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DELTAS AND WETLANDS

(Book of Abstracts)

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Tulcea

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Dear Distinguish guests,

It is a pleasure and we are honoured to open this

„Deltas & Wetlands" DDNI Scientific Event Community, 30th edition
Deltas & Wetlands International Symposium

Which marks 2 important Days:

- Celebrating the World Environment Day on June 5th, 2023, the world will celebrate World Environment Day which is a global event established by the United Nations to raise awareness and encourage action for the protection of our environment. Each year, World Environment Day focuses on a specific theme to highlight a pressing environmental issue:

The theme for World Environment Day on 5 June 2023 will focus on *solutions to plastic pollution under the campaign #BeatPlasticPollution*. The world is being inundated by plastic. More than 400 million tons of plastic is produced every year, half of which is designed to be used only once.

- Celebrating United Nations World Oceans Day 2023. Oceans Day was first declared as 8 June, 1992 in Rio de Janeiro at the Global Forum, a parallel event at the United Nations Conference on Environment and Development (UNCED) which provided an opportunity for non-government organizations (NGOs) and civil society to express their views on environmental issues. On this day, we have an opportunity to raise global awareness of the benefits humankind derives from the ocean and our individual and collective duty to use its resources sustainable. Future generations will also depend on the oceans for their livelihoods.

Through the theme for World Oceans Day on 8 June 2023, which is *Planet Ocean: Tides Are Changing*, we will discover how Earth is more than it may seem, and generate a new wave of excitement towards cherishing and protecting the ocean and the entirety of our blue planet.

Allow us to extend a warm welcome to the proceedings of the 30th edition of the Deltas and Wetlands Symposium. It is a special occasion to gather here today and reflect on the remarkable progress made in protecting and conserving wetlands.

This anniversary is not only an opportunity to celebrate our shared successes, but also an opportunity to focus on the current and future challenges facing our wetlands. Over the three decades of this symposium's existence, we have witnessed significant changes in awareness and understanding of the importance of wetlands to the health of our environment and our communities.

Today, in an era marked by challenges such as climate change, biodiversity degradation and the need to ensure sustainability, the need to act responsibly and strategically to protect and restore the health of wetlands is becoming increasingly evident. This celebration of the symposium's 30th edition provides us with an opportune moment to reflect on our progress, but also to reaffirm our commitment to the conservation and protection of these valuable ecosystems.

Over the years, we have seen tremendous growth in wetland health research and expertise. The results and innovative solutions that have resulted from these efforts have provided us with essential clues and guidance for decision-making in managing and protecting wetlands.

Today, in this special celebration, we urge you to reflect on lessons learned and successful projects to continue to promote an integrated and cooperative approach to wetland conservation and restoration. Let's share our knowledge, learn from each other and establish sustainable partnerships that will allow us to continue to move towards more effective and sustainable management of these important ecosystems.

On behalf of the organizers, we would like to extend a warm welcome to the 30th edition of the Deltas & Wetlands Symposium. It is a privilege to gather here today and address the crucial topic of environmental health in wetlands.

All research and development organizations, both in the public and private sectors, face new challenges. The pressure to compete on a global scale with limited resources is ever greater. We must all work together to ensure our prosperity and that of future generations. The strategic model promoted by DDNIRD provides a framework that encourages the cooperation, collaboration and innovation we will need to ensure this goal is achieved.

We talk, more and more often, about creativity as that way to trigger our inner forces, which make possible an approach, more than interdisciplinary, why not, transdisciplinary.

It is axiomatic that a system cannot be managed unless it is measured, and that the measurements take place in a rigorous manner, likely to cover the relevant spatial and temporal scales. Furthermore, it is not possible to predict the future direction of a system unless any predictive approach or model is supported by empirical evidence from monitoring.

Complex systems like River-Delta-Sea, has no differences from any other system in these respects. This analysis indicates the nature and topics of monitoring both biodiversity, but especially of environmental factors, as well as its constraints in times of climate crisis, economic austerity, the sequence of topics subject to monitoring and the volume of monitoring of different topics carried out, as you will be able to ascertain from presentations. We discuss how the monitoring structure is decided, interpretations of working hypotheses and use examples to comment on how monitoring drives and responds to the management and governance of the Danube Delta Biosphere Reserve.

The world does not stand still, but is changing faster and faster. The links between organizations, communities, countries and socio-ecological systems are increasingly strong and complex. To remain competitive in this environment, any organization must innovate and improve continuously. Now, more than ever, an organization must understand, balance and effectively manage the needs and expectations of its stakeholders.

Wetlands play a vital role in maintaining the balance of our ecosystems and supporting biodiversity. They provide habitats for many species of plants and animals, filter water, mitigate floods and store carbon, among many other valuable ecological services. Recognizing the importance of wetlands, it is essential that we come together to discuss their health and explore strategies for their sustainable management.

This symposium serves as a platform for sharing knowledge, experiences and innovative ideas related to wetland conservation and restoration. Through open dialogue and collaboration, we can improve our understanding of the challenges facing wetland ecosystems and identify effective solutions.

Our discussions should cover a range of topics, including the impact of human activities on wetlands, the role of wetlands in mitigating and adapting to climate change, the importance of conserving biodiversity, and the links between wetland health and human well-being.

Furthermore, let's not forget the cultural significance of wetlands. There are deep-rooted ties to local communities, providing them with livelihoods, recreational spaces and a sense of identity. We need to explore ways to preserve and promote these cultural values while addressing environmental issues.

As we attend sessions, workshops and symposium presentations, allow us to foster an environment of collaboration and knowledge exchange. Together, we can generate innovative ideas, establish partnerships and develop action plans that will contribute to the long-term health and sustainability of wetland ecosystems.

We would like to express our gratitude to the organizers for their efforts to bring us all together and create this platform for dialogue. We would also like to extend our appreciation to the experts, researchers, policy makers and stakeholders who contributed their expertise to this event.

May this 30th edition of the Wetland Health Symposium serve as a stepping stone toward a future where wetlands thrive, ecosystems are resilient, and human communities coexist harmoniously with nature. Let's inspire each other, learn from each other and work for a sustainable and healthy environment for all.

Preliminary Program

„Deltas & Wetlands" DDNI Scientific Event Community, 30-th edition

Deltas & Wetlands International Symposium

Tulcea, June 05 - 09, 2023

- ✓ **June 05, 2023 (Monday)** - Arrival of participants
- ✓ **June 06, 2023 (Tuesday)**

***Venue*: „Mihail Kogălniceanu" City Hall** / 20 Păcii Street, Tulcea

- 09.00 - 09.30 - Registration of participants *(Romanian time)*
- 09.30 - 11.00 - **Opening ceremony** (**Dr. Biol. Marian TUDOR**, General Director of DDNI)

  *Celebrating **World Environment Day** (June 5) and **World Oceans Day** (June 8)*
  - Dr. **Róbert-Eugen SZÉP**, Secretary of State, Ministry of Environment, Waters and Forests
  - Mrs. **Magdalena-Andreea STRACHINESCU-OLTEANU**, Head of unit, DG MARE
  - Mr. **Gabriel Teodosie MARINOV**, Governor, Danube Delta Biosphere Reserve Authority
  - Mrs. **Elisabetta BALZI**, Head of Unit at European Commission, DG Research and Innovation, Healthy Seas and Ocean (*online*)
  - Mr. **Amb. Lazăr COMĂNESCU**, Secretary General of the Organization of the Black Sea Economic Cooperation (*online*)
  - Dr. **Robert LICHTNER**, Coordinator, Danube Strategy Point, EU Strategy for the Danube Region *(online)*
  - Mrs. **Ulrike LEIS**, Deputy Director, Project Finance Programme European Climate Initiative (EUKI) (*online*)
  - Rector emeritus, Prof. Dr. **Adrian BAVARU**, Ovidius University Constanţa
- 11.00 - 11.15 - *Coffee break*
- 11.15 - 11.45 - ***Keynote Speaker***: Prof. Dr. **Ming JIANG,** General Director of Northeast Institute of Geography and Agroecology, Chinese Academy of Science * *(online presentation)*
- 11.45 - 12.30 - **Symposium interviews:** Prof. Dr. Doc. **Petre GÂŞTESCU**, Hyperion University / University of Bucharest, Prof. Dr. **Erika SCHNEIDER**, Karlsruher Institut für Technologie
- 12.30 - 14.00 - ***Lunch & Networking***
- 14.00 - 16.00 - ***Keynote Speaker:***
  - Mrs. **Magdalena-Andreea STRACHINESCU-OLTEANU**, Head of unit, DG MARE

    - Green Deal Challenges - Decarbonising Danube Delta: 3D Initiative (EDAPHIC-BLOOM Danube / All Stakeholders Meeting)

    Mobility Pillar:
    - **Florin NEMȚANU** (University POLITEHNICA Bucharest): Smart Mobility in the Danube Delta Region

    Agriculture Pillar:
    - **Iulian HORNEŢ** (Cluster MEDGreen): Technologies for the sustainable exploitation of the non-wood biomass resources of the Danube Delta in order to protect and preserve it, in conjunction with the sustainable economic development of the area

- **Iulian NICHERSU** (DDNI): Master Plan for nature-based regional ecometry through the protection of organic soils, carbon sequestration, greenhouse gas mitigation potentials, Biodynamic Regenerative Agriculture and Biophilia in the Danube Floodplain and the Danube Delta
- **Costin LIANU**: Innovation Hub Bio Danubius as a pathway to new agro-ecology practice in the wetlands

Energy Pillar:

- **Jürgen RAIZNER**: Building on the EDAPHIC-BLOOM Experience Exchange: Energy Efficiency Solutions from Germany
- **Sergiu NICOLAIE** (ICPE-CA): Clean access in Danube Delta
- **Valeriu VILAG**, **Narcisa BURTEA** (COMOTI): Green, Renewable & Resilient Energy (& Transport) Scalable Solutions for Danube Delta

- 16.00 - 17.00 - **Roundtable debates**:
  - ***„Romania's initiatives in the fields of education and adaptation to climate change"***
    - Debate moderator: Dr. **Alexandra-Maria BOCŞE**, State Adviser, Department of Climate and Sustainability, Romanian Presidential Administration
    - Mr. **Chris FREAN**, Head of Economic Diplomacy, British Embassy
    - ***Smart Mobility Solutions - Case studies***, Prof. Ph.D. Eng. Ec. **Florin NEMȚANU**, Director of the Intelligent Systems for Transport Master Program, Vice-Dean of Transport Faculty, Politehnica University of Bucharest
  - ***„Measures for the protection and conservation of Natura 2000 Sites in the DDBR"***
    - Debate moderator: **Gabriel Teodosie MARINOV**, Governor, Danube Delta Biosphere Reserve Authority
- 17.00 - 17.15 - *Coffee break*
- 17.15 - 18.25 - **A touch of Blue in the EU Research Nights for a more Sustainable Use of the Ocean (BlueNIGHTs)** (hybrid)
  - An informal space to discuss the interaction between **Blue Scientists** and European society, the need to spread ocean literacy among citizens and in schools, and the importance of raising awareness of the impact of human activities on the marine environment for a more sustainable use of it:
    - **Francesca ALVISI** & BlueNIGHTs consortium partners: Bringing the Blue Science to Society: the EU Researchers' Night experience
    - DDNI: Ocean Literacy in Delta & Wetland areas: how to connect land to sea?
    - Romanian teachers: Toward a Blue School Network in the Black Sea: challenges and opportunities for the educational system.
  - **PICO** (**P**resenting **I**nteractive **Co**ntent) & **Business approaches**:
    - **Mihaela APOSTOL** (TehnoINSTRUMENT Impex): Environmental Quality Monitoring Solutions
    - **Sorin BOGDAN** (MDS Electric): Equipment and solutions for water monitoring

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

- 18.30 - 19.00 - **Posters presentations** & *Coffee*
- 19.30 - ***Festive dinner***

✓ **June 07, 2023 (Wednesday)**

Parallel events:

9.00 - 12.00 Restore our Ocean and Waters - EcoDaLLi project in the Danube and Black Sea Lighthouse *Venue*: **Hotel Delta Tulcea**, Second floor, **Toma Caragiu & Constantin Găvenea** rooms (2 Isaccei Street)	**9.00 - 12.00 „Deltas & Wetlands" Scientific Symposium, Sections II & IV** *Venue*: **„Mihail Kogălniceanu" City Hall,** (20 Păcii Street)

***Venue*: Hotel Delta Tulcea**, Second floor, **Toma Caragiu & Constantin Găvenea** rooms, 2 Isaccei Street, Tulcea:

- 09.00 - 12.00 **Restore our Ocean and Waters - EcoDaLLi project in the Danube and Black Sea Lighthouse**
  - Presentation of the EU Mission Ocean framework, guidelines and related policies, for better understanding of the Restore our Ocean and Waters and the Horizon Europe EcoDaLLi project. The workshop is bringing the regional and local focus on current spatial policies in the different landscape typologies of the Danube Delta and Black Sea area, aiming at aligning with the 3 main Mission Ocean objectives: increased biodiversity and resilience, control and prevention of water pollution and more circular, blue and free carbon economy, with co-participatory approaches and a clear focus on citizen engagement

***Venue*: „Mihail Kogălniceanu" City Hall** / 20 Păcii Street, Tulcea:

- 09.00 - 09.30 - ***Keynote Speaker:***
  - Prof. Dr. **Timothy EHLINGER** - Engaging Complex Systems for Environmental Peacebuilding: Examples from the Romanian Black Sea Coast
- 09.30 - 10.30 - **Section II**, **Environmental factors. Ecological restoration and Anthropic Impact**

Convener: Dr. Viola Somogyi		***Co-convener: Dr. Adrian Burada***
09.30 - 09.40	Somogyi Viola	Future of nature-based wastewater treatment solutions in view of water reuse strategies
09.40 - 09.50	Detlef Günther-Diringer	Floodplain restoration along the Lower Danube and its importance as a CO_2-sink
09.50 - 10.00	Cristian Paltineanu	Dynamics of soil organic carbon after long time farming in the Danube Delta
10.00 - 10.10	Hui Zhu *	Design of constructed wetlands with low greenhouse gas emissions
10.10 - 10.20	Albert Scrieciu	The development of a Natural Assurance Scheme in the Lower Danube: from NbS design processes to co-benefits capitalization
10.20 - 10.30	Emine Erdem Yurur	The Ecological Consequences Of Large Dam Construction

- 10.30 - 10.45 - *Coffee break*
- 10.45 - 11.15 - ***Keynote Speaker:***
  - Prof. Dr. Eng. **Eden MAMUT** - Multicriteria & Multiscale Methods on Sustainable Development
- 11.15 - 12.00 - **Section IV**, **Geographical Information System and Application System Modeling**

Convener: Prof. Dr. Siniša Ozimec		***Co-convener: Dr. Marian Mierlă***
11.15 - 11.25	Bianca Fazacas	Unraveling Flood Zones Dynamics with Spatio-Temporal Analysis Using Earth Observation Data: A Case Study of the Danube Delta
11.25 - 11.35	Siniša Ozimec	Watch Out project: the usage of modern digital tools in the wildlife biomonitoring in Kopački rit Nature Park (Croatia)
11.35 - 11.45	Anna Davison	A sturgeon digital twin: understanding migration and poaching in (near) real-time

- 12.00 - 13.30 - ***Lunch & Networking***

- 13.30 - 14.00 - ***Keynote Speaker:***
  - Dr. **Delia DIMITRIU** - The Role of 3D Initiative in supporting the Missions Ocean, Climate & Cities
- 14.00 - 16.00 - **Section III**, **New Research approaches in EU climate change challenge. Neutral carbon 2050**
  - 3D Initiative (EDAPHIC-BLOOM Danube - All Stakeholders Meeting)

  Climate Mitigation & Adaptation Pillar:
  - **Sorin CHEVAL** (NMA): OPTimising FORest management decisions for a low-carbon, climate resilient future in Europe
  - **Camelia IONESCU** (WWF): Addressing societal challenges in Lower Danube and Danube Delta through nature restoration

  Circular Economy Pillar
  - **Ionela ION** (GEOSTUD): Circular Economy in the Danube Delta

  Water-Food-Biodiversity Nexus
  - **Mădălina COZMA**: Live roots for a new Life. The role and importance of forest and forest areas in CO_2 sequestration
  - **Ionela ION** (GEOSTUD): Wetlands at the Frontline of Climate Change: Assessing Biodiversity Vulnerability

  3D International Actions (EU Missions, COP 28)
  - **Romulus CHEVERESAN** (BEIA): Audio detection and identification of Danube Delta bird species in the Smartsense project
  - **Dragoş Sebastian CRISTEA** (ALT FACTOR): Technological framework for sustainable research and promotion of tourist areas using innovative techniques for computerized visualization and audio-visual recognition
  - **Laura URDES -** Applying One Health to Aquatic Ecosystems
- 16.00 - 16.15 - *Coffee break*
- 16.15 - 16.45 - ***Keynote Speaker:***
  - **Dr. Katrin TEUBNER** - International Association for Danube Research (IAD): How our focus has changed over time
- 16.45 - 18.05 - **Section I**, **Biodiversity & nature conservation, natural resources & socio-economic aspects**

Convener: Dr. Mariana Golumbeanu		***Co-convener: Dr. Mihai Marinov***
16.45 - 16.55	Bavaru Adrian, Stoica Godeanu	The reduction of biodiversity in the world
16.55 - 17.05	Mariana Golumbeanu	Supporting The Blue Growth Initiative In The Black Sea Area
17.05 - 17.15	Denis Deže	Habitat monitoring in Natura 2000 site HR2000394 Kopački rit (Croatia)
17.15 - 17.25	Csizmadiane Czuppon Viktoria	Possible circular economy solutions in order to ensure sustainable short food supply chain
17.25 - 17.35	Vera Stanković	Ponds in Romania - Need and Recommendations for Improvement of Legal Protection
17.35 - 17.45	Ana Simionov	Preliminary genetic diversity of the critically endangered beluga sturgeon (Huso huso) population in the Lower Danube River as revealed by young of the year of 2019
17.45 - 17.55	Mariam Avakova	Eco-Entrepreneurial Mindset towards Natural Protection
17.55 - 18.05	Elchin Sultanov	The results of winter counts of birds in Azerbaijan in 2023 and comparison with results of winter counts of 2022
18.05 - 18.15	Cvijanović Dušanka	Conservation value of fluvial lakes and gravel pits in river-floodplain systems in the Western Balkans

- 18.15 - 18.45 **Conclusions & Awards**

- ✓ **June 08, 2023 (Thursday)**
  - 9.00 - 19.00 - Field trip in the Danube Delta Biosphere Reserve
    - **EDAPHIC-BLOOM Danube** / All Stakeholders Meeting
    - **DANS 2** / Strategy and actions for the preparation of national participation in the project DANUBIUS - RI
- ✓ **June 09, 2023 (Friday)** - Departure of participants

***) online participation**

Posters:

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

1.	Alexandru Cătălin Birău, Simona Dumitrița Chirilă, Marian Mierlă, Dumitru Murariu	Is There A Conflict Between Local Communities In Romania And Birds Of Prey?
2.	Carme Machí Castañer, Karen Naciph Mora	Restore Our Ocean And Waters - Ecodalli Project In The Danube And Black Sea Lighthouse
3.	Mitică Ciorpac, Ovidiu A. Popescul, Gabriela Grigoraş, Cecilia Şerban, Dragos-Lucian Gorgan	Preliminary genetic diversity of the extinct in the wild Scardinius racovitzai species
4.	Constantin Ciubuc	Research On The Evolution Of Trichoptera Communities (Class Insecta,Ord.Trichoptera) From Aquatic Ecosystems On The Territory Of Romania With The Help Of The Botosaneanu And Ciubuc Collections, Sheltered In "Grigore Antipa" Național Museum Of Natural History In Bucharest
5.	Chiara Colotti, Dario Brusco, Francesca Alvisi, Mauro Caccavale and Silvia Merlino	Bluenights Eu Project: A Framework To Develop Ocean Literacy Experience And Activities
6.	Simona Dumitrița Chirilă	Analysis Of The Distribution And Characteristics Of The Populations Of Crambe Tataria Sebeók (Brassicaceae) In Romania
7.	Ivan Damjanović, Dragan Prlić	Biodiversity Monitoring Of The Spačva Basin Floodplain (Eastern Croatia)
8.	Cristian-Sorin Danilov, George Țiganov, Cătălin Valentin Păun, Daniel Grigoraș, Dragoş Diaconu	State Of Small Scale Fisheries Sector In The Romanian Black Sea Area, During 2018 – 2022
9.	Liliana Ene, Mihai Doroftei, Silviu Covaliov, Simona-Dumitrița Chirilă, Marian Mierlă, Matei Simionov, Aurel Năstase, Irina Cenișencu, Alexandru Dorosencu, Lucian Bolboacă, Mihai Marinov, Vasile Alexe, Iulian Nichersu, Dragoș Balaican, Florentina Sicrieru, Gabriel Lupu	Status Of Biodiversity, Habitats, Sustainable Exploitation Of Natural Resources And Socio-Economic Implications In Danube Delta Biosphere Reserve In 2021
10.	Stefana Jurcoane, Stelică Cristea, Adrian Bâșa, Mirela Drăgan, Elena Ivan, Constantin Dobrescu	Adaptation To Climate Change Of Some Energy Crops In The Sustainable Mode
11.	Filip Jurić, Iuliana Nichersu, Carme Machí Castañer, Hrvoje Mikulčić	Stakeholders' Involvement In Eu Mission Ocean-Basis For The Danube Lighthouse Living Labs System
12.	Botond Janos-Szabolcs Kiss, Vasile Alexe, Mihai Marinov, Lucian-Eugen Bolboacă, Alexandru-Cătălin Dorosencu, Gabriel Bogdan Chișamera, Cristina-Nicoleta Nanu	The Current And Historical Presence Of The European Fallow Deer - *Dama Dama*, (Linnaeus 1758) On The Territory Of The Danube Delta Biosphere Reserve (Romania)
13.	Givi Kochoradze	Black Sea Submarine Power Cable From Georgia To Romania
14.	Aurel Năstase, Ion Năvodaru	How Are The Current Fish Stocks And Fish Fauna In Freshwater Of Danube Delta Compared To The Last Century

15.	Ana Bianca Pavel, Catalina Gavrila, Sabin Rotaru, Catalin Gheablau, Albert Scrieciu	Multiple stressor effects on benthic macroinvertebrates in critical sectors from the lower sector of the Danube River (626-811 km)
16.	Anastasiia Portarescu, Corina Certan, Constantin Bulimaga	Floristic Diversity Of The "Rădoaia" Medicinal Plants Natural Reserve
17.	Daniela-Mariana Rosioru, Elena-Daniela Pantea	The Exploitation Of *Mytilus Galloprovincialis* From The Romanian Black Sea Coast With Practical Application
18.	Matei Simionov, Silviu Covaliov, Gabriel Lupu	Addressing Invasive Alien Species In Black Sea Deltaic Ecosystems: Achievements And Implications Of The Iason Project
19.	Oleksandr Solomukha, Larysa Voitenko, Olha Kravchenko	Assessment Nitrogen Compounds Of Drinking Water Supply In The Starokonstantiniv Region (Ukraine)
20.	Antonio-Valentin Tache, Oana-Cătălina Popescu, Alexandru-Ionuţ Petrişor	Model For The Connectivity Analysis Of Blue-Green Areas In Bucharest Metropolitan Area
21.	Ahmet YAZAR	Conservation Of Wetlands In The Context Of Local Wetland Commissions In Turkey: Wetland Management Of Ekşisu Marshes
22.	Dorel Ureche, Teodora-Ramona Pintilieasa, Camelia Ureche	Considerations On The Fish Fauna Structure Of The Bistrita River (North-Eastern Romania), Spillway Area, In The Period 2020-2022 - An Overview
23.	Hui Zhang, Xin Sun, Dong Liu, Haitao Wu And Huai Chen	Air Warming And Drainage Influences Soil Microarthropod Communities

Section II: Environmental factors, Ecological restoration and Atrophic Impact

24.	Claudiu Cepan , Melinda Cepan, Adina-Elena Segneanu, Ioan Grozescu	Sustainable Water Management In The Context Of The Circular Economy
25.	Melinda Cepan, Adina-Elena Segneanu, Claudiu Cepan, Dorin Munteanu, Ioan Grozescu	Removing Nutrients From Water And Reusing Them As Fertilizers In Agriculture - An Important Stage Of Water Remediation
26.	Viacheslav Chobotar, Volodymyr Kopilevich, Olha Kravchenko	Assessment Of The Quality Of Water Supply Sources For Irrigation In Mogilev-Podilsky District (Ukraine)
27.	Zhu HUI	Design Of Constructed Wetlands With Low Greenhouse Gas Emissions
28.	Anastasiia Hats	Anthropic Pressure Assessment On Surface Waters Using Water Quality Indices
29.	Alexandru Iorga	Development And Tourism At The Margins Of Europe. Politics Of Development And Tourism In Chilia Veche, Romania
30.	Răzvan Mateescu, Victor Nita	Coastal Waves' Gauge Stations Network Extension In The Romanian Transitional Shore Unit. Its Support For A Sustainable Beach Sediments And Aquaculture Experimental Farms Management
31.	Dorin Popa, Doina Prodan, Marioara Moldovan, Codruța Saroși, Stanca Cuc, Maria Popa, Simona Varvara	Study On The Possibility Of Obtaining Some Green Technologies Used In The Rehabilitation Of Heritage Buildings
32.	Elena Ristea, Nicoleta Damir, Valentina Coatu, Diana Danilov, Vasile Lavric	Analysis Of Polycyclic Aromatic Hydrocarbons In Black Sea Pelagic Fish

33.	Iasemin Suliman, Iuliana - Mihaela Tudor, Orhan Ibram, Adrian Burada, Cristina Despina, Seceleanu-Odor Daniela, Lucica Tofan	Assessing The Toxicity Of Water Using Toxkit Microbiotests: A Case Study In The Zaghen Ecological Restoration Area (Danube Delta Biosphere Reserve)"
34.	Daniela Seceleanu-Odor, Adrian Burada, Cristina Despina, Mihaela Țigănuș, Iasemin Suliman, Orhan Ibram, Iuliana-Mihaela Tudor, Isabelle Metaxa	Seasonal Dynamic Of Nitrogen And Phosphorus Concentrations In The Lakes Of The Danube Delta In The Period 2019-2022
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36.	X. J. Shen, B. H. Liu, M. Jiang, Y. J. Wang, L. Wang, J. Q. Zhang And X. G. Lu	Spatiotemporal Change Of Marsh Vegetation And Its Response To Climate Change In China From 2000 To 2019
37.	Viktor Vyshnevskyi, S. Shevchuk	The Danube Delta And The Processes Affecting Its State
38.	Yelyzaveta Zalenska	River Water Quality Index: Methodology And Application

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39.	Laura Alexandrov, Dan Vasiliu, Stoicho Motev, Bogdan Ghinea, Maria Novicova, Dragos Niculescu, Iulian Nichersu	Defining And Analysing Future Conditions Under Maritime Spatial Planning In Romania And Bulgaria
40.	Irina Catianis, Gabriel Iordache, Adriana Maria Constantinescu, Bogdan-Adrian Ispas, Ana Bianca Pavel	Mapping Of Emergent Aquatic Plant Communities According To Point-Intercept Surveys And Landsat Satellite Imagery For Uzlina And Lumina Lakes, Danube Delta, Romania
41.	Romulus Cheveresan, Svetlana Segarceanu, Maria Niculae,Theodor Pintilie	Audio Detection And Identification Of Danube Delta Bird Species In The Smartsense Project
42.	Marian Mierla, Silviu Covaliov, Mihai Doroftei, Cristian Trifanov, Cristina Despina, Irina Cernisencu	Preliminary Results On Centaurea Jankae Monitoring
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Section III: New Research approaches in EU climate change challenge.
Neutral carbon 2050

Sectiunea IV: Geographical Information System and Application System Modeling

ABSTRACTS

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

1. ECO-ENTREPRENEURIAL MINDSET TOWARDS NATURAL PROTECTION

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We need to reconsider what natural resources and biodiversity are, how they are connected to nature conservation, how they foster love for nature, and how they raise awareness when we speak about biodiversity and natural conservation, taking into account using natural resources as a valuable social and economic aspect. Sustainable development goals (SDG) and people, particularly in countries with middle incomes, are based on natural resources in today's contemporary world. The majority of Georgia is surrounded by stunning protected areas with communities that rely on agriculture, livestock, and nature. It is important to understand that the success of biodiversity conservation in protected areas will depend on individuals, farmers, tourists, and entrepreneurs and how well they integrate into the area, the wider landscape, and the habitat, considering their engagement practices. This is particularly significant in middle-income countries. Traditionally, any form of income-generating business that involves interpreting the natural, cultural, historic, and environmental values of the land and the people who live there is referred to as agricultural tourism or a "green job." Based on Georgian experience and global observation, I'd like to share my personal thoughts on the principles of nature protection through ecosystem services and eco-agrotourism in my presentation. I'd also like to discuss how human activities can be integrated by encouraging a socio-economic entrepreneurial mindset to manage multi-use areas for the benefit of all individuals, including nature and humans, to protect nature and address socio-economic issues by appreciating the natural resources around us.

2. THE REDUCTION OF BIODIVERSITY IN THE WORLD

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At the world summit aimed at biodiversity, held in December 2022 in Montreal - Canada, specialists assessed that we are at the beginning of the seventh mass extinction of all forms of life at the planetary level, and its cause is no longer natural, but owes to the people. The main causes are: pollution - which affects all living environments (air, water, soil, subsoil), the acceleration of processes that determine climate change, the introduction and stimulation of the expansion of invasive species, as well as other human actions with negative repercussions on natural ecological systems (such as are the anthropization of land, the expansion of monocultures in agriculture, the use of increasingly aggressive pesticides, uncontrollable genetic manipulations, the expansion of fires, the fragmentation of natural ecosystems, etc.).
La summit-ul mondial destinat biodiversității, desfășurat în decembrie 2022 la Montreal – Canada, specialiștii au apreciat că suntem la începutul celei de a șaptea extincție în masă a tuturor formelor de viață la nivel planetar, iar cauza acesteia nu mai este naturală, ci se datorește oamenilor. Principalele cauze sunt: poluarea - care afectează toate mediile de viață (aer, apă, sol, subsol), accelerarea proceselor care determină schimbările climatice, introducerea și stimularea extinderii speciilor invazive, precum și alte acțiuni umane cu repercusiuni negative asupra sistemelor ecologice naturale (cum sunt antropizarea terenurilor, extinderea monoculturilor în agricultură, utilizarea unor pesticide tot mai agresive, manipulările genetice incontrolabile, extinderea incendiilor, fragmentarea ecosistemelor naturale etc.).

3. IS THERE A CONFLICT BETWEEN LOCAL COMMUNITIES IN ROMANIA AND BIRDS OF PREY?

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Local communities may come into conflict with birds of prey because some of these species attack domestic animals, especially pigeons, and poultry. In such situations, negative perceptions towards birds of prey are created and lead to conflicts with people who could persecute not only the species in question but all the species of prey. For the conservation of biodiversity, the persecution of birds of prey due to local community-birds of prey conflict has become a serious concern. In this case, it is necessary for the socio-ecological dimensions of each particular situation to be included in the strategies for the conservation of the target species. The purpose of the study was to evaluate the extent and social characteristics of local community-birds of prey conflicts in Romania. The study was carried out between April and May 2023, and the data collection method was the questionnaire, applied in two samples: through interviews and the distribution of questionnaires on the Internet (via social media). The questionnaire was completed by 969 (total number, without deducting the inconclusive questionnaires) people. The statistical analysis of the data was carried out in the R program. The results showed that 55% of the respondents had negative attitudes towards birds of prey, mainly with the species of hawks. A total of five species were considered to be in conflict due to predation on domestic animals, of which the hawks presented the highest conflict. Only 15% of those interviewed reported taking direct action against conflict species. This indicates a relatively peaceful coexistence of humans with these species. However, the negative attitudes towards species of hawks but also the erroneous identification, in our case study, of the long-legged buzzard, in many cases being confused with the northern goshawk suggest the need for a comprehensive conservation approach to address future threats to the conservation of all species of birds of prey in Romania

4. RESTORE OUR OCEAN AND WATERS - ECODALLI PROJECT IN THE DANUBE AND BLACK SEA LIGHTHOUSE

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The session entitled “Restore our Ocean and Waters - EcoDaLLi project in the Danube and Black Sea Lighthouse" is organised as part of the 30 th edition of the “Deltas & Wetlands” DDNI Scientific Event Community. This interactive session will be structured in two parts, attracting stakeholders with a better understanding of the Restore our Ocean and Waters and the Horizon Europe EcoDalli project. A first 45 minutes presentation about the EU Mission Ocean framework, guidelines and related policies, followed by a coffee break and a 1 hour and a half participative working session with all stakeholders involvement, to bring the regional focus on the Delta and the Black Sea for the transposition of the Mission Ocean objectives at this level. Local and international stakeholders will discuss contextual specificities and possible drivers for change in the existing local and regional spatial policy framework. In the discussions we will identify gaps, inter-linkages and challenges, propose actions and brainstorm on how to enable locals to provide and support innovation. These interactions will be held in 3 groups, divided by the Mission Ocean main topics: “Ecosystem Restoration for increased Biodiversity and Resilience”, “Reduction or elimination of Water Pollution” and “Circularity, Blue Economy and Decarbonisation Actions” for the Danube and Black Sea, and the exercise will be conducted following a template format provided by the workshop moderators.

5. PRELIMINARY GENETIC DIVERSITY OF THE EXTINCT IN THE WILD SCARDINIUS RACOVITZAI SPECIES

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Scardinius is a genus of ray-finned fish within the Cyprinidae family, native to Europe and middle Asia, with an area from Western Europe to the Caspian and Aral Sea basins. The genera comprise 10 species, more than half of them have a status from near threatened to critically endangered. Insufficient or even complete absence of molecular data, for species such as *S. racovitzai*, have induced multiple uncertainties and miscellaneous phylogenetic relationship within Scardinius genera. To infer the genetic diversity taxonomic status and phylogenetic relationships between S. racovitzai and S. erythrophthalmus, a combined analysis of the mitochondrial marker COX1 and the nuclear marker RAG1 has been performed. This study infers the phylogenetic relationship within Scardinius genera, the genetic diversity and the differentiation degree between S. racovitzai and S. erythrophthalmus. We observed a phylogenetic incongruence among 3 species, S. plotizza and S. scardafa lineages exhibits a lack of genetic differentiation and the monophyly of S. erythrophthalmus was rejected. The S. racovitzai individuals exhibits a failure in describing their own clade and a lack of the haplotypes convergence in a species specific ancestral lineage. In conclusion, we highlighted the level of genetic diversity and an evolution from at least two different lineages of S. erythrophthalmus species.

6. RESEARCH ON THE EVOLUTION OF TRICHOPTERA COMMUNITIES (CLASS INSECTA,ORD.TRICHOPTERA) FROM AQUATIC ECOSYSTEMS ON THE TERRITORY OF ROMANIA WITH THE HELP OF THE BOTOSANEANU AND CIUBUC COLLECTIONS, SHELTERED IN "GRIGORE ANTIPA" NAȚIONAL MUSEUM OF NATURAL HISTORY IN BUCHAREST

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The work carries out a critical analysis of the conservation status of Trichoptera communities by contrasting the taxa present in two Trichoptera collections captured at different stages, the "Botoșăneanu Collection", made between 1952 - 1970 and the "Ciubuc Collection", made between 1984 - 2015 , both deposited for preservation at the *"Grigore Antipa"* National Museum of Natural History in Bucharest. Each specimen from the two collections was analyzed, revised and synonymized, and the systematic classification was according to Fauna Europaea-org. Also, the evolution of the state of specific habitats and their changes following destructive anthropogenic and climatic factors that have changed over more than 60 years was qualitatively analyzed. The Botosaneanu collection contains a number of 12840 specimens (7642♂♂, 5115♀♀ and 83 pupae). The Ciubuc collection consists of an overwhelmingly large number of samples, specimens, sampling points and specific habitats (178227 specimens in which there are 67888♂♂, 110286♀♀ and a number of 85 pupae). A significant reduction in the number of taxa between 1984 and 2015 is noted, especially from the family Limnephilidae. For the species of each family, the environmental factors responsible for the drastic decrease of the taxa captured during the period in which the Ciubuc collection was made are analyzed qualitatively. The existence of some taxa from our collection, analyzed above that Botosaneanu did not signal, is not an indication of the improvement of the quality of the environmental factors in the habitats, but rather attributed to the simplified sampling technology. Several families (Psychomyiidae, Odontoceridae, Goeridae, Ecnomidae) record the same taxa in both periods indicating a stability of habitats for those species.

7. BLUENIGHTS EU PROJECT: A FRAMEWORK TO DEVELOP OCEAN LITERACY EXPERIENCE AND ACTIVITIES

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The United Nations has proclaimed the Decade of Ocean Sciences for Sustainable Development (2021-2030). The primary objective is to protect and promote sustainable and conscious use of the oceans, seas and marine resources. The BlueNIGHTs project, financed by the European Commission under the HORIZON-MSCA2022-CITIZENS-01 action, aims to strengthen the link between researchers and the area where they live and to make these issues known to the public and young people. As part of this initiatives, BlueNIGHTs also propose integrated paths to

encourage and promote the participation of pupils and teachers in the activities and pre-events of the project (activity "Adopt a School"). Out of all this came the idea of a photo contest, titled "Why Marine Science for Ocean Conservation?", open to school students and also organized and run totally by school students, , of IIS Galilei Zaccagna in Carrara, Italy. A new way to introduce young people to Ocean Literacy and scientific research, starting from the idea of WATER in order to express oneself and one's vision, sharing one's connection with this element through a photograph or video. The idea is to foster young people to explore new forms of communication that can merge experiences, emotions, and information connected to this fundamental resource, the WATER, that is loved, hated, used, exploited and more and more the subject of scientific research.

8. ANALYSIS OF THE DISTRIBUTION AND CHARACTERISTICS OF THE POPULATIONS OF CRAMBE TATARIA SEBEŐK (BRASSICACEAE) IN ROMANIA

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Crambe tataria Sebeók (Brassicaceae) is a relict species from the interglacial period, present in xerophilous grasslands of Central Europe, South-Eastern Europe and Western Siberia. At the level of the European Union, the species is included in the "extinct in the wild" category. The purpose of the study is the distribution and analysis of the demographic and morphological parameters of the species C. tataria in Romania. The methods used were simple random sampling. The study was carried out in the period 2019-2021, in the regions of Moldova, Muntenia and Transylvania. The results showed that in Romania, the species is present only in the Continental geographical bioregion. The analysis of the demographic and morphological parameters showed that the highest values were recorded in the individuals of the populations from Glodeni (Vaslui County), Bădeni, Tăutești (Iasi County) and Slimnic (Sibiu County) and the lowest values were reported in the individuals of the populations from Vulturi and Popricani (Iasi County). The proportion of flowering individuals was lower compared to the proportion of vegetative individuals. The most flowering individuals were observed only in the Miroslava and Horlești populations (Iasi County). Regarding the population size, it showed a slight increase over the three years of the study. The most individuals were recorded in the Miroslava (Iași County) and Glodeni (Vaslui County) populations. Demographic parameters are influenced by height and vegetation cover, and morphological parameters are influenced by silicon, lead, pH, and calcium. The current assessment shows a 70% decrease in the number of populations in Romania. Due to the impact of overgrazing, especially the increase in the number of sheep on pasture, it can be stated that in the next two generations, the number of populations will decrease by 30%.

9. CONSERVATION VALUE OF FLUVIAL LAKES AND GRAVEL PITS IN RIVER-FLOODPLAIN SYSTEMS IN THE WESTERN BALKANS

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This study aimed to compare habitat diversity, and conservation value of small fluvial and gravel pit lakes along the river floodplain systems in the Western Balkans (Cvijanović, 2022). Aquatic habitat types were presented according to the Habitats Directive and the Bern Convention. Physical habitat properties were evaluated following the standard approach for hydromophological assessment of European lakes, using the LHMS (Lake Habitat Modification) and the LHQA (Lake Habitat Quality) scores. Conservation value was calculated based on macrophyte vegetation trait. Habitats considered as conservation priorities are present in both types of small water bodies, covering a wide range of water trophic gradient and hydromorphological conditions. This phenomenon and macrophytes' physical structural heterogeneity create extremely diverse habitats for other aquatic communities. Hence, fluvial and gravel pit lakes along the river-floodplains can be considered hot spots of aquatic habitat diversity in the Western Balkans. However, these ecosystems are subjected to various human pressures such as alteration of hydrological regime, artificial land use of the riparian zone, sediment erosion, shoreline modification, and eutrophication in the entire region.

Cvijanović, D. (2022). Conservation Value and Habitat Diversity of Fluvial Lakes and Gravel Pits in River-Floodplain Systems. In: Pešić, V., Milošević, D., Miliša, M. (eds) Small Water Bodies of the Western Balkans. Springer Water. Springer, Cham. https://doi.org/10.1007/978-3-030-86478-1_3

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10. POSSIBLE CIRCULAR ECONOMY SOLUTIONS IN ORDER TO ENSURE SUSTAINABLE SHORT FOOD SUPPLY CHAIN

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Freshwater environments are threatened by increasing anthropogenic stresses, including urbanization, industrial waste, and climate change. Extreme climatic events (droughts, floods and waterlogging) are leading to increased water stress, affecting the water needs for drinking water, agriculture and other uses. The health of the ecosystem is based on maintaining its structure and function in the face of external stressors. This includes both biotic and abiotic components. Furthermore, in a water catchment area, the water bodies, including rivers, lakes and groundwater and the economic and other types of activities carried out by the residents and businesses are interconnected. This interconnectedness becomes especially apparent in agriculture with regards to the food supply chain. To ensure these connections (improvement of circular economy) the proposal should focus on in-depth assessment of the interconnectedness of economic processes, the interlinkage with water-carbon-nutrient cycle in the river basin and the food supply chain. In this research, the overall aim is to introduce possibly useful circular economy solutions to maintain our local food system. Support the mitigation of the damage to the food system caused by emerging risks, such as climate change-

related changes (floods, droughts, etc). To seek opportunities for forming more resilient food chains in uncertain times and changing climate by eliminating obstacles, and understanding the knowledge base for future awareness raising.

11. A STURGEON DIGITAL TWIN: UNDERSTANDING MIGRATION AND POACHING IN (NEAR) REAL-TIME

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We present digital twins as a promising new methodology to support effective conservation decision making, specifically for the management of endangered sturgeon species. A digital twin is a virtual model of a physical entity which is constantly synchronised with its counterpart using (near) real-time data. These models have been used for many years in engineering and manufacturing but their potential within ecological science is yet to be realised. During the course of the Nature FIRST project, the digital twins methodology will be applied to the issue of monitoring endangered sturgeon species in the Danube Delta to create a pioneering new prototype conservation tool. The aim of this digital twin is to provide a real-time understanding of sturgeon migration with the eventual goal of identifying poaching hotspots and sending alerts to facilitate targeted conservation interventions. This will be achieved by integrating data on environmental variables pertinent to sturgeon migration, illegal fishing activities and expert knowledge. Through collating this data, the digital twin will help identify the drivers of undesired trends through its unique real-time perspective and highlight knowledge gaps to be addressed. Digital twins can also be utilised for monitoring the success of conservation interventions, either by tracking their impact over time or through providing an *in silico* testing function to simulate the effects before implementation. By integrating these beneficial services into a single system monitoring sturgeon, we will demonstrate that digital twins are a potentially integral tool in the future conservationist's toolkit, both in the Danube Delta and beyond.

12. BIODIVERSITY MONITORING OF THE SPAČVA BASIN FLOODPLAIN (EASTERN CROATIA)

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The Spačva basin represents the largest complex of pedunculate oak (Quercus robur L.) forest in Croatia and with an area of approximately 44,000 hectares it is one of the largest pedunculate oak forests in Europe. Spačva basin is located in the eastern Croatia, between the rivers Sava and Danube. It is part of alluvial Pannonian floodplain with a characteristic relief consisting of micro-depressions (lower elevations) and sandbars (higher elevations) interconnected by a network of natural canals and watercourses including river Bosut and its tributaries Spačva, Brežnica and Studva. Spačva belongs into two Natura 2000 areas in Croatia: SPA HR1000006 Spačvanski bazen, SCI HR2001414 Spačvanski bazen and SCI HR2001415 Spačva JZ. Preserved forest and riverine ecosystems provide suitable habitats for wild fauna and flora species resulting in high biodiversity. Many of the species are threatened, strictly protected or listed in the EU Directives on birds and habitats. Obtained researches concluded 17 habitat types of which four habitats (3150, 9160, 91E0*, 91F0) are listed in the EU Habitat Directive. The faunal diversity comprises over 50 mammalian species, over 100 bird species (over 20 waterbird species), 10 amphibian species, 11 reptile species and over 40 freshwater fish species. Among the vertebrate species listed in Annex 2 of the EU Habitat Directive, there are 2 mammalian species (Barbastella barbastellus, Lutra lutra), 2 amphibian (Bombina bombina, Triturus dobrogicus) and 1 reptile species (Emys orbicularis). Among the recorded bird species, 9 of them are listed in Annex 1 of the EU Birds Directive.

13. STATE OF SMALL SCALE FISHERIES SECTOR IN THE ROMANIAN BLACK SEA AREA, DURING 2018 – 2022

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Small-scale fisheries involve close links to the economy, social structure, culture and traditions of coastal towns and communities and fishing operations relatively close to shore that require less time at sea. In small scale fisheries is used less fuel per unit of fish caught and more selective techniques that have less impact on living marine resources. Romanian small scale fisheries are practiced along the marine coast in four fishing ports (Sulina, Cape Midia, Constanta and Mangalia) and other 18 small fishing stations, located between Sulina - Vama Veche, at depths ranging between 2 - 20 m. When practicing specialized turbot fisheries can reach up to 50 m. Of significant importance is the fishing with divers for the *Rapana venosa* (Valenciennes, 1846), the species with the greatest impact on the landed catches. Catch and fishery productivity vary from year to year, depending on environmental conditions, fishing effort, status of fish stocks and human factors. During the analyzed period (2018-2022), catches in shallow waters off the Romanian coast varied between 563 and 1024 tonnes. The fisheries sector is one of the most affected by socio-environmental changes in the Black Sea ecosystem thus the small scale fisheries activities must continue and develop.
This study is related with the project "Services for the realization and implementation of the National Program for the Collection of Data from the fishing sector of Romania", POPAM through ANPA.
Keywords: small scale fisheries, landed catches, Black Sea.

14. HABITAT MONITORING IN NATURA 2000 SITE HR2000394 KOPAČKI RIT (CROATIA)

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Along the section of the Middle Danube reach in Croatia, a large fluvial-marshy floodplain has been formed around the confluence of the Danube and the Drava Rivers. Actual protection status in category of Kopački rit Nature Park was established in 1999, including the part of the Danube River course between river km 1,412 and 1,382. According to the EU Habitats Directive 92/43/EEC, this area is designated in category of SCI site HR 2000394 Kopački rit (surface of 23 127,42 ha), and makes part of the Natura 2000 ecological network in Croatia. The target and priority habitat types, listed in Annex I of the EU Habitats Directive are following: Oligotrophic to mesotrophic standing waters (3130); Natural eutrophic lakes (3150); Alluvial meadows of river valleys (6440); Alluvial Forests (91E0), and Riparian mixed forests (91F0). Fieldwork activities in habitat monitoring were carried out in the period from March 2021 to October 2022. Distribution, dynamics and ecological status of the surveyed habitats were determined and assessed, and 12 permanent plots were established at selected locations. The identified threats to the habitat diversity are: increased fluctuations in flooding intensity of the Danube River, increased summer air temperatures, extension of dry season, accumulation of bedload, natural succession of the wetlands, and dispersal of the invasive alien plant species.

15. STATUS OF BIODIVERSITY, HABITATS, SUSTAINABLE EXPLOITATION OF NATURAL RESOURCES AND SOCIO-ECONOMIC IMPLICATIONS IN DANUBE DELTA BIOSPHERE RESERVE IN 2021

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This paper presents the results of research conducted in 2021 in Danube Delta Biosphere Reserve regarding the mapping of DDBR habitats - meaning the transposition of habitats in the Romanian classification system following the correspondence of vegetation identified in the field, assessment of the sustainable exploitation of plant resources (medicinal herbs, pastures, beekeeping plants, reeds, and edible mushrooms), conservation status of invertebrate species of Community Interest - 8 species of invertebrates, 7 species of entomofauna (insects) and 1 species of gastropod, assessment of the ecological status of ichthyofauna in in the context of recent changes due to the emergence of new limiting factors, fisheries research for the sustainable exploitation and conservation of biodiversity (fish catches in the natural basins of the Danube Delta and the Razim-Sinoie lagoon complex), colonial waterfowl species (*Pelecaniformes, Ciconiiformes and Charadriiformes*), bird species of conservation interest with insufficiently known nesting and pilot study of bioacoustics, 9 mammal species of Community Interest, socio-economic revitalization of human settlements and the disparities in economic development between different administrative units and support research for the substantiation of ecotourism in order to sustainably capitalize on the landscape resource recognized for its tourist potential due to its geographical, biological, ecological and cultural characteristics.

16. SUPPORTING THE BLUE GROWTH INITIATIVE IN THE BLACK SEA AREA

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The Black Sea is a very important resource with huge potential to boost the societal value of the blue economy for its surrounding countries. Blue Growth has a great potential for the Black Sea countries and for Europe as a whole as it can be considered an instrument to promote stability and empower the coastal communities in the region (EC, 2014). With the support of the European Commission, a working group of experts from countries bordering the Black Sea gathered in 2017 to develop a shared agenda for research and innovation for the Black Sea and provide guidance to national and EU policymakers. The publication was introduced at the 2018 European Maritime Day in Burgas, Bulgaria (May 2018). It addresses the key pillars on which the Black Sea Strategic Research and Innovation Agenda (SRIA) is built on. The Ministerial Declaration towards a Common Maritime Agenda for the Black Sea (2018), endorsed by the same Black Sea countries, provided more backing for this approach.
Coordination of Marine and Maritime Research and Innovation in the Black Sea - Black Sea CONNECT (http://connect2blacksea.org) is a key H2020 Coordination and Support Action (CSA) which will scientifically, technically and logistically support the broader Black Sea Blue Growth Initiative.
Based on it, national-level SRIA consultations were held in the Black Sea riparian countries aiming to get national-level input from a broader stakeholder group on the themes and concrete **strategic joint (SJAs) actions** drafted as an output of the National SRIA Consultations. The goal of this exercise was to identify common strategic joint actions that different Black Sea countries find feasible and/or already in the progress of implementing so that synergies among the implementation of these actions can be aligned across different countries. The results of these workshops provided direct input to the SRIA and its Implementation Plan with regard to country-level goals and priorities.
Keywords: Black Sea CONNECT, Blue Growth Initiative, Strategic Research and Innovation Agenda, Implementation Plan
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17. ADAPTATION TO CLIMATE CHANGE OF SOME ENERGY CROPS IN THE SUSTAINABLE MODE

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The aim of our research is t study the impact of climate change on the health of plants in the Danube Delta, in the same time we intend to test new energy crops. The need for organic farms and organic agricultural crops is very important for biodiversity conservation and human health.We would like using certain conceptual evaluation models in the case of sustainability for the ecological beekeeping sector testing of different crops such as: Camelina variety Mădălina, (Camelina sativa), Hrisca (Fagopyrum esculentum), Waite mustang (Sinapis alba) Common vetch (Vicia sativa) this concept offers food security, contributing to the quality of life in rural areas of Danube Delta.
Study of the impact of climate change involve the identification of pathogens, and presentation of the diseases induced by them in crops in the research area monitoring the attack of pathogens on the area's crops and possibilities for preventing and combating them. We have solutions for improving climate resilience through the modification and improvement of nutrient and crop protection processes, such as fertilization, pest control, and irrigation, to ensure sufficient crop yields both in terms of quality and quantity, while also reducing emissions, water consumption, and preserving biodiversity. We have solutions for the development of more natural ecosystems, generating combined benefits for climate mitigation, reduction of water flooding and soil erosion, (by Mischantus giganteus planting).

18. STAKEHOLDERS' INVOLVEMENT IN EU MISSION OCEAN-BASIS FOR THE DANUBE LIGHTHOUSE LIVING LABS SYSTEM

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The Mission Restore our Ocean seeks to achieve marine and freshwater targets outlined in the European Green Deal by 2030. Through coordinated actions, it adopts a systemic approach to restore, protect, and preserve the ocean, seas, and waters. Climate change also affects water systems, such as more frequent extreme droughts, reduced water levels, deterioration of water quality, and the decline of aquatic life and plant species.
EcoDaLLi project, funded under the Horizon Europe Programme, supports the Mission Ocean in achieving its' goals in the Danube and Black Sea Basins. For this a Living Labs system is established in the four units of the Danube Basin: the Upper Danube, the middle Danube (centralised in the town of Draž), the Lower Danube and Danube Delta (centralised in the town of Tulcea) to monitor and apply nature-based solutions. For these four Living Labs, engagement of identified stakeholders from governance, research, civil society and business is ensuring identification of gaps, inter-linkages and challenges, and proposition of actions to enable local and regional support innovation around the ecosystems of Danube, its Delta and Black Sea region: particularly concerning biodiversity conservation and restoration actions, policy-making and services. All results are planned to be online and available to the stakeholders through the EcoDaLLi portal. This will help to create a shared understanding of the natural treasure and socio-economic value of the Danube basin and Delta. Participatory working sessions with stakeholders will support transposition of the Mission Ocean objectives at this level: "Ecosystem Restoration for increased Biodiversity and Resilience", "Reduction or elimination of Water Pollution" and "Circularity, Blue Economy and Decarbonisation Actions", with a focus on 3 topics, water systems, Climate Change and Blue Economy.
Keywords: Danube Lighthouse, Ecosystem Restoration; Danube; Mission Ocean; Water Pollution; Stakeholder Engagement.

19. THE CURRENT AND HISTORICAL PRESENCE OF THE EUROPEAN FALLOW DEER - *DAMA DAMA*, (LINNAEUS 1758) ON THE TERRITORY OF THE DANUBE DELTA BIOSPHERE RESERVE (ROMANIA)

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Relatively few paleozoological samples of the species are known from Dobrogea, especially from the Eneolithic period, which attests to the presence of subfossil samples of european fallow deer in sites such as Ceamurlia de Jos, Carcaliu, Dinogetia/Garvăn even in the middle of the Danube Delta, from the insular settlement of Taraschina where it would undoubtedly have arrived as a result of hunting campaigns from the nearby dryland. The presence of the fallow deer - *Dama dama* (Linnaeus 1758) in Northern Dobrogea has been documented since the Holocene, then the species disappeared, being reintroduced through successive colonizations starting with 1958. A small lot was also released on the island of Letea, where it lived until 1982 when it dissapeared with no certain known. After a hiatus of almost 7000 years, the fallow deer reappeared in Dobrogea. Since the early 2000s there have been periodic and irregular reports of the appearance of fallow deer across the north of the delta, including more recently the reappearance of the species on the island of Letea. Sightings increased especially in 2022, a phenomenon attributed to the colonization of the species in the Ukrainian delta. The present paper tries to collect information about the historical presence of the species in the Danube Delta.

20. BLACK SEA SUBMARINE POWER CABLE FROM GEORGIA TO ROMANIA

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Presentation concerns the EU's decision to support the undersea power line between Georgia and Romania, which is significant for the development and utilization of the Black Sea opportunities. It will allow electricity, produced in Azerbaijan, Georgia, and other countries to be delivered directly to the European market and will help energy producing countries to attract more foreign direct investment in hydro, wind and solar power generation. Transition of energy from Georgia to Romania is very important for Europe, because it implies transition of clean, affordable and secure energy sources. This project could bring Georgia great benefits as well. It could transform the country into an electricity hub and integrate it in the EU internal electricity market. At the same time, the Black Sea electric cable could also help bring electricity to Moldova and the Western Balkans, and of course, to Ukraine – it will help to start rebuilding of Ukraine's energy system and the reconstruction of the country. On December 17, 2022, leaders of Azerbaijan, Georgia, Romania, and Hungary met each other in Bucharest and signed agreement about the transmission of green energy from the South Caucasus to Europe. During the meeting, it was outlined that this agreement would be part of the European Union's wider plans for energy diversification.

21. HOW ARE THE CURRENT FISH STOCKS AND FISH FAUNA IN FRESHWATER OF DANUBE DELTA COMPARED TO THE LAST CENTURY

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Our proposal for present paper is continued to compare results of fish sampling with commercial catch statistics in long-data time. Fish fauna from freshwater of Danube Delta has on base the studies from 2003-2021 period and catch statistics represent a long time series data recording. In the studies was used three methods of sampling: electric fishing for shallow border water zone, gillnets (Nordic and commercial) fishing for deep open water and seine fishing for Razim lake. This analysis shows that Danube Delta lakes are dominated by medium or small size eurytopic and opportunistic fish species, favoured by eutrophication of lakes. However, there are differences in fish species and size structure between fish sampling and fisheries catch statistics which are explained by targeting fishing to large size and high market value fish species. According with recorded catch statistics from 1890 until 2022 the catch size pattern is large variable, with maximum increasing in 1970-1980 period compare with anterior periods, but after 1980s a continuous downward trend until 2022. In last half century gibel carp become the dominant commercial species, followed by roach category (roach + rudd) and bream category (bream + white bream) In 2003-2021 studies period the biomass is dominated by *R. rutilus*, *S. erythrophthalmus*, *B. bjoerkna, P. fluviatilis*, *C gibelio* and *A. alburnus* for scientifically fishing, but differing from commercial catch dominating by *gibel carp (C. gibelio), Pontic shad (Alosa immaculata)*, roach and bream categories, carps (included Chinese carps) and wels catfish (*Silurus glanis*).

22. FLORISTIC DIVERSITY OF THE "RĂDOAIA" MEDICINAL PLANTS NATURAL RESERVE

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The research carried out during the years 2020-2022 reveals that the floristic spectrum of the natural reserve of medicinal plants "Rădoaia" is represented by 155 species, grouped into 122 genera and 47 families of magnoliophytes. The most representative families are: Asteraceae (14 species), Rosaceae (13 species), Poaceae (12 species) and Lamiaceae (10 species).
Although the reserve is protected, human traces are still present inside it, a fact that is demonstrated by both the roads within the forest and the presence of species that are not specific to forest ecosystems. Share of ruderal species (*Chelidonium majus* L., *Cyclachaena xanthiifolia* (Nutt.) Fresen., *Geum urbanum* L., *Ballota nigra* L., etc.). constitutes 25%. The presence of segetal-ruderal species (*Bromus arvensis* L., *Conium maculatum* L., *Aristolochia clematitis* L., etc.), in a proportion of 8%, is explained by the fact that they penetrated from agricultural ecosystems, which the Rădoaia forest is surrounded by. A threat with a negative impact on the flora of the reserve is presented by the invasive species: *Acer negundo* L., *Robinia pseudoacacia* L., *Sambucus ebulus* L, *Rubus caesius* L. and *Erigeron annuus* (L.) Pers.
In order to optimize the conservation of plant diversity and ensure the sustainable development of the nature reserve, it is recommended: to restrict access for transport, to remove both non-native tree species and invasive herbaceous species from the arborethum, which contain a large reserve of seed material and create aggressive competition with native species.

23. THE EXPLOITATION OF *MYTILUS GALLOPROVINCIALIS* FROM THE ROMANIAN BLACK SEA COAST WITH PRACTICAL APPLICATION

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The use of mussels *Mytilus galloprovincialis* from the Black Sea as human food represents one of the concerns with exponential amplitude in the past years. The evaluation of the nutritive value (proteins, carbohydrates, lipids) of the mussels collected from the natural environment has become a necessity. The condition index (CI) has been used as a tool to evaluate the physiological state of mussels' health and to estimate the meat quality. Large amounts of shells and byssus as waste material are produced from processing of seafood. The disposal of mussels waste led to serious environmental problems. The shells and byssus of *Mytilus galloprovincialis*, can be superior economic valorized through biotechnological techniques. The shells were processed in order to obtain calcium carbonate ($CaCO_3$) and subsequently calcium chloride ($CaCl_2$), natural compounds with multiple practical applications in the pharmaceutical industry, medicine, agriculture, animal husbandry, environment, etc. The byssus collected from *Mytilus galloprovincialis* was processed using a pepsin-aided extraction method and it was obtained pepsin solubilized collagen. Mussel byssus is a waste and may provide an alternative to other types of existing collagen from animal sources with different applications in pharmaceutical industry, tissue engineering, medical field, food industry, cosmetics. Calcium carbonate, calcium chloride and collagen extracted from *Mytilus galloprovincialis*, a natural resource, represent autochthonous products which can be used in different domains and to solve an environmental problem.

Keywords: *nutritive value, condition index, calcium carbonate, calcium chloride, collagen, Mytilus galloprovincialis, Black Sea coast*
Acknowledgements: This research has been carried out with financial support from the NUCLEU programme (INTELMAR) funded by the Ministry of Research, Innovation and Digitization the project no. PN 19260202

24. PRELIMINARY GENETIC DIVERSITY OF THE CRITICALLY ENDANGERED BELUGA STURGEON (HUSO HUSO) POPULATION IN THE LOWER DANUBE RIVER AS REVEALED BY YOUNG OF THE YEAR OF 2019

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In the Lower Danube River still spawn the last wild population of beluga sturgeon (Huso huso) living in the Black Sea. In the last century, this population has experienced severe declines in the need for adequate management plans for species conservation and recovery in the region. In this study samples of 90 young of the year beluga sturgeon of year 2019 were analyzed using mitochondrial markers (partial D-loop region sequencing) to assess the genetic diversity to gain insight into the ecological status of this critically endangered species. For 77 samples, a number of 28 haplotypes were identified with 20 unique and eight haplotypes shared between individuals. It was revealed a minimal variation among the analyzed sequences and a significant level of haplotype diversity. The high level of haplotype diversity and the low nucleotide diversity could be attributed to demographic growth after a population size contraction. These results show the need for urgent managerial measures to support the conservation and recovery of the species in the region. They need to address the enforcement and prolongation of the existing sturgeon fishing bans and the continuation of the supportive stocking program. Enhancement of essential habitats and longitudinal connectivity in the river would be beneficial for beluga sturgeon species long-term survival in the wild. Moreover, a genetic assessment is mandatory to fundament adequate management measures for species conservation and recovery.

25. ADDRESSING INVASIVE ALIEN SPECIES IN BLACK SEA DELTAIC ECOSYSTEMS: ACHIEVEMENTS AND IMPLICATIONS OF THE IASON PROJECT

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This paper provides a concise overview of the IASON Project, which successfully addressed the challenges posed by Invasive Alien Species (IAS) in the Black Sea deltaic ecosystems from Georgia, Greece, Ukraine, Romania, and Turkey. The project achieved its objectives of establishing joint monitoring actions and assessing the response of these ecosystems to current and predicted climatic conditions. Through the implementation of collaborative efforts, the project developed and implemented robust monitoring and risk assessment procedures for IAS in the Black Sea deltaic areas of the participating countries. The creation of IAS inventories, along with improved cross-border collaboration, research capacity, and information sharing utilizing innovative technologies, significantly enhanced the project's outcomes. The monitoring activities conducted in the Danube Delta yielded valuable baseline data on the distribution of IAS. The establishment of the IASON Observatory played a pivotal role in strengthening information and research capacity, effectively engaging citizens and stakeholders, and facilitating the dissemination and utilization of updated project results for this region. The paper emphasizes the importance of cross-border collaboration and information exchange in the project's communication activities across various societal sectors. The IASON Observatory, as a long-term monitoring framework, emerges as a critical tool for safeguarding the ecological balance and supporting sustainable socio-economic activities in the Black Sea region. The outcomes highlight the significance of proactive monitoring, risk assessment, and cross-border collaboration to effectively manage and mitigate the impacts of IAS. The knowledge gained through this project provides a foundation for continued conservation efforts, fostering the sustainable development of the region in the face of global environmental changes.

26. ASSESSMENT NITROGEN COMPOUNDS OF DRINKING WATER SUPPLY IN THE STAROKONSTANTINIV REGION (UKRAINE)

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Starokostantyniv region is a region with a predominance of agricultural production, but there are other enterprises on the territory of the community and the city that directly affect the quality of water resources.

The research was concerned nitrate, nitrite and ammonium compounds of nitrogen, because they were singled out as the main polluters of water resources in the region.
To determine the quality of drinking water in urban and suburban areas, 10 samples in the city itself and 2 samples in nearby villages directly bordering the city were taken for hydrochemical analysis. All samples were collected within 2 weeks in the winter period during February 2023
It was found, that, most of the samples do not exceed the MPC (50 mg/dm^3) of nitrate concentration, but their concentration can be called acceptable (less than 10 mg/dm^3) only for four samples, three of which were taken from the centralized water supply network. On the other hand, in seven other samples, the concentration ranges from 15 to 35 mg/dm^3. Such results indicate contamination of the aquifers of the sampling sites, despite the absence of an exceedance of the overall MPC. One sample has a concentration of NO_3^- - 153.3 mg/dm^3, which exceeds the MPC by 3 times and is not permissible for drinking water.
Most of the selected samples did not exceed the MPC (2.6 mg/dm^3) of ammonia, but in 10 samples the concentration exceeded 1 mg/dm^3, indicating the recent sources of pollution. In one sample, the concentration of ammonia was 6.7 mg/dm^3, which is 2.5 times higher than the MPC

27. WATCH OUT PROJECT: THE USAGE OF MODERN DIGITAL TOOLS IN THE WILDLIFE BIOMONITORING IN KOPAČKI RIT NATURE PARK (CROATIA)

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Kopački rit Nature Park is located in north-eastern Croatia in a large floodplain formed around the confluence of the Danube and the Drava Rivers. Biodiversity inventory shows an exceptional richness, estimated to 2,756 species classified in taxonomical groups of animals, plants, fungi and algae. Project: Wetland and Wildlife Monitoring Using Technology and Acoustics (Watch Out) use the inventive digital and new biomonitoring approach in the wildlife survey in Kopački rit Nature Park. This three-year project is supported under the TECH4ALL Global Initiative by Huawei Croatia, and implement in partnership with Rainforest Connection. Main project tasks are: 1) acoustic monitoring by deploying recording devices for sampling the soundscape, three times a year (mid-spring, mid-summer, early autumn), and data analyses using the artificial intelligence technology; 2) standard field monitoring of wild fauna, flora and habitat diversity, with special concern on 49 wildlife species designated as threatened, protected or Red List species, and five flagship species: *Cervus elaphus, Canis aureus, Haliaeetus albicilla, Dendrocopos major*, and *Hyla arborea*; 3) data collection and harmonization in GIS environment, and geospatial time series analysis of various characteristics vegetation indices; 4) establishment of the Mission Centre for education, raising the public awareness and dissemination of the project results. Watch Out project's benefit is broadening knowledge on diversity and ecology of wildlife in Kopački rit Nature Park, and their resilience to harmful effects of climate change.

28. MODEL FOR THE CONNECTIVITY ANALYSIS OF BLUE-GREEN AREAS IN BUCHAREST METROPOLITAN AREA

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Landscape connectivity is a crucial feature of blue-green infrastructure, and key principle of spatial organization for ensuring better opportunities for providing ecosystem services, which can positively affect urban hydrology, mobility, recreation and cultural assets. One of the main objectives of the European Union's Blue-Green Infrastructure Strategy is to integrate its goals into as many policy areas as possible, e.g., climate, water, nature conservation, especially through the European Union Biodiversity Strategy, regional policy, land and soil. In Romania, peri-urban landscapes are under great pressure, which must be curbed by effective cooperation methods, common green spaces, blue-green infrastructure planning tools for municipalities, and active public participation. Taking into account the urban sprawl in large Romanian cities, but also Romania's commitment to achieve the European Green Pact goals in terms of climate change, biodiversity, social conditions and economic development, the present study aims to analyze the connectivity of blue-green areas in Bucharest metropolitan area in order to include the blue-green infrastructure in urban and territorial plans. The methodology uses European environmental data (CORINE, Urban Atlas) and GIS tools dedicated to biodiversity connectivity analyses. The result of this study is a draft of metropolitan blue-green infrastructure. This presentation is supported by the project PN-III-P4-PCE-2021-1015 "Green Belt of Bucharest - Intelligent integrated model for the sustainable management of urban green infrastructure - GreenSmartB", funded by the Executive Unit for the Financing of Higher Education, Research, Development and Innovation (UEFISCDI) and carried out under Program 4: Fundamental and Frontier Research, Exploratory Research Projects.

29. PONDS IN ROMANIA - NEED AND RECOMMENDATIONS FOR IMPROVEMENT OF LEGAL PROTECTION

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The importance that small water bodies, most often called ponds, have in preserving unique biodiversity and providing unique ecosystem services is well known in the scientific world. Many ponds are present on the territory of Romania, which, due to weak rural development in the last century, remained preserved. Today, many of these ponds are protected at the national level, as part of larger territories as protected areas, and at the international level, applying the laws of the European Union. However, a more efficient implementation of by-laws is needed to ensure the complete protection of these fragile aquatic habitats and replace the incomplete legal protection of EU directives related to habitats. Awareness raising and education about the importance of ponds is needed among the immediate users of the areas where these small waters are located. Furthermore, it is necessary to regulate and stimulate the collaboration of relevant stakeholders. Recommendations for improving the legal and practical protection of ponds at the landscape level are given.
Keywords: EU legislation of environmental protection, pondscape, small freshwater habitats, whole-catchment integrity.

30. THE RESULTS OF WINTER COUNTS OF BIRDS IN AZERBAIJAN IN 2023 AND COMPARISON WITH RESULTS OF WINTER COUNTS OF 2022

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As a result of the surveys conducted from 11 to 25.01.23 totally, about 960,000 individuals of belonging to 157 species were registered. The vast majority are ducks (76%), from them 51% are dabbling ducks, 5% are unspecified ducks and 20% are diving ducks. Among species Wigeon (20%) takes the first place, Coot takes the second place (14%) and pochard takes third place (10%). Waterbirds make up 95% of the registered birds, including grebes 3,5%, Flamingo 2.3% and cormorants 0.3%. 9 species listed in the IUCN Red List and Azerbaijan Republic Red Data Book (AzRDB).9 species listed only in AzRDB. The most numerous species of 1st group are Little Bustard (29770), Black-tailed Godwit (370), Ferruginous Duck (353) and Dalmation Pelican (347). The most numerous species of 2nd group are Flamingo (21932), Mute Swan (268) and Tundra (Little) Swan (190). Around 0,5 mln birds were counted in Gizilagaj National Park (NP), second was Absheron NP (152137) and third was aquatory of Pirallahi island (77610). Around 40-60 thousand occurred in Alat and Gobustan Bays and Aggol NP, near 30 thousand near Baku Deep Water Jacket Plant and other sites had leaser than 10 thousand birds.
In comparison with results of winter counts 2022 the number of wintering birds 15% more throughout more sever winter; the share of terrestrial birds were lesser (5% instead 10,4%) throughout decrease the number of registered Little Bustard from more 110 000 up to 29 770; increasing the share of waterbirds from 86% to 95%: among species Coot and Pochard keep their share in general number of registered birds but Wigeon increased its share from 10% to 20% and Red-crested Pochard decreased from 8% to 2%.

31. CONSERVATION OF WETLANDS IN THE CONTEXT OF LOCAL WETLAND COMMISSIONS IN TURKEY: WETLAND MANAGEMENT OF EKŞISU MARSHES

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It is important that the studies on the protection of wetlands are carried out with local administrative structures. Because in this way, taking preventive measures for protection and use at local scale, monitoring and control can be carried out much more effectively and in a short time. There are administrative structures, legislative provisions and documents regulating such administrative processes in Turkey. There are many managerial studies on wetland protection. However, at this point, there are deficiencies in the effectiveness of the administrative structure created and the regulatory documents produced. In the current situation in Turkey, Local Wetlands Commission is established in the provinces for the protection of wetlands locally, and these local commissions prepare management plans for wetlands. The "Management Plan of Ekşisu Marshes Wetland" for the Ekşisu wetland in Erzincan was made in 2018. However, it can be said that there are problems in the protection of wetland regarding this managerial understanding and method. A local perspective is required to clearly reveal these problems. The shortcomings of the said management plan in terms of the conservation approach, the problems experienced in the conservation and solution proposals were evaluated through the findings obtained from the qualitative interviews conducted within the scope of this study.

32. CONSIDERATIONS ON THE FISH FAUNA STRUCTURE OF THE BISTRITA RIVER (NORTH-EASTERN ROMANIA), SPILLWAY AREA, IN THE PERIOD 2020-2022 - AN OVERVIEW

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The study was carried out over a period of 3 years in the lower reaches of the Bistrita River, at its confluence with the Siret River, and its main objective was to investigate the diversity of fish fauna. The need for this study arises from changes in environmental conditions resulting from the influence of anthropogenic activities (road infrastructure works). Fifty sampling points have been scientifically investigated (10 in 2020, 16 in 2021 and 24 in 2022). Sampling was carried out by legal methods, respecting the principles of rare species protection. Taxonomic analysis revealed the presence of 21 fish species (17 in 2020, 15 in 2021 and 16 in 2022), belonging to 4 orders and 10 families. Two of these are non-native species: *Pseudorasbora parva and Perccottus glenii*. As the study area overlaps the chub zone, the most common and frequent fish species are *Squalius cephalus, Alburnus alburnus and Carassius gibelio.* The study revealed some changes in the structure of fish communities, probably due to the influence of infrastructure works. Thus, we note that 3 of the fish species present in the investigated area in 2020 were no longer identified in 2021 and 2022. On the other hand, in 2021 and 2022 new species were identified that were not present in 2020, such as Tinca tinca, Rutilus rutilus, Cyprinus carpio and the invasive Perccottus glenii. It can be considered that changing environmental conditions have favoured the replacement of more sensitive species by more resistant ones and a decrease in the number of species.

33. AIR WARMING AND DRAINAGE INFLUENCES SOIL MICROARTHROPOD COMMUNITIES

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The degradation of wetlands due to climate change is of critical concern to human beings worldwide. Little is known about the potential synergistic effects of simultaneous water level reduction and warming on the underground wetland ecosystems. We conducted a 5-month field experiment in the Sanjiang Plain, utilizing open-top chambers and water level automatic control systems to investigate such synergistic effects. Soil springtails

(Collembola) and mites (Acari) in the top (0–20 cm) soil layers were sampled to calculate their density, diversity, and to screen for indicator species. Warming significantly influenced soil springtail communities, slightly increasing the total density and total abundance under the natural water level while reducing them under a constant water level. In addition, Anurida maritima and Vertagopus laricis, two indicators for the natural water level, had the highest densities in the natural water level treatment and under the combined treatment of warming and natural water level, respectively. *Cheiroseius sinicus* and *Malaconothrus tardus* had the highest densities in warming under the 0 cm water level, significantly higher than the other three treatments. This study also revealed the importance of maintaining fluctuating water levels for microarthropod communities influenced by global warming, providing a theoretical basis for water level control in wetland restoration.

34. INTERNATIONAL ASSOCIATION FOR DANUBE RESEARCH (IAD): HOW OUR FOCUS HAS CHANGED OVER TIME.

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The International Association for Danube Research (IAD) was founded in 1956 under Austrian low and is the longest existing international scientific network in the Danube Region. Our aim in IAD is to promote and coordinate activities in the fields of limnology, water management, water protection and sustainable development in the Danube River basin. The current structure and the contact are provided on our website https://www.danube-iad.eu/ . IAD has Expert Groups in 12 topics covering major ecological and management fields: Water Quality, Biotic Processes, Microbiology, Phytoplankton & Phytobenthos, Macrophytes, Floodplain Ecology, LTSER & Environmental History, Fish Biology & Fishery, Invasive Alien Species, Ecotoxicology, Delta/Fore-Delta, and Sustainable Development & Public Participation (for detailed description see expert groups). Since 1998, IAD has a permanent observer status at the International Commission for the Protection of the Danube River (ICPDR, www.icpdr.org). In the beginning of IAD history, an exchange of methodology behind research ideas and finally a harmonization of scientific methods different in each Danube country was discussed. At that time most publications were written in native languages of each country. Later, joined studies describing various limnological characteristics including chemistry and biota (macrozoobenthos, algae, fish) became the research focus. Results of these surveys were published in English. At that time there was a growing awareness of the Danube River as a whole ecosystem - from the source to the mouth, from the river to the flood-plain ecosystems, from Danube River stretches to the Delta and all tributaries of the Danube River Basin. Finally, taking action for protection of nature and specific flag ship species (e.g., sturgeons) across country boarders became of utmost interest among IAD people. So, the main aim of IAD is connecting scientific activities by people from Danubian countries – and thus connecting the many facets that the Danube River system is facing. The change of research focus can also be followed by the release of “Danube News” twice a year. The first volume, released in Sept 1999, was bilingual written (German and English) but turned to English only from July 2008 onwards. The corner-stones of history of IAD, main achievements and publications and how we in IAD support people and their research activities in the Danube Region are described in detail on the IAD website at “About Us” (https://www.danube-iad.eu/index.php?item=about_us).

Section II: Environmental factors, Ecological restoration and Atrophic Impact

35. SUSTAINABLE WATER MANAGEMENT IN THE CONTEXT OF THE CIRCULAR ECONOMY

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The work addresses a topical issue of sustainable water management in the circular economy context. In the current context, global population growth, industrialization, intensive agriculture, pollution, and climate change have a strong negative impact on water quality. Conserving the world's drinking water resources has become essential for food safety and people's health. Therefore, the sustainable management of water, the most important natural resource on which the existence of life essentially depends, must be approached from a modern and economically competitive perspective. Effective measures for the removal of pollutants are necessary for water remediation, conservation and regeneration of the ecosystem. Among the different categories of industrial wastewater pollutants, heavy metals are among the most common and dangerous types of water pollutants due to their high toxicity for human health and negative impact on biosystems.
The use of waste as a source of raw materials for the development of advanced, inexpensive and environmentally friendly materials for wastewater remediation is a sustainable method for conserving natural resources in the current context of the circular economy. Recent studies by our team have reported that by functionalizing some waste mixtures, cheap adsorbents with very high efficiency can be obtained for the removal of heavy metals from waste water.

36. REMOVING NUTRIENTS FROM WATER AND REUSING THEM AS FERTILIZERS IN AGRICULTURE - AN IMPORTANT STAGE OF WATER REMEDIATION

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In recent years, anthropological activities have caused the depletion of non-renewable natural resources and the pollution of surface and underground water sources and the soil, which is reflected in the natural ecosystem. Moreover, the expansion of intensively industrialized agriculture and the excessive soil fertilization (more than 50% more than necessary) to ensure the increase in agricultural production has negative implications on biodiversity and economic, social and recreational activities. The discharge of excessive amounts of phosphorus and nitrogen led to the eutrophication of the waters with repercussions on the natural habitat of fish and molluscs, in particular.
Our team research is part of a larger program in which the aim was to obtain new composite materials with superior adsorbent properties for the simultaneous removal of phosphorus and nitrogen from wastewater and their reuse as fertilizers. The research team carried out studies on the

preparation of a new type of adsorbent for the phosphorus removal and reuse based on the recovery of some waste. The obtained results showed that the phosphorus recovery efficiency is over 99%, which is an important step for the future implementation of cheap and high-performance technologies as a sustainable alternative for water remediation and diminution of water processing costs.

37. ASSESSMENT OF THE QUALITY OF WATER SUPPLY SOURCES FOR IRRIGATION IN MOGILEV-PODILSKY DISTRICT (UKRAINE)

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7 water bodies have been studied in the southern part of the Vinnytsia region, in the Mogilev-Podilskyi district (Ukraine): №1 – Surface source (stream), № 2 – Catchment source with a depth of 3 m, №. 3 – Surface source with a depth of 2 m, № 4 – Pond, № 5 – Catchment source with a depth of 2 m, № 6 – River Kotlubayivka (Left tributary of the Dniester). All objects are important sources of water supply in the studied region, so the possibility of using these sources for irrigation of agricultural crops with environmentally safe cultivation technology has been considered. The results of studies of the hydrochemical composition have been showed that the general mineralization of the most water samples has been suitable for irrigation without restrictions (exception – water sample #6). According to Stabler irrigation coefficient, all water samples have been suitable for irrigation without restrictions. Regarding the water quality assessment by the SAR index, only water samples No. 2 and 3 have been referred to sources with excellent water, which makes them the most promising for use in this area (SAR≤3). The value of SAR of sources # 1, 4, 5 has been indicated the conditional eligibility of the specified samples for irrigation. According to the obtained results, water from the tributary of the Dniester (# 6) cannot be used for, due to the risk of soil salinization.

38. THE ECOLOGICAL CONSEQUENCES OF LARGE DAM CONSTRUCTION

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Large dams have been built for a variety of uses, including agriculture, drinking water, industry, flood control, power generation, recreation, and tourism, because to the increased need for water, which also led to emerging science of dam engineering. However, it is crucial to recognize that major dams, from building through operation and decommissioning, can have a considerable negative impact on the environment. Sadly, the entire impact of these environmental consequences is frequently not sufficiently taken into account. The development of big dams and the corresponding power plants has already had a significant impact on the environment, leading to the extinction of important biological structures, the movement of various species, and the loss of huge vegetation. Identification and rigorous evaluation of project, program, and plan outcomes on a variety of factors, such as the physical, chemical, social, economic, biological, cultural, and environmental aspects are essential to reducing these effects. Water resource development projects can connect with the goals of sustainable development by undertaking thorough assessments, resulting in the best possible use of the nation's water resources while avoiding negative environmental effects. To achieve sustainable development, it is crucial to evaluate the environmental effects of the Dam Construction Projects. In addition to assisting in the identification of acceptable places based on ecological potential and socioeconomic requirements, this evaluation procedure also helps to avoid the execution of the Dam Construction Project that would have severe environmental harm.
Keywords: Dam, Environmental Impact Assessment, Biodiversity Loss, Ecosystem Disruption

39. DANUBE DELTA BIOSPHERE RESERVE, STATE-OF-THE-ART, MANAGEMENT (DDBR)

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The Danube Delta, the second largest in Europe after that of the Volga river and the 20th worldwide, through its extraordinary biodiversity, with its fauna richness where birds hold the most important place, is extremely interesting from the scientific standpoint, a true laboratory in the making with respect to the Delta ecosystems also with respect to tourism and economy, through its renewable natural resources. Under natural conditions, the predominant processes in the deltaic space were those of clogging inside the delta, through the transported Danube alluvial material and decomposed organic remains, in situ, by wind modeling on sandy sea ridges, by the formation of coastal cordons and secondary deltas at the outflow of Chilia and Sfântu Gheorghe arms, resulting in the special mosaic of the ecosystems of the Danube Delta. Taking into account the morphologic-hydrographic configuration of natural ecosystems or ecosystems partly modified by man the area, its flora and fauna communities and the long-term human impact, the two main categories of Danube Delta ecosystems associated Biosphere Reserve, have been delimited: natural ecosystems or ecosystems partly modified by man; anthropic ecosystems. To identify and characterize ecosystems, have been analysed the data on hydrography, morphology, biodiversity, human settlements, types of land use, spatial changes through the construction of agricultural, fisheries, forestry polders, modification of the network of channels and canals with consequences on the water circulation system inside the delta.

40. FLOODPLAIN RESTORATION ALONG THE LOWER DANUBE AND ITS IMPORTANCE AS A CO_2-SINK

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Floodplains along the Lower Danube, the natural areas that occur along every river and can be flooded by high water, have been largely destroyed from the1950ies to the 1970ies. Only about 10% are available for the natural alternation of high and low water. And this despite the fact that intact floodplains have a high biological diversity, improve water quality, offer natural flood protection, serve the recreational function for people and as CO_2 sinks for climate protection. Possibilities are shown how CO_2 reduction can be achieved through floodplain restoration.

41. ANTHROPIC PRESSURE ASSESSMENT ON SURFACE WATERS USING WATER QUALITY INDICES

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The aquatic environment is the most sensitive to pollution biosphere component, since most xenobiotics migrate through it, regardless of their solubility, in the form of ions, colloidal particles, or suspended solids. The objective of the study was to assess the anthropic pollution of River Unava in Kyiv Oblast, Ukraine via concentrations of heavy metals (Copper, Zinc, Cadmium, and Lead) and a few reference physicochemical parameters as markers of pollution. My research is to develop the complex pollution index of natural waters basing on the concentration of anthropic markers – i) total content of heavy metals in all forms; ii) different forms of Nitrogen ($N\text{-}NH_4^+$; $N\text{-}NO_2^-$; $N\text{-}NO_3^-$), Phosphorus ($P\text{-}PO_4^{3-}$), and Chemical Oxygen Demand (COD). These two groups of solutes are united in so-called Heavy Metal Water Quality Index (HMWQI) and Eutrophication Water Quality Index (EWQI).
It has been established that the level of pollution is directly dependent on the volume of municipal waste that is thrown into the river practically without treatment. After the beginning of the russian invasion, as a result of the destruction of infrastructure, control over the functioning of the municipal economy practically ceased. Apparently, as a result of this, a sharp increase in the level of pollution is observed in terms of indicators that are assigned to the second group - indicators of eutrophication.

42. DESIGN OF CONSTRUCTED WETLANDS WITH LOW GREENHOUSE GAS EMISSIONS

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As a nature-based solution, constructed wetlands (CWs) have been widely applied worldwide for treating various wastewaters, including municipal wastewater, domestic sewage, agricultural runoff, industrial wastewater. However, CWs usually emit more greenhouse gases (GHGs) than natural wetlands as a result of plant respiration, microbial assimilation and decomposition, diffusion, and ebullition, implying the significance of controlling GHGs emission in CWs, especially under the demand of carbon peak and neutrality goals. Here, we conducted a meta-analysis on main factors that affecting GHG emission from CWs. We found that GHG emissions from CWs can be strongly impacted by the factors including CW typologies, wastewater composition, and plant species, etc. Therefore, GHG reduction could be achieved by optimizing the basic design of CWs. We also tested the effectiveness of some new strategies including biochar addition and the integration of microbial fuel cells (MFC). We found that the amendment of biochar improved the efficacy of CWs for removing pollutants and mitigating GHG emissions. Especially, the addition of biochar reduced global warming potential (GWP) by 57.3% for subsurface batch CWs. For the combination of MFC and CWs. We found that MFC-CWs exhibited significantly higher COD, NH4+-N, TN, and TP removal efficiencies and significantly lower GWP than traditional CWs. The integration of MFC decreased GWP by 23.88% due to the reduction of CH4 and N2O fluxes, whereas the CO2 fluxes were slightly promoted. Lastly, we call for the international peers to develop more efficient and feasible strategies for simultaneously removing pollutants and abating multiple gas emissions in CWs, which is imperative for mitigating climate change.

43. DEVELOPMENT AND TOURISM AT THE MARGINS OF EUROPE. POLITICS OF DEVELOPMENT AND TOURISM IN CHILIA VECHE, ROMANIA

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In my presentation, I discuss how development and tourism take shape in a post-socialist village from the Danube Delta Biosphere Reserve (DDBR), Romania.The village is located in a protected area on the Chilia branch of the lower Danube River at the European border with Ukraine. From a historical perspective, during the communist regime, the village was supposed to become a town as a consequence of enormous projects to systematize the largest wet area in Europe. In the effort of clearing swamps and other wetlands to create new agricultural polders, channels, dikes, and fish farms, people from all over Romania were brought in for work. The unfinished projects remained as such and the completed ones failed soon after the communist regime fell in 1989. What is left of these projects has become nowadays ruins that bring into being an eclectic and peculiar post-socialist landscape. In the late 1980s tourism was supposed to be an important feature of the big communist development plans in Chilia Veche, but it only emerged in the early 1990s, triggered by rich fishing and hunting grounds in a 'no man`s land' and with poor facilities for tourism. Only in the late 2000s, major investments were made in facilities for tourists by private. Based on data collected during ethnographic fieldwork research carried out in the summers of 2017 and 2018, I talk over the interplay of environmental history, contested

landscape, reified heritage, and politics in shaping the interplay between tourism and development in a post-socialist borderland village inside a protected area at the margins of Europe.
Keywords: post-socialist rural development, tourism, biosphere reserve, Romania, European Union border.

44. DYNAMICS OF SOIL ORGANIC CARBON AFTER LONG TIME FARMING IN THE DANUBE DELTA

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Soil organic carbon (SOC) and its dynamics are important parameters in the context of global warming. The purpose of our paper is to test the existence of SOC losses from the soils taken for farming for more than 25 years in some areas of the Danube Delta and to quantify SOC losses. The studies have been carried out in two land reclamation areas, Carasuhat and Dunavat. Data of present-day SOC stocks were compared to the SOC stocks calculated for longer than 25 years for the same soil units in order to assess the dynamics of SOC losses. A specific process was noted for the organic soils, Histosols, which were turned into histic soils after farming, due to a significant decrease in SOC pool. Thus, SOC losses due to farming had maximum values for Histosols, and SOC stocks were highly significantly lower after 25 years, due to mineralization processes of organic matter and subsequent greenhouse gas emissions that occurred in croplands. Relationships have been found quantifying SOC losses versus the original stocks, confirming that Histosols, containing the maximum SOC stocks, present the highest risk of degradation. Policy makers, decision makers and stakeholders should therefore promote conservation of the natural landscape of the Danube Delta in order to increase SOC stocks and decrease CO2 and other greenhouse gas emissions into the atmosphere. Maintaining the former SOC stock at the present-day level and enhancing new organic C sequestration in the renatured parts of the less fertile Delta soils could contribute to global warming mitigation in the future and to supply agricultural products in the cropland already in use. Future research in stationary cropland sites of the Danube Delta is recommended to improve our knowledge on SOC evolution.

45. COASTAL WAVES' GAUGE STATIONS NETWORK EXTENSION IN THE ROMANIAN TRANSITIONAL SHORE UNIT. ITS SUPPORT FOR A SUSTAINABLE BEACH SEDIMENTS AND AQUACULTURE EXPERIMENTAL FARMS MANAGEMENT

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Marine waves monitoring is essential for the balanced implementation of all maritime activities, including sustainable touristic beach management and marine aquaculture management as well. The ongoing extension of a coastal waves' gauging station network, formed by GPS/wave-rider/near-real time data transmitters buoys, is providing required data and crucial information for the scientific support of the above mentioned activities. In the present work, it will be emphasized several results after two years of continuous waves and sea surface temperature monitoring in the Mamaia and Efori Bay.

46. MULTIPLE STRESSOR EFFECTS ON BENTHIC MACROINVERTEBRATES IN CRITICAL SECTORS FROM THE LOWER SECTOR OF THE DANUBE RIVER (626-811 KM)

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The Danube River, which is the most significant in Europe, has always played a vital role in the economy of the countries along its banks. It has served as a crucial navigation route, a reliable source of water supply, a significant foundation for fishing and fish farming, and a virtually inexhaustible hydropower source in recent times. Anthropogenic stressors, such as pollution, habitat fragmentation, damming, navigation, and species invasion, have significantly influenced the ecological status of benthic macroinvertebrates. The transformation of the ecosystems in the Danube River has been shaped by various human activities, including hydro-morphological changes for flood protection and navigation in the 19th century, industrial pollution, hydropower plant construction, channelization, and damming in the 20th century, resulting in the separation of river corridors from floodplains. This study aims to evaluate the main stressors or combinations of stressors in the lower sector of the Danube River and to assess the response of benthic invertebrate communities to these pressures. It presents the qualitative and quantitative analysis results of benthic fauna associations in four critical sectors (Downstream Corabia Km 626 - 631, Bechet Km 674 – 678, Pisculeț – Desa km 760 – km 765, Golenți – Cetate km 805 - km 811) and identifies more than 54 taxa from the 161 samples collected between 2019-2022. Stressors have emerged as the primary factors shaping benthic macroinvertebrate assemblages, and these organisms show distinct correlations with human impacts and serve as suitable bioindicators for ecological status classification. This study identifies relevant pressures for the bioassessment of critical sectors on the Danube River and highlights that the occurring pressures and their correlations with stressors vary among different sectors of the river.
This paper was carried out as part of the project "Analysis of the potential for sustainable use of vegetation specific to the Danube-Delta system Danube-Black Sea - D3MN" POC/78/1/2.
The research leading to these results was supported by the Ministry of Education and Scientific Research -" Program Nucleu": 13N/08.02.2019 – PN 19-20-02-04.

47. STUDY ON THE POSSIBILITY OF OBTAINING SOME GREEN TECHNOLOGIES USED IN THE REHABILITATION OF HERITAGE BUILDINGS

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The study addresses the possibility to obtain the materials and the technology used in the rehabilitation of heritage buildings. The main problem of these buildings is the humidity of the masonry and the effects. To establish the technological solution for control humidity, it is extremely important to know the causes that led to the degradation of the building, subsequently establishing the technological solution to be used to eradicate humidity from foundations and walls. Establishing the execution technology is closely related to the preliminary investigation, so physicochemical investigations play an extremely important role. The study presents the experimental results regarding the effects of graphene on the properties of hydraulic lime mortars. Starting from the specialized literature and considering the recipe of the basic mortar, different percentages of graphene powder and additives were added in its composition.
The results of the study show which is the recommended option for the rehabilitation of heritage buildings, considering the current requirements regarding environmental protection, through the correct management of waste.

48. BUILDING ON THE EDAPHIC-BLOOM EXPERIENCE EXCHANGE: ENERGY EFFICIENCY SOLUTIONS FROM GERMANY

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Continuing the momentum of the successful German-Romanian Experience Exchange on Energy Efficiency in Buildings, which took place in April 2023, this presentation explores the pressing need for new solutions and identifies the enormous collaboration opportunities they present. With a special focus on identifying emerging technologies, the Steinbeis Danube Center aims to accelerate the adoption of innovative approaches to enhance energy efficiency in buildings. By showcasing tangible practices and success stories, we aim to inspire collaboration among stakeholders from academia, industry, and policy sectors. This presentation highlights the transformative potential of innovative energy-efficient technologies, underscoring their role in sustainable development and offering a roadmap for seizing lucrative business prospects.

49. ANALYSIS OF POLYCYCLIC AROMATIC HYDROCARBONS IN BLACK SEA PELAGIC FISH

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A study was conducted to analyze the polycyclic aromatic hydrocarbons (PAHs) in Black Sea pelagic fish, from Romanian seaside. The pelagic fish species (*Engraulis encrasicolus, Sprattus sprattus, Trachurus mediterraneus ponticus)* were collected from 8 sampling sites of Romanian seaside, along 2018 year. Gas chromatography coupled with mass spectrometry (GC-MS) was used to determine PAHs concentrations. The highest values were observed in the warm season, May, July, and the lowest values in November. The concentrations were higher in northern area receiving Danube River discharges and close to harbour Midia-Navodari. PAHs concentrations indicate a significant degree of technical pollution.

50. THE DEVELOPMENT OF A NATURAL ASSURANCE SCHEME IN THE LOWER DANUBE: FROM NBS DESIGN PROCESSES TO CO-BENEFITS CAPITALIZATION

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The Lower Danube wetlands, renowned as a vital European ecosystem, have experienced a distressing decline of approximately 80% in their surface area during the past century. This devastating loss can be attributed to human activities, including river dredging, land reclamation, and flood control measures (www.icpdr.org). Notably, anthropic interventions along the Danube River, such as the construction of hydropower plants Iron Gates I and Iron Gates II, as well as alterations along its banks, have exacerbated bank erosion and induced undesirable riverbed changes that detrimentally impact navigation. Furthermore, the adverse effects resulting from these human interventions, coupled with the influence of climate change, have intensified both flooding and drought events in the region.
In response to these pressing concerns, we present an innovative wetland restoration project in the Lower Danube, centered around the development of a Nature-Based Solution (NBS) for effective flood risk management. Our research primarily focuses on the Dabuleni-Potelu-Corabia (DPC) enclosure, an area initially reclaimed in 1965 to mitigate catastrophic floods, featuring a safety reserve height of one meter. This particular region, alongside other stretches of the Lower Danube, faced severe impacts during the catastrophic flood of 2006, rendering them increasingly vulnerable to both less destructive but more frequent flood events.
By undertaking this wetland restoration project and leveraging Nature-Based Solutions, we strive to restore and enhance the resilience of the Lower Danube wetlands in the face of flood risk. Our research sheds light on the unique challenges faced by the Dabuleni-Potelu-Corabia (DPC) enclosure and provides valuable insights into potential strategies for its restoration. Ultimately, our findings contribute to a comprehensive understanding of the Lower Danube ecosystem and pave the way for sustainable and effective flood management approaches in the region.
Keywords: Nature Based Solutions, wetland restoration, catastrophic floods

51. SEASONAL DYNAMIC OF NITROGEN AND PHOSPHORUS CONCENTRATIONS IN THE LAKES OF THE DANUBE DELTA IN THE PERIOD 2019-2022

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This paper presents the seasonal dynamic of nitrogen (organic and inorganic forms) and phosphorus (dissolved and total forms) in the surface water of some representative lakes in Danube Delta Biosphere Reseve, as Parches, Fortuna, Merhei, Rosu, Uzlina and Razim lakes, in the period 2019- 2022. Both nitrogen and phosphorus play an important role in the energetic processes of living bodies, being constituent elements of cells and found in organic and inorganic compounds. Nitrogen and phosphorus compounds contribute to the eutrophication processes that lead to the algae rapid development and higher forms of plant life. The samples were analysed, preserved and stored according to European Standards. The methods used for the quantitative determination of selected nutrients in surface waters was molecular spectrometry, using Perkin Elmer Lambda 650S. The results of the study show that phosphorus levels (both dissolved and total forms) were found in the lowest concentration in the spring season, due to the decomposition of organic matter and the transition of phosphorus into mineral form, with the exception of Razim lake. The maximum concentration of total phosphorus, 0.22 mg/L was determined in Uzlina lake during autumn season and minimum recorded value was 0.017 mg/L in Rosu lake in the spring season. Dissolved phosphorus concentrations ranged between 0.01 mg/L and 0.06 mg/L during the studied period.Nitrogen was identified in the highest concentrations in its organic form, reaching the value of 7.861 mg/L determined in Merhei lake in the spring season and the lowest concentration 0.97 mg/L in Uzlina lake during summer season. The highest values of inorganic nitrogen were recorded in the spring season, with the maximum concentration of 2.326 mg/L in the Razim lake in the spring season and the minimum value of 0.08 mg/L in the Uzlina lake in the summer season.

52. FUTURE OF NATURE-BASED WASTEWATER TREATMENT SOLUTIONS IN VIEW OF WATER REUSE STRATEGIES

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With a paradigm shift currently occurring in managing water resources, water reuse, energy and nutrient recovery became the forefront of research in the field. Although some countries have already implemented water reuse technologies, there are still several questions to be answered. The new EU regulation on minimum requirements for water reuse aims to facilitate water reuse, mainly for irrigation. Nonetheless, finding solutions that can meet all of the resource recovery requirements, including the reuse of water, mitigating pollution, and achieving energy efficiency, is difficult. If the above statement is true for large centralised systems, it is even more so for smaller on-site treatment facilities.
Nature based solutions (NBSs), such as constructed wetlands, green roofs and green walls could in part be the answer for the raised questions. They retain water, produce biomass for further utilisation and regulate the microclimate improving climate resilience of the surrounding areas. On the other hand, natural wetland systems can only remove 50% of the microplastics, lower than large-scale activated sludge systems. Since water reuse is of urging necessity, the issues of micropollutant and microplactic discharges will have to be managed parallel to defining sustainable water reuse strategies. The paper discusses existing risks an potential solutions considering nature-based wastewater treatment. An overview of legal regulations concerning water reuse and NBSs has been also carried out, within and outside the European Union. Special attention is paid to the legislation of those countries where water reuse practices are established and its social acceptance is high.

53. ASSESSING THE TOXICITY OF WATER USING TOXKIT MICROBIOTESTS: A CASE STUDY IN THE ZAGHEN ECOLOGICAL RESTORATION AREA (DANUBE DELTA BIOSPHERE RESERVE)

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Aquatic biota is used worldwide in ecotoxicological studies. This study aimed to assess the potential adverse effects of chemicals or environmental pollutants on living organisms by utilizing aquatic test biota. Water samples were collected from the Zaghen ecological restoration area, and the toxicity estimation was performed using microbiotests. Two species, *Thamnocephalus platyurus* (Thamnotoxkit F™ test) and *Daphnia magna* (Daphnotoxkit F™ test), belonging to the consumer trophic level in the food chain, were used as indicator organisms to evaluate the toxicity of the water. Water samples were collected in March 2023, from five sampling sites. The results showed that the water samples had low toxicity levels, indicating no significant response in the test organisms.

54. SPATIOTEMPORAL CHANGE OF MARSH VEGETATION AND ITS RESPONSE TO CLIMATE CHANGE IN CHINA FROM 2000 TO 2019

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China has the third largest area of marshes in the world. Understanding the change of marsh, vegetation and its response to climate change in China is important for the protection of wetland ecosystem. Based on the climate and normalized difference vegetation index (NDVI) data, we investigated the spatiotemporal variation in vegetation and its response to climate change for different types of marshes in China. The results indicated that growing season NDVI increased significantly (0.02/decade, $P < 0.01$) over the whole marshes of China from 2000 to 2019. The increased precipitation and minimum temperature during the growing season could promote the growth of marsh vegetation over China. This study found for the first time that the increase of temperature during the day and at night had asymmetric effects on vegetation growth in marshes of China, and the positive effect of night warming was more significant. Spatially, increasing growing season precipitation was beneficial to the vegetation growth of herbaceous marshes, marsh meadows, inland salt marshes, and seasonal saltwater marshes in eastern Inner Mongolia. Increased growing season minimum temperature could greatly promote the vegetation growth of marsh meadows, herbaceous marshes, inland salt marshes, forest swamp, and bush swamp in cold and high-altitude regions of Northern Northeast China and the Tibet Plateau. In the context of global climate change, more attention should be paid to the different responses of vegetation to climate change for different marsh types, especially when we use the model to simulate the impact of climate change on vegetation in different marsh regions of China.

55. THE DANUBE DELTA AND THE PROCESSES AFFECTING ITS STATE

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The Danube Delta is a unique natural object influenced by natural and human factors. Among the natural factors, affecting the delta, the most important are water discharge, sediment transport, climate change, changes of the Black Sea water level. In turn, the delta is affected by many anthropogenic factors: flow regulations, dredging, reed harvesting, water withdrawals, fishing, and pollution. To some extent these processes are connected. Generally, over the past 100 years, there have been no significant changes in the water runoff of the Danube River in the top of the delta. The mean long-term runoff of the Danube River at Reni station is about 6500 m^3/sec, or 205 km^3 per year. Simultaneously as a result of the construction of directing flow dam at Izmail Chatal the share of the Kiliyskyi branch has significantly decreased. In 1991–2000 it was 58.1% of the total and now (2011–2021) decreased to 49.8%. As a result of climate change and flow regulation the intra-annual distribution of runoff has become more even. The peak of spring flood has become less and now it is observed somewhat early than before. As result of air temperature increase, the water temperature increased as well. Nowadays in July and August it reached 26°C. As a result of reduced sediment transport and rising water levels in the Black Sea, the increase in delta size has become slower than it was several decades ago.

56. RIVER WATER QUALITY INDEX: METHODOLOGY AND APPLICATION

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The aquatic environment is a complex research object in terms of quantitative monitoring and assessing of its ecological status due to the many influenced factors and variability in space-time scale. A methodological problem, for example, is how to distinguish an anthropogenic influence from natural variations in chemical composition and physical properties.One of the most popular ways to generalize the results of seasonal and long-term river water monitoring data is the use of water quality indices (WQI). This is a very informative tool that allows you to generalize and analyse huge arrays of numerical data obtained during monitoring both at the level of limited areas and the entire river basin. The idea of my research is that I compared various methods for assessing water quality on the example of the Umanka River in the Cherkassy region of Ukraine, using both known WQIs (i.e., NSF-WQI) and my own methodology. The last one is based on the use to assess the guidelines for specific types of water consumption - fish farming, irrigation, animal consumption, recreation. As it turned out, the generalized estimate, mathematically processed using the Harrington desirability function, differs greatly depending on the type of water consumption. Therefore, in my opinion, the main methodological problem of the generalized assessment is the validity of the parameters choice included in the model, their level of variability and weight fractions. My development is free from this shortcoming, because it is based on the accurate values of maximum permitted concentrations.

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

57. BIOMASS AND CARBON STOCK OF THE REED BEDS IN THE DANUBE DELTA

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Intact wetlands can act as carbon sinks and mitigate increased amounts of CO_2 in the atmosphere following climate change. In addition to the organic soils, also the riparian vegetation plays an important role in the carbon storage and carbon cycle within wetlands.In the context of the project 'EDAPHIC-BLOOM Danube', actions for greenhouse gas (GHG) mitigation as well as dialogues with authorities and stakeholders in the

Lower Danube region in Romania are developed. The project with Romanian and German partners is managed by the Danube Delta National Institute for Research and Development in Romania. It is part of the European Climate Initiative (EUKI).
One project part deals with the biomass and carbon stock of the floodplain forests and reed beds in the Danube Delta. The different vegetation types were investigated in the vegetation periods of 2021 and 2022 using a plot design in which vegetation and habitat parameters were measured. For the reed beds, the aboveground biomass was harvested on 1 m^2 plots and analysed on carbon and nitrogen content using an C/N Element Analyzer. The field and laboratory results were used to upscale the values on the huge reed bed areas of the whole Danube Delta. Results show differences between the main reed species. *Phragmites australis* dominated types had in general more biomass than *Typha*- and *Carex*-dominated sites. The medium carbon contents were similar and ranged between 41.9% and 43.2% of the aboveground biomass.

58. THE ROLE OF 3D IN SUPPORTING THE MISSION OCEAN, CLIMATE & CITIES

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The paper is presenting the synergies between the 3D objectives and the ones illustrated in the 3 EU Missions: *Clima, Ocean and Cities*, with focus on implementing the Grean Deal initiatives, while engaging with a large range of stakeholders. The importance of identifying local based solutions related to renewable energy (solar & wind) is further explored, and aspects of circular economy are illustrated to indicate local benefits and jobs creation. Additionally, some examples of pilot projects are given, illustrating the synergies between several 3D pillars, while highlighting the (renewable) energy vector. The importance of vertical pillars (*mobility, agriculture, energy, climate, biodiversity, circular economy and emissions offsetting*) is further underlined, and examples of the support pillars are exemplified with samples of interaction, particularly with regards to *tourism, environmental impact, social innovations.* The significance of digitalization is underlined, and the interaction with Delta's communities is explained as a top priority. Some ideas of pilot projects are explored and an invitation to join 3D in European & International projects is issued. Examples of and *engagement and interaction roadmap* is further supporting the concept of 3D, its ambitious objectives and motivated outcomes.

59. TECHNOLOGIES FOR THE SUSTAINABLE EXPLOITATION OF THE NON-WOOD BIOMASS RESOURCES OF THE DANUBE DELTA IN ORDER TO PROTECT AND PRESERVE IT, IN CONJUNCTION WITH THE SUSTAINABLE ECONOMIC DEVELOPMENT OF THE AREA

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In the current geo-political context, the notion of energy independence acquires primordial values. From here, the need to use the energy resources that a community has, locally, giving priority to rapidly renewable energy resources, whose processing is not polluting, does not interfere with the natural environment. In the specific case of the Danube Delta, the responsible, sustainable collection and processing of non-wood biomass, waste produced by contemporary society are the keys to the connection between the protection and conservation of the Danube Delta, on the one hand, and sustainable economic development, on the other hand .
The company ECOHORNET develops technologies and equipment for the production of thermal and electrical energy using biomass resulting from human activities, in an efficient, economic and ecological way.
The ecoHORNET equipment achieves:
- the production of thermal energy with pellets produced from any biomass, respectively by-products and organic residues from agriculture, animal husbandry, forestry, industry, energy plants, municipal and industrial biodegradable waste
- the processing of solid organic waste through pyrolysis for the production of electricity, thermal energy in cogeneration and bio gas, bio-oil, biochar.
The ecoHORNET technologies are designed to meet the most demanding requirements of the 3rd millennium in terms of the efficiency of thermal energy production, minimal CO and particle emissions, access to an inexhaustible and ecological fuel, without encouraging deforestation
Non-woody biomass is the energy source that can change the way the planet looks today. If we direct investments towards sustainable activities, with a lot of political will, we can break the vicious circle of using fossil fuels, building the economic development of communities through the use of local energy resources.

60. INNOVATION HUB BIO DANUBIUS AS A PATHWAY TO NEW AGRO-ECOLOGY PRACTICE IN THE WETLANDS

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This paper is looking to the experience of Innovation Hub Bio Danubius, a leading cluster in plain crops along the Danube, in adoption of new practices through a combination of organic and agroecological farming systems. Part of an European research project (Transect), the hub explores the value of certification and standardinzation processes to build trust around a new business model . Agroecology-TRANSECT is a 4-year project funded by the European Commission under the Horizon Europe programme. The project has a triple focus: climate change, biodiversity and socio-economic resilience of farms.The paper highlights agroecology as a response to these major challenges and aims to produce robust evidence of its benefits for the wetlands.

Sectiunea IV: Geographical Information System and Application System Modeling

61. DEFINING AND ANALYSING FUTURE CONDITIONS UNDER MARITIME SPATIAL PLANNING IN ROMANIA AND BULGARIA

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Similar to any planning process, Maritime Spatial Planning is a future-oriented activity. Under the MARSPLAN Projects (I,II) these likely and desired directions of future development of maritime uses and their management are modeled in a set of scenarios for Bulgaria and Romania. Each of them is supporting for the decision-making levels directed towards the main goal for the marine space. According to the EU Directive 2014/89/2014 and the legislation transposed both countries there were established the followed steps for the Definition and Analysis of future conditions: forecasting the effects induced by current trends in the spatial and temporal needs of existing human uses; estimation of spatial and temporal requirements for new uses of maritime space; identification of future alternative scenarios for the planning area; selection of the optimal scenario for the use of the maritime space. The results obtained in the stage of defining and analyzing the future conditions, are underlined: alternative scenarios for the use of maritime space to illustrate the evolution of maritime space following planned activities based on new goals and objectives; one scenario illustrating the evolution of the maritime space, if current trends and conditions are maintained without new interventions; an optimal scenario selection to provide the basis for identifying and selecting the measures for the maritime space planning.For the establishment of the analysis and management areas boundaries in transboundary approach, a GIS database updated and GIS model designed, including: a complex database – built on the basis of information from the both MARSPLAN projects, validated and permanently updated; data and information covering both the maritime space and the coastal areas within the plans boundaries for both countries and the cross-border area. Added aspects, lessons learnt and new thematic topics were added to the spatial data collected. The basis of the decisions for the delimitation of the area and for more detailed investigations in it lies in the basic analyzes of a wide range of components and indicators and characteristics of the neighboring territories.

62. MAPPING OF EMERGENT AQUATIC PLANT COMMUNITIES ACCORDING TO POINT-INTERCEPT SURVEYS AND LANDSAT SATELLITE IMAGERY FOR UZLINA AND LUMINA LAKES, DANUBE DELTA, ROMANIA

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The unique aquatic habitats in the Danube Delta Biosphere Reserve (DDBR) are vulnerable to increasing pressure from urbanization, industrialization, and climate change effects. Thereby, it is very important to measure and understand the effects of these pressures on the environment, to increase ecosystem resilience to such environmental changing conditions. Point-intercept surveys and LANDSAT 8 satellite imagery were performed on Uzlina Lake and Lumina Lake, Danube Delta, Romania, to qualitatively and quantitatively assess emergent aquatic vegetation distribution and abundance. The lakes were selected for comparison, based on their position in the delta (fluvial delta and fluvio-maritime delta) and in relation to the main Danube River alluvial input and water level fluctuation (wet season versus dry season). In addition, the physical properties of bottom lacustrine sediment substrate (organic matter analysis and the grain size analysis) were implemented to assess to what extent the sedimentary organic matter content and/or the mineral material influenced the emergent aquatic plant community's development and their spatial distribution. The investigations showed that the Uzlina L. (proximity to river network) was characterized by four aquatic plant species. Instead, the Lumina L. (further away from main river network) had only one species of plants. No significant differences in biomass allocation patterns and bottom substrate type were found in the two investigated lakes, which are both relatively dynamic environments. The acquired results within this study will be used for future recommendations of wetlands management within the DDBR, an ecoregion of national and international environmental significance.
Keywords: assessment, lake ecosystems, mapping, satellite imagery, surface sediments, surveys

63. AUDIO DETECTION AND IDENTIFICATION OF DANUBE DELTA BIRD SPECIES IN THE SMARTSENSE PROJECT

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Appraisal of bird presence and abundance is important in environment monitoring applications for detecting particular bird species, bird crowding and chorus, and ecosystem health, in general. It became an essential field of research as bird population is in strong alteration due to terrain management or climate change. Acoustic monitoring became lately a suitable and necessary option for bird monitoring. Sometimes it is easier to spot a bird's song than its image. Birds' detection by their song is a subfield of a more comprehensive and growing domain, Automatic Environmental Sound Recognition, and thus inherits many techniques applied there. The paper presents the results of bird recognition experiments in the framework of the SMARTSENSE project. The research has involved more than 15 bird species of Danube Delta and applied the Gaussian Mixture Modelling as baseline solution, and Convolutional Neural Networks. We have used several configurations by varying several specific parameters such as the length of the analysis frame, frequency domain, number of input parameters, number of Gaussian components, number of convolutional layers, etc. The identification rates presented in the final part shows the advantage of the Neural Network techniques over the classical methods. 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 SMARTSENSE project

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

64. TECHNOLOGICAL FRAMEWORK FOR SUSTAINABLE RESEARCH AND PROMOTION OF TOURIST AREAS USING INNOVATIVE TECHNIQUES FOR COMPUTERIZED VISUALIZATION AND AUDIO-VISUAL RECOGNITION

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SmartSense is a technological framework designed to support sustainable tourism and research in the Danube Delta area. It consists of software applications based on visualization technologies, audio-visual recognition (augmented reality), and IoT components. SmartSense offers an interactive and eco-friendly experience for tourists, allowing them to explore and discover the Delta's unique elements. The platform includes a multilayer interactive map that displays various information categories, a user dashboard for managing points of interest and experiences, and an IoT component for collecting data from environmental sensors. The platform integrates augmented reality, allowing users to interact with digital elements in the environment, and visual recognition, which displays 2D and/or 3D content based on images and markers. It also features audio recognition, enabling bird species identification through their songs. The multilayer interactive map provides users with access to heterogeneous information, including points of interest, environmental conditions, nearby restaurants, and flora and fauna. It utilizes geolocation technology to display relevant results based on the user's location. The IoT component collects real-time data on air quality and meteorological parameters, using strategically placed sensors throughout the Danube Delta. This data is processed and visualized on the platform.
SmartSense offers innovative technologies that can benefit local communities, tourists, and researchers engaged in tourism, promotion, education, and research. It provides a customizable and adaptable solution for sustainable development and exploration, with the potential for application in other tourist areas or natural environments. The project is being implemented by ALTFACTOR SRL in partnership with BEIA CONSULT INTERNATIONAL SRL

65. UNRAVELING FLOOD ZONES DYNAMICS WITH SPATIO-TEMPORAL ANALYSIS USING EARTH OBSERVATION DATA: A CASE STUDY OF THE DANUBE DELTA

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This study investigates the hydrological dynamics and societal implications of water occurrence and flooding patterns in the Danube Delta. Using data obtained through the European Commission's Global Surface Water project from 1984 to 2021, six distinct dimensions of water extraction are analyzed: land inundation, water occurrence change intensity, water seasonality, water recurrence/frequency, water transition, and maximum water extent. Hydrologically, the Danube Delta has naturally expanded and evolved until around 1860. In the early 20th century, the main branches were Chilia, Sulina, and Sf. Gheorghe, listed from north to south. The Sulina branch was restructured to facilitate navigation, and several other canals were constructed. A significant modification of the hydrographic network occurred from 1949 with the construction of the Danube-Black Sea Canal.
Based on the findings, it is evident that the permanent water bodies in the Danube Delta have remained relatively stable over the past four decades. However, the region has experienced spatially heterogeneous seasonal floods. Various human activities, such as anthropogenic modifications, the construction and drainage of artificial lakes, the establishment of seasonal fish reserves, and dam construction, have played a significant role in influencing the hydrological dynamics of the area .
The analysis of maximum water extent has helped identify areas at high risk of flooding and assess the vulnerability of settlements within the study area. By examining various dimensions of water occurrence, it becomes evident that wetlands in the Danube Delta are frequently submerged due to their shallow depths and dense vegetation cover. These wetlands transform into temporary pools, covering approximately 40% of the Delta's territory during periods of elevated water levels. Large lakes and river branches have maintained their boundaries, with exceptions in adjacent wetland areas and meandering sections of the Sfântu Gheorghe branch
Furthermore, the study highlights the importance of understanding water seasonality. Permanent water surfaces cover the majority (63%) of the total water-covered area, while seasonally flooded lands account for 25.5%. Seasonal lakes comprise extensive shallow wetlands distributed across the entire study area, while permanent lakes experience seasonal expansions of their boundaries. The findings emphasize the historical significance of water bodies and their impact on human settlements. While water is essential for life and supports the biosphere, excessive water can lead to population displacement, species migration, habitat destruction, disease outbreaks, and loss of lives. The study underscores the importance of measures such as increased awareness of risks and structured flood defenses in mitigating the societal implications of flooding. Presenting valuable insights into the hydrological dynamics and flooding patterns in the Danube Delta, this case study sheds light on the subject. By understanding these patterns, policymakers and stakeholders can make informed decisions concerning land use, flood management strategies, and the preservation of this ecologically significant region.

66. PRELIMINARY RESULTS ON CENTAUREA JANKAE MONITORING

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The importance of this study resides from the fact that the plant species *Centaurea jankae* is a rare one, distributed in Danube Delta Biosphere Reserve territory only on Cape Dolosman. Monitoring a rare species is a step forward to protect and conserve it in a developing and changing world. Protection and conservation of the species, in general, and rare species, in special, are the premises of preserving biodiversity. The paper presents a fast and modern way to monitor and evaluate the species. The used tools consist in using images resulted from the drone flights in order to compose an entire wide image with the studied species area within the Danube Delta Biosphere Reserve. Once the entire image is formed, took place the supervised classification in order to extract the pixels that represents the inflorescences of the studied species. In this manner there could be spotted more than 750 inflorescences grouped into 2 subpopulations in the studied area. Having the average number of the flowers on an individual of species it was calculated the number of the plants in order to have an accurate estimation of the population of studied species. All the steps that were followed could be transposed in future into a programing script in order that the whole process to be accessible for botanists without remote sensing techniques knowledge.

67. DISTRIBUTION OF FORTRESSES AND FORTIFIED SETTLEMENTS ACCORDING TO THE NATURAL ENVIRONMENT IN THE LOWER DANUBE SECTOR

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The purpose of this scientific work was to highlight aspects related to the influence of the natural environment, in the Lower Sector of the Danube, on the distribution of fortresses and fortified settlements. Although, the human settlements in this sector have been the object of numerous studies, however, following the bibliographic research undertaken within the „Gavrilă Simion" Eco-Museum Research Institute Tulcea and on the Internet, we identified a series of aspects that justified the approach presented. Among them, the most notable was the absence of a unified presentation of the fortresses and fortified settlements on the Ostrov-Tulcea sector of the Danube. For this purpose, the fortresses and fortified settlements, known and registered in the National Archaeological Register, in the Ostrov - Tulcea sector were targeted. All this information has been georeferenced and integrated into the free GIS application Quantum GIS. Thus, several layers of thematic information were obtained, which led to a more detailed analysis of the aspects related to the influence of the natural environment on the distribution of fortifications and fortified settlements in the Lower Danube Region. The realization of this papers would not have been possible without an interdisciplinary study. Within it, the following were used: archaeological studies, natural science studies, geography studies and satellite images. To these were added materials obtained within social networks for scientists and researchers, sites for the popularization of science and/or promotion of tourism. These materials came to complete the overall picture, which the approach to this subject in the present work, tried to create.