstream the river with the maximum concentrations in the foothill zone of the republic. Prevalence of the suspended migration form is characteristic for the studied heavy metals.

Considerable distribution unevenness on various sites of the Belaya River is characteristic to the heavy metals concentrations in bottom sediments. Practically throughout the river (except for inflows and the mouth) bottom sediments are presented by detrital and sandy material. Bottom sediments are considerably polluted with zinc and lead at Ministochnik township, Bzhedugkhabl aul and the river mouth. In the lower Belaya watercourse pollution with copper prevails.

When oxidation-reduction zonality in bottom sediments changes, the forms of heavy metals presence change too. The most mobile are the heavy metals which present in the greatest numbers in the structure of exchange and carbonate fractions and fractions of ferromanganese oxides and hydroxides. At equilibrium violation on the contact border of solid and liquid phases, first of all at pH decrease, oxidation-reduction conditions and dissolved oxygen deficiency, and also in the case of mineralization increase of the contacting water the heavy metals migratory mobility increase and their transition into water environment are possible.

In the stations with low content of heavy metals their vertical distribution is rather homogenous. In less polluted river parts flowage plays an important role in heavy metals distribution: at weak flowage (the part of the river from the Ministochnik township to the Bzhedugkhabl aul) the greatest concentrations are noted in the surface layers of 0-10 cm in comparison with the layer of 10–30 cm, and at strong flowage (Dakhovskaya village) the lowest heavy metals content in the layer of 0–10 cm, and the highest in the layer of 10–30 cm are observed.

Particle size and Fe and Mn redox-cycle along with hydrological conditions and conditions of dumping of the polluting substances are the most important factors defining heavy metals distribution in the Belaya River bottom sediments. The obtained high values of correlation coefficients testify to the important role of Fe and Mn redox-cycles in the geochemical circulation of such elements as Zn and Cu.

Regulation on bottom sediments reflects their granulometric variability, allows to reveal sources of heavy metals in the river system, to reduce the volume of chemical and analytical works at the assessment of the existing level of heavy metals load on river ecosystems, to cut down expenses on the organization of stations of continuous supervision.

The Republic of Adygea renewable energy potential assessment

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Abstract

There is the renewable energy potential estimation in the Republic of Adygea given in the abstract. The currently used methods of renewable energy potentials calculation are discussed. The analysis of the data sources and their verification are held. The calculation results of solar, wind, geothermal energy, biomass (organic waste) and energy of small rivers gross and technical potential are given. The various factual basis factors assessments are compared.

The Republic of Adygea territory, thanks to its geographical location, natural features, economy specialization has a significant renewable energy resources gross and the technical potential values. From the values of incident solar energy it - like the rest of the Russia Southern Federal District -is the most preferred district for solar energy development. Terrain developed hydrographic network provide significant hydropower potential. Agricultural production and processing industry take the leading place in the national economy, that detects the presence of significant organic waste amounts, and therefore of raw material for processing to get energy products (primarily biogas and thermal energy). Republic geothermal waters big potential allows their use both for industrial purposes and for homes heating.

Further research and pre-project development requires factors local analysis that limit the objects placement on the wind turbines (geological conditions, topography (slope surface ruggedness расчлененность), land use restrictions, environmental aspects), evaluation of wind turbine plant performance considering nonstationarity of renewable all kinds energy resources, as well as of the potential renewable energy resources in the Republic of Adygea consumers analysis.

Climate changes of the temperature of the surface and level of the Black Sea by the data of remote sensing at the coast of THE Krasnodar Krai and the Republic of Abkhazia

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Abstract

Climate changes in the Black Sea basin and its water area are reflected in changes in the main parameters of the sea state: sea level and sea surface temperature (SST). To study these changes, satellite altimetry and radiometry data were used that allow analyzing the spatial-temporal variability of the interannual rate of change of these parameters over a long time interval.

To study the spatial-temporal variability of the rate of SST climatic variability used remote sensing data for two intervals in 1982-2015 and 1993-2015. The results of the study showed that over the time interval 1982-2015 that the SST near the coast of the Krasnodar Krai increase at an average rate of 0.079±0.005 °C/yr, and the coast of the Republic of Abkhazia at a rate of 0.072±0.002 °C/yr. At the same time, the growth rate of SST decreased from the Kerch Strait (0.082 ° C/yr) to Adler (0.076 °C/yr), and along the coast of the Republic of Abkhazia decreased from Adler (0.076 °C/yr) to Ochamchira (0.071 °C/yr).

In the shorter time interval of 1993-2015, which coincided with the time interval for the study of the rate of measurement of the Black Sea level, the rate of change in SST also decreased in the direction from the Kerch Strait to the border with Georgia.

The results showed that for the time interval of 1993-2015. Sea level off the coast of the Krasnodar Krai increase at an average rate of 0.29±0.03 cm/yr, and the coast of the Republic of Abkhazia - at a rate of 0.27±0.02 cm/yr. The rate of increase in the level of the Black Sea increased from the Kerch Strait (0.28 cm/yr) to Adler (0.31 cm/yr), and along the coast of the Republic of Abkhazia, on the contrary - decreased from Adler (0.31 cm/yr) Up to Ochamchira (0.24 cm/yr).

The reported study was funded by RFBR according to the research project № 17-55-40015_Abh_a «Climate changes of intensity and frequency of extreme hydrological and meteorological events in the coastal zone of the Krasnodar Territory and Abkhazia».

Theoretical Basis for a Non-Expensive Experiment for Proving or not Green-House Effect

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Abstract
The simplest theoretical basis is proposed for proving or not green-house effect. It is hypothesized that a colder object cannot increase temperature of a warmer, by only radiation. A chip experimental set up is described.

Determination of the Seasonal Water Quality of Aksu Creek (Giresun), Turkey

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Abstract

Aksu Creek, with 752 km^2 watershed, 61 km main channel length and 129.4 km diameter length, is important water source in the close vicinity of Giresun. Some water quality and sediment parameters of the Aksu Creek were determined by taking monthly samples. The means obtained data were as follow; dissolved oxygen; 9,85 mgL^{-1}, pH; 7,47, temperature; 12,52°C, salinity; 0,14 ppt, TDS; 0,191 gL^{-1}, conductivity; 290 $mScm^{-1}$, ORP; -93,1 mV, $BOİ_5$; 2,7 mgL^{-1}, total alkalinity; 115,47 mgL^{-1}, total hardness; 156,47 mgL^{-1}, chlorophyll-a; 7,58 ugL^{-1}, TAN; 0,73 mgL^{-1}, ammonia; 0,002 mgL^{-1}, nitrite; 0,011 mgL^{-1}, nitrate; 1,354 mgL^{-1}, chloride; 0,44 mgL^{-1}, total phosphate; 0,672 mgL^{-1}, SRP; 0,045 mgL^{-1}, TSS; 2,954 gL^{-1}. Additionally, Sediment organic matter % and pH were averaged as 3,92 % and 7,4, respectively. Obtained data showed that the water quality of Aksu Creek may suitable for agricultural activities and may be a suitable living habitat for the living beings and getting into the category of mild contaminated according it's average total phosphate rate of 0,56 mgL^{-1} and nitrite rate of 0,011 mgL^{-1}.

The Analysis Of Protein, Lipid, Moisture, Ash And Heavy Metal Some Fish Species Consumed In Giresun

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Abstract
This research is conducted to determine the levels of protein, lipid, moisture, ash and heavy metals in the muscle tissue of five different species of fish consumed in Giresun. Heavy metal values in the muscle tissues of the five fish species have been measured by ICP-MS device (Inductively Coupled Plasma-Mass Spectrometer). The average values (%) of protein, lipid, moisture and ash in fish species are analysed seasonally and it is respectively as follows: 12.71, 3.91, 74.68, 1.40 during the winter months and 14.73, 2.21, 78.81, 1.12 during the summer months. The research shows that there is an increase of fat and ash during winter and a decrease in protein and moisture levels. Heavy metal values (ppm) in the muscle tissues of fish are as follows; Cr: 0.861-0.350, Mn: 1.203-2.262, Fe: 27.076-75.789, Co: 0.001-0.075, Ni: 11.581-18.617, Cu: 1.125-4.507, Zn: 19.318-48.061, Cd: 0.004-0.044, Pb: 1.935-4.486, These values are compared to the daily intake which can be tolerated by humans beings. As a result, this study shows that the heavy metal concentration in the five fish species that are found and sold in Giresun is below the daily intake level that can be tolerated by human beings.

Heavy Metals In Wild Mushrooms From Black Sea Region

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Abstract
The study investigated the heavy metal levels in edible mushrooms species collected from Black Sea Region. Six wild mushroom species were investigated from twenty one stations. Iron had the highest concentrations in all examined species in all stations. All samples were analyzed (as mg kg^{-1} dry weight) three times for cobalt, chromium, copper, iron, manganese, nickel, lead and zinc by ICP-MS. A logarithmic transformation was done on the data to improve normality. One way ANOVA and Duncan's multiple range tests were performed to test the differences among metal levels of sites. The differences among metal levels in stations were statistically significant ($p<0.05$). Maximum Provisional Tolerable Weekly Intakes (PTWI) in edible mushroom species were calculated and assessed for human health.

Effects of ecological factors on the chemical composition of essential oils of *Eucalyptus camaldulensis* (Myrtaceae) from Montenegro coast

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Abstract

In the current study the essential oil obtained from the leaves of *Eucalyptus camaldulensis* plants collected from five localities of the Montenegro coastline was analyzed. The oil yield varied from 0.63 % (Kotor) up to 1.59% (Tivat). The chemical composition of the leaf essential oil was analyzed using GC-MS technique. Monoterpene hydrocarbons were a major class of compounds. Among them, dominant compounds were p-cymene (17.38-28.60%), β-phellandrene (12.35-14.47%) and β-pinene (0.94-11.48%). The second largest group was oxygenated monoterpenes with cryptone (4.97-7.25) and terpinene-4-ol (2.75-4.21%) as predominant. Besides high content of sesquiterpene alcohol spathulenol (7.83-14.15%) was found. According to the results obtained *E. camaldulensis* from Montenegro can be classified in the chemotype with low 1,8-cineole and high p-cymene and cryptone ratio.

It should be pointed out that in the same plant species the quantity and composition of ethereal oil varies depending on environmental conditions (ecological factors). The quantity of distilled water, temperature conditions, light, characteristics of the land on which the plant grows has a significant impact on the qualitative and quantitative properties of the plant.

Subchronic acrylamide exposure induces inducible nitric oxide synthase expression in endocrine pancreas

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Abstract

Acrylamide is a widespread industrial chemical with recognizedcarcinogenic, mutagenic, neurotoxic and endocrine disruptive effects on living organisms. The aim of our study was to examine effects of acrylamide on inducible nitric oxide synthase (iNOS) expression in endocrine pancreas using immunohistochemical method.

Juvenile male Wistar rats aged 23 days at the beginning of the experiment were subchronicly (three weeks) treated with 25 mg/kg or 50 mg/kg body weight of acrylamide. Formalin-fixed paraffin-embedded pancreatic tissue was cut into 5 μm thin sections and immunostained with anti-iNOS antibody. The amount of iNOS in immunostained sections was determined using Windows based ImageJ program (ImageJ, Version 1.50f). We measured the optical density (OD) of immunolabelediNOS, since OD is proportional to the concentration of the stain.

Immunostaining of iNOS in the pancreatic sections showed cytoplasmic iNOS immunoreactivity in majorityof endocrine cells of endocrine pancreas. AA treatment led to significant dose-dependent increase of OD of immunolabelediNOS in islets of Langerhans.

Obtained results indicate that acrylamide, by inducing iNOS expression, exerts a potentially toxic effect on the endocrine pancreas.

Methane emission from small lakes of estuarial and lagoon type

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Abstract

Lakes cover significant part of land surface in many regions. In the course of last decade, for adequate simulation of energy, moisture and momentum exchange between atmosphere and hydrologically heterogeneous land surface, lake models have been introduced into many Numerical Weather Prediction systems and Earth system models (ESMs). This caused significant regional impacts on simulated weather and climate. Simultaneously, it was important to identify differences in the performance of lake model formulations involved.

Meanwhile, a broad empirical evidence has been collected, arguing that inland freshwaters are a globally important component of carbon cycle due to emitting methane and carbon dioxide). Moreover, a positive feedback can be expected between global warming and greenhouse gases (GHGs) emissions from lakes, at least through lakes' temperature. Evidently, pure empirical data analysis is very limited in its capability to quantify contributions of a variety of physical and biogeochemical processes to lakes' GHG fluxes, and climate-lake feedbacks. A need for process-based lake biogeochemical models resulted in emergence of first models of this kind, potentially capable to represent biogeochemical ties between lakes and climate system, if included in ESMs. However, a number of problems arise, considering the lake-atmosphere coupling that are partially addressed in this paper. These problems can be divided into two groups: in-lake processes and the energy and gas transfer in the atmospheric boundary layer above. In inhomogeneous landscapes (*e.g.*, lakes surrounded by forest), the latter problem becomes even more intricate.

The small lakes of estuarial and lagoon type may be a source of methane to atmosphere . Evidence of this is the increased air methane concentration in lagoon lakes region at White sea and above the estuary of the Bolshoy Viluy river.

The Bolshoy Viluy is the estuarine type lake with strong stratification in density and temperature. The depth of mixing layer is 2,5 m. Subsistence of hydrogen sulphide and numerous bubbles on the surface suggest the existence of methane emission from lake. In this paper thr results of experimental study of air-gas exchange are presented.

The increased air methane concentrations (2-2.2 ppm) were observed for the time of experiments. At night time regular increasing of methane concentration was recorded. It is connected with the night methane emission from lake.

Estimations of waterside buoyancy fluxshowed that the high methane fluxes coincided with convective periods. Waterside convection might enhance the transfer velocity and consequently enhance the diffusive flux.

The linear fit to the data shows no strong effects of wind speed and pressure increases. Conversely, there seems to be a weak increase in CH_4 fluxes with increasing temperatures. For incoming solar radiation the linear fit has again a very low explanatory power (low R^2) and hence CH_4 fluxes do not seem to depend on the amount of incoming solar radiation.

Condition of Natural Resources of the Regional Park Dragišnica and Komarnica with the Assessment of their Sustainable Valorization

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Abstract
The area of research is the zone of low, medium and high mountains and ridges with canyon and cliff valleys, that are mainly cut into mesozoic limestones, belonging to the municipality of Savnik. The dissection of the relief of this area is especially emphasized with the uneven width and height of the mountain ridges, limestone valleys and the Komarnica and Grabovica valleys.

The canyon valley of Komarnica prevales, with developed processes of disintegration, dispersal and landslides of rock masses on the Boljska and Komarska shafts.

The area is differentiated into different altitudes, from the valleys of the rivers Komarnica and Grabovica through the karst pasture areas to the tops of mountains and ridges with valuable leafy and coniferous forests on their slopes.

The area of Dragisnica and Komarnica should be viewed and treated as an area with different economic interests that would be achieved through the development of hiking- sport-recreational tourism, ecotourism, agriculture ... It should be emphasized that any kind of use of natural resources must be organized on the principle of sustainability. The possibility for future application to the funds was identified as a particular advantage for the establishment of this regional park, which would be used to provide funds for certain activities.

Prolonged and Fractionated Steam Distillation Methodology for Essential Oil Extraction

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Abstract

Steam distillation is known to be the most prevalent method of essential oil extraction from plant material. Despite many studies on extraction methods, there is no report about the impact of distillation process duration on oil yield, its quality, as well as its chemical composition and related biological variability.

A systematic, prolonged and fractionated isolation was applied to a selection of 30 different plants. The aim was to develop a 24-hour extraction system in terms of different harvesting and extraction times.

Essential oils have been isolated by direct steam distillation procedure separating the oil at interval times of 1, 2, 3, 6, 12 and 24 hours.The obtained fractions were subjected to both GC-MS analysis and antimicrobial activity evaluation.

Great impact of phenological stage on chemical profile was observed. In certain cases, the antimicrobial activity has been found to be heavily influenced by this factor. When it comes to the duration, prolonged distillation gives chemically more diverse samples, which is often followed by alternations in their biological variability.
On the basis of the studies presented, it can be concluded that there is no rule concerning the appropriate extraction duration: it is directly dependent on what the study is conducted for.

Monitoring of bacteriological water parameters from drilling and wells of Shkoder city

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Abstract
The inhabitants of the city of Shkoder, besides the water supply, use also water from wells and drillings for drinking. The purpose of this article was to present the bacteriological quality of waters from drillings and wells used from inhabitants of Shkoder city. Water quality problems of wells and drilling waters can often be linked to: drilling and wells depth, construction deficiencies, selecting the wrong place, or the presence of cracks, channels and caves formations. Monitoring for the presence of pathogenic bacteria is essential assessment of water quality, which directly or indirectly use leads to serious health problems of man. Problems that come from drinking waters are numerous, because the consumption of contaminated water can be: abdominal typhoid, gastroenteritis, dysanteries by pathogenic bacteria, parasites etc. Fresh water is essential for human life and in general, it is an essential input to human production and to the economic development. Water pollution is not only a serious environmental issue but also an economic and human health problem. Water samples from drilling and wells were collected according to European recommendations and WHO legislation. The bacteriological parameters measured were: *Escherichia coli, Enterococcus faecalis etc.* The bacteriological parameters were carried out at the Centre for Microbiological Diagnostication, "Wolfdieter Sixl", Albania.

Assessment organochlorine pesticides in Velipoja ground waters

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Abstract
Due to their lipophilic nature, hydrophobicity, and low chemical and biological degradation rates, organochlorine pesticides (OCPs) have led to their accumulation in the biological tissues and subsequent magnification of concentrations in the organisms due to the progression up the food chain. A survey for the possible contamination of underground water by organochlorine pesticides (OCPs) was carry out in the year 2015. The water samples were collected 11 domestic wells in the area. The water samples were collected in cleaned glass bottles and refrigerated at 4 °C until chemical analyses. The samples were extracted by using L/L extraction. The chemical analyses were performed in gas chromatograph equipped with micro electron capture detector (GC-μECD). A number of pesticides as heptachlor, HCB, DDTs were detected. In general, the levels of some individually OCPs in the study area for groundwater are still within EU Directive for ground water. The hexachlorobenzene and lindane were the most problematic pollutants with higher concentrations. The total concentration of the OCPs ranged from 0.5-3.1 μg/L.

Accumulation of heavy metals in the leaf of *Plantago lanceolata* L.

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Abstract

Plant material *Plantago lanceolata* L. was collected in 4 sites in the area of Podgorica in August 2015. in order to determine the content of heavy metals: Lead (Pb), Cadmium (Cd), Arsenic (As), Mercury (Hg), Copper (Cu), Nickel (Ni), Manganese (Mn), Zinc (Zn), Chromium (Cr), Selenium (Se), Cobalt (Co), Molybdenum (Mo), Strontium (Sr), and Antimony (Sb). For determination of heavy metals was used method of atomic absorption spectrophotometry. The content of the studied metals decreases in the following order: Mn> Zn> Sr> Cu> Cr> Ni> Pb> Sb> Co> Mo> Se> Cd> As> Hg. The maximum value of the tested metals is determined at two locations close to the source of pollution and traffic: Mn (125 mg kg^{-1}), Zn (73 mg kg^{-1}), Cu (14.5 mg kg^{-1}), Sr (36 mg kg^{-1}), Cr (7.8 mg kg^{-1}), Ni (7 mg kg^{-1}) at the location of L2 (near Tobacco Factory), and Pb (3.75 mg kg^{-1}), Cd (0.27 mg kg^{-1}) at the location of L1 (Boulevard of Ivan Crnojević).

Lichen *Candelaria concolor* (Dicks.) Stein as bioindicator of air pollution in Podgorica (Montenegro)

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Abstract
Lichen *Candelaria concolor* (Dicks.) Stein, which was collected on the barks of deciduous trees, has been used as bioindicator of atmospheric pollution in Podgorica. Method of atomic absorption spectrophotometry was applied on selected lichen species in order to determine heavy metals content: lead (Pb), iron (Fe), cupper (Cu), zinc (Zn) and chromium (Cr). Values of lead (Pb) content ranged from 0.017 to 0.099 mg/kg, of iron (Fe) from 12.959 to 25.780 mg/kg, of cupper (Cu) from 0.168 to 3.100 mg/kg, of zinc (Zn) from 0.239 to 1.151 mg/kg and of chromium (Cr) from 0.023 to 0.078 mg/kg of dry matter. Results of this research indicated the highest concentration of heavy metals on localities close to city centre, with car traffic as dominant source of air pollution.

Sensitivity of the Black sea bioluminescence field structure to sea surface temperature anomalies

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Abstract

A relatively thin mixed layer of the Black sea makes its ecosystem to be extremely vulnerable under the impact of the climate change and anthropogenic influence. A time-depended bioluminescence field (BF) is formed due to extensive development of bioluminescent dinoflagellates.

Seasonal and interannual variability of phytoplankton community and generated bioluminescence field were studied using the results of six-year monitoring (2009-2014) in the coastal zone near Sevastopol which involved bioluminescence registration and phytoplankton sampling in 60m-depth upper layer every month.
In addition, satellite-derived sea surface temperature (SST) data at the sampling point and long-term standard measurements at the nearest meteorological station (30 years long) were used. From these datasets pronounced monthly SST anomalies were extracted. Pronounced monthly SST anomalies were shown to induce taxonomic restructuring of phytoplankton community and changes in BF structure.

Typical vertical BF profiles showing seasonal dependency of dinoflagellates distribution in a water layer and the effect of surface temperature anomalies on it were described.

Application of modern technologies of data collection in the geoecological research

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Abstract

With the development of modern technologies (sensors and platforms) for mass data acquisition (LIDAR and UAV) has created conditions for the development of accurate and up-to-date geospatial base for all kinds of research and design. Geospatial data can be collected in different time periods, even when it comes to large areas and terrain that is inaccessible for conventional measurements.

Advantageous embodiments including multiple technologies in a "multitasking" system, wherein the filtration and processing of huge amounts of extractable base geodata spatial form is of importance for the geoecological studies. Substrates that can provide this advanced technology, refer to the digital ortho-photo plan and three-dimensional point cloud optimalne- centimeter spatial resolution.

The paper gives an overview of possible applications of such technologies, especially laser scanning, with the acquisition and analysis of geoecological data. These methods are primarily directed to substrates that are used in solving the practical problems, especially in the process of assessing the condition and potential geoecosystem.

The technology is based on the use of mobile platforms to capture and use the data laser scanner, GNSS receiver, inertial navigation systems and digital cameras with high resolution and the use of unmanned aircraft.

Temporal and spatial distribution of zinc in the lake ecosystems

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Abstract

The use of aquatic plants as an indicator of water ecosystems is based on their ability to "absorb" the pollutants (heavy metals, chemical substances and the like.). The aim of this study is to determine the ratio of the content of metals from sediment-water-plant and monitor their distribution and adoption of the plant (root, stem, leaf).The aquatic macrophytes *Phragmites australis*,*Ceratophyllum demersum* and *Lemna minor* were used as bioindicator plant species in order to define contamination level by Zn in Skadar Lake (Montenegro). Plants, water and sediments were tested for the content of Zn at six locations around Lake Skadar in four different seasons of year. The content of Zn in the examined sediment was in the range of 47.6-135 mg/kg dry weight. The largest proportion of Zn, based on the total amount of the sediment, is incorporated into the crystal lattice of minerals (residual fraction).The concentration of Zn in the studied macrophytes declined in the following order: *L. minor* >*C. demersum* >*P.australis*. The highest average content of Zn was detected in the root of *L. minor* (97.8 mg/kg) in October.

Water Quality of River Crn Drim

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Abstract

In aim to determine water quality of River Crn Drim (and its significant tributaries) between Lake Ohrid and Globocica reservoir, onto ten localities during 2011, bacteria from ecological and sanitary aspect, qualitative and quantitative composition of phytoplankton, Chlorophyll *a*, basic physic-chemical parameters and heavy metals were investigated. For all analyses were used standard limnological methods.

On the basis of obtained results it can be concluded that investigated localities are under different human impact. Received results of these investigations indicate that water of the treatment plant outflow (treated wastewater) is typical sewer water with high values of all investigated microbiological and chemical parameters. Domination of the bacterial indicators from a sanitary aspect points to fecal sewer waters. According to the obtained results and criteria for the water categorization, the water quality of the investigated localities varied from II to V class. Parameters from ecological aspect had relatively low values in the water of Lake Ohrid outflow which is characteristic for relatively clean waters. Higher values in the other localities mainly are results of anthropogenic influence (discharge of municipal wastewater from the villages directly into the rivers, without any treatment, rich in nutrients, pollutants and bacteria). In these investigations large difference in the phytoplankton composition during the River Crn Drim flow were not indicated. Chlorophyll *a* concentration was similar to the phytoplankton density. In whole flow of River Crn Drim high chlorophyll a concentration were not determinedd.The tributaries of River Crn Drim (Belicka, Dzepinska, Susica and Vevcanska) are high polluted.

Heavy metals influence on the ctenophores *M. leidyi* and *B. ovata* bioluminescence

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Abstract

Investigations were conducted in the Department of biophysical ecology of Kovalevsky IMBR of RAS in September - October of 2013 and 2015. The body length of the gathered for experiments ctenophores was 35 – 40 mm. Characteristics of the ctenophores light emission were studied under the mechanical and chemical stimulations, with the usage of laboratory complex "Svet". The following HM salts: Cu_2S0_4, $ZnCl_2$, $PbCl_2$ and $HgCl_2$ in different concentrations were used in our experiments. The just-caught samples, contained in the clean marine water were used as a control. The exposition time was 1, 3 and 24 hours under the temperature of 21 ± 2°C.

The investigations results have shown considerable variability of the ctenophore luminosity characteristics in dependence of metal concentration and exposition duration. It was stated that minimal concentrations of cooper, zinc and mercury stimulates ctenophores bioluminescence and the high ones inhibit. The alien ctenophore luminescence inhibition was registered under the lead activity under all investigated concentrations. We can place investigated metals as following: Zn < Cu < Hg < Pb, according to the force of the toxic influence on the ctenophore bioluminescence. Thus, alien ctenophore bioluminescence parameters can serve as a sensitive express-indicator of the resistance degree to the heavy metals impact and be the expressive index of the marine environment regional pollution.

The Impact of Atmospheric Precipitation (rainfalls) on the Sea-Surface Microlayer in the Sevastopol Coastal Waters (Crimea, The Black Sea)

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Abstract

Rain drops that pass through the atmospheric boundary layer dissolve some components of aerosols, including organic and inorganic compounds, spores, cysts, and microorganism assemblages. The influence of rainfalls on fluctuation in chemical characteristics and biodiversity in the sea-surface microlayer (SSM) was investigated in 2014−2016. In samples of rain-water and SSM:
pH values and salinities were measured bymeans of "Sansion-5" (Hitachi)
anionic surfactants were determined by spectrophotometry
chemical elements were quantified by the neutron activation method.

The phototrophic microbiotataxonomic diversity was investigated by direct light microscopy after incubation of samples at natural solar illumination. The connection was established between the level of rainfall contamination by surfactants and they accumulation into SSM. In rain-water pH values varied from 4,2 to 8.2. As a result, the pH value and salinity in SSM were decreased by 11–15% after storm and prolonged rains. Seasonal and interannual variability of dissolved in rain-water Sr, Se, Cu, Zn, Mo and Ba concentrations associated with the direction of the prevailing rainy winds. Cyanophyta (genera Synechococcus, Microcystis) and Clorophyta (genus Closterium) were capable of growth both in rain water at salinity 0.0–0.7‰, and in SSM (range of salinities 17.0−18.5 ‰).

Monitoring of waterfowls during the wintering time in the ROSPA0063 Buhusi – Bacau – Beresti Dam Lakes (Romania)

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Abstract

Part of Nature 2000 network, the ROSPA0063 Buhusi – Bacau – Beresti Dam Lakes is situated around the confluence of Siret and Bistrita Rivers, including five large dam lakes: Lilieci, Bacau, Galbeni, Racaciuni and Beresti, which cover a surface about 5600 hectares.

Our field monitoring activities began during the 2011' spring and are still on-going, including not just these five lakes but also the northern Garleni Lake for which we prepare the documentation to be included in the Nature 2000 site. Our monitoring is part of the management plan for this area, giving support to the caretaker in order to elaborate and implement the most appropriate conservation measures.

We present the dynamic of specific diversity and effectives of waterfowls during the whole wintering season for the last eight years. This area shelters large groups about thousands and tens thousands of waterfowls in migration, but also during the wintering time. Part of lakes and surrounding canals are not frozen completely during the coldest winters. The suitable habitats cover different surfaces on the five lakes, so the diversity and effectives of waterfowls are different from one location to other. The greatest diversity was recorded on Lilieci Lake, while the biggest waterfowl populations were recorded on Racaciuni and Lilieci Lakes.

The ecological condition of coastal waters off the Heracles Peninsula (Crimea, the Black Sea)

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Abstract

The results of the long-term monitoring of coastal waters off the Heracles Peninsula (Crimea, the Black Sea) are presented. The abiotic and biotic parameters, indicating the ecological condition of the coastal zone, have been studied. The following parameters have been measured by standard methods: water temperature, illuminance, concentration of particulate matter, organic matter, primary production, intensity of biotic reproduction of particulate matter, phytoplankton and meroplankton species diversity, abundance, and biomass, as well as shell morphometrics and sex ratio in mussel *Mytilus galloprovincialis* Lam. It has been found that upwelling water circulation is typical for the coastal waters off the Heracles Peninsula. The mean annual sea surface temperature over the study period 2000-2016 proved to be 2,7°C higher than that in the early 20th century. The maximum values of phytoplankton primary production are associated with inner waters of coves and with increased T_{water} and E_{max} values. A reduction in phytoplankton and meroplankton diversity and a dominance of eurybiontic species have been recorded from the waters subject to anthropogenic impacts. The most pronounced shift of sex ratio toward predominance of *M. galloprovincialis* males and a high mussel H/L shell index are observed in waters with increased technogenic load. The taxonomic structure of phytoplankton and meroplankton, sex ratio, and morphometric parameters of bivalves are the sensitive tools of ecological monitoring to assess the condition of the surrounding aquatic environment.

Evaluation of water quality in littoral zone of Prespa Lake by using phytoplankton as an indicator

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Abstract

Prespa Lake, one of the world's ancient lakes is a very unique ecological and hydrological system that over the past years has faced serious environmental challenges such as pollution and eutrophication. Littoral zone of the lake is most exploited zone; hence water quality in this zone is very important. Aim of the study was to evaluate water quality in this zone by using phytoplankton as an indicator. Algal samples, from 5 sampling points were collected and analyzed, during the period April 2014 –March 2015, with monthly dynamics. Two biodiversity indexes, Shannon and Simpson, were calculated in order to estimate the changes in biodiversity of phytoplankton. Highest biodiversity indexes were calculated for October 2014, on all sampling points. Ezerani sampling point has continuously lowest biodiversity indexes during investigated period, compared to the rest of the points. This locality is dominated by one or two species. Lowest biodiversity indexes were calculated in August 2014 (on tree localities) and in March 2015 on (four localities). Species that dominate in the zone belong to the divisions Cyanophyta and Bacillariophyta, mainly characteristic for meso-eutrophic waters, according to Palmers index. According to biodiversity indexes and determinated species, water in littoral zone, during this study was meso-eutrophic.

Nutrients as an indicator of the quality of waste water

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Abstract

Household waste waters mainly consists of biodegradable organic materials. The basic parameters- indicators for these waters are BOD_5, COD, TSS and nutrients (nitrogen N and phosphorus P). Concentration of pollutants in waste waters depends of quantity of delivered and consumend waters per capita and day. Some polluters can have the hazardous or potentially hazardous effects on ecosystem and human helath. Presence of nutrients in communal waters is mainly linked with organic materials, which increases a presence in ecosystem, leads to increasing of primary production, known as eutrophication proces.

Results of the analysis indicate that the load of waste water TN 120 kg/day, TP 10 kg/day, BOD_5 570 kg /day, COD 810 kg/day, TSS 420 kg/day. These waste water should be pre-purified before being discharged into the water system or adequately discharged.

Influence of communal waste waters discharge on local sea ecosystem

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Abstract

Discharge of communal waste waters frequently is the main pollution source of coastal waters, as its recipient. Much more bigger amount of waste waters, also related pollution, has discharged by Trašte outfall. Waste waters are non treated. In regular conditions and correct operation of submarine infrastructure, emitted pollution would be most probabely distributed at savefull way, without significant impact to the sea ecosystem, because high depth, direct contact with open sea waters and capture and transport of pollution by dominant sea currants. Determined damage of the pipe at cca 1500m, conditions discharge of waste waters much more closer to the coast and at lower depth (20m), practicaly in the middle of the bay, so the pollution has transformed under quite other circumstances. In these circumstances, pollutatnts distribute around the bay, where concentrated and transformed in accordance with phisical and biochemical egularities.

Content of major and trace elements in *Origanum vulgare* L. and *Origanum heracleoticum* L. and their extracts

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Abstract

For the majority of the world population, medicinal plants represent the primary source of the health care. Origano is aromatic, medicinal and spice plant. Numerous studies have demonstrated antibacterial, antifungal, antiviral and antioxidant properties of the origano, due to which is widely used in traditional medicine. For this reason and because of the high standards in terms of product safety leads to the need to examine the contents of essential and toxic elements in plants.

In this work, content of sixteen elements including major (Al, Ca, Fe, K and Mg) and trace elements (As, Ba, Cd, Co, Cu, Cr, Mn, Ni, Pb, Sr and Zn) in the *Origanum vulgare* L. and *Origanum heracleoticum* L. and their extracts (water and ethanol) was determined. The samples of plants were obtained from Institute for medicinal plant research „Dr Josif Pančić". Concentrations of the elements were measured by using the instrument ICP-OES.

In both plants (*Origanum vulgare* L. and *Origanum heracleoticum* L.) the most common major elements were K and Ca and the most common trace elements were Ba, Mn, Sr and Zn. Concentration of Ni and As were below the detection limit of instrument.

In water extracts of both plants the most common major elements also were Ca and K, and the most common trace elements were Mn, Sr and Cu. Elements such as Zn (in both samples) and Al (in *Oreganum heracleoticum* L.) were below the detection limit of the instrument.

In ethanol extracts of both plants the most common major elements were K, Ca and Mg. The most common trace element was Sr. Elements such as Ba, Zn and Cr (*Oreganum vulgare* L.) and Fe (in both samples) were below the detection limit of the instrument.

Based on the results it can be concluded that the higher content of most metals was in the water than in ethanol extract.

Determination of essential and toxic elements in Montenegrin honeys

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Abstract

Honey is the important food for human consumption because it has valuable nutritional and medicinal properties. Honey is the complex natural product, whose characteristics depend on the flower nectar from which it is obtained, but also on other factors such as geographical origin, bee species, season, type of processing and storage. The content of minerals and heavy metals have a major impact on the quality of honey.High standards in terms of product safety leads to the need to examine the contents of essential and toxic elements in honey. In this study fourtheen elements (Pb, Cd, As, Cu, Zn, Fe, Cr, Co, Sr, Ba, Ca, Na, K, Mg) contents were determined by ICP-OES in honey from 21 location in the surrounding of Podgorica, Plužine and Pljevlja. The samples were collected from individual beekeepers in August 2015.

Potassium, calcium, magnesium, sodium and iron were the most abundant elements in samples from all three regions. The concentrations of toxic elements (Pb, Cd, Sr, Ba) were low (samples of honey in the surrounding of Pljevlja) or below the detection limit of the instrument (samples of honey in the surrounding of Podgorica and Plužine) but without risk to human health. So, from the point of essential and toxic elements contents all samples of honey were of good quality.The recommendation is to continue to control the content of heavy metals in the samples of honey from investigated areas and from other areas of Montenegro.

Assessment of Metal Pollution in Boka Kotorska Bay

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Abstract

Contents of seven heavy metals, Cd, Cr, Cu, Hg, Ni, Pb and Zn, were determined in mussel samples collected in Boka Kotorska Bay, Montenegro, in order to evaluate their levels in different locations and seasons in this important area of Adriatic Sea. Sampling was performed in the fall of 2014, winter, spring and summer of 2015 at three locations in Boka Kotorska Bay. Freeze-dried soft tissues were digested with HNO_3 and H_2O_2 in closed vessel microwave digestion system under high temperature and pressure (Anton Paar, Multiwave PRO). Concentrations of Cd, Cr, Cu, Ni, Pb and Zn were determined by inductively coupled plasma-optical emission spectrometer (ICP-OES, Spectro Arcos) and Hg was determined by Direct Mercury Analyzer (Milestone, DMA-80). The obtained results were compared with their maximum allowable concentrations (MAC), as well as with results that were obtained in *Mytilus galloprovincialias* in other areas of Adriatic Sea. Although metal contents in mussels from Boka Kotorska were mostly lower than permitted limits for *M. galloprovincialis,* there weresome minor exceptions mainly for essential elements. However, the results are within the range of values commonly found in other areas of Adriatic Sea.

Acknowledgment
This work has been supported by the Ministry of Science of Montenegro and the HERIC project through the BIO-ICT Centre of Excellence (Contract No. 01-1001).

Bioaccumulation of trace elements in muscle tissue of six fish species from Skadar Lake (Montenegro)

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Abstract

The concentrations of trace elements (Mn, Zn, Fe, Cu, Ni, Cr, Co, Hg, Pb, Cd and As) were determined in 255 muscle samples of six fish species with different feeding habits (*Alburnus scoranza*, *Cyprinus carpio*, *Rutilus prespensis, Scardinus knezevici, Perca fluviatilis* and *Anguilla anguilla*) from Skadar Lake (Montenegro). For all analyzed elements, concentrations were compared with fish age and fish biometric data (total length, fresh weight and condition factor). This study is the first such survey in fish from Montenegrin lakes. The results showed the highest concentrations of essential elements (Zn, Fe, Mn and Cu), while concentrations of Pb and Cd were the lowest in all fish species analyzed (i.e. Zn>Fe>Mn>Cu>Hg>Cr>As>Ni>Pb>Cd). Concentrations of trace elements in fish muscle showed variation in a range typical for waters without considerable anthropogenic impact, since all investigated elements were below maximum permitted levels of recognized international standards. Therefore, all analyzed fish species could be recommended for human diet. Significant inter-species differences in accumulation of investigated elements were found for Mn, Zn, Fe and As. The total metal accumulation (MPI index) was the highest in roach and the lowest in perch. Significant relationships between metal accumulation and fish age and size were established for essential elements, while the absence of clear relationships for non-essential elements could be attributed to their small percent of detection (i.e. very low number of samples where these elements were detectable). Similar situation was observed in case of inter-metal relationships. Having in mind intensive agricultural activities in the regions around Skadar Lake as well as the continual pollution of the lake by communal and industrial wastewater, further studies are needed for better understanding of the trace metals bioaccumulation mechanisms in fish of Skadar Lake.

Experimental Application of the Antibiotic on the Deteriorated Mural Frescoes ofthe Post byzantine churches in central Albania

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Abstract

Biodeterioration of mural frescoes and all other paintings by different biological reasons, and particularly by *Aspergillus niger* and other *Aspergillus* species fungi has been proved in different mural paintings in central Albania. Along with environmental factors the biodegradation lead to nowadays serious damages of Post Byzantine churches. In our previous approaches the effect of fungion mural frescoes, the mechanism of factors interaction has been considered, but there was no solution with out causin gasi deeffect on paintings or other structures of the churches. In this paper we are presenting the first experimental application with a treatment by antibiotic "*6penthylα pyronephenol*" was applied as a successful technique for elimination of *Aspergillus niger* and other *Aspergillus* species. On the other hand, it is favorable for cleaning surfaces of murals executed by tempera technique from the fungi metabolism which caused black pigments on surfaces.

Physical - geographical Characteristics of Lower Zeta

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Abstract

The Lower Zeta Basin is located in the central part of central Montenegro. The geographic coordinates of this area are 18º 56 'and 19º 45' east longitude and 42º 27 'and 42º 45' north latitude. The bottom of the valley of the Zeta River, Bjelopavlica Plain, is located predominantly at 45 - 50 m.n.v. And it accounts for 25% of the total territory of the municipality of Danilovgrad. The largest part of the Danilovgrad municipality is the mountainous terrain.

The southwestern valley side consists of the slopes of the mountain Garča with its highest peak (Milunova Bobija 1436 m.n.v.), and the northeastern valley side of the slopes of the mountain of Prekornica whose highest peak (Kula 1927 m.n.v).

The area of the explored area belongs to the morphological whole of the synclinorium of the Duga, Valley of Niksic and valley of the River Zeta. The terrain of the Lower Zeta can be divided into three parts: the valley bottom of the Zeta River, the left and the right lowest slopes.

In the Bjelopavlić Plain the influence of the Mediterranean climate is dominant, slightly modified, which means that the area is characterized by long, hot and dry summers, while winters are relatively mild and rainy.

Effects of acrylamide subchronic treatment on porto-biliary spaces of Kiernan in rat liver

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Abstract

Acrylamide (AA) is a toxic monomer, used to synthesize polymers for industrial and laboratory processes. The aim of our study was to investigate potential toxic effect of acrylamide on porto-biliary spaces of Kiernan in rat liver using light microscopic stereological method.

The investigation was conducted on adult male Wistar rats aged 65 days at the beginning of the experiment. Thirty rats were divided into three groups, one control and two groups subchronically treated with 25 mg/kg bw and 50 mg/kg bw of AA during three weeks. Stereological analysis of porto-biliary spaces was performed on 5 μm thick liver sections stained withhistochemical staining technique. Volume densities ofblood vessels, interlobular bile ducts and connective tissue of porto-biliary spaces of Kiernanwere determined using multipurpose test grid (M42).

Stereological analysis showed a dose-dependent increase of volume density of blood vessels and significant decrease of volume density of interlobular bile ducts in group treated with AA dose of 50 mg/kg bw. AA application did not affect volume densitiy of connective tissue.

Observed increase of volume density of blood vessels indicates that AA exerts hepatotoxic effect by induction of vasodilation. Furthermore, toxic potential of AA is manifested by interlobular bile duct volume reduction.

Organochlorine pesticide residues, organic matter and lipolytic bacteria in sediment samples from two natural lake's in Macedonia, Lake Ohrid and Lake Dojran

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Abstract

The highest potential for an unintentional negative effect of pesticides is through the contamination of the hydrological systems, as well as the flora and fauna that live in them, which, together with abiotic factors, comprise the food chain in those systems. Organochlorine pesticides as members of the persistent organic pollutants group, with their properties such as: toxicity, lipophilicity, stability and bioaccumulation pose a potential risk to the environment and all living things, including human as the top link in the trophic food chain. Once introduced into the water ecosystem, the persistent organic substances forever remain in it. They are introduced in the living organisms through the food or are accumulated on suspended particles, and due to their high affinity for binding to organic matter,they eventually accumulate in sediments that are a secondary source of contamination. Sediments represent the source of organochlorine components both for the water and the living organisms through their redistribution in the aquatic system, thus sediments can represent long-term pollutants.

The purpose of this paper is to show the correlation between the content of the total recorded organochlorine pesticides and organic matter and the number of lipolytic bacteria in the sediment samples collected from the littoral zone of two natural lakes in Macedonia, Lake Ohrid and Lake Dojran. The conclusion from the research results is that the highest values for all parameters analyzed were recorded in sediment samples collected from Lake Dojran. This is because of the different trophic state of these two lake ecosystems. Lake Ohrid is oligotrophic ecosystem, while Lake Dojran shows eutrophic character. It can also be concluded that the content of the registered organochlorine pesticides is positively correlated with the content of organic matter and the number of lipolytic bacteria in the sediment samples of the surveyed sites.

Antimicrobial activity of fennel (Foeniculum vulgare Mill.) seeds essential oil

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Abstract

Fennel (*Foeniculum vulgare* Mill.) is annual, biennial or perennial plant belonging to family Apiaceae. Fennel is known since antiquity as a medicinal and aromatic herb, commonly used in liqueurs, breads, fishes, salads and cheeses.

The drug consists of the dry, ripe, whole cremocarps and mericarps (commonly called seeds), which contain essential oil whose major constituents are the phenylpropanoid derivatives. The oil is used as an ingredient of cosmetic and pharmaceutical products for its balsamic, cardiotonic, digestive and tonic properties.

Essential oil from ground fennel seeds, growing wild in Montenegro, was isolated by hydrodistillation in order to determine yield, composition and antimicrobial activity. In order to evaluate the antimicrobial activity of the fennel essential oil following microorganisms were used: *Bacillus cereus*, *Staphylococcus aureus*, *Salmonella enteritidis* and *Escherichia coli*.

In this study fennel essential oil yield was 4.1vol% while GC/MS analysis revealed major compounds in oil trans-anethole, fenchon and methylchavicol.The highest activity of fennel essential oil was observed against *S. aureus* and *E. coli*.Presented results in this study confirm that plant molecules have significant antibacterial activity and therefore can be used as antimicrobial agent.

Acknowledgments
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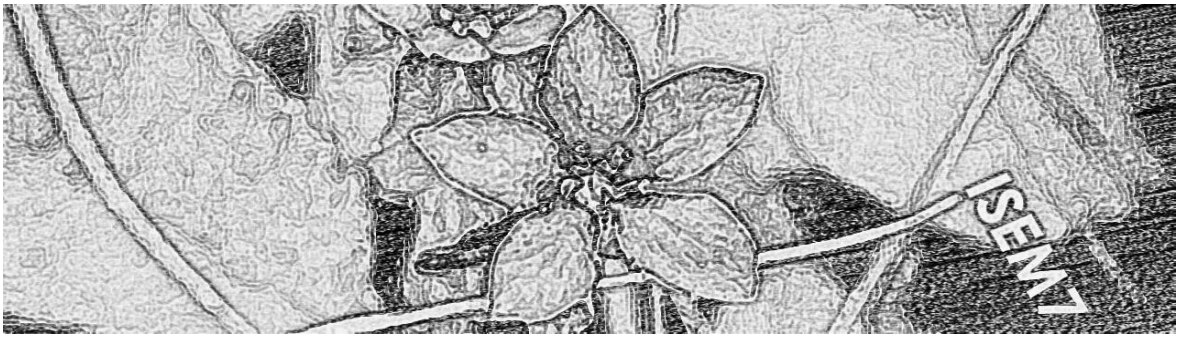

FORESTRY AND AGROECOLOGY

Soil Erosion in Iran: State of the Art, Tendency and Solutions

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Abstract

Soil erosion mirrors the complex interactions among living and non-living elements in a watershed system. Any type of imbalance in watershed components leads to unexpected and unwished outcomes causing loss of infrastructures and investments. Different figures from 0.8 to even 7 billion tones have been given on soil erosion rate in Iran, progressively increased during last decades. Untimely erosive rain, high potential sensitivity of resources, improper infrastructures development, land use changes, and unlawful/over exploitation of resources are the main reasons behind ever-increasing soil erosion. However, many attempts made by authorized organizations and agencies could simply brake down the high rate of the erosion. In the present article, it was aimed to report some managerial approaches for minimizing the soil erosion-related problems towards developing integrated watershed management approach in Iran.

Calculation of Sediment Yield in the S2-1 Watershed of the Shirindareh River Basin, Iran

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Abstract
Soil erosion by water as a natural process can occur in all climates and zones and change all landforms. As the measuring of soil erosion is costly and time consuming process, dozens of erosion prediction models have been developed and the aim of the majority of all of them is to predict average rates (often an annual average rate) of soil loss from an area such as a plot, a field or a catchment/watershed under various land management techniques. On the other hand, outflow is the most important element of the hydrological cycle and that is why it is important to determine it as accurately as possible by measuring and predicting. Therefore, the IntErO (Intensity of Erossion and Outflow) model based on the EPM (Erosion Potential Method) method was used for calculation of outflow and sediment yield in the S2-1 watersheds of Shirindareh River Basin in the Northeast Iran with the area of 46.77 km^2. According to the results, the predicted peak discharge was 101 m^3 s^{-1} for the incidence of 100 years and the specific sediment yield was 267 m^3 km^{-2} $year^{-1}$. According to the previous studies and topographic characteristics, the river basin watershed belongs to the V category and has very weak erosion. The results of the present study and previous experiences of the other researchers revealed that the IntErO model can be used to estimate soil loss in the other regions similar to Shirindareh River Basin.

Quality of surface water in the agricultural district Lonja field (Croatia)

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Abstract
The objective of this study was to estimate the impact of land use on the surface water quality. Water samples were collected in the main drainage channel, in the agricultural area of Lonja field, Croatia. Lonja field is the largest protected wetland in both Croatia and the entire Danube basin. It extending along the river Sava and the lower course of the river Lonja. Sampling was performed during the spring months in 2016 and 2017. Investigation was done through the measurements of physicochemical and chemical indicators: pH value, biochemical oxygen demand (BOD), concentration of oxigen, nitrate, phosphate, metals (Zn, Pb and Cd), dissolved organic carbon (DOC), and surface active fraction of DOC. The obtained results were compared with the those of the Lonja and Sava rivers (the sampling was conducted in the same period). The significant higher concentrations of DOC (up to about 22 mg/L) has been observed in the water from main drainage channel. It is known that, high DOC concentrations in surface waters have negative effects on the water quality and water habitats. Additionally, on the basis of the surfactant activity normalized to the organic carbon content, it is concluded that saturated fatty acids are the significant constituent of DOC.

Combating harmful rodents in forest plantations oak saplings

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Abstract
In the renewal process, the action of human disturb the forest ecosystems, and forming conditions for the smooth development of certain species of rodents. In the beginning of the recovery of forest areas, in the condition where the readily available sources of seed material or herbaceous plant cover the rich nutrients, to favor the development of small types of rodents, especially mice or representatives voles.

We performed testing the effectiveness of the preparation on the basis of the active substance difenacoum for the application in the forests in the category of four the number of rodents. Tested is a rodenticide Ratak Forst, difenacoum (0.005%), as granular bait GB compared to the composition BRODISAN-A in pellet form, bromadiolone (0.005%). The experiments were performed according to the method EPPO Standard (2004) in a randomized complete block design with four replications on two localities. The main plot size was 20x20 m2. The baits were exhibited in an amount of 30 g (one bag) in commercially available plastic boxes. Presently there are 105 boxes per plot, or a total of 420 boxes of preparation.

The results show that a tested Ratak Forst (76.46%) and the standard preparation BRODISAN-A (79.85%) exhibited very good efficacy in the control of rodents.

Significant damages caused by Alternaria leaf spot on Savoy cabbage in Montenegro

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Abstract

In January of 2016, significant damage to a crop of Savoy cabbage (*Brassica oleracea* L. var. *sabauda*) was observed in the locality of Botun near Podgorica. There were 12-13 000 plants (cultivar 'Siberia') planted in the beginning of August, 2015 at a plant spacing of 35 cm in rows and 75-80 cm between the rows. Most of the plants were affected with the disease, significantly reducing the yield.

Symptoms were most evident on the lower leaves, with yellowing mainly on the leaf edges and with the appearance of circular yellow to grey-brown spots on the leaves. Merging of the spots led to necrosis that caused stunting and wilting of leaves.

By examining and analysing the collected samples in the laboratory of the Biotechnical Faculty, the disease was identified as Alternaria leaf spot (*Alternaria* spp.). Microscopic analysis revealed that the fungus had septate, light brown hyphae and club-like brown conidia with several transversal and longitudinal septations, typical for *Alternaria* species.

Alternaria leaf spot is a common disease of Brassicacae, but this is the first time that the disease has been observed on crops of Savoy cabbage in Montenegro. Taking into account the damage caused by the disease, it is necessary to apply integrated protection measures that include the use of healthy seeds, crop rotation, removal or incorporation of infected plant debris into the soil and the application of appropriate fungicides in order to manage the disease in an economically and environmentally sound way.

Powdery mildew of zucchini (*Cucurbita pepo* L.) in a greenhouse in Montenegro

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Abstract

At the end of April 2017, during a visit to a greenhouse close to Podgorica where zucchini (*Cucurbita pepo* L.) was being grown, symptoms of leaf yellowing and ashy spots were observed. These spots consisted of powdery fungal colonies which measured about 1cm in diameter. The beginning of necrosis, especially at the leaf edges, could also be observed. Symptoms of the disease were found on the lower and middle leaves, and only on upper leaf surfaces. At the time at which symptoms were observed, the zucchini plants were in the flowering stage.

After analysis of the collected samples in the laboratory of the Biotechnical Faculty in Podgorica, it was confirmed that zucchini was infected by a powdery mildew pathogen. Microscopic examination revealed barrel-shaped, hyaline conidia borne in chains and with no fibrosin bodies. Based on symptoms description, host plant, fungal conidia and literature data, the pathogen has been identified as *Erysiphe cichoracearum*.

The disease is more prevalent if zucchini is grown indoors than in the open field. Besides zucchini, the disease can be found on pumpkins, cucumbers, watermelons, melons and potatoes, so it is very necessary to monitor the disease and its potential spread in Montenegrin agricultural area. In neighbouring countries plant protection products with active ingredients such as the following: sulphur, isopyrazam, kresoxim-methyl, meptyldinocap, trifloxystrobin + tebuconazole and others, are used in order to control the disease.

Acknowledgement: This research was conducted within the program on vegetable health protection with monitoring of pesticide residues in 2017, supported by Directorate for Food safety, Veterinary and Phytosanitary Affairs of Montenegro.

Land Consolidation in Bulgaria – Useful Foreign Lessons in Efficient Land-Use Management

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Abstract

Land consolidation is a consistent goal of the land policies worldwide. It is one of the basic permitting conditions for achieving adequate spatial structure of the agricultural territory and optimizing of the land relationships. Land consolidation is actively promoted in the developed countries like the USA, Australia, Germany, Netherlands, Denmark, etc., and in some countries in transition – namely in Poland, Slovakia, Hungary, etc. By considering large dimensions of land property, good logistics and good transportation connections, land consolidation enables implementation of high field production technologies, predisposes good environmental quality, and opens the way of foreign and national investments in land.

The paper analyzes the current economic structure of the rural households in Bulgaria and the tendencies of its development. The need in land consolidation is motivated and some current and future land consolidation projects are presented. A summary and a review of the legal regulations of land consolidation in Bulgaria are presented too. The enabling and hindering conditions for applying of some effective foreign approaches to land consolidation are revealed and discussed.

Morphological variability of sweet chestnut (*Castanea sativa* Mill.) in the municipality of Kozarska Dubica (Republic of Srpska)

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Abstract
Sweet chestnut (*Castanea sativa* Mill.) has its optimum in a moderate, warm and humid climate of the Mediterranean and Sub-Mediterranean regions and grows on acid soils. The areal of this species confined to the Balkan Peninsula is interrupted and the origin of chestnut forests in particular areas is not yet explained. The main goal and purpose of the work is a comparative morphological analysis of *Castanea sativa* populations in the municipality of Kozarska Dubica (Republic of Srpska), where the chestnut forest is indigenous. A total of 11 morphological characters (length of leaf petiole, length of the leaf blade, width of leaf blade, the distance from the base of a leaf blade to the widest part of the leaf blade, total leaf length, fruit length, fruit width, the thickness of the fruit and fruit weight) were used for morphological analyses. Descriptive statistics of morphological characters, analysis of variance (ANOVA), principal components analysis (PCA), discriminant analysis (CDA) and cluster analysis (UPGMA) were used to test the hypothesis on morphological segregation of groups of populations. Results suggest that populations of *Castanea sativa* in the municipality of Kozarska Dubica overlap, indicating a very low expressed discrimination between studied populations.

Developing Ecosystem Indicators for Characterization of the Water Budged Processes and Assessment of the Conditions in the Agroecosystems

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Abstract

The agricultural land in Bulgaria covers more than 50% of its territory and contains some of the most valuable natural country resources. Nevertheless, the national agricultural production has as low contribution to GDP as approximately 5 %, due to inefficient policy, bad management of land use, and lack of data for sufficient estimation of the land potential. Except for provisioning, the farmland (i.e. the agroecosystems) in Bulgaria generates lots of regulating and maintenance ecosystem services which are of particular importance. For that reason, the need for implementation of the contemporary ecosystem services concept in land management is constantly growing. This concept is an indispensable tool for assessment of the ecosystem state for the purpose of management of the natural resources. The quantitative estimation and valuation of the ecosystem services helps modern ecology and the related sciences or application fields in management and territories planning. Assessment and mapping of the ecosystem services are priority tasks of the United Nations (since 2000 until now) and of the European Commission (under Action 5 of the EU Biodiversity Strategy 2020).

The paper presents the selection process of certain indicators for estimation of the state of the agroecosystems in Bulgaria by using the DPSIR approach (Driving Forces, Pressures, State, Impacts, and Responses). The group of the ecosystem processes related indicators that characterize the water budget is concerned. The selection of indicators supports the analysis of the possibilities for provision of a database on a national and regional (or municipal) level in connection with assessment of the agroecosystems' state in Bulgaria and the ecosystem services that they provide. The latter will be a basis and a corrective for sustainable land management measures.

The Assessment of the Soil Erosion and Runoff in Katete river Catchment. Malawi

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Abstract
Soil loss is a serious environmental challenge in worldwide, however, it continues to receive little attention in developing countries. In view of that, this study presents the application of the of the Erosion Potential Method (EPM) embedded in the Intensity of Erosion and Outflow model (IntErO) in the Catchment Area of Katete river in Malawi. The river is one of the major tributaries of Lilongwe river which supplies water to Malingunde dams as such it was the underlying assumption of this study that runoff and soil loss within its catchment area has to be assessed. This is the first application of the EPM models in estimating runoff and soil loss intensity in Malawi. This model required for first a mapping of the factors that influence soil loss, such as the land use, the type of ground, the lithology, the topography and the climatic and meteorological distribution of the data. The model permitted evaluation of the contribution of watershed characteristics towards surface run-off and soil loss. The results of this study has revealed that there is intense erosion in catchment area of Katete river. Accordingly, the study has unraveled factors that greatly influence soil loss, this will provide reasonable land Management direction. The study has also demonstrated that the IntErO model is a relevant and useful tool for determination of soil loss and run-off in parts of Malawi with similar conditions to Katete catchment area.

The technology of production of jams in Montenegro

Odalović, A., Hadžić Aida
Biotechnical Faculty, Podgorica

Abstract

In Montenegro, as well as in the region of the focus is placed on the food and therefore the processing of fruits and vegetables. In the late 20th and early 21st century in Montenegro has increasingly become fruit and striving for more modern production methods to ensure the production of finished products of good quality that can be placed outside the borders of our country. This is the case in the factory for fruit "Pirella" at Danilovgrad, which produces in addition to the wide range of juices and the production of various kinds of jam (stirred jams of apricot jam, peach, jam cherry and jam fruits of the forest). The first is a private company in Montenegro, which has implemented ISO 9001 and HACCP system.

Tests were carried out in the factory "Pirella" in Danilovgrad. For the purposes of our research in 2013 and 2014, we monitored and described in detail the technological process of production of jams following ingredients produced from canned fruits thereof (sugar, porridge of these types of jam, citric acids (E330), gelling agents (E440) and dry matter content. Since the nutritional value per 100 g of the product, by standard laboratory methods, we have found (energy value, fats, proteins and carbohydrates), as well as the organoleptic properties of said final product.

All tests of mixed fruit jams, apricot, peach, cherries and berries in its composition contained 67.0% added sugar, fruit pulp of the dominant, citric acids (E330), and a gelling agent, ie. pectin (E440). The energy value of the examined species jam ranged from 1125 kJ (269 kcal) for jam from cherry to 1190 kJ (284 kcal) for apricot jam. The fat content was lowest in mixed marmalade 0.17 g, and the highest in apricot jam from 0.41 g. A similar tendency has been determined and to protein content, where the biggest value will have been established at the jam of 0.59 g cherry, and the lowest with the jam of 0.19 g of the peach. The carbohydrate content was quite uniform and varied in the range from 65.0 to 68.5 g. Organoleptic properties of the tested fruit jam are characteristic of the materials from which they originate.

Stereological analysis of the thyroid gland in alcoholic rats

Emilija Nenezić
Department of Biology, University of Montnegro

Abstract

The effect of chronic ethanol consumption on the structure of thyroid gland follicles was the subject of our studies. Mature male Wistar rats were given 15% ethanol solution ad libitum as the only liquid offered. The animals were sacrificed in five groups: one, ten, twenty, thirty and forty days after the beginning of alcohol ingestion. Stereological analysis showed a significant increase in the volume density of follicular epithelium /Vve/, its thickness /t/, index of activation of the thyroid gland /Ia=Vve/Vvc/, and significant reduction in volume density of colloid /Vvc/ in all the periods examined. These results suggest the possibility that long-term alcoholism can disturb the normal structure of the thyroid gland, besides its well-known effects on the peripheral metabolism of thyroid hormones.

The thinnings proposal in artificially established stand of Weymouth Pine (*Pinus strobus* L.) in the area of Čelinac in Republic of Srpska

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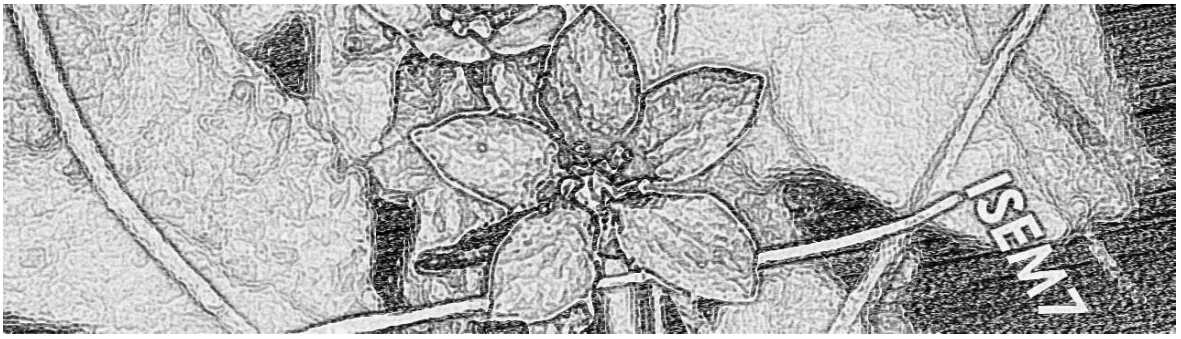
[3] Faculty of Forestry, University of Banja Luka

Abstract
The paper presents results of research on the effect of selective thinning in artificially established stand of Weymouth pine in the area Čelinac, in the habitat of *Carpino-Quercetum petraeae cerridis* B. Jov. et Tom. 1980 woodlands on pseudogley on sandstones and cherts. The stand is 45 years old, it was founded by dense planting and silviclTural measures was not conducted. After studying the environmental conditions of habitats, phytocenological research, bio-ecological characteristics of species, development level and stands structure, development of dominant trees and stands quality, a selective thinning was conducted along with isolation of the trees of the future on the basis of specific silvicultural purposes. Tree marking was done in accordance with known silvicultural principles of positive selection. The spatial distribution of trees and horizontal projection of the crown of trees for the situation before and after thinning in the studied stand was done with software SVS-Stand Visualization System (McGaughey, RJ, 2002).



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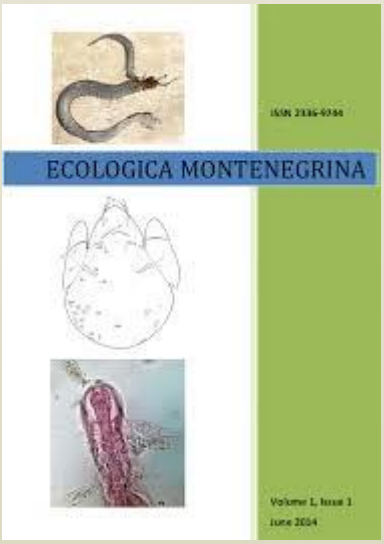

The ***Animal Ecology Research Group*** *(headed by Prof Vladimir Pešić) is based in the Department of Biology, University of Montenegro. Our research strengths cover hydrobiology and ecology, from both pure and applied perspectives. Our current research projects include the ecology, biogepgraphy and taxonomy of macroinvertebrates and ecology of spring habitats and intermitent streams.*

In 2004, our Research Group formed Centre for Biodiversity (from 2016 ***Institute for Biodiversity and Ecology****) as non-profit independent organisation of international experts in biodiversity and ecology. Main objective of the Animal Research Group is is to create and foster the network of leading biodiversity experts through the provision of services and products to members, including conferences, publications and support for member groups. In addition, to represent the views of members in national and international forums aimed at advancing best practice in biodiversity and ecology research.*

Activities of the Ecology Research Group include publishing of scientific journal ***Ecologica Montenegrina*** *and organization of scientific Symposiums (International Symposium of Ecologists of Montenegro-* ***ISEM****) and Workshops, providing information services for society's members, as well as cooperation and exchange of information with other similar national or international associations.*

http://www.ucg.ac.me/pmf/aerg

Faculty of Economics - University of Montenegro

The Faculty of Economics celebrated its 57th anniversary this year, and it is the oldest higher education institution in the country. Since its establishment, 8,630 students graduated at our Faculty.

Today, Faculty of Economics is a largely interdisciplinary institution, characterized by expressed dynamism in its work. Employees at the Faculty are dedicated to constant improvements and enhancements, all in accordance with the needs brought by the changes.

We provide our students with the best theoretical and practical knowledge, enabling them to develop critical spirit in approaching economic phenomena and solving concrete problems in daily work. From September 2017, at the Faculty, the new generation will start a 3 + 2 + 3 study, which will improve the quality of studying.

Development of Faculty of Economics in the coming period will follow the vision of development of the University of Montenegro, pursuing full achievement of its mission. Comprehensive literature, contemporary authors and works have always been imperative in creation of new academic directions at Faculty of Economics, which will form the basis of our future.

Faculty and its employees are dedicated to developing interest in strengthening the entrepreneurial initiative, creative and interdisciplinary approach among young people, using modern teaching and research methods. In this regard, the Faculty has modern textbooks and adequate IT technology, which supports the objectives set.

Ecologica Montenegrina is peer-reviewed, open access journal in which scientific articles and reports are quickly published. The papers are in the fields of taxonomy, biogeography and ecology. The journal is fee-free for the contributing authors.

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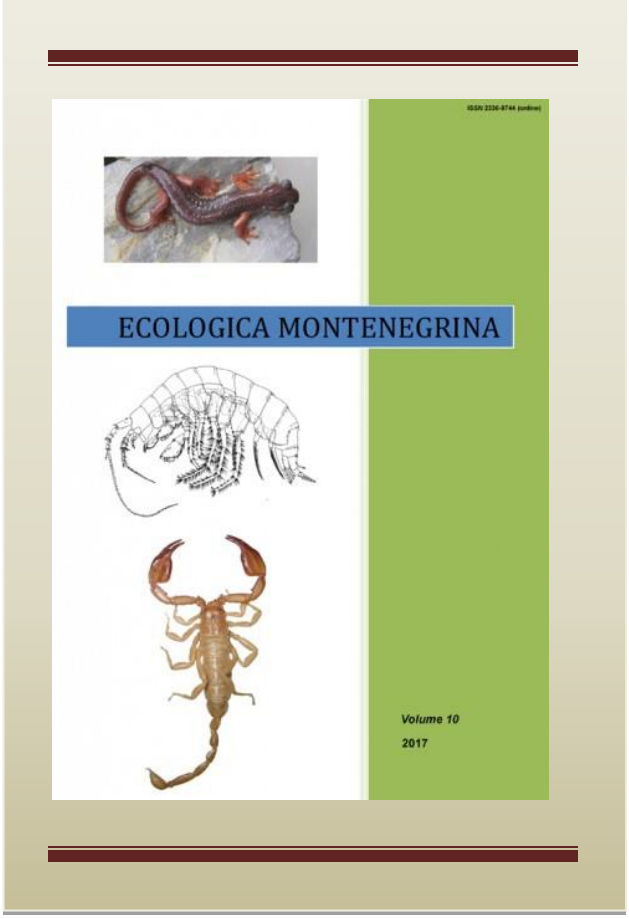

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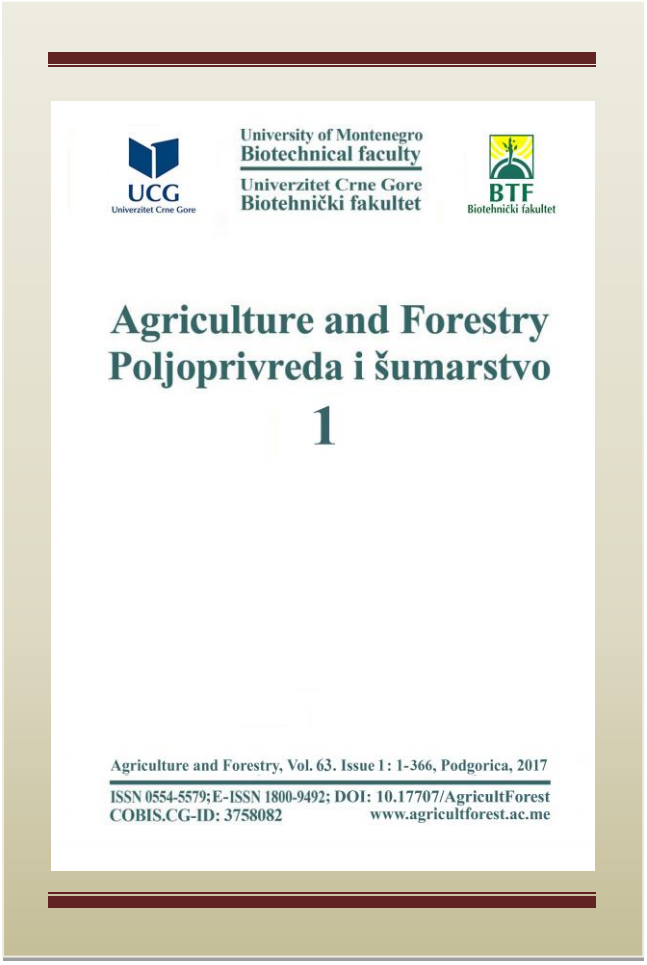

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First issue of our Journal is published on 1955 and is publishing quarterly (4 issues per year). The publisher is the Biotechnical Faculty of the University of Montenegro.

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Dr Milić Čurović,
Editor in Chief of the Journal
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