



# DELTA AND WETLANDS

(BOOK OF ABSTRACTS)

No. 8

Tulcea - 2022



MINISTRY OF RESEARCH, INNOVATION AND DIGITIZATION  
„DANUBE DELTA” NATIONAL INSTITUTE  
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# **DELTAS AND WETLANDS**

## **(Book of Abstracts)**

# **Vol. 8**

## **2022**

## **Tulcea**

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## „Deltas & Wetlands” DDNI Scientific Event Community, 29-th edition Deltas & Wetlands International Symposium (hybrid event)

Tulcea, June 01 - 05, 2022

- ✓ **June 01, 2022 (Wednesday)** - Arrival of participants
- ✓ **June 02, 2022 (Thursday)**
  - 9.30 - 10.00 - Registration of participants (*Romanian time*)  
Venue: „Mihail Kogălniceanu” City Hall - 20 Păcii Street, Tulcea County Council
  - 10.00 - 10.30 - **Opening ceremony (Dr. Biol. Marian TUDOR, General Director of DDNI)**
  - 10.30 - 11.30 - **Keynote Speakers**
    - **Dr. Róbert - Eugen SZÉP \*** - Danube Delta Regional Monitoring Integration in ICPDR TNMN - TransNational Monitoring Network
    - **Prof. Dr. Angheluță VĂDINEANU** - Long-term retrospective and prospective views on the dynamics and governance of the local and regional coupled Nature and Society Ecological Complexes (NSEC), nested in the Romanian part of the eastern Lower Danube River sub-catchement: A focus on Danube Delta Biosphere Reserve (*Edaphic-Bloom Danube*)  
**Awarding the title of Researcher Emeritus from DDNI Tulcea**
  - 11.30 - 11.45 - *Coffee break*
  - 11.45 - 13.00 - **Section I, Biodiversity & nature conservation, natural resources & Socio-economic aspects**

<ul style="list-style-type: none"> <li>➤ <b>Convener: Prof. Dr. Siniša OZIMEC</b></li> </ul>	<ul style="list-style-type: none"> <li>➤ <b>Co-convener: Dr. Gabriel LUPU</b></li> </ul>
<ul style="list-style-type: none"> <li>11.45 - 12.00 Prof. Dr. Siniša OZIMEC, Dragan PRLIĆ</li> <li>12.00 - 12.15 Daniela HOLOSTENCU, Adela AMBROSIMOV, Elena TAFLAN</li> <li>12.15 - 12.30 Prof. Dr. Alexandru-Ionuț PETRIȘOR, Arh.-Urb. Liliana Elza PETRIȘOR</li> <li>12.30 - 12.45 Prof. Dr. Elchin Hafiz SULTANOV *</li> <li>12.45 - 12.55 Dr. Manuela Sidoroff</li> <li>12.55 - 13.10 Dr. Viktória MIKLÓSOVÁ *</li> </ul>	<ul style="list-style-type: none"> <li>Biodiversity monitoring in the Aljmaš floodplain near the Drava-Danube confluence (eastern Croatia)</li> <li>A glance on the molecular identification of Danube Delta aquatic macroinvertebrates</li> <li>Urban ecology: state-of-the-art in Romania</li> <li>The results of winter counts of birds in Azerbaijan in 2022 winter</li> <li>DANUBIUS-RO, insights on implementation of european and regional strategies to sustain the development of transitional zones</li> <li>Case Study: Landscape management of the Little Danube</li> </ul>
  - 13.10 - 14.30 - **Lunch & Networking** (*Delta Hotel Tulcea, 2 Isaccei Street*)  
Venue: „Toma Caragiui” Conference Room - 2 Isaccei Street, Delta Hotel Tulcea
  - 14.30 - 16.30 - **Conservation of biodiversity in wetlands - endangered habitats and species, International Symposium**  
(Measures to ensure a favorable status of protection and conservation of habitats and endangered species in DDBR in an international context - Large Infrastructure Operational Program, Project code 123621)  
Venue: „Mihail Kogălniceanu” City Hall - 20 Păcii Street, Tulcea County Council
  - 14.30 - 15.30 - **EDAPHIC-BLOOM - Danube Delta Stakeholders Meeting**  
**- Green Deal Challenges - Decarbonising Danube Delta: 3D Initiative**

Parallel events



**Convener: Prof. Dr. Florin NEMȚEANU**

**Co-convener: Dr. Eng. Valeriu VILAG**

14.30 - 14.45 Magdalena-Andreea STRACHINESCU-OLTEANU

Mission Ocean of Horizon Europe - Work Programme 2022 and the Implementation Charter

14.45 - 15.00 Dr. Iuliana NICHERSU

Innovations in Regional Decarbonisation - 3D Working group strategy

15.00 - 15.15 Dr. Delia DIMITRIU, Dr. Emilia PECHEVA

Building a Framework towards Netzero Mobility in Danube Delta

15.15 - 15.30 **Discussions**

**Q & A**

- 15.30 - 15.45 - *Coffee break*

**Venue: Avramide HOUSE, 32 Progresului Street, Tulcea**

- 16.00 - 17.30 - **Posters presentations & PICO - Innovative business approaches**

Mihaela APOSTOL \*

New technologies to manage environmental challenges

Juergen RAIZNER,

Networking through Technology Transfer. Creating Synergies for Multiplying Forces when it comes to connect academic and business environment

Roxana - Ștefania BOBORUȚĂ

Călin HUMA, Nicholas

Independent drinking water unit - PAQUA VIDA

SCOTT

Emi Mihaela COȘERU

Support services for SMS's offered by IPA SA Bucharest - Galați Subsidiary / Enterprise Europe Network

- 19.00 - **Festive dinner** (Delta Hotel Tulcea, 2 Isacsei Street)

✓ **June 03, 2022 (Friday)**

**Venue: „Mihail Kogălniceanu” City Hall - 20 Păcii Street, Tulcea County Council**

- 09.00 - 10.30 - **Keynote Speaker**

- **Bart FOKKENS:** The EU Biodiversity Strategy making river and wetland restoration mainstream (*Edaphic-Bloom Danube*)
- **Dr. Valeria ABAZA:** State of marine and coastal environment in 2021
- **Dr. Radu MUSCALU:** Exploitation of fish stock in artificial pools. Business management and planning in aquaculture

**Venue: „Dobrogea” City Hall - 20 Păcii Street, Tulcea County Council**

09.30 - 13.00 - **Parallel event: Organic, sustainable, regenerative agriculture practices in Danube Delta (EDAPHIC-BLOOM Danube)**

- 10.30 - 15.00 **Venue: „Toma Caragiu” Conference Room - 2 Isacsei Street, Delta Hotel Tulcea ANADROM Conference**

**Venue: „Mihail Kogălniceanu” City Hall - 20 Păcii Street, Tulcea County Council**

- 10.30 - 11.00 - **Section II, Environmental factors. Ecological restoration and Anthropic Impact**

➤ **Convener: Dr. Iulian NICHERSU**

➤ **Co-convener: Dr. Ștefan RĂILEANU**

10.30 - 10.40 Dr. Ștefan RĂILEANU

Fires, ticks and epidemiological aspects in the spread of diseases to wild and domestic animals on the territory of the Danube Delta

10.40 - 10.50 Dr. Enikő Anna TAMÁS,  
Dr. Béla KALOCSA

Changes in the hydrological regime of the middle Danube reach and its implications on the lateral connectivity and the reconstruction of floodplains

10.50 - 11.00 Dr. Octavian PACIOGLU, \*  
Florin DUȚU, Ana B. PAVEL, Laura TIRON  
DUȚU

The influence of hydrology and sediment grain-size on the spatial distribution of macroinvertebrate communities in two submerged dunes from the Danube Delta



- 11.00 - 11.10 - **Coffee break**
- 11.10 - 11.40 - **Keynote Speaker**
  - **Prof. Dr. Costel NEGREI:** Evaluation of the Impact of the Royalty on the Fishery Resource (*EDAPHIC-BLOOM Danube*)
  - **Tunde KALLAI \*** : Climate-resilient low-cost measurement technologies and in-situ datasets for heterogeneous Earth systems
- 11.40 - 12.10 - **Section III, New Research approaches in EU climate change challenge. Neutral carbon 2050**
  - **Convener: Conf. Dr. Raluca Georgiana LĂDARU** ➤ **Co-convener: Dr. Marian MIERLĂ**

11.40 - 11.50	Prof. Dr. Costin LIANU, Prof. Dr. Irina Gabriela RADULESCU, Drd. Cosmin LIANU	Decarbonization business models and challenges at the level of companies, farmers, business associations and clusters
11.50 - 12.00	Drd. Oliver LIVANOV	The organic carbon content from the Danube Delta soils. Results from the 2021 field campaign
12.00 - 12.10	Dr. Victoria MOCANU, Dr. Sorina DUMITRU, Dr. Cristian PĂLTINEANU	Assessing carbon sequestration and possible greenhouse gas emission within the Danube Delta soils
- 12.10 - 12.30 - **Keynote Speaker**
  - **Prof. Dr. Detlef GÜNTHER-DIRINGER:** ArcGIS Web Application of the Lower Danube / Danube-Delta (*EDAPHIC-BLOOM Danube*)
- 12.30 - 13.00 - **Sect IV, Geographical Information System and Application System Modeling**
  - **Convener: Prof. Dr. Detlef GÜNTHER-DIRINGER** ➤ **Co-convener: Drd. Cristian TRIFANOV**

12.30 - 12.40	Dipl.-Ing. (FH) Konrad BERNER	VR-application of planned dike-opening
12.40 - 12.50	Dr. Svetlana SEGĂRCEANU, Dr. Romulus CHEVERESAN	Acoustic detection of Danube Delta bird species in the framework of SMARTSENSE project
12.50 - 13.00	Adrian PASAT	PIMEO AI - a platform for environmental monitoring of the aquatic sensitive environments
- 13.00 - 14.30 - **Lunch & Networking** (*Delta Hotel Tulcea, 2 Isacsei Street*)
  - **Venue: „Toma Caragiu” Conference Room - 2 Isacsei Street, Delta Hotel Tulcea**
- 14.30 - 15.30 - **Conservation of biodiversity in wetlands - endangered habitats and species, International Symposium** (Measures to ensure a favorable status of protection and conservation of habitats and endangered species in DDBR in an international context - Large Infrastructure Operational Program, Project code 123621)
  - **Venue: „Mihail Kogălniceanu” City Hall - 20 Păcii Street, Tulcea County Council**
- 14.30 - 16.00 - **Invasive Alien Species Observatory Network - IASON International Conference**
- 16.00 - 16.10 - **Coffee break**
- 16.10 - 17.45 - **EDAPHIC-BLOOM DANUBE, Danube Delta Stakeholders Meeting - Green Deal Challenges - Decarbonising Danube Delta: 3D Initiative**
  - **Convener: Dr. Delia DIMITRIU** **Co-convener: Dr. Iuliana NICHERSU**

16.10 - 16.20	Prof. Dr. Margarida COELHO *	Challenges and opportunities for a smart and sustainable mobility in Port cities
16.20 - 16.30	Prof. Dr. Liana CIPCIGAN	Decarbonising transport through electrification
16.30 - 16.40	Teodor FROLU	Soft mobility in Danube Delta - solution for sustainable development



16.40 - 16.50	Dr. Iulian NICHERSU	3D - Agriculture Pillar
16.50 - 17.00	Dr. Eng. Valeriu VILAG	3D Energy - Capturing existing knowledge for future initiatives aimed at meeting local Danube Delta needs
17.00 - 17.10	Ana BRĂILEANU	Climate change mitigation: the role of circular economy in Danube Delta to reduce carbon footprint in several sectors
17.10 - 17.20	Dr. Raluca NICOLAE	The impact of climate change on the biodiversity components in the Danube Delta
17.20 - 17.30	Valentin MOLDOVEANU	3D Cross - Cutting Priorities
17.30 - 17.40	Dr. Iuliana NICHERSU	DTC Network for strategic exploitation & networking - key to fostering a stronger Danube Innovation ecosystem
	<b>Discussion</b>	<b>Q&amp;A</b>
• 17.45 - 18.15	- <b>Roundtable of debates:</b> <b>„Pharmaceuticals vs. water quality”</b> Dr. Adrian BURADA Traceability of pharmaceuticals Assoc. Prof. Dr. Viktória CZUPPON CSIZMADIÁNE Local economic development activities as a part of conservation Dr. Cristina DESPINA, Daniela SECELEANU-ODOR, Mihaela ȚIGĂNUȘ, Drd. Orhan İBRAM, Dr. Iuliana-Mihaela TUDOR, Dr. Marian TUDOR Pharmaceutical residues in Danube Delta Biosphere Reserve - first results	
• 18.15 - 18.30	- <b>Conclusions &amp; Awards</b>	

✓ **June 04, 2022 (Saturday)**

✓ **June 05, 2022 (Sunday)** - Departure of participants

\* - online participation



## POSTERS:

### I. Biodiversity and nature conservation, natural resources & Socio-economic aspects

- 1 Dr. Eng. Viorel CUZIC Contributions to the knowledge the avifauna of Oltina lake, Bugeac lake and Dunăreni lake nature reserves, Constanța county
- 2 Dr. Aurel NĂSTASE, IANI Marian, Dr. HONȚ Ștefan, Dr. PARASCHIV Marian, Dr. CERNIȘENCU Irina, COCIAȘ Ștefan, Dr. NĂVODARU Ion Preliminary data regarding fish fauna from freshwater of Danube Delta Biosphere Reserve
- 3 Dr. Lucian BOLBOACĂ, Dr. Alexandru-Cătălin DOROȘENCU, Dr. Mihai MARINOV, Marta PERAITA, Dr. Vasile ALEXE Habitat selectivity of breeding Red-footed Falcon (*Falco vespertinus*) in DDBR
- 4 Dr. Alexandru Cătălin DOROȘENCU, Dr. Lucian Eugen BOLBOACĂ, Dr. Mihai MARINOV, Dr. Vasile ALEXE, Marta PERAITA, Dr. Viorel CUZIC, Constantin ION, Laurențiu PETRENCU, Lucian FASOLĂ-MĂTĂȘARU, Vitalie AJDER, Vlad AMARGHIOALEI Breeding population estimates of Common Goldeneye (*B. c. clangula*) (Palmer 1976, Bellrose 1980) in Danube Delta Biosphere Reserve
- 5 Marta PERAITA, Dr. Alexandru Cătălin DOROȘENCU, Dr. Lucian Eugen BOLBOACĂ, Dr. Mihai MARINOV, Dr. Vasile ALEXE, Dr. Viorel CUZIC, Iuliana POȘTARU, Ana Mirela SCIOTNIC Brief analysis of the bird species recorded in the Danube Delta Biosphere Reserve and their phylogenetic relationships
- 6 Dr. Gabriel CHIȘAMERA, Dr. Mihai MARINOV, Dr. Viorel POCORA, Dr. Vasile ALEXE, Dr. Lucian-Eugen BOLBOACĂ, Dr. Alexandru - Cătălin DOROȘENCU New data on the distribution of Pine Marten - *Martes martes* and Beech Marten – *Martes foina* populations from Danube Delta Biosphere Reserve
- 7 Dr. Ioana COBZARU, Dr. Viorel Dumitru GAVRIL, Dr. Andreea CIOBOTĂ, Dr. Mihaela CIOBOTĂ, Dr. Cătălin Răzvan Stanciu, Dr. Gabriel Bogdan CHIȘAMERA Danube Delta Biosphere Reserve - an important stopover for tern migrations (Aves: Laridae). Insight from ringing-recovery database of the Romanian Ornithological Center
- 8 Prof. Dr. Constantin CIUBUC General presentation of the volume Carabidae from Romania
- 9 Drd. Silviu COVALIOV Natural vegetal resources of the Danube Delta territory - present status and trends
- 10 Dr. Gabriel LUPU, Dr. Mihai DOROFTEI, Drd. Silviu COVALIOV, Dr. Aurel NĂSTASE, Dr. Irina CERNIȘENCU, Dr. Alexandru DOROȘENCU, Dr. Lucian BOLBOACĂ, Dr. Mihai MARINOV, Dr. Vasile ALEXE, Eugenia MARIN, Dragoș BALAIKAN, Drd. Liliana ENE, Diana BOTA, Dr. Ion NĂVODARU Status of biodiversity, habitats, sustainable exploitation of natural resources and socio-economic implications in Danube Delta Biosphere Reserve in 2020

### II. Environmental factors, Ecological Restoration & Anthropic Impact

- 11 Dr. Andra-Cosmina ALBULESCU Mapping over 80 years of wetland sensitivity to human intervention. The spatial dynamics of the lakes and wetlands of the Jijia-Iași Wetlands Ramsar Site in 1935-2018
- 12 Dr. Corneliu Mihăiță POHONȚU Chronic and acute exposure to landfill leachate on zebrafish model used as bioindicator in polluted aquatic ecosystems
- 13 Iasemin SULIMAN Zooplankton and Water quality of Carasuhat and Zaghen Wetlands, Danube Delta Biosphere Reserve
- 14 Dr. Teodora Ramona PINTILIEASA Actual state of fish communities in the lower basin of Bistrița river (2021), Romania
- 15 Daniela SECELEANU-ODOR The seasonal distributions of N fractions in the main lakes of the Danube Delta Biosphere Reserve between 2019-2021
- 16 Drd. Elena Daniela PANTEA, Dr. Daniela Effect of the environmental conditions on biochemical composition and



- Mariana ROȘIORU, Prof. Dr. Natalia ROȘOIU condition index of *Mytilus galloprovincialis* (Lamarck, 1819) from the Romanian Black Sea coast
- 17 Dr. Irina CATIANIS, Drd. Gabriel IORDACHE, Dr. Adriana Maria CONSTANTINESCU, Dr. Laura TIRON DUȚU, Eng. Dumitru GROSU Hydro-chemical characteristics of lakes in the southern part of the Rusca-Gorgova-Uzlina intertributary depression, Danube Delta, Romania
- 18 Drd. Silviu COVALIOV BSB ECO MONITORING BSB MONITORING - Joint Monitoring for Environmental Protection in BSB countries - Project Number: BSB-884
- 19 Orhan IBRAM Bioaccumulation of heavy metals in fish species from Danube Delta

#### IV. Geographical Information System and Application System Modeling

- 20 Dr. Valentin PANAIT New data about the evolution of the Murighiol-Dunavăț area reflected in old cartographic materials and by modern remote sensing techniques
- 21 Gabriel IORDACHE, Irina CATIANIS, Adriana Maria CONSTANTINESCU Identification and spatial distribution of emergent aquatic vegetation of lakes in the northern part of the Rusca-Gorgova-Uzlina intertributary depression, Danube Delta, Romania
- 22 Drd. Cristian TRIFANOV Some morphodynamic aspects concerning the meandred river section of the St. Gheorghe's arm from the Danube Delta Biosphere Reserve
- 23 Drd. Anca CRĂCIUN, Romulus COSTACHE Flood susceptibility in Danube Delta using GIS and multicriteria decision-making analysis
- 24 Drs. Marcel ROMPELMAN Applying the principles of the circular economy for the tailings dump in the Vărăria area, Tulcea

#### IASON project posters:

- 25 Assist. Prof. Dr. Spyros TSIFTSIS Invasive Alien Species along Nestos river: current status and preliminary results of the monitoring actions
- 26 Dr. Oleksandr HAIDASH, Maksym YAKOVLEV Results of monitoring of invasive species of mammals and reptiles in the Ukrainian part of the Danube Delta
- 27 Dr. Gabriel LUPU, Drd. Silviu COVALIOV, Matei SIMIONOV, Raluca (BOZAGIEVICI) CĂLIN Invasive Alien Species from the Danube Delta representative for the phenomenon of invasiveness

#### IASON project presentations:

- 1 Drd. Silviu COVALIOV, Dr. Mihai DOROFTEI The most common alien invasive plant species of Danube Delta Biosphere Reserve territory
- 2 Dr. Yuriy KVACH, Dr. Viktor DEMCHENKO, Dr. Yuliia KUTSOKON, Dr. Volodymyr YURYSHYNETS The Chinese sleeper (*Perccottus glenii*) distribution in the Ukrainian part of the Danube Delta and perspectives of the post-invasion spread
- 3 Dr. Mikhail SON, Dr. Olena BONDRENKO, Dr. Vasyl DYADICHKO, Dr. Yuriy KVACH Preliminary results of IASON Project alien aquatic invertebrate surveys in the Ukrainian Danube Delta
- 4 Dr. David TSISKARIDZE, Dr. Guranda MAKHARADZE Invasive Alien Species Observatory and Network Development for the Assessment of Climate Change Impacts in Georgia (Kolkheti and Chorokhi Delta)
- 5 Dr. Rafet Çağrı ÖZTÜRK, Dr. Mehmet AYDIN, Dr. Coşkun ERUZ, Dr. Fatma Telli KARAKOÇ, Dr. Ahmet ŞAHİN, Dr. Hacer SAĞLAM, Dr. İknur KURT, Dr. Muzaffer FEYZİOĞLU, Dr. Yahya TERZİ, Dr. Nurettin BAŞKAN Invasive and Alien Fish Species in Kizilirmak Deltaic Area
- 6 Gabriela MOROZOV, Gabriela CREȚU, Fânica BAȘCĂU Danube Delta Biosphere Reserve Authority's Experience in the IAS Management
- 7 Dr. Gabriel LUPU, Drd. Silviu COVALIOV, Matei SIMIONOV, Raluca (BOZAGIEVICI) CĂLIN IASON Project - Invasive Alien Species Observatory and Network Development for the Assessment of Climate Change Impacts in Black Sea Deltaic Protected Areas

## CONTENT

### 🚩 Section I - Biodiversity and nature conservation, natural resources & Socio-economic aspects

No.	Authors	Title
1.	Abaza Valeria, Laura Boicenco et al.	STATE OF MARINE AND COASTAL ENVIRONMENT IN 2021 AUTHORS (COLLECTIVE PAPER)
2.	Bolboacă Lucian-Eugen, Doroşencu Alexandru-Cătălin, Marinov Mihai, Peraita Marta, Alexe Vasile	HABITAT SELECTIVITY OF BREEDING RED-FOOTED FALCON <i>FALCO VESPERTINUS</i> IN DDBR
3.	Chişamera Gabriel Bogdan, Marinov Mihai, Pocora Viorel, Alexe Vasile, Bolboacă Lucian-Eugen, Doroşencu Alexandru-Cătălin	NEW DATA ON THE DISTRIBUTION OF PINE MARTEN - <i>MARTES MARTES</i> AND BEECH MARTEN – <i>MARTES FOINA</i> POPULATIONS FROM DANUBE DELTA BIOSPHERE RESERVE
4.	Ciubuc Constantin	GENERAL PRESENTATION OF THE VOLUME CARABIDAE FROM ROMANIA, COLOR ATLAS, PUBLISHED, PIM PUBLISHING HOUSE IAŞI, 2021
5.	Cobzaru Ioana, Gavril Viorel Dumitru, Ciobotă Andreea, Ciobotă Mihaela, Stanciu Cătălin Răzvan, Chişamera Gabriel Bogdan	DANUBE DELTA BIOSPHERE RESERVE - AN IMPORTANT STOPOVER FOR TERN MIGRATIONS (AVES: LARIDAE). INSIGHT FROM RINGING-RECOVERY DATABASE OF THE ROMANIAN ORNITHOLOGICAL CENTER
6.	Covaliov Silviu	NATURAL VEGETAL RESOURCES OF THE DANUBE DELTA TERRITORY - PRESENT STATUS AND TRENDS
7.	Cuzic Viorel	CONTRIBUTIONS TO THE KNOWLEDGE THE AVIFAUNA OF OLTINA LAKE, BUGEAC LAKE AND DUNĂRENI LAKE NATURE RESERVES, CONSTANTA COUNTY
8.	Czuppon Viktoria Csizmadiane, Laszlo Veronika	LOCAL ECONOMIC DEVELOPMENT AS A PART OF CONSERVATION
9.	Damjanović Ivan, Prlić Dragan, Florijančić Tihomir, Ozimec Siniša	BIODIVERSITY MONITORING IN THE ALJMAŠ FLOODPLAIN NEAR THE DRAVA-DANUBE CONFLUENCE (EASTERN CROATIA)
10.	Doroşencu Alexandru Cătălin, Bolboacă Lucian Eugen, Marinov Mihai, Alexe Vasile, Peraita Marta, Cuzic Viorel, Ion Constantin, Petrencu Laurenţiu, Fasolă-Mătăşaru Lucian, Ajder Vitalie, Cuzic Viorel, Amarghioalei Vlad	BREEDING POPULATION ESTIMATES OF COMMON GOLDENEYE ( <i>B. C. CLANGULA</i> ) (PALMER 1976, BELLROSE 1980) IN DANUBE DELTA BIOSPHERE RESERVE
11.	Holostenco Daniela Nicoleta, Ibram Orhan, Taflan Elena, Ambrosimov Adela, Porea Daniela	A GLANCE ON THE MOLECULAR IDENTIFICATION OF DANUBE DELTA AQUATIC MACROINVERTEBRATES
12.	Lupu Gabriel, Doroftei Mihai, Covaliov Silviu, Mierlă Marian, Năstase Aurel, Cenişencu Irina, Doroşencu Alexandru, Bolboacă Lucian, Marinov Mihai, Alexe Vasile, Eugenia Marin, Balaican Dragoş, Ene Liliana, Bota Diana, Năvodaru Ion	STATUS OF BIODIVERSITY, HABITATS, SUSTAINABLE EXPLOITATION OF NATURAL RESOURCES AND SOCIO-ECONOMIC IMPLICATIONS IN DANUBE DELTA BIOSPHERE RESERVE IN 2020
13.	Năstase Aurel, Iani Marian, Honţ Ştefan, Paraschiv Marian, Cenişencu Irina, Cociaş Ştefan, Năvodaru Ion	PRELIMINARY DATA REGARDING FISH FAUNA FROM FRESHWATER OF DANUBE DELTA BIOSPHERE RESERVE
14.	Negrei Costel, Ladaru Georgiana Raluca	EVALUATION OF THE IMPACT OF THE ROYALTY ON THE FISHERY RESOURCE
15.	Peraita Marta, Doroşencu Alexandru Cătălin, Bolboacă Lucian Eugen, Marinov Mihai, Alexe Vasile, Cuzic Viorel, Poştaru Iuliana, Sciotnic Ana Mirela	BRIEF ANALYSIS OF THE BIRD SPECIES RECORDED IN THE DANUBE DELTA BIOSPHERE RESERVE AND THEIR PHYLOGENETIC RELATIONSHIPS
16.	Petrişor Alexandru-Ionuţ, Petrişor Liliana Elza	URBAN ECOLOGY: STATE-OF-THE-ART IN ROMANIA

17. Sultanov Elchin, Nigar Aghayeva, Abdin Abbasov, Saida Samadova, Ilqar Mustafayev, Abulfat Samadov THE RESULTS OF WINTER COUNTS OF BIRDS IN AZERBAIJAN IN 2022 WINTER
18. Ureche Dorel, Pintilieasa Teodora Ramona, Ureche Camelia ACTUAL STATE OF FISH COMMUNITIES IN THE LOWER BASIN OF BISTRITA RIVER (2021), ROMANIA
19. Vădineanu Angheluță LONG - TERM RETROSPECTIVE AND PROSPECTIVE VIEWS ON THE DYNAMICS AND GOVERNANCE OF THE LOCAL AND REGIONAL COUPLED NATURE AND SOCIETY ECOLOGICAL COMPLEXES (NSEC) NESTED IN THE ROMANIAN PART OF THE EASTERN LOWER DANUBE RIVER SUB-CATCHMENT: A FOCUS ON DANUBE DELTA BIOSPHERE RESERVE (DDBR)

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## ABSTRACTS

### **Section I - Biodiversity and nature conservation, natural resources & Socio - economic aspects**

#### **1. STATE OF MARINE AND COASTAL ENVIRONMENT IN 2021 AUTHORS (COLLECTIVE PAPER)**

**ABAZA VALERIA, LAURA BOICENCO et al.**

*National Institute for Marine Research and Development Grigore Antipa, Address: Mamaia Bd. 300, Constanta, Romania, E-mail [yabaza@alpha.rmri.ro](mailto:yabaza@alpha.rmri.ro)*

Present paper was elaborated based on the report of the marine and coastal environment, part of the national report regarding the state of environment in Romania. As indicators for the assessment, mainly state and pressure indicators were used. To this aim, physical, chemical, and biological parameters were analysed and their evolution trends along time were graphically represented. Biological parameters' analysis reveals an increasing trend of species diversity, although the dominant ones are mostly opportunistic. Sea level and multiannual average temperature show that marine ecosystem is clearly influenced by climate changes we face today. Overall assessment is difficult to interpret, because despite the improvement signs identified from one year to another, the living resources are in fragile balance to the environment

#### **2. HABITAT SELECTIVITY OF BREEDING RED-FOOTED FALCON *FALCO VESPERTINUS* IN DDBR**

**BOLBOACĂ LUCIAN-EUGEN, DOROȘENCU ALEXANDRU-CĂTĂLIN, MARINOV MIHAI, PERAITA MARTA, ALEXE VASILE**

The Danube Delta is an atypical and complex ecosystem in the border of the slowly shrinking breeding distribution of *Falco vespertinus*. In 2021 we registered 231 breeding pairs, with a local density of 0.034 bp/km<sup>2</sup> in DDBR. We investigated the habitat selectivity of the species in the area using Manly's standardized habitat selection index for constant resources, calculated for each habitat class. The results suggests a high selection for non-irrigated arable land, beaches, dunes and sands, transitional woodland-shrub, salt marshes, and strong avoidance towards costal lagoons, water courses, sea and oceans, broad-leaved forests, and inland marshes.

#### **3. NEW DATA ON THE DISTRIBUTION OF PINE MARTEN - *MARTES MARTES* AND BEECH MARTEN - *MARTES FOINA* POPULATIONS FROM DANUBE DELTA BIOSPHERE RESERVE**

**CHIȘAMERA GABRIEL BOGDAN, MARINOV MIHAI, POCORA VIOREL, ALEXE VASILE, BOLBOACĂ LUCIAN-EUGEN, DOROȘENCU ALEXANDRU-CATALIN**

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Meso-carnivores like Pine Marten and Beech Marten have an important role in determining the quality of an ecosystem. During the last century these species were hunted either due to the fact that they were considered pests and for their fur.

Although in the continental part of Dobrogea and on the edge of Danube Delta Biosphere Reserve the distribution of the two marten species is relatively well known, in the territory between the Danube branches is still poorly known. Due to their elusive behavior, their size and the accessibility of the Danube Delta Biosphere Reserve, little is known about the distribution and the population size for these species in the area.

The few recent mentions in literature offer few distribution points for Pine Marten and for Beech Marten in this area. Thus, the aim of our study was to gather all known data on the distribution of the two species in Danube Delta and surrounding areas from literature and other databases which also include hunting reports, sightings from locals and together with original data, to have a better understanding on their distribution.

The novelty of the study is the intensive use of camera traps in order to collect new distribution points for these two elusive species.

#### **4. GENERAL PRESENTATION OF THE VOLUME CARABIDAE FROM ROMANIA, COLOR ATLAS, PUBLISHED, PIM PUBLISHING HOUSE IAȘI, 2021**

**CIUBUC CONSTANTIN**

*University of Bucharest, Zoological Resort Sinaia, Telecabine street, no. 54, Prahova,  
E-mail: [Ciubuc1206@gmail.com](mailto:Ciubuc1206@gmail.com)*

This paper is addressed to students and researchers, being indispensable for those involved in biodiversity studies, those who compile wildlife lists for protected natural areas, natural and national parks, sites of community importance, named ROSCI, belonging to Natura 2000 network of protected areas, or those working to develop protected area management plans. ~ Introducere - Introduction ~ 13 The samples taken for the collection of the species described in this atlas cover 2/3 of the Romanian territory including: the Danube Delta, the Danube Floodplain, most of the islands on the Danube channel between Brăila and Calafat, Brăila Small Island, Romanian Plain, Arges, Prahova, Neajlovului, Ialomița river basins, from the sub-Carpathian area/zone until the outflow; Southern Carpathians (Retezat, Parâng, Cozia National Park, Fărăraș National Park, Bucegi, Penteleu Curvature Carpathians); Apuseni Mountains, Crișurilor Plain, Maramureș, Banat Mountains and Iron Gates; North Dobrogea from Traianu – Lake Cerna; Southern Dobrogea from Agigiea, Hagieni, Canaraua Fetii and Negru Vodă; Transylvania. The total number of sampling stations is 187, their toponyms and geographical coordinates are included in the table and map in the Annexes section. All samples were personally taken by the author, on the occasion of numerous expeditions in research projects developed by the Department of Ecology of the Faculty of Biology Bucharest, when simultaneously with the specific activities of research projects we made captures from the researched areas, or in expeditions exclusively for the purpose of taking samples of Carabids and Trichoptera – those with light traps (some of those in Apuseni, Cerna Valley, Iron Gates, Izvoru Valley, Corbii Ciungi – Neajlov Basin, Romanian Plain).

#### **5. DANUBE DELTA BIOSPHERE RESERVE - AN IMPORTANT STOPOVER FOR TERN MIGRATIONS (AVES: LARIDAE). INSIGHT FROM RINGING-RECOVERY DATABASE OF THE ROMANIAN ORNITHOLOGICAL CENTER**

**COBZARU IOANA, GAVRIL VIOREL DUMITRU, CIOBOTĂ ANDREEA, CIOBOTĂ MIHAELA, STANCIU CĂTĂLIN RĂZVAN, CHIȘAMERA GABRIEL BOGDAN**

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With over 580.000 hectares of diverse habitats, the Danube Delta Biosphere Reserve is situated on the Via-Pontica migration route putting it forth as an important area for migratory water birds, both as a migration stopover and a breeding or wintering quarter. One of the earliest forms of studying bird migration is represented by ringing birds and for over 100 years, this was the main research method in bird migration. In many of the cases the recovery of the rings was from dead birds and only occasionally from alive birds. Nowadays, due to the technological advance in optics and the use of color rings provides an easier reading and allows more observations of the same individual.

The aim of this study was to focus on three tern species: the Caspian Tern – *Hydroprogne caspia*, the Common Tern – *Sterna hirundo* and the Sandwich Tern – *Thalasseus sandvicensis*. We have reviewed all the ringing-recovery data from the Romanian Ornithological Center database and compiled a complete list of recoveries in order to establish the origin of terns that are using Danube Delta and Black Sea seashore as stopover during migration and/or a breeding area. Last data related to this topic were published five decades ago. Meanwhile, the Romanian recovery database substantially increased, allowing for a better view on stopover places, and their role in migration. This study aims to shed more light on the complex phenomenon of migration and offer conservation insight, while trying to determine the most important resting and breeding areas for these birds.

## **6. NATURAL VEGETAL RESOURCES OF THE DANUBE DELTA TERRITORY - PRESENT STATUS AND TRENDS**

### **COVALIOV SILVIU**

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The Danube Delta Biosphere Reserve territory has great potential regarding natural vegetal resources such as medicinal herbs, plant species important to beekeeping, pastures and reed. This article will focus only on those resources with estimated harvesting potential.

The Administrator of this area faces great challenges in taking the right decisions and keeping the balance between nature conservation and sustainable use of natural resources.

Since 2002 our institute has conducted studies on the sustainable harvesting potential and estimation of natural vegetal resources.

The resulting database is a valuable source of information that can be used to assess the evolution of the harvesting potential of the above-mentioned resources and describe scenarios for sustainable management by The Administration of the Danube Delta Biosphere Reserve. Therefore, we will draw attention to different perspectives that can be taken to help the decision makers in their work.

## **7. CONTRIBUTIONS TO THE KNOWLEDGE THE AVIFAUNA OF OLTINA LAKE, BUGEAC LAKE AND DUNĂRENI LAKE NATURE RESERVES, CONSTANTA COUNTY**

### **CUZIC VIOREL**

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Lakes Bugeac, Oltina and Dunăreni, belong to the most representative fluvial limans on Dobrudja bank of the Danube, making an in south-western an compact group between the localities Ostrov and Cernavodă. As regards the geomorphologic features, the fluvial limans mentioned above are situated at the contact of two distinct units: Romanian Plain and Dobrudja Plateau, nowadays separated by the wide alluvial meadow of the Danube.

The nesting bird fauna is obviously higher, but the breeding populations cannot be recorded just only crossing along some transects on the lakes shore, being absolutely necessary some transects by boat inside the canals and compact reed beds from the lakes tail perimeters. In the same time, probably numerous forest typical bird species, including some species that represent criteria for designation of one Nature 2000 site, can be present like breeding species in the wooded area from slopes of this three Lakes.

This three nature reserves investigated represent important refuges for breeding, feeding and resting for many rare species of bird. Since these lakes are situated on the eastern way of the migratory birds, this place is important for meeting, concentrating and feeding the species of birds. The richest as regards the number and the variety of the species is Oltina Lake, but all three fluvial limans are very important for the avifauna. It requires further monitoring of these river limans to learn the full avifaunistic potential of these.

## **8. LOCAL ECONOMIC DEVELOPMENT AS A PART OF CONSERVATION**

### **CZUPPON VIKTORIA CSIZMADIANE, LASZLO VERONIKA**

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Local economic development (LED) is a complex process, which is based on tradition, local community, and local values. Considering LED, inhabitants, authorities, SME's, and NGO's are working together locally. In our paper we introduce the importance of LED in the way towards sustainability, focusing on the traditional way of small scale production and the short supply chain.

- traditional land use and processes might contribute to conservation and biodiversity,
- small scale food production and sustainable animal husbandry have the opportunity to restore the phosphorous -cycles regionally and strengthen smart water use,
- circular economy solutions are more easily established through local cooperation,
- effective SFCs ease the stress on robust global chains and contribute to the resilience and adaptability of these systems.

In our experience, it is necessary to rethink and revive traditional practices - adapted and innovated - in order to preserve sustainable consumption. This is true both for land use, production as well as for

and for industrial processes that contribute to the livelihoods of local societies. These past practices must be brought into line with our current expectations. Past research findings will be presented to highlight solutions that make our environment sustainable and livable.

#### **9. BIODIVERSITY MONITORING IN THE ALJMAŠ FLOODPLAIN NEAR THE DRAVA-DANUBE CONFLUENCE (EASTERN CROATIA)**

**DAMJANOVIĆ IVAN<sup>1</sup>, PRLIĆ DRAGAN<sup>2</sup>, FLORIJANČIĆ TIHOMIR<sup>3</sup>, OZIMEC SINIŠA<sup>3</sup>**

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<sup>2</sup>*Donji Meljani 92c, HR-33520 Slatina, Croatia*

<sup>3</sup>*Josip Juraj Strossmayer University of Osijek, Faculty of Agrobiotechnical Sciences in Osijek,  
Vladimira Preloga 1, HR-31000 Osijek, Croatia*

The Aljmaš floodplain is situated on the right bank of the Drava River, along the last 12 km of the river course before confluence with the Danube River. The total surface area is 26 km<sup>2</sup>. Together with Kopački Rit Nature Park it makes a unique floodplain ecosystem of the Middle Danube. The Aljmaš floodplain is an integral part of two Natura 2000 areas in Croatia: SPA HR1000016 Podunavlje i donje Podravlje, and SCI HR2000372 Dunav-Vukovar. The Drava River in its lower course forms meanders, side arms, ponds and canals, which provides habitats for wild fauna and flora species, most of which are threatened or listed in the EU Directives on habitats and birds. Revitalisation activities in the Aljmaš floodplain were carried out in the period 2013-2021. Selected canals were deepened and sediment was removed from the old riverbed with an aim to re-establish the water flow and improve the overall ecological status. The monitoring activities of wild fauna and flora species and habitats were carried out during four-year period, from 2018 to 2021. The monitoring identified 16 habitat types, and four habitats are listed in Annex 1 of the EU Habitat Directive. The vascular flora comprises 75 species (2 ferns, and 73 angiosperms), and 13 invasive alien plant species were recorded. The faunal diversity comprises 17 freshwater fish species, 13 amphibian species, 10 reptile species, 65 bird species (21 wetland birds), and 52 mammal species. Among the vertebrate species listed in Annex 2 of the EU Habitat Directive, there are three freshwater fish, one amphibian and one reptile species. Among the recorded bird species, 20 are listed in Annex 1 of the EU Birds Directive. The presented monitoring activities had been supported by Hrvatske vode, a legal entity for water management in the Republic of Croatia

#### **10. BREEDING POPULATION ESTIMATES OF COMMON GOLDENEYE (*B. C. CLANGULA*) (PALMER 1976, BELLROSE 1980) IN DANUBE DELTA BIOSPHERE RESERVE**

**DOROȘENCU ALEXANDRU CĂTĂLIN, BOLBOACĂ LUCIAN EUGEN, MARINOV MIHAI, ALEXE VASILE, PERAITA MARTA, CUZIC VIOREL, ION CONSTANTIN, PETRENCU LAURENȚIU, FASOLĂ-MĂTĂȘARU LUCIAN, AJDER VITALIE, CUZIC VIOREL, AMARGHIOALEI VLAD**

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The Common Goldeneye is regarded as a northern breeding species mostly restricted to the boreal forests. Breeding in the areas that are outside the main range are sometimes overlooked. In the early 1900s, the Goldeneye was regarded as a common species that, although occurring in relatively small numbers, nested in the flood-plains of lower Danube, as well as in the Danube Delta. In Romania it is recorded as breeding species until the 1960s. In the following decade Goldeneye was mentioned only as a transient winter visitor in Romania from October to March. In the late 1990s the breeding is reconfirmed in the Danube Delta and since 2000 at least three cases of confirmed nesting have been recorded. The breeding population for Romania of 20–40 pairs is reported as relatively constant in the last 20 years and restricted to Danube Delta only. Our results indicate a significantly larger breeding population for Danube Delta Biosphere Reserve with an increasing trend and a larger distribution in the expanding riparian forests. We estimate a breeding population of 150 -200 pairs for Danube Delta Biosphere Reserve. The records presented are the result of observations performed in different research projects in the last 20 years by the ornithologists of Danube Delta National Research and Development Institute.

## **11. A GLANCE ON THE MOLECULAR IDENTIFICATION OF DANUBE DELTA AQUATIC MACROINVERTEBRATES**

**HOLOSTENCO DANIELA NICOLETA, IBRAM ORHAN, TAFLAN ELENA, AMBROSIMOV ADELA, POREA DANIELA**

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Biodiversity assessment is crucial for evaluating the ecological status of freshwater ecosystems. Macroinvertebrates are one of the ecological indicators used for water quality assessment. In many cases, morphological identification of macroinvertebrates poses problems when different life stages need to be identified to the species level. A molecular approach is needed for assigning individuals to a species. In this order, 12 samples of two taxonomic groups, order Diptera (Family Chironomidae) and order Coleoptera collected in the Danube Delta were analyzed using a short sequence of mtDNA COI barcode. Ten samples were successfully identified to species level based on 97-100% similarity with DNA sequences from GenBank and BOLD databases. One sample could not be assigned to any species and for one sample no DNA correspondent was found in both databases. Overall, this preliminary study underlines the importance of DNA barcoding for identification of macroinvertebrates species and brings new light on the biodiversity assessment of Danube Delta aquatic macroinvertebrates.

## **12. STATUS OF BIODIVERSITY, HABITATS, SUSTAINABLE EXPLOITATION OF NATURAL RESOURCES AND SOCIO-ECONOMIC IMPLICATIONS IN DANUBE DELTA BIOSPHERE RESERVE IN 2020**

**LUPU GABRIEL, DOROFTEI MIHAI, COVALIOV SILVIU, MIERLA MARIAN, NĂSTASE AUREL, CENIȘENCU IRINA, DOROȘENCU ALEXANDRU, BOLBOACĂ LUCIAN, MARINOV MIHAI, ALEXE VASILE, EUGENIA MARIN, BALAIAN DRAGOȘ, ENE LILIANA, BOTA DIANA, NĂVODARU ION**

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This paper will present the results of research conducted in 2020 in Danube Delta Biosphere Reserve regarding the mapping of DDBR habitats in the Romanian classification system, assessment of the sustainable exploitation of plant resources, conservation status of invertebrate species of community interest, assessment of the ecological status of ichthyofauna in the context of recent changes due to the emergence of new limiting factors, fisheries research for the sustainable exploitation and conservation of biodiversity, colonial waterfowl species, bird species of conservation interest with insufficiently known nesting and pilot study of bioacoustics, mammal species of Community interest, socio-economic revitalization of human settlements and the dynamics, support research for the substantiation of ecotourism in order to sustainably capitalize on the landscape resource.

## **13. PRELIMINARY DATA REGARDING FISH FAUNA FROM FRESHWATER OF DANUBE DELTA BIOSPHERE RESERVE**

**NĂSTASE AUREL, IANI MARIAN, HONȚ ȘTEFAN, PARASCHIV MARIAN, CERNIȘENCU IRINA, COCIAȘ ȘTEFAN, NĂVODARU ION**

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In last 3 years fish fauna was investigated in different sites of freshwater of Danube Delta Biosphere Reserve (DDBR). In all sampling sites it was recorded 68 fish species included some non-native species observed from commercial fishermen like *Ameiurus melas*, *A. punctatus* and *Clarias gariepinus* (or more correctly hybrid between *C. gariepinus* and *Heterobranchus longifilis* because of small adipose fin) must be mentioned as present in DDBR in 2021. The number of native fish species (56) is smaller than past when was recorded 72 species (because uncaptured of some very rare species), but non-native species number are on the increase in Danube delta freshwater habitats.

#### **14. EVALUATION OF THE IMPACT OF THE ROYALTY ON THE FISHERY RESOURCE**

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For the conservation of the fish population, a mix of legal, technical, social and economic instruments must be used, among which we find the royalty.

Beyond the fact that it is a source of budgetary revenue, depending on its amount, the royalty is meant to help avoid overexploitation of fishery resources, but within a mechanism that combines economic, social and environmental criteria.

The modeling of this mechanism, as well as the evaluation of the ecological impact that it generates, represent the objectives of the approaches for conducting the scientific research on this topic.

To the purely biological (based on maximum sustainable yield) and bio-economic models (which also take into account the fishing effort), we add an ecological model, which highlights, in the same plan, the economic, social and ecological optimum.

Keywords: yield, support capacity, sampling rate, overexploitation rate, optimal

#### **15. BRIEF ANALYSIS OF THE BIRD SPECIES RECORDED IN THE DANUBE DELTA BIOSPHERE RESERVE AND THEIR PHYLOGENETIC RELATIONSHIPS**

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Danube Delta Biosphere Reserve is a well-known biodiversity hotspot and a key place for the life cycles of numerous species. Regarding the bird fauna, there have been records of more than 350 different species in the last 50 years. Some of these species are resident here (autochthonous or allochthonous) and others come here in the breeding period. Nevertheless, some of them come to the DDBR only in winter and some others can be seen resting and foraging in a stopover of their migration flyway. There are also very rare species, vagrant or accidental, or even some very exotic introduced.

In this poster we present the phylogenetic relationships of these 364 species (published by the NCBI through the website "Lifemap: Exploring the Entire Tree of Life") and also refer to their conservation status (as published by the IUCN Red List of Threatened Species), grouped by Order taxa. In addition, we point the species present in the ornithological collection of naturalized birds property of the "Gavrilă Simion" Eco-Museum Research Institute from Tulcea, Romania, specifying which of them are currently exposed at the Danube Delta Eco-Tourism Museum Center. This way, we emphasize the importance of the museal collections in getting the public to know about the local biodiversity.

#### **16. URBAN ECOLOGY: STATE-OF-THE-ART IN ROMANIA**

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The presentation is aimed at presenting the state-of-the-art of urban ecology in Romania, comparing it to its international and European status. Urban ecology is a relatively new interdisciplinary area. Its dynamic parallels the one of ecology, with a certain delay. The analysis of the Romanian context reveals that this discipline is marginalized by traditional ecologists, but also by planners, who are still tributary to an outdated understanding of the urban environment. Moreover, the border position among the different disciplines makes difficult the establishment of specific criteria for funding specific research projects, especially in the context of an engineering vision over ecology in general. Despite these general obstacles, progress has been made in understanding the status and urban green infrastructure of Romanian cities in the context of comparative analyses. The findings indicate that the categories of urban green infrastructure correspond to the four types of city nature. The dominant

categories are natural and agricultural areas, while landscaped green spaces are characteristic only to large, populous, and dense cities. While the urban green infrastructure has been lost, fragmented and transformed, the dynamic of each category depends on its share. Future studies should aim to help turning these valuable results into planning provisions.

## **17. THE RESULTS OF WINTER COUNTS OF BIRDS IN AZERBAIJAN IN 2022 WINTER**

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As a result of the surveys conducted from 11 to 25.01.22 totally, 820,086 individuals of belonging to 118 species were registered. The vast majority are ducks (66%), from them 34% are dabbling ducks, 11% are unspecified ducks and 21% are diving ducks. Coot (13.6%) takes the second place, and Little Bustard takes the third place (13.4%). Waterfowl make up 86% of the registered birds (706,589 individuals), including geese 0.7%, cormorants 0.9%, Flamingo 2.6% and grebes 0.3%. Other birds consisted less than 1% by each.

The most numerous species were: 1) Coot - 111260 (13.6%), 2) Little Bustard- 110068 (13.4%), 3) Pochard - 90791 (11.1%), 4)Wigeon - 81466 (9.9%), 5) Red-crested Pochard - 68273 (8.3%), 6)Tufted Duck - 47231 (5.8%), 7) Mallard - 46189 (5.6%), 8) Teal - 39087 (4.9%), 9) Shoveler - 36361 (4.4%), 10) Flamingo - 21003 (2.6%), 11) Ruddy Shelduck - 15139 (1.92%) etc.

12 species listed in the IUCN Red List and Azerbaijan republic red Data book (AzRDB).12 species listed only in AzRDB. The most numerous species of 1st group are Little Bustard, Marbled Teal (1010) and White-headed Duck (1060). The most numerous species of 2nd group are Flamingo, Mute Swan (163) and White-tailed Sea Eagle (15). Around 100-200 thousand and more birds were counted in Gizilagaj National Park (NP), Absheron NP and Aggol National Park. Around 40-60 thousand occurred in Alat Bay, around Pirallahi Island and around Acinohur Lake (here only terrestrial birds mainly Little Bustard). About 10-30 thousand have been registered around the Baku Deep Water Jacket Plant, in Gobustan Bay, Kura Delta, Lake Mahmudchala, Yenikend w.r. and around the fish pond (mainly Little Bustard) in the Samukh region. Less than 10,000 birds were registered in other water bodies and around

## **18. ACTUAL STATE OF FISH COMMUNITIES IN THE LOWER BASIN OF BISTRITA RIVER (2021), ROMANIA**

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This research study is a part of a more comprehensive study in the Bistrita River basin. The study was carried out in 2021 in the lower basin of Bistrita River, and it comes to update scientific data on the status of the fish communities in an important section of Bistrita River.

The biological material has been sampled in 25 sampling sites, by electrofishing, according to the current environmental Romanian legislation, following the principles of protection for the rare species. All of the sampling sites are placed on the main course of Bistrita River.

The taxonomic analysis revealed the presence of 21 fish species, one of them being non-native: *Pseudorasbora parva*.

This study contains data concerning the fish communities from the perspective of the ecological analysis, also taking into account the human pressures in the last decades (hydro power plant, and household pollution) reflected in the fish communities' structure, both qualitative and quantitative. This is the reason why a special attention has been paid not only to qualitative features, but also to quantitative ones. The study of fish communities involved an ecological analysis based on some ecological indices, as well as biodiversity indices, evenness, and fish stocks.

Since the study area overlaps the chub riverzone, the most common fish species are *Squalius cephalus*, *Alburnus alburnus*, *Rhodeus amarus*, and *Carassius gibelio*.

**19. LONG-TERM RETROSPECTIVE AND PROSPECTIVE VIEWS ON THE DYNAMICS AND GOVERNANCE OF THE LOCAL AND REGIONAL COUPLED NATURE AND SOCIETY ECOLOGICAL COMPLEXES (NSEC) NESTED IN THE ROMANIAN PART OF THE EASTERN LOWER DANUBE RIVER SUB-CATCHMENT: A FOCUS ON DANUBE DELTA BIOSPHERE RESERVE (DDBR)**

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The two main aims of my presentation are: i) to identify the most relevant facts and to give answers to where, when and how much questions about the past (phase one 1960/1989 and phase two 1990/2020) interrelated transformative changes, and their trade-offs occurred within the two basic compartments of the nested NSECs from Lower Danube River Land-Water scapes (delta and foodplain)/LDRW, and ii) to provide consistent arguments to choose among three potential scenarios (explore the potential trajectories of the nested NSECs in the third phase /2021-2030/2050), that one which better support the objectives of the recently established Strategy for Sustainable Development in the Danube Delta region, and the revised National Strategy for Sustainable Development (NSSD-2030) as well as those of the new EU policies, programs and agreements.

In order to deliver an integrated, adaptive and consolidated science-based and effective operational support which allows for understanding complexity across space and time and to identify and get policy and decision – oriented solutions at many wicked problems, I decided to focus on: i) the instrumental role of the updated contextual, conceptual and operational frameworks for identification, planning and assessment of long-term dynamics within and between nested NSECs across Lower Danube River Sub-catchment; ii) the social-economic transition and major drivers responsible for structural and functional changes recorded in the LDRW; iii) the trends, thresholds and tipping points in the long – term changes of biophysical structure and functioning capacity together with the most severe trade-offs recorded and assessed since 1975, which have provided strong arguments to shift from former policy and management regime deeply relied on the principles of the neo-classical economic theory and practice regarding natural environment toward new policy, institutional and management regime, designed and developed since 1990, around principles of conservation and restoration the biophysical structure and functions of the “ natural capital”, including the climate system, sustainable use of biological and ecosystem service and human – wellbeing ; 4) some of most powerful anthropogenic drivers which had significant negative impact upon planning and governance the transition toward sustainability of local ( DDBR) and regional NSECs ; 5) brief presentation of three scenarios designed as useful feedbacks for the public debate ,and policy and decision making , regarding future long-term use and management of the LDRWS.

**✚ Section II: Environmental factors, Ecological restoration and Atrophic Impact**

**20. HYDRO-CHEMICAL CHARACTERISTICS OF LAKES IN THE SOUTHERN PART OF THE RUSCA-GORGOVA-UZLINA INTERDISTRIBUTARY DEPRESSION, DANUBE DELTA, ROMANIA**

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Around the world, delta lakes are susceptible to significant pressures due to economic and social development, rapid population growth, and the associated activities, which are putting pressures on the natural resources and the environment. The aim of this study was to investigate the water quality of selected lakes from the Danube Delta, Romania, based on the main water quality environmental indicators. Thus, 101 representative water samples were collected from 7 lakes for determination of physical (temperature, electrical conductivity, total dissolved solids, turbidity, total suspended solids, transparency) and chemical (pH, dissolved oxygen, nutrients, silica, total organic carbon, sulphates, oxidation-reduction potential etc.) characteristics. Additionally, the content of certain technophilic

elements (Cd, Co, Cr, Cu, Ni, Pb and Zn) was investigated. Overall, the results did not show significant differences between the investigated lakes. However, some differences among the hydro-chemical characteristics were emphasized that may be attributed to local conditions of the shallow lacustrine transitional environment, which is continuously subjected to a series of natural and anthropogenic variations. In this regard, it can be concluded that the surface water of investigated lakes is generally in a good physical-chemical status and suitable for water-living organisms. This study highlights the idea that periodic evaluation of certain hydro-chemical characteristics of water is proven efficient for identifying changes in water quality over time. The obtained results can be used for future assessment strategies related to Danube Delta water quality.

Keywords: Danube Delta lakes, evaluation, hydro-chemical characteristics, hydro-dynamic conditions, surveillance, water quality

ACKNOWLEDGEMENTS: The research leading to these results was supported by the Ministry of Education and Scientific Research - „The Core Programme: 13N/08.02.2019 - **PN 19 20 02 03**“.

## **21. BSB ECO MONITORING BSB MONITORING - JOINT MONITORING FOR ENVIRONMENTAL PROTECTION IN BSB COUNTRIES - PROJECT NUMBER: BSB-884**

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The project “Joint Monitoring for Environ Protection in BSB countries” is aimed at solving common problems of nature parks and protected areas in the Black Sea Basin (BSB). Its overall objective is to contribute to increasing the level of availability of cross-border compatible environmental monitoring data and information in nature parks and protected areas in BSB.

During last year, a series of monitoring, assessment of pressure and threats as well as communication activities were done.

We present partial results of the project to draw the attention of the interested stakeholders to the most important identified aspects as mitigation for improvement of management practices.

## **22. PHARMACEUTICAL RESIDUES IN DANUBE DELTA BIOSPHERE RESERVE – FIRST RESULTS**

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This paper aims to present a new series of chemical compounds, emerging contaminants, with aggression on aquatic ecosystems of the Danube Delta Biosphere Reserve, as a result of the diversification of services and the rapid development of new industries.

About 4000 active pharmaceutical ingredients are being administered worldwide in prescription medicines, over-the-counter therapeutic drugs and veterinary drugs. From these, between 30 to 90% of oral doses of pharmaceuticals administered to humans or animals are generally excreted via urine and faeces as active substances.

The research activities focused on the areas of the Danube Delta Biosphere Reserve where 18 sampling points were monitored from 4 areas with different anthropogenic influences from discharge area.

For the detection and the identification of the targeted pharmaceutical compounds (antibiotics, antacids and antidiabetics), a system of Ultra High-Pressure Liquid Chromatography-tandem Mass Spectrometry (UHPLC-MS/MS) was used.

Our results indicate the fact that the most contaminated water with pharmaceutical residues were associated with the areas of municipal discharges across the large urban agglomerations. In addition, a significant contribution with these contaminants was noticed in the case of the two Danube tributaries in the Lower Danube, Prut and Siret respectively.

Pharmaceutical residues, this increasing threats to environmental and human health and not only in the Danube Delta Biosphere Reserve but all over the globe since their adverse effects on ecosystems health, have not been sufficiently studied and substantial gaps still exist in our knowledge.

Keywords: Pharmaceuticals residues, Danube Delta

### 23. BIOACCUMULATION OF HEAVY METALS IN FISH SPECIES FROM DANUBE DELTA

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Considered as important toxic pollutants, heavy metals enter the biogeochemical cycle and accumulate in aquatic ecosystems. They are particularly important because of long persistence, but also bioaccumulation and biomagnification in the food chain. Aquatic organisms exposed to these contaminants accumulate heavy metals. High bioavailable levels in the aquatic environment represents an issue for both human health and aquatic communities ecology.

In the present study we analyzed the concentration of 6 heavy metals (As, Cd, Cu, Cr, Ni, Pb) in 28 different freshwater fish species from the Danube Delta. The results showed that the variation of As concentrations is between 0.19 mg / kg for the *Esox lucius* (pike) and 0.97 mg /kg for *Rutilus rutilus* (roach). Cd, was the element for which the level of accumulation in the muscle tissue showed variations between species as well as depending on the age of the specimen. Thus, the concentration in young specimens of *Scardinius erythrophthalmus* (rudd) were up to 2.6 µg / kg, while specimens of over 6 years old *Cyprinus carpio* (carp) showed a higher Cd content between of 3,1 µg / kg and 5.3 µg / kg.

In conclusion the heavy metal content in the analyzed fish species, depends both on the level of exposure (water, food) and on the physiological factors (age, metabolic activity). In addition, observations made on fish species of the Danube Delta have a particularly important role to play in assessing the effects of pollution of the aquatic ecosystems.

### 24. THE INFLUENCE OF HYDROLOGY AND SEDIMENT GRAIN-SIZE ON THE SPATIAL DISTRIBUTION OF MACROINVERTEBRATE COMMUNITIES IN TWO SUBMERGED DUNES FROM THE DANUBE DELTA (ROMANIA)

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The present study focused on the ecological preferences of benthic macroinvertebrates regarding water flow and sediment characteristics in two submerged dunes from Danube Delta (Romania). Three hydraulic microhabitats, the stoss, trough and crest areas were sampled, along with measurements of water hydraulics, hydrology, sediment grain-size, and organic content. The results showed that the slope angles between stoss-crest and crest-trough areas are crucial in modulating local flows, sediment structure, organic content, macroinvertebrate communities, and taxonomic richness and density. As such, the stoss microhabitats are considered zones with the highest turbulence, hence driving low taxonomic richness and density compared to crest and trough microhabitats. When local environmental conditions in trough microhabitats allow the accretion of fine and organically enriched sediments, the development of maximum density for certain macroinvertebrates groups is reached. However, the benthic assemblages did not show clear preferences for certain microhabitats, suggesting ubiquitous ecologic traits, crucial for the successful colonisation of dynamic habitats, such as the submerged dunes in large rivers. The results of this study offer a better understanding on the abiotic factors driving the spatial preferences, density, and diversity of benthic macroinvertebrates in these understudied hydrogeomorphological units from large rivers.

**25. EFFECT OF THE ENVIRONMENTAL CONDITIONS ON BIOCHEMICAL COMPOSITION AND CONDITION INDEX OF *Mytilus galloprovincialis* (LAMARCK, 1819) FROM THE ROMANIAN BLACK SEA COAST**

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Changes in condition index and biochemical composition of mussels occur as a result of complex interactions between food availability, environmental conditions and gametogenic cycle. The aim of this study is to investigate the effect of the environmental parameters on the condition index and biochemical composition of mussels (*Mytilus galloprovincialis*) from the Romanian Black Sea coast. This study was carried out between November 2017 and November 2018. The samples were collected seasonally, from four sites (three port areas and one reference area for comparison). Seasonal variations of condition index and biochemical composition (protein, carbohydrate, lipid, moisture, and ash) are analyzed in relation to some environmental parameters such as temperature, salinity, dissolved oxygen, and chlorophyll a. The highest mean value of the condition index was recorded in spring (29.49 g) and the minimum in winter (4.96 g). The highest mean value of protein content was recorded in winter (41.57%), carbohydrate in spring (20.31%), and lipid in winter (13.23%). Maximum mean values of moisture (90.32%) and ash (19.06%) were recorded in autumn. The study showed statistically significant correlations between condition index, biochemical composition, and environmental factors. The condition index and biochemical composition of mussels were influenced by the environmental factors (in particular, temperature and food availability) and reproductive cycle, reflecting the specific environmental conditions in which they develop.

Keywords: mussels, *Mytilus galloprovincialis*, biochemical composition, condition index, environmental conditions, Black Sea

**26. PIMEO AI – A PLATFORM FOR ENVIRONMENTAL MONITORING OF THE AQUATIC SENSITIVE ENVIRONMENTS**

**PASAT ADRIAN**

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The assessment of the water quality in different ecosystems is of utmost importance and increase with the continuous development of human activities. PIMEO AI project propose a platform able to monitor water quality in highly sensitive and fragile ecosystems. The PIMEO AI platform consist of a powered unmanned surface vehicle (USV) equipped with the high accurate measurement instrumentation connected to a secure cloud data platform to provide archival, centralization and analytics capabilities. Moreover, the use of the blockchain technology provide trust and traceability, such as securely managing the sensor data information as well as the identity of the stakeholders. The PIMEO AI platform was successfully tested on Créteil lake (a lake in a dense urban environment), Danube Delta (Sulina, Rosu and Rosulet lakes) and Black Sea (Vadu and Corbu beaches, Constanta Maritim port). The results obtained emphasizes the need to use such equipment to provide a granular image of water quality.

**27. CHRONIC AND ACUTE EXPOSURE TO LANDFILL LEACHATE ON ZEBRAFISH MODEL USED AS BIOINDICATOR IN POLLUTED AQUATIC ECOSYSTEMS**

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Anthropogenic activities increasingly provoke deleterious impacts in aquatic ecosystems becoming an emerging problem with global implications. Aquatic ecosystems are often subject to accidental pollution from various discharges. Landfill leachate is a liquid resulting from the disposal of mixed solid waste, having a refractory character due to its content in persistent pollutants. It becomes high toxicity source by the content of ammonia, heavy metal ions in complex form and other xenobiotic in the same

substance. The interactive effects of the landfill leachate solution on the biotic communities are quite unknown, due to its compositional variability and the presence of several pollutants at the same time. Biomonitoring offers an appealing tool for the assessment of different pollutants in aquatic ecosystem. Zebrafish (*Danio rerio*) has been considered a suitable model organism often used in biological, environmental, ecotoxicological and medical researches. At the laboratory level, adults of zebrafish were exposed to two different types of landfill leachate, stabilised and unstabilised, in a concentration range of 6.25, 12.5, 25, 50, 100 mL / L, using only tap water non – chlorinated in the control media. The aims of these experiments were to quantify acute response by determining the lethal dose (D.L.50) during 72 hours of testing and chronic response in the remaining viable organisms of fish, for three weeks, to evaluate any morphological malformations and bioaccumulation of heavy metal ions (Pb<sup>2+</sup>, Cr<sup>6+</sup>, Ni<sup>2+</sup>, Cu<sup>2+</sup>, Cd<sup>2+</sup>) in different type of tissues such as: epithelial, striated muscle, liver. The landfill leachates investigated were highly toxic to the aquatic organisms. Acute response was higher for zebrafish organisms exposed to stabilised landfill leachate from an older waste dump. Of the three tissues analyzed, liver has bioaccumulated the highest amount of heavy metal ions. Keywords: zebrafish, ecotoxicity, heavy metals, ammonia, landfill leachate.

## **28. THE SEASONAL DISTRIBUTIONS OF N FRACTIONS IN THE MAIN LAKES OF THE DANUBE DELTA BIOSPHERE RESERVE BETWEEN 2019-2021**

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This paper discusses the seasonal distribution of N fractions in the main lakes of the Danube Delta Biosphere Reserve, Parches, Fortuna, Merhei, Rosu, Uzlina and Razim lakes respectively, between 2019 - 2021 period of time.

Nutrients, including nitrogen distribution in the aquatic ecosystems are determined by a large variety of interacting factors and various forms of the nitrogen in the water serve either directly or indirectly as a source nitrogen for both the plant and animal life of the lake.

Therefore, this study pays a special attention to spatial and temporal distribution of nitrogen forms, respectively total dissolved inorganic nitrogen, consisting of ammonium nitrogen (N-NH<sub>4</sub>), nitrite nitrogen (N-NO<sub>2</sub>), nitrate nitrogen (N-NO<sub>3</sub>) and organic nitrogen fraction. The graphs were made based on the average mean annual concentration of each nitrogen form (reduced form, oxidized forms and organic nitrogen), on every season between 2019-2021.

In order to assess the variability of the nitrogen forms concentrations within a lake, a representative number of sampling points were established for each studied lake (between 9 and 19) taking into account the lakes surface. Water samples were collected during spring, summer and autumn seasons from each sampling point.

Sampling was performed according to European standards (SR ISO 5667- 3/2018) preserved and properly stored in polypropylene containers. The method used for quantitatively determination of the selected nutrients in the surface waters was molecular spectrophotometry, using Perkin Elmer Lambda 650S. All the analytical determinations of nitrogen forms were performed in the accredited chemistry laboratory of Danube Delta National Institute. The accuracy and precision of the results were evaluated by measuring certified reference samples of similar matrix and organizing several intercomparison exercises between research laboratories.

Our results indicate that a considerable proportion of the total nitrogen in the studied areas is associated with the organic nitrogen. In all sampling sites, concentrations of organic nitrogen are much higher than those of the total inorganic nitrogen fraction, in percentage varying between 59% and 74% in the spring season, 82% and 96% in the summer season and a similar percentage of 83 % and 97% in the autumn season. The lower level of organic nitrogen detected in Razim lake in the spring season (59%) comparing to the other lakes, can be attributed to the low water temperatures after winter season which reduce the microorganisms activity but in the same time could be the indirect influence of the Black Sea on this lake substrate.

Regarding the seasonal distribution of inorganic nitrogen fraction, the highest percentage was recorded in the spring season in all 6 studied lakes, ranging from 14% -30% in the spring season, decreasing in the summer season (4% - 18%) and remaining approximately constant in the autumn season.

The study reveals that the parameters of water quality, in terms of nitrogen forms, vary significantly seasonally, due to the various processes occurring in the lakes, processes such as nitrification, denitrification, fixation, mixing and dilution effect.

In the six studied aquatic ecosystems the organic nitrogen fraction often exceeded 50% of total nitrogen percentage. This higher amount of dissolved organic nitrogen, frequently exceeding that of dissolved inorganic nitrogen (ammonium-N, nitrite-N and nitrate-N), indicates that this component is a dynamic participant in aquatic ecosystems, with an active role of supplying N nutrition to phytoplankton and bacteria, directly or indirectly.

Also, our results pointed out the fact that nitrogen concentrations depend on the rate of physical, chemical and biological processes occurring in the lakes; chemical and biological processes act on different nutrient species at different rate varying as the community responds to environmental factors.

## **29. ZOOPLANKTON AND WATER QUALITY OF CARASUHAT AND ZAGHEN WETLANDS, DANUBE DELTA BIOSPHERE RESERVE**

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This study evaluated the water quality and zooplankton community of two wetlands, Carasuhat and Zaghen after five years of ecological restoration. Five sampling sites for Carasuhat and four sampling sites for Zaghen, were selected and throughout one sampling year, following the guidelines of the Water Framework Directive, several physico-chemical and biological parameters were evaluated seasonally, as well as the zooplankton community. Values of nutrients concentrations indicated relatively narrower fluctuations and were frequently below the imposed limits. The values of chlorophyll “a” concentration displayed a similar trend along the year with the lowest values recorded in spring, and highest values in summer and autumn seasons. According to the concentration of chlorophyll “a”, water quality, was within the limits of “very good” and “good” quality class for Carasuhat and “good” and “moderate” quality class for Zaghen. Zooplankton communities reach their highest abundance and diversity during the summer season. Carasuhat is more rich in species (46 species) than Zaghen (29 species). Numerical density throughout the year was higher in Zaghen (24.60 Ind/L) and lower in Carasuhat (7.91 Ind/L). Most of the species identified in this study are, also common in other types of aquatic ecosystems of the Danube Delta, and indicate high trophic conditions.

Keywords: zooplankton, nutrients, water quality, ecological restoration

## **30. CHANGES IN THE HYDROLOGICAL REGIME OF THE MIDDLE DANUBE REACH AND ITS IMPLICATIONS ON THE LATERAL CONNECTIVITY AND THE RECONSTRUCTION OF FLOODPLAINS**

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The Danube river is the second largest river of Europe. It constitutes the most important freshwater resource of the largest lowland basin of Central Europe, the Carpathian Basin. Floodplain ecosystem dynamics are largely dependent on the dynamics of the flow regime of rivers. We already know that there is a riverbed incision along the free-flowing alluvial reach of the middle Danube, and lateral connectivity is at risk along the reach as the deepening of the riverbed still continues and according to some parameters it is even increasing. The comprehensive hydrological statistical analysis of the changes in the water regime for the entire alluvial reach of the middle Danube has been done in 2021-22, the results of which are alarming because of the ongoing processes of anthropogenic origin: the decreasing trend of water levels which is connected to riverbed deepening. Because of this, there is a risk that traditional floodplain reconstruction activities may become ineffective in a relatively short time. Another endangering result for the floodplain ecosystems is that while the discharge trends, when assessed based on yearly characteristic values, show no significant changes in the negative direction, based on the analysis of the long-term data series, in the empirical discharge distributions of the daily data a characteristic shift towards smaller discharges can be concluded, mainly in the summer months.

## Section III: New Research approaches in EU climate change challenge. Neutral carbon 2050

### 31. 3D ENERGY - CAPTURING EXISTING KNOWLEDGE FOR FUTURE INITIATIVES AIMED AT MEETING LOCAL DANUBE DELTA NEEDS

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The role of renewable local based solutions to decarbonize Danube Delta

This paper is presenting the most important perspective of 3D Energy pillar: renewable energy. The focus is on existing & accessible local solutions, easy to be scaled up and implemented, as well as cost-effective. An analysis of existing solutions versus barriers imposed by the natural habitat and legislation imposed by ARBDD will be conducted in the case of onshore/off shore wind energy, and an assessment of solar panels will be performed.

The topic of waste to energy will be signaled, as this source may be an answer at the entire Tulcea county level. The paper concludes with example of pilot projects to be conducted in Danube Delta.

### 32. BUILDING A FRAMEWORK TOWARDS NET ZERO MOBILITY IN DANUBE DELTA

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This paper is exploring opportunities on a low carbon mobility in Danube Delta, building on Britain's legacy in the region. A **mobility framework** is developed to be tested in **port cities** like Galati, Braila, Tulcea and Sulina. The topics investigated are linked to *decarbonisation, mobility, renewable energy and biodiversity*. The framework is an *action-oriented tool* which incorporates information on *policies and local strategies, governance* on carbon decision making, *human investment* and skills. Information on *financial resources* & business case clarifies existing *funding instruments* and opportunities for investment, while knowledge on *data* and *innovations* indicates ways to operate this Framework. Evidence on *infrastructure* and *capacity building* is complementing the type of information needed to be captured in order to identify opportunities for engagement and investment in Danube Delta's cities. Input in the operational aspect of this Framework is needed to understand the gaps and barriers to implementation, given the complexity environment of Danube Delta with its isolated communities, where mobility is an important aspect.

### 33. THE ORGANIC CARBON CONTENT FROM THE DANUBE DELTA SOILS. RESULTS FROM THE 2021 FIELD CAMPAIGN

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Climate change in recent decades can be attributed to the industrial boom that the world has been experiencing since the emergence of high-performance but polluting production methods. Due to pollution, the concentration of greenhouse gases has increased in the atmosphere, a fact that caused the global temperature to rise over time. The effects of global warming are well known, so huge efforts are being made worldwide to reduce GHG emissions into the atmosphere. The most important GHG is CO<sub>2</sub> because it has the highest concentration in the atmosphere. To predict future CO<sub>2</sub> emissions it is necessary to quantify the carbon / CO<sub>2</sub> cycle in nature. For this study, measurements were made on Danube Delta soil samples to determine the organic carbon content and CO<sub>2</sub> emissions directly from the soil. The results showed a decent amount of OC cumulated in organic soils, the most widespread type of soil in the Danube Delta, and low to medium values in soils with an agricultural profile. On the other hand, the CO<sub>2</sub> emissions proved to be more prevalent in agricultural soils than the soils of natural provenance. However, based on these results, even if there is no immediate danger,

agriculture, if not properly managed, can lead to high levels of CO<sub>2</sub> emissions and consequently undesirable effects.

#### **34. DTC NETWORK FOR STRATEGIC EXPLOITATION & NETWORKING - KEY TO FOSTERING A STRONGER DANUBE INNOVATION ECOSYSTEM**

**NICHERSU IULIANA**

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The European Union Strategy for the Danube region (EUSDR) is a macro-regional strategy that addresses a wide range of issues divided among 4 pillars & 12 priority areas. Priority Area 8 (PA 8) supports the competitiveness of enterprises in the Danube region. Established in 2012 as one of the EUSDR PA8 flagship activities, the “Danube Transfer Centre” (DTC) network, coordinated by SEZ is a powerful transnational structure in the Danube Macro-Region dedicated to fostering innovation & knowledge transfer between academia & the economic environment. With currently 15 so-called “entry points” in 10 countries of the Danube region, the main task of the DTC Network is to create connections between local companies & European R&D stakeholders in order to support technology transfer in the Danube region & contribute to closing the gap between research and (marketable) innovations. The DTC network is embedded in EUSDR within PA8 working group “Innovation & Technology Transfer”, which is also managed by SEZ.

#### **35. CLIMATE CHANGE MITIGATION: THE ROLE OF CIRCULAR ECONOMY IN DANUBE DELTA TO REDUCE CARBON FOOTPRINT IN SEVERAL SECTORS (3D)**

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This paper is part of the 3D network and explores the role of circular economy to mitigate *climate change in Danube Delta through carbon footprint reduction*.

Circular economy principles and concept are presented, with reference to the Danube Delta's economy. Examples from fish farming, subsistence farming and agriculture, as well as tourism are given. Reed resource is illustrated through different angles, exploring its complex potential to tackle climate change.

The role of the *port* is explored, as a complex place, to show the interdependencies between several activities that contribute to climate change impact, while clear examples to mitigate this impact are being investigated. The link between circularity and mobility, energy sources and waste management is explored.

Reference to the *Port of Tulcea & Sulina* is given, underlying opportunities to develop interest for residents that can engage with prospects, needs and assets. Such example includes *waste management* as a complex topic. Thus, several *waste production flows* are identified in Danube Delta, for which *recycling and reuse* are priorities; scrap metal, reed and organic waste. The potential of producing renewable energy from waste is also mentioned, particularly from food-waste and example from other regions (port-cities) are given.

The paper is also developing the link between *research-innovation-demonstration-business* and *jobs* creation, identifying opportunities for local communities living isolated in Danube Delta, to engage with circular economy, for their benefits and society's as a whole.

The conclusion is on the power of circular economy not only to reduce carbon footprint, but to bring jobs and re-invent local knowledge, not to be lost. One of such example is the use of reed to manufacture local products and mitigate climate change through carbon sequestration.

#### **36. THE IMPACT OF CLIMATE CHANGE ON THE BIODIVERSITY COMPONENTS IN THE DANUBE DELTA**

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The Danube Delta represents a true backbone of biodiversity in Europe, hosting more than 7000 species of flora and fauna.

It has been declared a World Heritage site and a UNESCO Biosphere Reserve and it provides one of the most important bird migration corridors on the continent.

However, recent changes caused by climate change have brought increasing threats to the welfare of humans and wildlife alike. Earlier spawning of fish, less snow in winter and higher water temperature in summer have already been reported. Bird populations are influenced by limiting factors (e.g.: food resources, human actions etc.), but they are also becoming increasingly affected by the negative effects of climate change.

According to forecasts, there will be an increase of the air and water temperature in the Danube Delta by 1-2° C, leading to more frequent heat waves and milder winters, and dramatically affecting aquatic wildlife. Unprecedented future sea level rise, water scarcity, and more frequent and severe extreme weather events will be the main factors affecting the fragile ecosystem of the Danube Delta.

The paper emphasizes the need for an ecosystemic approach in order to anticipate and to cope with these changes, whilst providing the protection and conservation of biodiversity components.

It also raises the need for local stakeholders to implement measures in order to adapt to the challenges posed by climate change in the future.

## **Secțiunea IV: Geographical Information System and Application System Modeling**

### **37. IDENTIFICATION AND SPATIAL DISTRIBUTION OF EMERGENT AQUATIC VEGETATION OF LAKES IN THE NORTHERN PART OF THE RUSCA-GORGOVA-UZLINA INTERDISTRIBUTARY DEPRESSION, DANUBE DELTA, ROMANIA**

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Deltaic aquatic plants are essential components of healthy aquatic systems. They yield favorable conditions (food source and habitats) for growth and development of aquatic fauna (fish, water birds and other wildlife species). The characteristics of aquatic vegetation are also an important part of the deltaic landscape, providing a wide spectrum of ecological functions and ecosystem services (biomass, improvement of water quality, soil and nutrients, oxygen). The present study aims to contribute to the general assessment of four freshwater shallow lakes with the latest information on spatial distribution of emerging aquatic plant communities. In order to identify the main associations and communities of emergent aquatic vegetation, several topo-geodesic measurements and mapping of the outline of lakes were performed during August 2021, in low water conditions of the Danube River. Thereby, based on in situ measurements and using LANDSAT 8 satellite imagery, the extent of emergent aquatic vegetation of four lakes (i.e., Gorgova, Gorgovăț, Potcoava and Rotund) were mapped. Thus, in August, when the vegetation reaches its maximum coverage and extent, our results show that the investigated lakes were characterized by varying degrees of vegetation development and several types of vegetation associations were identified. These are represented by species as *Nymphaea alba*, *Nuphar lutea*, *Stratiotes aloides*, *Phragmites australis* and *Trapa natans*, that occur in different proportions within each investigated lake. Based on the maps of spatial distribution, it was observed that the lakes with the highest extent and most types of aquatic plants were represented by Potcoava and Rotund lakes. Instead Gorgova and Gorgovăț lakes were moderately inhabited with floating or emergent aquatic plants. The obtained results are useful for planning and implementing future suitable environmental strategies for the conservation of the Danube Delta Biosphere Reserve ecoregions, that supports many unique assemblages of flora and fauna.

Keywords: aquatic vegetation, dominant species, emergent vegetation, Landsat, mapping, shallow lakes

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### **38. FLOOD SUSCEPTIBILITY IN DANUBE DELTA USING GIS AND MULTICRITERIA DECISION-MAKING ANALYSIS**

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As a result of global climate change, floods have become more frequent and more severe. The Danube Delta is a region subject to frequent floods, due to water spills that occur on surfaces with very low altitudes. Thus, in order to make the most appropriate decisions in order to reduce the negative effects of floods, it is very important to detect areas prone to the possibility of such phenomena. Therefore, a methodology for estimating flood susceptibility using GIS techniques and the Analytical Hierarchy Process model has been proposed in this paper. Thus, several flood predictors such as: distance from Danube branches, distance from the channels, altitude, slope, lithology, land use, hydrological soil group, and distance from agriculture arrangements were used as input data in ArcGIS 10.5 software. These factors were classified in ArcGIS software for later use as input to the Analytical Hierarchy Process (AHP) model. The AHP model involved the creation of comparison matrices both between factors and between categories / classes of the same factors. Through these comparison matrices, the weight of each factor and of each factor class / category was determined. These weights were used in the GIS environment to determine flood susceptibility. The results showed that about 62% of the surface of the Danube Delta (except for the surfaces permanently covered with water) has a high and very high susceptibility to floods.

### **39. NEW DATA ABOUT THE EVOLUTION OF THE MURIGHIOL-DUNAVĂȚ AREA REFLECTED IN OLD CARTOGRAPHIC MATERIALS AND BY MODERN REMOTE SENSING TECHNIQUES**

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The purpose of this study was to try to use the old cartographic materials and modern remote sensing techniques to determine how the Danube Delta evolved in the Murighiol-Dunavăț area.

Although there are many studies on the Danube Delta, there are still aspects that are waiting to be discovered. This study focuses on the evolution of the Danube Delta in the Murighiol-Dunavăț area. Knowing the evolution of the Danube Delta in the Murighiol-Dunavăț area is very important, because a pattern of evolution that repeats on the scale of the entire delta is indicated by the existing information. Patterns in the natural world represent regularities that can be observed in nature. These patterns can be found in different contexts and are the basis of some of the natural systems. The qualitative analysis was important because it provided information about the early stages of the evolution of the Danube Delta and how the 7 subsystems evolve over time: parental material, soils cover, mesorelief, microclimate, water, vegetation and anthropogenic factor.

Because a large surface of land remains uncovered by studies and is difficult to have data collected at the same time layer a degree of inconsistency in the data obtained appeared. Thus, detecting a pattern of the evolution of the Delta that can then be applied at different levels is a good way to fill in the gaps without changing the information in any way.

Finally the distribution and importance of patterns was studied based on semiotic analysis.

### **40. ACOUSTIC DETECTION OF DANUBE DELTA BIRD SPECIES IN THE FRAMEWORK OF SMARTSENSE PROJECT**

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SMARTSENSE Project - "Technological Framework for Sustainable Research and Promotion of Tourist areas using Innovative Techniques for Computerized Visualization and Audio-Visual Recognition"

The assessment of bird presence and richness is important for monitoring certain species and the overall health of the ecosystem. Bird Identification by their sound might be also useful in other activities like bird-watching or tourism. Most of the birds are detected rather by their sound, so the acoustic monitoring is suitable. In the framework of the SMARTSENSE project a mobile application

intended to Danube Delta visiting people will be designed to facilitate users to identify certain species in the Danube area. The paper presents the general framework, and some state-of-the-art methods applied in bird sound detection, how it relates to a more broad domain of environmental sound recognition, and some specific bird sound databases used to implement such systems. We will present our achievements in environmental sound recognition, and how we intend to apply them in identifying certain Danube Delta bird species.

The goal of the SMARTSENSE project is to define an innovative, scalable technological framework consisting of a suite of software applications based on modern visualization and audio-visual recognition technologies, IoT components, data warehouses, data analysis algorithms and modern transmission technologies, in order to support and improve tourism and research activities in tourist areas and reservations.

The project aims to use technologies specific to audio-visual recognition and computer visualizations, in the context of a geographical area of interest, by creating a prototype of the technological platform in the context of the Danube Delta biosphere, on the route T1 (Tulcea - Gorgova - Mila 23 - Crişan - Tulcea), respectively T2 (Letea - Nebunu Lake - Letea), in order to provide a suite of technological products, easily accessible to visitors of this specific area.

The technological framework will be customized for the Danube Delta biosphere.

The project is being implemented by the company ALTFACOR SRL in partnership with BEIA CONSULT INTERNATIONAL SRL.

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Priority Axis: Information and Communication Technology (ICT) for a competitive digital economy

#### **41. SOME MORPHODYNAMIC ASPECTS CONCERNING THE MEANDRED RIVER SECTION OF THE SF. GHEORGHE'S ARM FROM THE DANUBE DELTA BIOSPHERE RESERVE**

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Recent hydrological surveys dealing with high-resolution bathymetric data collection using an interferometric sonar were carried out to investigate the riverbed of some sections on the Sfântu Gheorghe arm of the Danube River located in the Danube Delta. The collected data was to enrich the available database on this river sections, especially in the bifurcation and confluence sectors of the meanders with the main river course. The data was harmonized with previous surveys and observations which allowed in depth analyses and a possibility to characterize the evolution of the meandered sections of the river. The approach in this study was to calculate the morphodynamics of the emerged surfaces (river banks), to analyze and characterize the hydro-morphological structure of the meandered sections of the river, to compare and quantify the liquid flow rates and lastly to analyze and compare the evolution of the riverbed's configuration based on bathymetric profiles. This analysis responds and aims to be a support to the objectives of the Management Plan of the Danube Delta Biosphere Reserve and the Water Framework Directive given the fact that this specific arm of the river was heavily modified at the beginning of 90s in order to shorten the length of the river by cutting the meanders. This part of the Danube River had been rectified for 15 km altogether for the following meanders: Murighiol, Dunăvaţ, Dranov and Ivancea which shortened the route with 32 Km. The benefit of these changes is clear: improve the water transportation by shortening the route, less time spent on transportation ergo, less fuel consumption. The downside is represented by clogging of the lateral connectivity, silting up the mouth of the river and of the adjacent water complexes. And for this balance alteration, several studies have been conducted in order to "keep an eye" on the area to ensure that the already fragile lateral connectivity with the adjacent water complexes inside the Delta is still present.

 **GREEN DEAL CHALLENGES – Decarbosing Danube Delta: 3D Initiative**

**42. CHALLENGES AND OPPORTUNITIES FOR A SMART AND SUSTAINABLE MOBILITY IN PORT CITIES**

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Sustainability is becoming increasingly important in the transport sector, and thus also in the European maritime and inland navigation sector. The adoption of multimodal solutions is essential to increase the efficiency of supply chains, particularly with respect to last-mile. Additionally, the implementation of mobility measures, such as shared mobility services, improved public transport, among others, are important to improve urban mobility in port cities.

The main objective of this presentation is to present the challenges and opportunities related with the implementation of integrated mobility measures in the Ports with the goal of reducing carbon footprint by promoting the efficiency in the use of transport infrastructure and smart mobility to/from/in the Port, namely through energy transition, ICT and digitalization.

**43. SOFT MOBILITY IN DANUBE DELTA – SOLUTION FOR SUSTAINABLE DEVELOPMENT**

**TEODOR FROLU**

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The significant increase in the number of tourists visiting the Danube Delta that we witness lately represents a heavy burden on the natural habitats. This pressure erodes natural resources, adding to the strain brought on by a physical and regulatory set up which is currently underprepared for this growth. The “almost invasion” of seasonal tourists requires a new (transitional) type of visiting and mobility infrastructure. This would increase the attractiveness of the tourist offer, would extend the length of stay and allow for a season of from 9-10 months, instead of just 4 months. Such an approach would lead to a reduction of the CO2 footprint and environmental impact.

 **IASON - Invasive Alien Species Observatory and Network Development for the Assessment of Climate Change Impacts in Black Sea Deltaic Protected Areas**

**44. THE MOST COMMON ALIEN INVASIVE PLANT SPECIES OF DANUBE DELTA BIOSPHERE RESERVE TERRITORY**

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The spreading of invasive species is one of the most obvious and threatening impacts in the Danube Delta Biosphere Reserve territory.

At the European and national level, strategies and concepts are developed to respond to this new challenge in nature conservation.

In this presentation we emphasize integrated information on different management strategies for the invasive plant species in Danube Delta Biosphere Reserve, thus offering up-to-date and specific data not only to the authorities that make political decisions, but to the public also. We include also information on alien species' ecology, information on the characteristics that the alien species possess. In this way, a clear distinction between non - invasive and invasive alien species will be made.

#### 45. RESULTS OF MONITORING OF INVASIVE SPECIES OF MAMMALS AND REPTILES IN THE UKRAINIAN PART OF THE DANUBE DELTA

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The monitoring of invasive alien species was provided during 2021 within the IASON project. The invasive alien species of mammals, amphibians and reptiles were selected for monitoring according to four criteria. The number and status of populations of invasive alien species known to the fauna of the region were monitored and new species of potential aliens were searched for. Monitoring was carried out on the transects, local residents were interviewed and photo traps were conducted. In total, one species of reptiles and 6 species of mammals were selected for monitoring. The current presence of 4 invasive alien species of mammals in the Ukrainian part of the Danube Delta has been confirmed: *Rattus norvegicus* Berkenhout, 1769, *Ondatra zibethicus* Linnaeus, 1766, *Canis aureus* Linnaeus, 1758 and *Nyctereutes procyonoides* Gray, 1834. The presence of *C. aureus* and *R. norvegicus* is evaluated by us as abundant, whereas the number of *O. zibethicus* and *N. procyonoides* tends to decrease. As a result of the study, we do not confirm the current presence in the Ukrainian part of the Danube Delta of potentially dangerous aliens: *Trachemys scripta* Thunberg, 1831, as well as *Myocastor coypus* Molina, 1782 and *Neovison vison* Schreber, 1777.

#### 46. THE CHINESE SLEEPER (*PERCCOTTUS GLENII*) DISTRIBUTION IN THE UKRAINIAN PART OF THE DANUBE DELTA AND PERSPECTIVES OF THE POST-INVASION SPREAD

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The present study aims to describe the current distribution of the invasive Chinese sleeper *Percottus glenii* (Actinopterygii: Odontobutidae) in the Ukrainian part of the Danube delta. The monitoring of the fish assemblage was provided in the Danube Biosphere Reserve, also in the neighboring parts of the Lower Danube. We confirm the increasing of the Chinese sleeper population in the Danube delta: at two of the long-term monitoring sites (fisheries pond near Lake Kartal, Vylkove canal near the Danube Biosphere Reserve Office), Chinese sleeper populations remained high (more than 100 ind.) during each survey year, while numbers increased from sporadic in 2011 to common in 2012–2013/2017 on the Ochakivske branch. At no locality were numbers observed declining or populations disappearing over the study period. Also, the spread of the fish is observed in the closed bodies of water (Lower Danube, several lakes, Sasyk Lagoon). The fish inhabits overgrown banks and marshes along sea foreshore in the delta. Taking into account the recorded post-invasion spread in the Lower Danube and delta, also outside the Danube basin, such as the Sasyk Lagoon and Gulf of Yahorlyk, it is highly plausible that further expansion of this fish species will be observed in the near future.

#### 47. INVASIVE ALIEN SPECIES FROM THE DANUBE DELTA REPRESENTATIVE FOR THE PHENOMENON OF INVASIVENESS

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Maintaining areas of high biological diversity such as wetlands requires an integrated approach and appropriate management practices at European level to meet both land use needs and nature conservation objectives. This is one of the reasons why such a research topic needs to be addressed. Projects on this topic have been carried out both regionally and nationally, carried out in collaboration and at the request of the European scientific community.

The Project - Invasive Alien Species Observatory and Network Development for the Assessment of Climate Change Impacts in Black Sea Deltaic Protected Areas - IASON (BSB), focuses on the inventory of non-native species in this wetland. The aim is to improve the management of the conservation of habitats and protected species as well as the eradication and / or control of Invasive Alien Species (IAS).

#### **48. INVASIVE ALIEN SPECIES OBSERVATORY AND NETWORK DEVELOPMENT FOR THE ASSESSMENT OF CLIMATE CHANGE IMPACTS IN BLACK SEA DELTAIC PROTECTED AREAS**

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The Black Sea area is under pressure from the massive presence of non-native species from the Mediterranean Sea, Indian Ocean or other parts of the world, in terms of maritime transport, climate change or expanding human presence, economic development, etc. In present, the "Mediterraneanization" of the Black Sea is widely debated in the scientific community, starting with the topic of climate change. A significant number of entities develop economic activities in the coastal areas of the Black Sea Coast, especially in deltaic areas, known for their population density and growth potential stimulated by fishing, aquaculture, tourism and recreation, agriculture, etc. Invasive Alien Species (IAS) is the reference point on which the IASON Project focuses, given that if not properly and sufficiently monitored and evaluated, they can dramatically unbalance not only the ecosystem balance of the bioregion, but also a range of socio-economic activities already well established. The "IASON" project aims to establish and carry out joint IAS monitoring actions in the deltaic ecosystems of the Black Sea Bioregion of five countries (Romania, Ukraine, Greece, Turkey and Georgia) and assess their response to current and projected climatic conditions.

#### **49. DANUBE DELTA BIOSPHERE RESERVE AUTHORITY'S EXPERIENCE IN THE IAS MANAGEMENT**

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Danube Delta Biosphere Reserve Authority (DDBRA) is responsible for the management of the public domain grounds of national interest and also has the prerogatives of the environment protection authority. The main prerogatives of the DDBRA are: to know the condition of the natural patrimony, including the evolution of the environment parameters (evaluation, monitoring, impact studies, implementation of the legal foresight in force, coordinating the research program, etc.); to draw up and implement the Management Plan of the Danube Delta Biosphere Reservation, which is the official document that regulates all the activities carried out all over this protected natural area and in its surroundings; to develop regional and international cooperation. The monitoring activity complies with the Integrated Monitoring System for the Environment in Romania and the objectives of the Management Plan for the Danube Delta Biosphere Reserve. The monitoring system in the DDBR identify and measure the state variables of the structure and functions of the Danube Delta ecosystems and the factors that affect their ecological integrity, in order to prevent their effects through corresponding management measures. Finally, DDBRA implements a number of awareness and education activities, as well as development and investment programmes.

#### **50. INVASIVE AND ALIEN FISH SPECIES IN KIZILIRMAK DELTAIC AREA**

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Monitoring studies, inventory programs, and distribution data are needed to manage invasive species and to develop quantitative ecologic, economic, and social impact assessment which would provide valuable insights that can help direct efforts to contain invasive species and prevent their distribution. In this study, carried out within the scope of the EU funded IASON Project (detection and monitoring of alien and invasive species in the Black Sea Delta protected areas), the presence of invasive fish species in the Kızılırmak Deltaic Area, which is the largest wetland and Ramsar area of the Black Sea Region of Turkey, was investigated. Fish populations in three lakes, located in the Kızılırmak Deltaic Area, were sampled by gillnets and electrofishing in Spring and Summer. Sampled fish were genetically identified at species level by analyzing COI gene region of mtDNA. In total, 17 different fish taxa were identified at species level. Among which, four invasive species; *Carassius gibelio*,

Syngnathus abaster, Pseudorasbora parva, and Gambusia holbrooki were identified and their presence were confirmed in all of the sampled lakes.

Keywords: Kızılırmak, Deltaic ecosystems, invasive alien species, IASON, fish

## **51. PRELIMINARY RESULTS OF IASON PROJECT ALIEN AQUATIC INVERTEBRATE SURVEYS IN THE UKRAINIAN DANUBE DELTA**

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The study of alien aquatic invertebrates in 2021 covered fresh marine and transitional waters within the boundaries of the Emerald Network Site "Danube Biosphere Reserve" (SiteCode: UA0000018). This used both a variety of benthic and planktonic sampling methods to species composition identification and the special standardized kick-net (ISO 7828) dragging according Assessment System for the Ecological Quality of Streams and Rivers throughout Europe using Benthic Macroinvertebrates protocol (AQEM Consortium2002) for to calculate biological contamination indices. In total of 10 species of aquatic macroinvertebrates were registered in the studied area: *Amphibalanus improvisus* (Darwin, 1854); *Anadara kagoshimensis* (Tokunaga, 1906); *Corbicula leana* Prime, 1864; *Dreissena bugensis* Andrusov, 1897; *Ferrissia californica* (Rowell, 1863); *Macrobrachium nipponense* De Haan, 1849; *Pectinatella magnifica* (Leidy, 1851); *Physella acuta* (Draparnaud, 1805); *Rhithropanopeus harrisi* (Gould, 1841); *Sinanodonta woodiana* (Lea, 1834). Among them, the most common in fresh waters were *Ph. acuta* and *C. leana*, and in marine and transitional waters – *A. improvisus*. The eastern river shrimp *M. nipponense* is the most recent invader in the Ukrainian Danube Delta and is potentially capable of rapid and aggressive invasion upstream of the Danube.

## **52. INVASIVE ALIEN SPECIES ALONG NESTOS RIVER: CURRENT STATUS AND PRELIMINARY RESULTS OF THE MONITORING ACTIONS**

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Invasive alien species are among of the most important threats to ecosystems around the world. Based on information regarding Nestos area, some species exhibit particularly dangerous behavior, expanding their range and mostly occupying grassland areas. *Amorpha fruticosa* is the most typical example of such a species. The aim of the present study was to record *Amorpha fruticosa*, as well as other invasive alien species along Nestos river, and specifically along the part of the river flowing in the plain area of Chrysoupolis. Based on literature data and information that come from stakeholders, the alien species distributed in the study area and are characterized as invasive are six (*Amorpha fruticosa*, *Solanum elaeagnifolium*, *Phytolacca americana*, *Robinia pseudoacacia*, *Acer negundo* and *Ailanthus altissima*). Following actions focused on the recording and monitoring of their populations, we found out that *Amorpha fruticosa* is the most aggressive species. Its expansion is considered a general threat for all habitats along Nestos river. *Amorpha* forms dense thickets, and is rapidly expanding in grasslands. This could be attributed to the large seed production and their dispersal due to the water. Apart from *Amorpha fruticosa*, *Robinia pseudoacacia* is also spreading, forming dense forest patches, reducing grassland communities which are the most species rich habitats in the area and threatening local biodiversity.

## **53. INVASIVE ALIEN SPECIES OBSERVATORY AND NETWORK DEVELOPMENT FOR THE ASSESSMENT OF CLIMATE CHANGE IMPACTS IN GEORGIA (KOLKHETI AND CHOROKHI DELTA**

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Under a global changing environment, the Black Sea is one of the seas most affected by global warming and human factors, which are actually called multiple pressures. For the monitoring of the climatic impact, effort to increase the resilience of the ecosystem by the controlling of invasive species is a key aspect. Activities within the IASON Project implemented so far perform the monitoring actions on Invasive Alien Species (IAS) in Georgia, Kolkheta and Chorokhi Deltaic ecosystems and assess their impact under current and predicted climatic conditions. Due to lack of research studies on the influence of IAS on bio-ecology, a main focus was given to the literature review having contained the observation of invasive species, their presence and distribution at national level. To develop different

scenarios of the evolution of the state of the ecosystem correlated to climatic changes, one of the main objectives was to make a Climate Data Review to assessing the conditions throughout the country and specifically the study areas. For developing the joint monitoring risk assessment procedures, IAS inventory surveys were implemented on study areas with relevant overviews, conclusions and recommendations facilitating the completeness of distribution knowledge. Since partner countries join different international memberships, meaning that they comply with different legal environmental constraints and requirements, Georgia being as a non-EU member doesn't apply to EU Nature Directives for EU members especially for meeting the NATURA 2000 requirements but joining the Emerald Network. These two networks are fully compatible with each other and use the same methodology and information tools in mapping protected areas under Natura 2000 requirements. For this reason, Standard Data Forms, harmonizing the NATURA 2000 and Emerald Network datasets, were developed accompanying with relevant maps.

## **PICO - Innovative business approaches**

### **54. NETWORKING THROUGH TECHNOLOGY TRANSFER. CREATING SYNERGIES FOR MULTIPLYING FORCES WHEN IT COMES TO CONNECT ACADEMIC AND BUSINESS ENVIRONMENT**

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Making functional the exchange of knowledge/information or technologies between academia and business environment is a significant success factor for environmental and economic progress. Creating the right knowledge and applying it responsibly requires intensive communication between science and industry. The fundamental question in this context is who stimulates research and in which direction: the scientist or the entrepreneur? How can a researcher know which knowledge (or technology) should be developed? And how would an entrepreneur know that certain research results are available to support him/her to be innovative and at least to remain productive / efficient?

Technology Transfer Centres are the institutional links between academia and business. Such offices should be located within research institutions. For reasons of efficiency, the facilities and infrastructure of the host research institution should be made available to the researcher for the implementation of applied science projects. Ideally, through these technology transfer centres, a self-sustaining network is created. A positive example of a successful technology transfer network is the Steinbeis model in Germany. The initial projection was to set up a state research and innovation institution; later on a private company model was chosen to act for reaching at least the same impact on effective communication between academia and business when it comes to innovation, efficiency, competitiveness and productivity of companies, as well as training students according to market requirements.



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