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INSTITUTUL NAŢIONAL DE CERCETARE–DEZVOLTARE
„DELTA DUNĂRII”– TULCEA

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DELTAS AND WETLANDS

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Preliminary Program

„Deltas & Wetlands" DDNI Scientific Events Community, 31-st edition

Deltas & Wetlands International Symposium

Tulcea, May 13 - 17, 2024

✓ **May 13, 2024 (Monday)** - Arrival of participants

✓ **May 14, 2024 (Tuesday)**

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

- 9.30 - 10.00 - Registration of participants *(Romanian time)*
- 10.00 - 11.00 - **Opening ceremony** - **Dr. Biol. Marian TUDOR**, General Director of DDNI
- 11.00 - 11.30 - ***Keynote Speaker***
  - Prof. Dr. **Ming JIANG** (Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences) - **Wetlands Conservation Network in Amur River Basin: outcomes and experiences**

  - Signing of MoU between Northeast Institute Of Geography And Agroecology (IGA), CAS and Danube Delta National Institute for R&D (DDNI) Tulcea
- 11.30 - 12.00 - The awarding of the honorary plaques "Researchers Emeritus" for **Mr. Nicolae PANIN, Academician** and **Mr. Dan BĂLTEANU, Academician.** Symposium interviews
  - Prof. Dr. Emeritus **Stoica Preda GODEANU** - Launch of the book "**The eight layers of our planet**"
- 12.00 - 13.30 - ***Lunch & Networking - Venue: Delta Hotel 4 ****, *2 Isaccei St. Tulcea*
- 13.30 - 14.30 - **Mission Ocean - Common Action Plan Danube Lighthouse & Black Sea Strategy - DANUBE4All / DaWetRest / Restore4Life / DALIA**
  - Prof. Ekaterina Batchvarova, Prof. Boian Koulov: The DaWetRest Project: an Element of the Black Sea Lighthouse System
  - Dr. Mihai Adamescu: Wetlands - Life supporting units (The Restore4Life project as a promoter of wetland restoration in the Danube River)
  - Prof. Dr. Helmuth Habersack: DANUBE4all - Restoration of the Danube River Basin Waters for Ecosystem and People from Mountains to Coast
  - Ion-Alexandru Morgovan *: DALIA - DPS 9 actions regarding floating waste pollution of rivers
  - Convener: Dr. Eng. **Iulian NICHERSU**, DDNI Tulcea
- 14.30 - 16.30 - **Lower Danube and Danube Delta Living Lab (EcoDALLi) on Water Systems**
  - Mission Ocean perspectives: Mrs. **Magdalena-Andreea STRACHINESCU-OLTEANU**, Head of Unit, DG MARE, EC
  - Chairman: Mr. **Gheorghe CONSTANTIN**, Director, Ministry of Environment, Waters and Forests of Romania
  - Moderator: **Dr. Delia DIMITRIU**, Smarter Mobility Solutions Ltd. UK
- 16.30 - 16.45 - *Coffee break*
- 16.45 - 17.15 - **PICO - Business approaches**

- Mr. **Pierre ERWES**, Executive Chairman: BioMarine, Co-Founder: Blue Forward Fund - Seventure
- Mrs. **Mihaela APOSTOL**, Tehnoinstrument IMPEX SRL Bucharest, New technologies applied to environmental monitoring: next generation mobile survey of CH4 emissions
- Mr. **Sorin BOGDAN** - MDS Electric SRL Bucharest
- Mr. **Vasili APOSTOL**, SC IPA SA Galați, Support services for companies through the Enterprise Europe Network

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

- 17.30 - 18.15 - **Posters presentations** & *Coffee*

Venue: Delta Hotel 4 *, *2 Isaccei St. Tulcea*

- 19.00 - *Festive dinner*

✓ **May 15, 2024 (Wednesday)**

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

- 09.00 - 09.30 - ***Keynote Speaker***
  - Prof. Dr. **Richard PREZIOSI** - Faculty of Science and Engineering, University of Plymouth
- 09.30 - 11.30 - **Section I**, **Biodiversity & nature conservation, natural resources & Socio-economic aspects**

Yingji PAN	Quantifying the effects of global change on wetland plants from a trait-based perspective
Alexandru DOROȘENCU	Review of the management plan and Danube Delta Biosphere Reserve regulation - the goal and objectives of the management plan, conservation measures and activities
Silviu COVALIOV	Beekeeping potential estimation in Danube Delta Biosphere Reserve - a new approach to improve biodiversity conservation and local traditions
Dorin ALEXANDRU POP	The Third National Report Decoded: Updates, Advanced Trends and Future Scenarios in Amphibian and Reptile Conservation in Romania
Elchin SULTANOV	Results of winter counts of birds in Azerbaijan in 2024
Liliana ENE	Status of biodiversity, reed habitats, sustainable exploitation of natural resources, invasive species and socio-economic implications in Danube Delta Biosphere Reserve in 2023
Olga ALEXANDROU	Dalmatian pelicans in Greece and avian flu outbreak 2022: impact and preliminary results of an ecoepidemiology study
Giorgos Catsadorakis	On the method for censusing great white pelican nesting aggregations through aerial photos taken by UAVs, in Lake Mikri Prespa, NE Greece
Călin COTOI	Phragmites australis and Arundo donax: Transnational plant lives and technologies in the socialist Danube Delta

- 11.30 - 12.00 - **Roundtable debate**: ***„Artificial intelligence for climate change adaptation and mitigation"***
- 12.00 - 13.30 - ***Lunch & Networking - Venue: Delta Hotel 4 ****, *2 Isaccei St. Tulcea*
- 13.30 - 14.30 - ***Keynote Speakers***
  - Prof. Dr. **Bernd CYFFKA** - International Association for Danube Research (IAD), *Ecosystems Services of Wetland Biomes*

- Mr. **Nick NELSON** - INTER-FLUVE US: *Connections: Vertical and lateral connectivity along rivers*

- 14.30 - 16.00 - **Section II**, **Environmental factors. Ecological restoration and Anthropic Impact**

Christian FERRARIN	A hydrodynamic model of the Danube Delta for evaluating river - lagoon-sea connectivity and reconnection solutions
Cornel TARABIC	Investigating Habitat Soundscapes in protected areas
Dušanka CVIJANOVIĆ	Designing and Fine-Tuning Restoration Measures for Peatland Ecosystems (Vlasina Plateau, Middle Danube Basin)
Katrin Teubner	Shifting Restoration Focus: From Minimum to Optimum Light Requirements re-establishing submerged macrophytes
Enikő Anna TAMÁS	Analysis of floodplain aggradation patterns along the Danube, Tisza and Hernád Rivers in Hungary
Markus WEINBAUER	Viruses und microorganisms on floating particles

- 16.00 - 16.30 - ***Keynote Speaker***
  - Mr. **Jose Luiz MOUTINHO** - AIR Centre: *Protecting and Restoring our Ocean & Waters: Cross-basin collaboration between the Atlantic, Arctic and Danube Delta*
- 16.30 - 17.30 - **Section IV**, **Geographical Information System and Application System Modeling**

Xiangjin SHEN	Critical role of water conditions in the responses of autumn phenology of marsh wetlands to climate change on the Tibetan Plateau
Cristian TRIFANOV	Changes of the hydro-morphological conditions of the Sfântu Gheorghe arm as a result of the hydrotechnical works to regulate the water course
Jingzhi ZHANG	Integrating Catchment-Scale Monitoring and Modeling Approaches to Enhance Research and Water Quality Management
Cristian TRIFANOV	EMODnet: Advancing European Bathymetry Initiatives for Enhanced Marine Data Integration and Accessibility
Mihnea-Ștefan COSTACHE *	Mapping Riparian Condition Index in the Cotmeana watershed based on GIS and Remote sensing techniques
Dragoș Sebastian CRISTEA	Smartsense - demonstrator of an innovative application for sustainable research and promotion of tourist areas using advanced techniques for computerized visualization and audio-visual recognition
Andrei TOMA	Remote Sensing-Based Mapping of Aboveground Biomass in the Danube Delta

- 17.30 - 17.45 - *Coffee break*
- 17.45 - 18.15 - **New Scientists Event**

✓ **May 16, 2024 (Thursday)**

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

- 09.00 - 12.00 - **Lower Danube and Danube Delta Living Lab (EcoDALLi) on Biodiversity**
  - Chairman: Mr. **Bogdan - Ioachim BULETE**, Governor, Danube Delta Biosphere Reserve Authority
  - Moderator: Dr. **Orieta HULEA**, General Director, WWF Romania
- 12.00 - 12.20 - **NEVERMORE** - Stakeholder engagement and social science for climate action, Mrs. Daniela PETROSCHI, The Prefect's Institution Tulcea County
- 12.20 - 13.50 - ***Lunch & Networking - Venue: Delta Hotel 4 ****, *2 Isaccei St. Tulcea*

- 13.50 - 14.20 - ***Keynote Speaker***
  - Dr. **Delia DIMITRIU** - Smarter Mobility Solutions Ltd. UK: *Decarbonising Danube Delta: Building upon Existing Initiatives and the Role of 3D Network*
- 14.20 - 16.50 - **Section III**, **Green Deal Challenges. 3D Initiative (Decarbonising Danube Delta)**
  - Moderator: Prof. Dr. **Florin Codruţ NEMŢANU,** Faculty of Transport, University POLITEHNICA of Bucharest

- Overview of the 3D Initiative experience. Results (COP27, COP28)

- What, Who & How about 3D Initiative - Dr. Eng. **Iulian NICHERSU** (DDNI)
- 3D internationalization (COP27, COP 28) - Mr. **Vlad SANDU**, Geostud SRL

- 3D existing cooperation - Danube Delta & Nile Delta and Valley

- Advancement of green materials and circular economy, Prof. Dr. **Irene GABRIEL**, Nile University
- Decarbonization of Nile Delta in Egypt: Challenges and opportunities, Prof. Dr. **Hamada M. MAHMOUD**, Beni-Suef University

- 3D debates & next steps - follow up / existing projects

- Moderators: Dr. **Iuliana NICHERSU** - FZI Research Center for Information Technology Germany**,** Dr. **Raluca Ioana NICOLAE,** Technical Director Geostud SRL
- Co-development of experimentations rooted in agroecological principles in Bio Danubius Hub, Associated Prof. Dr. **Costin LIANU**
- 3D Initiative Strategy and forward planning, Dr. **Iuliana NICHERSU** - FZI Research Center for Information

- 16.50 - 17.00 - *Coffee break*
- 17.00 - 17.40 - **Symposium Conclusions & Awards**

✓ **May 17, 2024 (Friday)**

- 09.00 - 19.00 - Field trip in the Danube Delta Biosphere Reserve

✓ **May 18, 2024 (Saturday)** - Departure of participants

- * ***online participation***

Posters:

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

Ana-Maria Chiosa, Simona Dumitrița Chirilă, Gabriel Lupu	Considerations on the diversity of entomofauna in the Şerbănești Lake area (Bacău county)
Simona Dumitrița Chirilă, Ștefan Răileanu, Livia Oana David, Mihai Doroftei, Silviu Covaliov	Study of the palatability of vegetation in the pastures of the Danube Delta, Romania
Florentina Sicrieru, Marian Mierlă, Eugenia Marin	Local population's perception of life quality in Danube Delta Biosphere Reserve: Mahmudia commune case study
Ștefan Honț, Marian Paraschiv, Marian Iani, Iuliana-Mihaela Tudor	An insight regarding adult sturgeon migration on Danube Delta's branches
Aurel Năstase, Irina Cernișencu, Marius Georgian Radu	Estimation of growth parameters and exploitation status of *Carassius Gibelio* (Giebel carp) stocks, in the fishery resource of the Danube Delta in 2023
Aleksandra Marković, Ivana Trbojević, Vera Stanković	New records of charophytes in Eastern Serbia: distribution and conservation perspectives
Viorel Cuzic	Some observations on the woodpecker species and their ecology in Northern Dobrogea
Mihaela Ciobotă, Andreea Ciobotă, Gabriel B. Chişamera, Viorel D. Gavril, Mihai Marinov, Vasile Alexe, Lucian E. Bolboacă, Alexandru C. Doroșencu, Ioana Cobzaru	Dead or alive: recovery data of the Great Cormorant (*Phalacrocorax carbo*, Linnaeus 1758) in Romania – between net-entrapment, shooting and resightings in Dobrogea region
Andreea Ciobotă, Mihaela Ciobotă, Viorel D. Gavril, Gabriel B. Chişamera, Ioana Cobzaru	Dispersal patterns of the Mute Swan (*Cygnus olor*, Gmelin 1789) in South East Romania, based on new ringing data

Section II: Environmental factors, Ecological restoration and Antrophic Impact

Florentina-Aurelia Vasilică, Carmen - Anca Safta, Panaitescu Mariana, Panaitescu Fănel - Viorel	Experimental researches from the Năvodari area regarding the presence of hydrocarbons in the soil of the Romanian Black Sea coastline
Silvia Chelcea, Maria Cristina Trifu	Sulina Branch - Suspended sediment transport and monitoring improvement
Ștefan Răileanu, Simona Dumitrița Chirilă, Livia Oana David, Mihai Doroftei, Silviu Covaliov	Parasitological and floristic analysis in some grasslands and pastures from the Danube Delta, Romania
Elena Ristea, Luminița Lazăr, Nicoleta Damir, Vasile Lavric	Assessing the impact of climate change on Black Sea waters nutrient dynamics and eutrophication
Daniela Seceleanu-Odor, Adrian Burada, Cristina Despina, Nicoleta Cioceanu, Bogdan Gheorghe, Mihaela Țigănuș, Iasemin Suliman, Orhan Ibram, Iuliana-Mihaela Tudor	Seasonal trend of physical-chemical parameters in Danube Delta Biosphere Reserve lakes in 2023
Nicoleta Cioceanu, Cristina Despina, Adrian Burada, Petre-Bogdan Gheorghe, Daniela Seceleanu, Mihaela Țigănuș, Iasemin Suliman, Orhan Ibram, Iuliana-Mihaela Tudor	The influence of the hydrological regime on the abundance and distribution of microplastics transported by the Danube River
Laurențiu Cristea, Marius Deaconu, Luminița Drăgășanu, Cornel Tarabic, Narcisa Burtea, Dan Rădulescu	Investigating Habitat Soundscapes in protected areas
Ionuț-Alexandru Chelaru, Dorel Ureche, Diana Mirilă, Alin Stelian Ciobîcă, Mircea Nicușor Nicoară	Single and combined toxicological effects of meropenem and ketoprofen treatments on zebrafish behavior
Oliver Livanov, Alexandru Banescu, Adrian Burada, Paula Pindic, Ciprian Anore	The Particle Size of the Bottom Sediments in Some Canals of the Fluvial-Marine Danube Delta
Albert Scrieciu	The complex interlink of safeguarding water availability and quality to mitigate and adapt to hydroclimatic extremes in Europe
Florentina-Aurelia Vasilică, Carmen-Anca Safta, Mariana Panaitescu, Fanel-Viorel Panaitescu	Experimental researches from the Navodari area regarding the presence of hydrocarbons in the soil of the Romanian Black Sea coastline

Daniela Florea, Florina Rădulescu, Vasile Lavric, Dan-Lucian Vasiliu, Andra Bucșe, Albert Scrieciu	Assessment of heavy metals contamination in Danube River sediments

Section IV: Geographical Information System and Application System Modeling

Dragoș Sebastian Cristea, Romulus Chevereșan, Marius Ivanov, Svetlana Segărceanu	Smartsense - demonstrator of an innovative application for sustainable research and promotion of tourist areas using advanced techniques for computerized visualization and audio-visual recognition
Valentin Panait, Tone Marcela	Creation of a spatial database using CORINE Land Cover vector maps, regarding the evolution of fortifications in the Lower Sector of the Danube
Anca Crăciun, Romulus Costache, Nicu Ciobotaru	The impact of climate change on the maximum discharge on the Danube at Isaccea
Dorottya Szám, Gábor Keve, Árpád Fekete, Zsolt Hetesi, Enikő Anna Tamás	Analysis of rainfall distribution patterns on the central part of the Tisza River floodplain

LIST OF ABSTRACTS

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

Section II: Environmental factors, Ecological restoration and Atrophic Impact

Authors	Title
20. Bernd Cyffka	Ecosystems Services of Wetland Biomes
21. Ionuț-Alexandru Chelaru, Dorel Ureche, Alin Stelian Ciobîcă, Mircea Nicușor Nicoară	Single and combined toxicological effects of meropenem and ketoprofen treatments on zebrafish behavior
22. Silvia Chelcea, Maria Cristina Trifu	Sulina Branch – Suspended sediment transport and monitoring improvement
23. Nicoleta Cioceanu, Cristina Despina, Adrian Burada, Petre-Bogdan Gheorghe, Daniela Seceleanu-Odor, Mihaela Țigănuș, Iasemin Suliman, Orhan Ibram, Iuliana-Mihaela Tudor	The influence of the hydrological regime on the abundance and distribution of microplastics transported by the Danube River
24. Laurentiu Cristea, Marius Deaconu, Luminita Dragasanu, Cornel Tarabic, Narcisa Burtea, Dan Radulescu	Investigating Habitat Soundscapes in protected areas
25. Dušanka Cvijanović, Djuradj Milošević, Minučer Mesaroš, Milica Stojković Piperac, Dragana Jenačković, Dragoslav Pavić, Gabriele Weigelhofer, Barbara Stammel, Martin Pusch, Laszlo Galambos, Martin Tschikof, Mathias Scholz, Ute Susanne Kaden, Johhana Weidendorfer, Paul Guriup, Mihai Cristian Adamescu	Designing and Fine-Tuning Restoration Measures for Peatland Ecosystems (Vlasina Plateau, Middle Danube Basin)
26. Christian Ferrarin, Irina Dinu, Adrian Stanica	A hydrodynamic model of the Danube Delta for evaluating River-Lagoon-Sea connectivity and reconnection solutions
27. Daniela Florea, Florina Rădulescu, Dan-Lucian Vasiliu, Andra Bucșe, Albert Scrieciu	Assessment of heavy metals contamination in Danube River sediments
28. Livanov Oliver, Banescu Alexandru, Burada Adrian, Pindic Paula, Anore Ciprian	The particle size of the bottom sediments in some canals of the fluvial-marine Danube Delta
29. Ioan-Alexandru Morgovan	DALIA - DPS 9 actions regarding floating waste pollution of rivers
30. Jose Luiz Moutinho	Protecting and Restoring our Ocean & Waters: Cross-basin collaboration between the Atlantic, Arctic and Danube Delta
31. Nick Nelson	Connections: Vertical and lateral connectivity along rivers
32. Ștefan Răileanu, Simona Dumitrița Chirilă, Livia Oana David, Mihai Doroftei, Silviu Covaliov	Parasitological and floristic analysis in some grasslands and pastures from the Danube delta, Romania

33. Elena Ristea, Luminița Lazăr, Nicoleta Damir, Vasile Lavric	Assessing the impact of climate change on Black Sea waters nutrient dynamics and eutrophication
34. Daniela Seceleanu-Odor, Adrian Burada, Cristina Despina, Nicoleta Cioceanu, Petre-Bogdan Gheorghe, Mihaela Țigănuș, Iasemin Suliman, Orhan Ibram, Iuliana-Mihaela Tudor	Seasonal trend of physical-chemical parameters in Danube Delta Biosphere reserve lakes in 2023
35. Albert Scrieciu,	The complex interlink of safeguarding water availability and quality to mitigate and adapt to hydroclimatic extremes in Europe
36. Florentina-Aurelia Vasilică, Carmen-Anca Safta, Mariana Panaitescu, Fanel-Viorel Panaitescu	Experimental researches from the Năvodari area regarding the presence of hydrocarbons in the soil of the Romanian Black Sea coastline
37. Katrin Teubner	Shifting restoration focus: from minimum to optimum light requirements re-establishing submerged macrophytes

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

Authors	Title
38. Delia Dimitriu	Decarbonising Danube Delta: Building upon Existing Initiatives and the Role of 3D Network
39. Irene Gabriel	Advancement of green materials and circular economy
40. Costin Lianu, Irina Gabriela Radulescu, Cosmin Lianu	Co-development of experimentations rooted in agroecological principles in Bio Danubius Hub
41. Hamada M. Mahmoud	Decarbonization of Nile Delta in Egypt: Challenges and opportunities
42. Dorottya Szám, Gábor Keve, Árpád Fekete, Zsolt Hetesi, Enikő Anna Tamás	Analysis of rainfall distribution patterns on the central part of the Tisza River floodplain
43. Enikő Anna Tamás, Kutassy, Emese, Kiss, János, Koch, Dániel, Varga, Balázs, Szabó, Szilárd, Antal, Örs, Illés, Zsombor, Kovács, Sándor, Verbőcziné Füstös, Vivien	Analysis of floodplain aggradation patterns along the Danube, Tisza and Hernád Rivers in Hungary

Sectiunea IV: Geographical Information System and Application System Modeling

Authors	Title
44. Nicu Ciobotaru, Romulus Costache, Anca Crăciun	The impact of climate change on the maximum discharge on the Danube at Isaccea
45. Mihnea-Ștefan Costache	Mapping riparian condition index in the Cotmeana watershed based on GIS and remote sensing techniques
46. Valentin Panait, Marcela Tone	Creation of a spatial database using Corine land cover vector maps, regarding the evolution of fortifications in the lower sector of the Danube
47. Dragos Sebastian Cristea, Romulus Chevereșan, Marius Ivanov, Svetlana Segarceanu	Smart sense – demonstrator of an innovative application for sustainable research and promotion of tourist areas using advanced techniques for computerized visualization and audio-visual recognition
48. Xiangjin Shen, Ming Jiang	Critical role of water conditions in the responses of autumn phenology of marsh wetlands to climate change on the Tibetan plateau
49. Andrei Toma, Ionuț Șandric; Bogdan Mihai, Albert Scrieciu	Remote Sensing-Based Mapping of Aboveground Biomass in the Danube Delta
50. Cristian Trifanov, Dumitriu D., Mihu-Pintilie A., Stoleriu C., Mierla Marian	Changes of the hydro-morphological conditions of the Sfântu Gheorghe arm as a result of the hydrotechnical works to regulate the water course
51. Cristian Trifanov, Iulian Nichersu, Marian Mierla	Emodnet: advancing European bathymetry initiatives for enhanced marine data integration and accessibility

52. Jingzhi Zhang	Integrating Catchment-Scale Monitoring and Modeling Approaches to Enhance Research and Water Quality Management

- **MISSION OCEAN LIVING LABS**
- **DANUBE LIGHTHOUSE AND BLACK SEA LIVING LAB**

Authors	Title
53. Ekaterina Batchvarova, Boian Koulov	Climate, atmosphere and waters research institute at the Bulgarian Academy of Sciences
54. Pan Yingji, Lars Lønsmann Iversen, Jorge García Girón, Peter van Bodegom	Quantifying the effects of global change on wetland plants from a trait-based perspective
55. Jingjie Zhang	Integrating catchment-scale monitoring and modeling approaches to enhance research and water quality management

ABSTRACTS

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

1. DALMATIAN PELICANS IN GREECE AND AVIAN FLU OUTBREAK 2022: IMPACT AND PRELIMINARY RESULTS OF AN ECOEPIDEMIOLOGY STUDY

Olga Alexandrou, Ursula Höfle, Giorgos Catsadorakis

Society for the Protection of Prespa, Agios Germanos, Prespa, 53150, Greece,
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The 2022 outbreak of highly pathogenic avian influenza (HPAI) caused a 60% loss at the world's biggest colony of Dalmatian pelicans *Pelecanus crispus* (DP), at Lake Mikri Prespa, Greece. Overall, 2,286 DP deaths were recorded in 13 Greek wetlands, of which 1,734 at the Prespa colony. The sympatric great white pelican *Pelecanus onocrotalus* (GWP) was hardly affected. The devastating effects at the Prespa colony prompted a study on HPAI and other pathogens to understand the exposure and susceptibility of DP to the virus. The study involved extensive post-outbreak (late 2022 and 2023) sampling at Prespa and four more Greek pelican colonies. A wide array of samples was taken from live nestlings of both pelican species and from live adult DP, while DP nesting material and fresh faecal samples from sympatric waterbirds were also collected. None of the sampled pelicans tested positive for AI, however a significant proportion of adult DP had antibodies against H5N1 AI, providing circumstantial evidence for potential survival of infected individuals. None of the sampled GWP were seropositive. Likewise, all ambient samples tested negative for AI, suggesting that the persistence of AI on nesting grounds is highly unlikely. Several factors may have contributed to high infection rates and high susceptibility of DP, especially at the Prespa colony: early nesting combined with low temperatures, high densities on nesting islets, courtship behavior, contamination of pelican nesting grounds by other infected migratory waterfowl species, and the potential co-occurrence of other immunosuppressive pathogens.

2. ON THE METHOD FOR CENSUSING GREAT WHITE PELICAN NESTING AGGREGATIONS THROUGH AERIAL PHOTOS TAKEN BY UAVS, IN LAKE MIKRI PRESPA, NE GREECE

Giorgos Catsadorakis, Olga Alexandrou, K. Bairaktaridou

Society for the Protection of Prespa, Greece, Agios Germanos, Prespa, 53150, Greece,
E-mail: catsadorakis@spp.gr, doncats@otenet.gr,

The second largest colony of great white pelicans *Pelecanus onocrotalus* (GWP) in Europe lies in Lake Mikri Prespa, Greece. Numbers of nests and near-fledged chicks are censused annually since 1983. The last 10 years the number of nests varied from 600 to 850. Formerly, the census was carried out during onsite visits, but to minimize disturbance and effort, after 2014 it is done through examination of aerial photos taken by an UAV flying fortnightly or monthly, from early March to mid-July. Not all dates, however, are suitable to count nests in photos. The reason is that at least during incubation and early chick stages, both pair members, when attending, stay close to each other, and it is impossible to distinguish between birds that sit on nest and mates sitting by. Circa 15 days after egg laying, the non-incubating members fly, in flocks, to distant parts of the basin or other wetlands outside it to feed. At average spring and summer weather, they depart at around 09:30 to 10:00 and return mostly 1-3 days later, after 14:00 in the afternoon. Thus, to have the most reliable estimation of AON, photos of colonies should be taken roughly at the second fortnight of the incubation period and first week after hatching, between 12:00 and 14:00, when only incubating or brooding birds are present. For Prespa, for the last six years, this time slot has been between 10/5 and 20/6. The result of not following these guidelines is likely an overestimation of nests.

3. DISPERSAL PATTERNS OF THE MUTE SWAN (*CYGNUS OLOR*, GMELIN 1789) IN SOUTH EAST ROMANIA, BASED ON NEW RINGING DATA

Andreea Ciobotă, Mihaela Ciobotă, Viorel D. Gavril, Gabriel B. Chişamera, Ioana Cobzaru

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Protected under the Bonn and Bern Conventions, the Mute Swan (*Cygnus olor*) has solid European populations, making it a keystone species to understanding the patterns of migration for highly adaptable waterfowl.
Within this framework, our study aims to have a broad look at the dispersive behaviour of *Cygnus olor* in SE Romania. Of the 85 Swans ringed between 2019-2021 (75% with added neck-bands), we recovered data from 38 ringed individuals, two thirds of which had between two and five resightings.
Over 70% of the analyzed individuals were resighted in close proximity to the ringing place more than two or three consecutive years, during different phenological periods of the same year, indicating high philopatry to the place of ringing. Furthermore, 40% displayed regional movement within the ringing province or inside Romania. Less than a quarter of the recovery data came from outside the country (all individuals ringed in the south-east having migrated south to Bulgaria, and one ringed in center Romania moving north to Poland). The vast majority of resightings (and most of the ringing) was on reservoirs and urban lakes.
Our findings suggest at least two resident populations of *Cygnus olor* in South East Romania and are consistent with the species tendency to form sedentary groups when proper conditions are met.
Further research into the drivers of ecological flexibility for Mute Swan could provide valuable information on what drives colonization of new suitable areas for waterfowl, in the context of habitat fragmentation and loss of natural stopover sites.

4. DEAD OR ALIVE: RECOVERY DATA OF THE GREAT CORMORANT (*PHALACROCORAX CARBO*, LINNAEUS 1758) IN ROMANIA – BETWEEN NET-ENTRAPMENT, SHOOTING AND RESIGHTINGS IN DOBROGEA REGION

Mihaela Ciobotă, Andreea Ciobotă, Gabriel B. Chişamera, Viorel D. Gavril, Mihai Marinov, Vasile Alexe, Lucian E. Bolboacă, Alexandru C. Doroşencu, Ioana Cobzaru

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With a nearly cosmopolitan distribution, increasing European populations and less philopatric tendencies compared to other colonial waterbirds, the Great Cormorant (*Phalacrocorax carbo*) has long been a species of interest when it comes to dispersal and longevity studies. Ringing and recovery data come in handy as to having a big-picture perspective on this topic, but research integrating the aforementioned data lack on a national scale.
To fill this research gap, recovery data for *P. carbo*, collected over the span of 65 years (1959-2024) in Romania, was analyzed, consisting of 59 recoveries. All resightings of live birds came from color-ringed individuals. A number of 47 individuals were resighted/recovered within our borders, out of which 25 were birds ringed under Romanian Ringing Scheme. Dispersal movements for the birds ringed in Romania were rather small distance-wise (most of the ringing-recovery distances ranging between 6 and 38 km). Other 12 individuals were reported dead or alive in Türkiye (6), Bulgaria (3), Greece, Poland, or Ukraine. Great cormorants that traveled the most to reach Romania were birds ringed in Denmark and Finland (over 1700 km). Half of the recoveries came from individuals that were found dead, mostly shot or caught in traps set for other species. Most of the birds found shot were reported before the year 2000, but no significant difference was found for recoveries of dead birds before or after this year in general. The majority of dead recoveries were first and second-year birds.
Our study provided a brief picture of the Great Cormorant's migration patterns from and to Romania, the significant number of dead birds recovered over the last 70 years highlighting issues such as net-entrapment, that pose dangers especially to younger birds.

5. CONSIDERATIONS ON THE DIVERSITY OF ENTOMOFAUNA IN THE ŞERBĂNEȘTI LAKE AREA (BACĂU COUNTY)

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Studies on the diversity of entomofauna are essential for assessing biodiversity and ecosystem dynamics. These observations contribute to understanding the ecological roles of insects, such as pollination, organic matter decomposition, and supporting trophic networks. By monitoring insect species, researchers can identify ecological changes and develop conservation strategies. Thus, the diversity of entomofauna serves as an indicator of ecological health, essential for maintaining natural balance and environmental sustainability. The purpose of the study was to analyze the diversity and dynamic patterns of the insect fauna in the aquatic habitats of Lake Şerbănești in Bacău County. The entomofaunistic biological material collected from aquatic pools consists of larvae, pupae, and adults, which lead to a benthic or necto-benthic lifestyle. For the study of the entomofauna, biological samples were collected and examined in the laboratory, using the following materials: nets, plastic bags, 96° alcohol, bottles with rubber stoppers, entomological needles, brushes, tweezers, plastic trays, binocular magnifiers, and identification keys. The results of the study indicated the presence of 780 individuals from 38 taxa and nine orders, collected from three stations. Periodic analysis revealed a high abundance of these insects in the warm season, with the predominance of Chironomidae sp., Caenagrionidae sp., and Baetidae sp. The highest numerical abundance values were recorded, in descending order, by the following taxa: Chironomidae sp., Caenagrionidae sp., and Baetidae sp. The calculation of the constancy index showed that the taxon Caenagrionidae sp. is euconstant within the studied entomocoenosis, and the taxa Chironomidae sp., Corixidae sp., and Gerris sp. are constant. The study concludes that the diversity of entomofauna at Lake Şerbănești indicates a healthy and dynamic ecosystem in the warm season, highlighting the essential role of insects in ecological processes and the need for conservation strategies.

6. STUDY OF THE PALATABILITY OF VEGETATION IN THE PASTURES OF THE DANUBE DELTA, ROMANIA

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This research focuses on examining the plant species within the grasslands and pastures of the Danube Delta, Romania, incorporating a wide range of sources on plant palatability. The analysis encompassed 12 grazing territories in the Danube Delta and adjacent areas, identifying 121 plant species across the examined pastures. Among these, 31 species were categorized as "Non Palatable," 16 as "Highly Palatable," 32 as "Mostly Palatable," 16 as "Less Palatable," and 26 as "Rarely Palatable." It was observed that 60 plant species were favored in their fresh state by animals, with an additional 29 species preferred in both fresh and dried forms. Predominantly, animals consumed whole plants. The dietary preferences highlighted that cows had the widest range of plant choices, followed by sheep, goats, and horses. The selection by domestic animals like goats, sheep, cows, and horses often hinges on the nutritional value and digestibility of the plants, while they typically avoid those with toxic properties. The results underscore the diverse plants in the investigated zones, offering a range of palatable options for grazing. The palatability index proves important in evaluating pasture quality, important for optimizing the average daily growth of different animal species grazing these lands. Given the fluctuating climatic conditions and the generally low quality of pastures in the Danube Delta, further comprehensive and cross-disciplinary research is imperative for a thorough understanding of the delta's biocenoses.

7. BEEKEEPING POTENTIAL ESTIMATION IN DANUBE DELTA BIOSPHERE RESERVE - A NEW APPROACH TO IMPROVE BIODIVERSITY CONSERVATION AND LOCAL TRADITIONS

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Conserving biodiversity and natural heritage is the primary objective of the Danube Delta Biosphere Administration, which requires constant improvement and refinement. The region's natural flora is not only a biodiversity element but also a valuable resource for grazers, insects, birds, and humans. It is not easy for the Danube Delta Biosphere Reserve Administration to balance conservation targets and capitalizing on local natural resources. This article proposes an innovative approach to managing honeybee resources, which serve a dual role as conservation objectives — natural habitats — and as a honey-producing base through beekeeping, a traditional activity of the local population and professional beekeepers. The use of GIS techniques brings a modern approach and helps to estimate with improved accuracy the load of bee families during the pastoral period.
Keywords: Danube Delta Biosphere Reserve, biodiversity conservation management, beekeeping, melliferous potential estimation tool, GIS

8. PHRAGMITES AUSTRALIS AND ARUNDO DONAX: TRANSNATIONAL PLANT LIVES AND TECHNOLOGIES IN THE SOCIALIST DANUBE DELTA

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In 1950s socialist Romania, a small city, modelled on the Soviet “science cities”, was erected in the marshes of Danube Delta, around the scientific research of reed. It is there that the new preparations for economic development, based on the exploitation of local reed (Phragmites australis) and acclimatization of “Italian reed” (Arundo donax), happened. Arundo donax, considered nowadays an invasive plant, was not at the first attempt to be transformed into an industrial and political project, as, in fascist Italy, it was at the core of one of the economic autarchy projects (Toraviscosa). In the Romanian cash-strapped economy, after WWII, almost no effort was spared for this project. A transnational hub of plants, scientists, plans, machines, imaginaries and hopes developed in the middle of the Danube Delta.
The economic development of large wetlands through biological and technological research was deeply entangled with plants’ lives and histories, and their multiple ontologies. The rhizomatic character of Phragmites australis, its ways of moving, changing and aggregating in the Delta was framed by heavy machinery, political and scientific imaginaries. The ways in which reeds entwined with technology re-shaped the local human communities, as they were redistributed alongside new extractivist projects and means of resisting them.
A complicated, relatively muted, socialist debate emerged in the 1960s, between extractivist nature governance strategies, and ecological and history of nature thinking. That debate has never died down completely and it is part of present-day re-understandings of the neo(colonial) governance of “wild nature” in the wetlands of Eastern Europe.

9. SOME OBSERVATIONS ON THE WOODPECKER SPECIES AND THEIR ECOLOGY IN NORTHERN DOBROGEA

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The presence and diversity of woodpecker species, as well as that of other species typical of forests and silvo-steppe areas, is a very good indicator of the naturalness and health of forests. They are considered keystone species because of their role as ecosystem engineers, creating nesting sites and shelter for many other vertebrate and invertebrate species.
The observations were focused on the forested areas of Northern Dobrogea, predominantly on the areas with deciduous forests typical of the area. The purpose of conducting these observations is to: identify and update the list of existing woodpecker species in Northern Dobrogea, estimate their populations, nesting preference of cestoras and the importance of old-growth forests with deciduous species for woodpeckers. 9 species of woodpeckers were identified: *Picus canus, Picus viridis, Dryocopus martius, Dendrocopos major, Dendrocopos syriacus, Leiopicus medius, Dendrocopos leucotos, Driobates minor, Jynx torquilla*. In order to understand the coexistence of woodpecker species in the same area and to propose further conservation strategies, it is necessary to investigate their food niche differentiation. The presence of *Dryocopus martius* and *Leiopicus medius* is determined by the presence of large trees and the diversity of forest species.

10. REVIEW OF THE MANAGEMENT PLAN AND DANUBE DELTA BIOSPHERE RESERVE REGULATION - THE GOAL AND OBJECTIVES OF THE MANAGEMENT PLAN, CONSERVATION MEASURES AND ACTIVITIES

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The "Review of the management plan and DDBR regulation" is a project co-financed by the European Regional Development Fund through the Large Infrastructure Operational Program 2014-2020, implemented in partnership between DDBR (Danube Delta Biosphere Reserve) as beneficiary and four partner entities: three research and development institutes, and one university. The project was carried out for a period of 42 months until December 31, 2023 and contributes directly to the plan of measures to improve the conservation status of species and habitats of community importance, from three Natura 2000 sites that overlap with the DDBR limits:ROSPA0031, ROSCI0066 and ROSCI0065. Within the management plan, the following objectives were achieved: a current inventory and mapping of wild species of community interest; an updated geospatial database with 312 distribution maps of species and habitats of conservation interest from the site; an assessment of anthropogenic pressures and threats and the relationship between communities and protected areas based on a socio-economic study; community awareness, education and involvement regarding the protection of the Danube Delta's biodiversity; action and monitoring plans; review of the regulation plan and strengthening the administrative capacity of DDBR Authority through the purchase of equipment necessary for monitoring and carrying out biodiversity protection activities. The DDBR management plan is the main tool for the responsible authority to make the appropriate management decisions in the managed protected area.
The project contributes directly to the plan of measures to improve the state of conservation for species and habitats of community importance in the site, according to the legislation in force.

11. STATUS OF BIODIVERSITY, REED HABITATS, SUSTAINABLE EXPLOITATION OF NATURAL RESOURCES, INVASIVE SPECIES AND SOCIO-ECONOMIC IMPLICATIONS IN DANUBE DELTA BIOSPHERE RESERVE IN 2023

Ene Liliana, Covaliov Silviu, Doroftei Mihai, Mierlă Marian, Simionov Matei, Năstase Aurel, Chirilă Simona-Dumitrița, Cenișencu Irina, Doroșencu Alexandru, Bolboacă Lucian, Marinov Mihai, Alexe Vasile, Sicrieru Florentina, Lupu Gabriel

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The Danube Delta Biosphere Reserve is naturally associated with research aimed at biodiversity and nature conservation, natural resources & socio-economic aspects. As a consequence, this paper presents the results of research conducted in 2023 in Danube Delta Biosphere Reserve regarding the mapping of the reed beds and characterizing their typologies in order to implement actions to regulate firefighting activities, based on elements of fire ecology, assessment of the sustainable exploitation of vegetal resources, conservation status of invertebrate species of community interest, research on the assessment of the conservation status of ichthyofauna species of community interest, fisheries research for the sustainable exploitation and conservation of biodiversity, colonial waterbirds species, mammal species of community interest, evaluation of the invasiveness degree of some species (using the latest methodologies) in the context of climate change, research regarding the quality of life of the human population and research on the practice of ecotourism, in the context of sustainable development.
The research was funded by Ministry of Research, Innovation and Digitization within the framework of Nucleus Programme ”Danube Delta 2030” PN 23 13, 2023-2026 – Nucleus Project: ”Research on the conservation of biodiversity, habitats, non-native invasive species, sustainable exploitation of natural resources, and socio-economic implications in the Danube Delta Biosphere Reserve, in the context of climate change - PN 23 13 01 03”

12. AN INSIGHT REGARDING ADULT STURGEON MIGRATION ON DANUBE DELTA'S BRANCHES

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The Danube River is the second-largest river in Europe and the largest river in the European Union. It stretches 2,778 kilometres, passing through 10 countries, and forms the Danube Delta before flowing into the Black Sea. Two out of the three branches, Sulina and Sfantul Gheorghe, have undergone in the past various artificial modifications that altered the natural course of the river. The Chilia branch located to the north of the Danube Delta, has seen comparatively less intervention, because it is located on the border between Romania and Ukraine. These three branches serve as the entry point for adult sturgeons into the Danube River, migrating upstream each year towards their spawning grounds. In order to better understand the migration of adult sturgeons through these branches, telemetry equipment has been installed for monitoring their migration. Consequently, throughout the years 2022-2023, several sturgeon specimens tagged by the INCDDD team, along with others tagged earlier, were recorded migrating through these Danube branches.

13. NEW RECORDS OF CHAROPHYTES IN EASTERN SERBIA: DISTRIBUTION AND CONSERVATION PERSPECTIVES

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The work presented is a result of research on charophyte algae (Charales) in E Serbia during the spring of 2022. Charophytes were for the first time investigated more systematically in this region, as so far,

the data were scarce and sporadic. Almost 150 localities were examined, located at Veliki Krš, Mali Krš, Veliki Stol, Devica, Tresibaba, Svrljig mountains, Belava, Šljivovački vis as well as slopes of Vlaška Mountain. Charophyte representatives were found at 15 sites only. Five species belonging to genera *Chara*: *C. globularis, C. vulgaris, C. gymnophylla, C. contraria, C. squamosa*, and three belonging to genera *Nitella*: *N. mucronata, N. syncarp*a and *N. capillaris*, were found. In total, eight species of Charales were found which can be considered a significant number keeping in mind that most of the species are rare and strictly protected by national law in Serbia and are on Red Lists of almost all European countries. The majority of aquatic habitats with charophyte algae were small and shallow. The most represented were ponds, puddles, streams and springs, but charophytes were also found in thermal waters as well as peat bogs. This research highlights and confirms the importance of protecting small water bodies, as guardians of rare and endangered species.
Acknowledgment: This work was funded by the Ministry of Environmental Protection of the Republic of Serbia (Project JN 10/2021).

14. ESTIMATION OF GROWTH PARAMETERS AND EXPLOITATION STATUS OF *CARASSIUS GIBELIO* (GIEBEL CARP) STOCKS, IN THE FISHERY RESOURCE OF THE DANUBE DELTA IN 2023

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To estimate the state of fish stocks of *Carassius gibelio* (Giebel carp) in the Danube Delta Biosphere Reserve (DDBR) in 2023, a number of 4024 specimens were sampled - 1613.6 kg from the 4 lake-complexes. For data analyses we used the virtual population analysis method where the samples were taken from the commercial catches brought to the collection points related to the fishing grounds. The length (TL)–weight (TW) relationship was analyzed for individuals from which scales were harvested to determine ages for the main commercial species sampled from commercial fisheries in the DDBR. This relationship was analyzed for the entire sample in the ESP program (Estimation of Fish Stocks Program developed by Danube Delta National Institute according with specialized literature) for estimating further stock (relationship and frequency of lengths). In order to assess the state of main fish stocks, length and weight measurements were made on the dominant species in commercial catches. The length-frequency distribution of a population suggests some preliminary data regarding the relative exploitation level of the stock: when under limits exploitation individuals predominate the stock is heavily fished and vice versa, in the case of the abundant presence of the elderly, the stocks are underexploitation. In the areas of the complexes-lakes of Danube delta, the samples were taken from the commercial fishing with relon multifilament nets, with the side of the mesh of a=45-55 mm. From the point of view of the numerical strength of the *Carassius gibelio* population from the samples taken, the presence of individuals within the limits of lengths 20-42 cm, with average values in the range of 26.1-29.2 cm, can be found. The average weight per specimen is between 356 g in the Gorgova-Uzlina complex and 508 g in the Roșu-Puiu complex. Officially reported fish catches for the DDBR are presented in percentages, with the support of the Administration of the Danube Delta Biosphere Reserve (ARBDD).

15. THE THIRD NATIONAL REPORT DECODED: UPDATES, ADVANCED TRENDS AND FUTURE SCENARIOS IN AMPHIBIAN AND REPTILE CONSERVATION IN ROMANIA

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The monitoring data on Romanian amphibian and reptile species of community interest collected in 2019 - 2023 to prepare the third national report under the obligation stipulated under Article 17 of the Habitats Directive reveal significant updates and trends regarding their conservation status. We emphasize the novelties concerning the spatial distribution of the herpetofauna of community interest, data on the habitats of these species and their quality, and information on the impacts of human activities at the bioregion level, which underpin the changes compared to the other two national reports, from 2013 and 2019, respectively. We also present some future spatial distribution scenarios and expected trends.

16. LOCAL POPULATION'S PERCEPTION OF LIFE QUALITY IN DANUBE DELTA BIOSPHERE RESERVE: MAHMUDIA COMMUNE CASE STUDY

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Over recent decades, the deltaic ecosystem has undergone notable transformations in its structural composition, functionality, and overall status. Despite early initiatives aimed at its protection dating back to 1940, the area has been subjected to extensive landscape modifications and anthropogenic interventions, leading to ecological imbalances and adverse repercussions on both the delta's biodiversity and the well-being of the surrounding human populations.
Until now, research investigating the quality of life within the Danube Delta Biosphere Reserve (D.D.B.R.) and its compatibility with sustainable development has been lacking in depth, primarily focusing on quantitative assessments of demographic trends, economic activities, and environmental changes driven by human actions.
To address this research gap, Mahmudia commune has been identified as a pertinent case study to evaluate local perceptions concerning territorial development and its potential for revitalization. Utilizing structured questionnaires, the perceptions of commune residents have been explored across various dimensions including financial stability, living standards, household amenities, access to basic necessities and social integration. Through detailed analysis, this study aims to offer a nuanced understanding of the prevailing conditions and serves as a valuable resource for informing evidence-based policy-making. By identifying optimal socio-economic strategies and interventions, this research seeks to enhance the standard of living and overall quality of life for local inhabitants. Furthermore, the insights garnered from this study may serve as afoundational framework for crafting sustainable development agendas encompassing all human settlements within the D.D.B.R.
Keywords: quality of life, standard life indicators, socio-economic system, Danube Delta Biosphere Reserve

17. RESULTS OF WINTER COUNTS OF BIRDS IN AZERBAIJAN IN 2024

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Joint count of the wintering birds was held jointly by Ministry of Ecology and Natural Resources and Azerbaijan Ornithological Society in Azerbaijan from 15 to 29.01.24. For this purpose, the territory of the country is conditionally divided into 4 main regions: North, South, Centre and West.
Maximal number of birds were recorded in the North (44.7%) and the South (31.8%). Birds counted in the Centre were only 15.8% and in the West 7.7% from general number of counted birds.
A total of 654,559 individuals were registered. The absolute majority were ducks (56%), of which 14% were diving ducks, 39% were river and land ducks, and 5.6% were unknown (unspecified) ducks.
According to the number of species, coot (24%) is in the first place, gadwall and little bustard (14%) are in the 2nd-3rd places, and the mallard (7%) is in the 4th place. Waterfowl consist 83% of all recorded birds (543,922). Among the waterfowl, flmingo consist for 7%, waders 0.7%, cormorants 0.5% and grebes 0.25%. Among the terrestrial birds, little bustard is on the first place (14%), the starling was on the 2nd place (1,4%), the rest species consists less than one percent. The most numerous species belonging to the IUCN RL and Azerbaijan Red Data Book were little bustard (92001), the marbled teal (702) and the Dalmatian pelican (286). The species listed in ARDB consisted for 28% of all counted birds (180717). 23 of the 82 species included in ARQK were recorded in the winter census of 2024.

18. QUANTIFYING THE EFFECTS OF GLOBAL CHANGE ON WETLAND PLANTS FROM A TRAIT-BASED PERSPECTIVE

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Trait-based approaches have been widely applied to plant ecology to reveal the ecological strategies of plants in adaptation to their habitats. However, plants living in wetland conditions may face even more complex habitat conditions than other non-wetland terrestrial plants. The specific adverse environmental factors in wetlands, including anaerobic soil, low redox potential and toxic organic compounds formed in highly reduced environments may cause additional stress on wetland plants. In addition, the impacts of global change may further threaten the survival of wetland plants. To quantify the effects of global change on wetland plants and the ecological adaptive strategies of wetland plants to their habitats, a trait-based framework is proposed to reveal the response of wetland plants to environmental stressors and global changes, where trait-trait and trait-environment relationships are especially emphasized. However, relevant studies are rather limited due to data scarcity and difficulties in field sampling in wetlands. If we look into the TRY database as an example, we will see only a very small proportion of wetland plant trait data is covered yet. Therefore, worldwide networks and collaborations on wetland plants are addressed (e.g. MAP project) to enhance the functional biogeography of wetland plants at a broader scale.

19. VIRUSES UND MICROORGANISMS ON FLOATING PARTICLES

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Viruses and microorganisms are the most abundant life forms on Earth. In aquatic systems, they populate all habitats and interfere with all ecosystem functions either in the plankton or inside organisms. Particles (organic or inorganic) are heavily populated with them; they shape nutrient and biogeochemical cycles as well as biodiversity. Depending on the type of particles, they are virus factories or concentrators of bacterial production. For example, organic particles rather release viruses, whereas inorganic particles rather trap organic matter and foster the growth of bacteria. Overall, the impact of viruses and bacteria on particles for ecosystems depends on the chemical and 3D-composition of particles and on the ability to adsorb organic matter.

Section II: Environmental factors, Ecological restoration and Atrophic Impact

20. ECOSYSTEMS SERVICES OF WETLAND BIOMES

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Wetland ecosystems play a crucial role in supporting biodiversity and providing many ecosystem services essential for human well-being. This abstract delves into the multifaceted ecosystem services offered by wetland biomes (e.g. fens, bogs, mires, but also floodplains along all our rivers) highlighting their ecological significance and socio-economic contributions. Wetlands act as natural water filters, improving water quality by trapping pollutants and nutrients, thereby safeguarding downstream ecosystems. Furthermore, these dynamic landscapes serve as essential habitats for a diverse array of flora and fauna, contributing to the overall global biodiversity. The ability of wetlands, especially floodplains, to regulate water flow and mitigate the impacts of floods and droughts underscores their importance in maintaining hydrological balance. Additionally, wetlands serve as carbon sinks, helping to mitigate climate change by sequestering substantial amounts of carbon dioxide. Beyond their ecological functions, wetlands provide valuable resources for human societies, including fisheries, agriculture, and recreation. However, despite their ecological and socio-economic significance, wetlands face numerous threats such as habitat loss, pollution, and climate change, necessitating effective conservation and sustainable management strategies. This abstract emphasizes the critical importance

of recognizing and preserving the ecosystem services provided by wetland biomes to ensure the long-term health of both natural and human communities.

21. SINGLE AND COMBINED TOXICOLOGICAL EFFECTS OF MEROPENEM AND KETOPROFEN TREATMENTS ON ZEBRAFISH BEHAVIOR

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Medications are necessary for human health, but once used, they can enter the environment through wastewater and incorrect disposal. This is problematic since wastewater treatment plants cannot remove all drugs. Contaminated wastewater may then enter rivers, lakes, and even drinking water. This raises concerns about water quality, the health of aquatic species, and the entire ecosystem. This study looked at the effects of drugs on the zebrafish (*Danio rerio*), focusing on ketoprofen (a pain reliever) and meropenem (an antibiotic). The results revealed that fish treated with ketoprofen and meropenem explored their new surroundings more, while they also spent more time in the lower section of the tank, which is normally associated with anxiety in fish. The treated zebrafish showed significant indicators of anxiety, such as freezing for longer amounts of time, spending more time near the tank's walls, and swimming counterclockwise, particularly when exposed to a mixture of the two drugs. On the sociability test, the treated groups explored more but exhibited less social activity, especially in the mixtures. Importantly, the study showed that the combination of ketoprofen and meropenem had a greater impact on social interaction than either medication alone. This demonstrates the potential for even larger impacts when these medications co-occur in the environment. Based on these data, the drugs in water may affect fish behavior and thus their survival. The observed anxiety-related behaviors and changes in swimming patterns may be harmful to fish, rendering them more exposed to predators or limiting their capacity to find food and mates.

22. SULINA BRANCH – SUSPENDED SEDIMENT TRANSPORT AND MONITORING IMPROVEMENT

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The aim of the study, accomplished in the framework of Dalia project (Danube Region Water Lighthouse Actions) is to improve the monitoring of sediment supply in the Black Sea through the Sulina branch, as well as the knowledge of the sediment transport by the Danube River in the Danube Delta. Sulina branch is an extremely dynamic one from morphological, hydrological and sedimentological point of view, due to its rectification, dammed banks, and especially due to the presence of groins that significantly influence the morphological evolution of the bed and the sediments transport from upstream to downstream. For this purpose, the long-term evolution of liquid and solid transport along the Sulina branch was analysed. This branch is hydrologically surveyed by four main hydrometric stations (h.s.) located at Ceatal Sfântu Gheorghe (Marine mile Mm 33.6), Crișan (Marine mile Mm 11.5), Sulina Port (Marine mile Mm 2.5) and Sulina Semnal Ceață (Hectometer Hm72+18m). The study highlighted the decreasing process of suspended sediment transport to the Black Sea, as well as the predominance of sediment deposition processes in recent years, due to decrease of the liquid flows. Also, the analysis of suspended sediment transport revealed that the highest sediment deposits were recorded in the first 41 km and the lowest sediment deposits in the last 11 km. It was found that the solid input is consistently deposited annually on the Sulina branch, along its entire length. The sediment deposition phenomenon at the mouth of the Sulina branch (called Sulina bar) can cause serious navigation issues in the area. As part of the DALIA project, an automated station was installed at the Sulina Semnal Ceata, allowing continuous monitoring of suspended sediment concentrations and a better estimation of the sediment input to the Black Sea. This station is equipped with five sensors: radar-type sensor for water level, sensors for air temperature, water temperature, turbidity and salinity.
Keywords: Sulina branch, suspended sediment transport, liquid flow, sediment monitoring, hydrological analysis

23. THE INFLUENCE OF THE HYDROLOGICAL REGIME ON THE ABUNDANCE AND DISTRIBUTION OF MICROPLASTICS TRANSPORTED BY THE DANUBE RIVER

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Over the last decade, the number of studies that signal the presence of microplastics in aquatic environment is growing and those that refer to the accumulation of plastics report increasing quantities. In this context, this study complet the information deficit and has as main objective the identification of microplastics and the quantification of quantities transported along the Danube River up to its mouths into the Black Sea. The amount of microplastics transported by the Danube was calculated and by difference, the amount retained in the aquatic ecosystems of the Danube Delta was established. The researches, carried out in 2 campaigns, aimed to captue the flood periods. In the first campaign, measurements were made in representative sampling points at minimum Danube rate and the second one was made 2 weeks later at a rate of 110 cm higher, using a net with a mesh size of 300 µm. The identification and classification of microplastics was carried out using a Zeiss Discovery Stereomicroscope and the quantification of the quantities was carried out based on the densities and measurements carried out on the identified particles.
The results obtained highlighted significant variations in the amounts of microplastics detected, which presented major differences both in terms of sampling location and the Danube rate at the time of sampling. Although the information provided by the present study is quite brief, the obtained results are intended to be a starting point in addressing the issue of microplastics in the aquatic ecosystems of the Danube Delta Biosphere Reserve.

24. INVESTIGATING HABITAT SOUNDSCAPES IN PROTECTED AREAS

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Noise is always an important environmental factor across industries and research fields, with a significant impact within the biodiversity arena and natural habitats. Sounds which arise from mixed environments have given birth to research fields such as ecoacoustics and new research directions as biophonics (cumulative non-human sound produced by living organisms), antropophonics (human related sound), or technophonics (technologically generated sound, e.g. traffic noise), and geophonics (natural sound, e.g. wind/ water). This paper aims to showcase the existing knowledge (Bucharest "Delta Vacaresti" urban natural park case study) and capabilities of INCD-T COMOTI in managing noise in natural habitats, having a multidisciplinary approach in investigating the role of sound towards the harmonious and sustainable co-existence of humans and nature, while aiming to support the achievement of climate resilience, environmental protection and restauration goals in different other natural protected areas.

25. DESIGNING AND FINE-TUNING RESTORATION MEASURES FOR PEATLAND ECOSYSTEMS (VLASINA PLATEAU, MIDDLE DANUBE BASIN)

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Lake Vlasina is the highest and largest reservoir in southeastern Serbia. It was created in the 1950s when the outflow of the peat bog Vlasinsko blato was dammed, submerging the peat bog. Prior to its inundation, Vlasinsko blato peat bog was the largest in Serbia, with unique features in the Balkans. Some marginal areas of the bog still persist and were selected for restoration activities within the EU Restore4Life project (restore4life.eu). The restoration thus aims to preserve and restore Peri-Danubian black-white-star sedge fens, listed in the Bern Convention as D2.226, a habitat type typical for south-east European mountains. These fens, which were subjected to intensive peat extraction during the last century, are threatened by droughts and overgrowth of trees. Restoration activities selected based on peat vegetation conservation goals were optimized according to stakeholder restoration objectives and calculated using digital LiDAR data (digital terrain model and digital surface model), Sentinel-2 Normalized Difference Moisture Index (NDMI), and the field plot data. Key restoration activities encompass the removal of uncommon tree species and stabilizing natural water levels to foster peat accumulation and enhance ecosystem resilience to climate drought impacts. Tree removal would optimally be realized by promoting and re-establishing pasture farming, which would generate multiple benefits for biodiversity conservation and local socio-economic development, and secure sustained preservation of the fens without regular manual tree removal. The developed restoration framework represents the basis for further adaptive restoration management and effective long-term monitoring of restoration outcomes and success.

26. A HYDRODYNAMIC MODEL OF THE DANUBE DELTA FOR EVALUATING RIVER-LAGOON-SEA CONNECTIVITY AND RECONNECTION SOLUTIONS

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Understanding the water transport and circulation in coastal seas and transitional environments is among the key topics of oceanographic and climate research. The Danube Delta represents a natural laboratory for hydrodynamic modelling due to its complex morphology and being subjected to several natural and anthropogenic stressors. Moreover, the concurrence of intense atmospheric forcing, direct morphological interventions within the delta territory and freshwater inflows led the Danube Delta to be characterized by a wide range of different transport phenomena. In this work, we present the results of the SHYFEM finite element hydrodynamic model application to the whole river-sea system of the Danube Delta. The model was applied to a domain that comprises the river network of the Delta from Isaccea (100 km upstream, in the vicinity of the Delta Apex at Ceatal Izmail) to the sea (Chilia, Sulina and Sf. Gheorghe branches), the Razelm Sinoe Lagoon System and the nearby prodelta and shelf area (290x100 km). The model was run for several years with the aim of characterizing: 1) the water discharge distribution among the river branches, 2) the plume dynamics in the coastal area, 3) the climatology and transport time scale of the Razelm Sinoe Lagoon System, 4) the river-lagoon-sea connectivity. The unique numerical description of the transport and mixing in the different water bodies of the Delta (river branches, channels, lagoons and coastal sea) provides the scientific basis to assess the impact of human activities and to design efficient management choices. Indeed, we used the modelling framework to evaluate the effect of several reconnection (restoration) measures in the Razelm - Sinoe Lagoon System designed to improve hydrological connectivity and water renewal.

27. ASSESSMENT OF HEAVY METALS CONTAMINATION IN DANUBE RIVER SEDIMENTS

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The Danube River is the second largest river in Europe, stretching over 2860 km and crossing or bordering the territories of ten Central and Eastern European countries (Germany, Austria, Slovakia, Hungary, Croatia, Serbia, Romania, Bulgaria, Republic of Moldova and Ukraine) before reaching the Black Sea. Our aim is to assess heavy metal pollution in the lower Danube River. Heavy metals are

present in the earth's environment. They are generated from anthropogenic and/or natural activities. Heavy metal pollution of soils and the environment is the result of industrialization, urbanization, and intensified irrigation for agriculture. Six heavy metals (Cd, Ni, Zn, Pb, Cu, Hg) were analyzed in two different seasons, in the spring and the autumn of 2023, using the X-Ray fluorescence spectrometry EDXRF Spectro Xepos spectrometer (Germany). Our assessment of heavy metal pollution focused on two main aspects: i. a determination of the potential risks of heavy metals in sediments by calculating the Potential Ecological Risk Index (RI), and ii. an evaluation of the influence of anthropogenic activities on the level of heavy metal contamination in the Danube River sediments, using three specific pollution indices, namely, the Geo–Accumulation Index (Igeo), the Contamination Factor (CF), and the Pollution Load Index (PLI). The Ni and Cu pollution indices showed a low pollution level, while As and Hg presented the lowest indices, not indicating a significant pollution in sediments.

28. THE PARTICLE SIZE OF THE BOTTOM SEDIMENTS IN SOME CANALS OF THE FLUVIAL-MARINE DANUBE DELTA

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In deltaic environments like the Danube Delta, sedimentary particles can range from clay and silt to sand and gravel. The proximity to the Black Sea introduces marine processes into the deltaic system that can be translated as a mixture of fine-grained sediments derived from the fluvial delta along with marine sediments from the Black Sea. This region is of particular importance for the ecology and hydrology of the Danube Delta due to the presence of sandy deposits that cause a major change in both natural and anthropogenic habitats. The emergence of artificial canals dug in sandy deposits had a huge impact on the deltaic ecosystems, as a better way of transportation but also a potential threat to the hydrological balance. Therefore the periodical dredging works became mandatory in maintaining waterway accessibility and supporting transportation. This work is intended to be a useful study for subsequent dredging works on the Danube Delta canals excavated on sandy material. The study involved the sampling of sediment from canals to assess its quality, determine dredging requirements, and manage dredged material effectively. An extensive sediment sampling program was established to collect samples from the bottom of several canals from the fluvial-marine Danube Delta (Cordon Litoral, Letea and Sidor Canals) at high and low water levels. At the Danube Delta National Institute laboratory, the sediment samples were subjected to particle size determinations. The main purpose of the particle size analysis was to quantify the fine fractions from the coarse ones. The results show that even though the material is expected to be predominantly sandy, significant percentages of finer material can be present as well. Following this study, three factors were identified to influence the particle size distribution, namely the variation of the water table during the year, anthropic activities and the additional supply of fine particles from the fluvial deposits. These considerations must be taken seriously into account especially in future dredging works, as these processes can significantly influence the depositional processes as dredging can resuspend fine sediments into the water column, increasing turbidity and altering its initial state.

29. DALIA - DPS 9 ACTIONS REGARDING FLOATING WASTE POLLUTION OF RIVERS

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Within this presentation, being a Designated Pilot Site engaged in the Horizon Europe financed project called Danube Region Water Lighthouse Action - DALIA, our institution is presenting our plan of implementing actions to diminish floating waste pollution on three main rivers in the Crisuri Catchment area: Barcău, Crișul Repede and Crișul Negru. We intend to disseminate the situation, our current phase of implementation and the next following steps until project fulfilment.

30. PROTECTING AND RESTORING OUR OCEAN & WATERS: CROSS-BASIN COLLABORATION BETWEEN THE ATLANTIC, ARCTIC AND DANUBE DELTA

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The health and wealth of our oceans and waters are fundamental to the well-being of our planet and its inhabitants. This presentation highlights the imperative need for collaborative efforts across basins, specifically focusing on the Atlantic, Arctic, and Danube Delta regions. Recognizing the interconnectedness of ecosystems, we emphasize the importance of working along the continuum of ocean, coasts, estuaries, rivers, lakes, and land forests. Through interdisciplinary collaboration and shared stewardship, we aim to address the complex challenges facing these diverse ecosystems. This includes tackling issues such as pollution, habitat degradation, climate change impacts, and biodiversity loss. By fostering cross-basin collaboration, we can leverage collective expertise, resources, and innovative solutions to protect and restore our precious marine and freshwater environments. The presentation will draw on lessons learned and best practices from each region, seeking to develop holistic approaches that promote sustainable management practices and resilient ecosystems. The presentation will showcase successful case studies, highlight ongoing initiatives, and propose strategies for enhancing collaboration and knowledge exchange across geographical boundaries.

31. CONNECTIONS: VERTICAL AND LATERAL CONNECTIVITY ALONG RIVERS

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Rivers connect - fish and other organisms migrate along rivers, sediment flows downstream, flood waters connect the river with its floodplains, humans use rivers for transportation, hyporheic flow connects river water and ground water, and there are subsurface connections with saline water as rivers approach the oceans and seas as well. These connections are critical for ecosystem health and human survival. Human construction activities and management of waterways has resulted in a loss of these connections on rivers throughout the world. Dams block fish, water and sediment; levees block floodwaters; concrete or sheetpile walls block movement of animals onto river banks. Plant and animal species have suffered population and habitat loss, ecosystems have been disrupted, and humans have often lost their connection to these critical waterways. In this talk, I will discuss the importance of connectivity along rivers and riparian corridors and what we can do to restore or repair these connections and our connection to these critical ecosystems.

32. PARASITOLOGICAL AND FLORISTIC ANALYSIS IN SOME GRASSLANDS AND PASTURES FROM THE DANUBE DELTA, ROMANIA

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The Danube Delta in Romania is an ecologically rich area that presents a unique environment for both floristic diversity and parasitic challenges affecting grazing animals. The aim of the study is the parasitological and floristic analysis of 12 grasslands areas in the Danube Delta and adjacent regions. The study was carried out between May and November 2023. For the parasitological analysis, the study focused on four groups of animals - goats, cattle, sheep and horses, analyzing the impact and parasite distribution. In this case, blood samples were collected for the diagnosis of babesiosis in the laboratory. To collect ticks from the natural environment and from animals, two methods were applied: the flag method and the method of collecting from the animal. For coproparasitological analysis (ovoscopy), faecal samples were taken directly from pastures or grazing areas. For the analysis of the vegetation, phytocenological surveys were carried out, with a sample area of 100 m^2. Vegetation classification was done using hierarchical agglomerative grouping (flexible β algorithm, Bray-Curtis dissimilarity). The

interaction between floristic composition and environmental factors was evaluated using Detrended correspondence analysis (DCA) and Canonical Correspondence Analysis (CCA), in CANOCO software. The importance of this study lies in its comprehensive approach to understanding the ecological dynamics of grasslands within the Danube Delta, emphasizing the interplay between floristic diversity and parasitic infections in livestock. Parasitological analysis revealed a widespread presence of strongylide infections among grazing animals, with different degrees of infestation in different species and grasslands. Floristic analysis identified a rich diversity of plant species, including several with potential anthelmintic properties. This study can be used as a tool in the development of measures and legislative content for biodiversity conservation and habitat protection, sustainable livestock grazing practices, parasite control and animal health.

33. ASSESSING THE IMPACT OF CLIMATE CHANGE ON BLACK SEA WATERS NUTRIENT DYNAMICS AND EUTROPHICATION

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Climate change can bring about several significant changes to the nutrient content of seawater, with major consequences for the marine ecosystem. Potential changes in nutrient content may be brought about by temperature increases that promote the decomposition of organic matter in waters and an increase in nutrient concentration. This can lead to a decrease in the amount of dissolved oxygen, negatively affecting marine organisms that depend on it. The salinity of surface waters is directly influenced by the freshwater intake of rivers and the rainfall regime which also increases the amount of freshwater input. Both salinity, nutrients and dissolved oxygen content can be altered with upwelling, whereby denser, colder, nutrient-rich, and oxygen-deficient waters from deeper layers reach the surface. This paper aims to evaluate the data obtained during 2012-2022, for seawater samples taken daily from the surface, of the coastal waters of the Black Sea (Mamaia Casino station) to measure physical parameters - temperature and salinity and analyze chemical ones - dissolved oxygen and nutrient concentrations (N, P, Si). The paper aims to highlight the evolution of these concentrations and the potential for intensification of eutrophication concerning climate change.
Keywords: nutrients, climate change, Black Sea, eutrophication

34. SEASONAL TREND OF PHYSICAL-CHEMICAL PARAMETERS IN DANUBE DELTA BIOSPHERE RESERVE LAKES IN 2023

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This paper presents the seasonal evolution of physical-chemical parameters (pH, electrical conductivity, dissolved oxygen, total nitrogen, total phosphorus, cadmium, zinc, copper, lead, nickel and chromium) from the surface water of most important lakes in Danube Delta Biosphere Reserve, namely Erenciuc, Parches, Fortuna, Merhei, Rosu, Uzlina, Razim and Gorgostel in spring, summer and autumn seasons in 2023. Regular assessment of water quality in the aquatic ecosystems of the Danube Delta support the biodiversity, the general health of the biosphere reserve population and are particularly important due to their role in defining the quality of the biotic and abiotic environment, establishing the ecological state of the surface waters according to European Water Framework Directive.
Depending on the surface area of each targeted lakes, a representative number of sampling points were established (between 5 and 19 points). The samples were analysed according to European Standards, both in situ using high-precision multiparameter YSI EXO2 and in the laboratory by molecular spectrometric methods and inductively coupled plasma mass spectrometry.
The results of the study show that the measured pH values frame the surface water quality of the lakes into the first quality class, with the exception of Razim Lake in the summer season and Parches Lake in the fall season, which values indicate a slightly alkaline environment due to the presence of carbonates and bicarbonates. Water electroconductivity had values from 156.6 µs/cm and 344.26 µs/cm, registering specific fluctuations corresponding to each season. Dissolved oxygen shows low values during the

summer and autumn seasons when the water temperature is high and the amounts of oxidable substances increases and a good water oxygenation during spring, when water temperature is low and the microbiota activity is reduced. If we refer to the nutrients, total phosphorus concentrations frame the surface water of the studied lakes into the first quality class, a very good ecological status and the total nitrogen values frame the lakes surface waters into the second quality class, good ecological status in all seasons and in all studied lakes. The minimum levels of heavy metal concentrations (Cr, Cu, Ni, Pb) were recorded in Merhei Lake, a lake with reduced connectivity to the Danube River and maximum values were recorded in the summer season in Fortuna Lake, directly supplied from Danube waters.

35. THE COMPLEX INTERLINK OF SAFEGUARDING WATER AVAILABILITY AND QUALITY TO MITIGATE AND ADAPT TO HYDROCLIMATIC EXTREMES IN EUROPE

INTERLAYER Consortium

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The main objective of INTERLAYER is to develop adaptation strategies that address the complex relationship between surface and groundwater management. These strategies involve employing water retention measures to reduce water runoff and replenish groundwater stores, thereby mitigating the impacts of hydroclimatic extreme events on water quantity and quality. This project aims to address knowledge gaps regarding the interrelation of surface water and groundwater during extreme precipitation, water scarcity, drought events, and seasonal variability across four European watersheds. It also seeks to demonstrate improved adaptation and mitigation strategies through the refinement of water retention measures at regional and watershed scales to protect against flooding and ensure water availability and quality. Additionally, INTERLAYER aims to enhance the adaptation capacity of water infrastructure, particularly related to stormwater management in rural systems. It will develop a decision support tool for adopting best practices that enhance water quantity and quality retention at both surface and groundwater levels. The project will create a hydrological model for groundwater-surface water interaction, including scarcely monitored areas, to improve real-time monitoring and modeling. It will also establish a digital twin of shallow and deep groundwater storage for monitoring recharge capacity and overall water balance. INTERLAYER will transfer governance practices and establish a living lab in a dry transboundary watershed, integrating stakeholders in co-creation and co-design processes. Overall, INTERLAYER aims to integrate interdisciplinary knowledge to develop resilience against hydroclimatic extreme events and enhance water availability and quality using novel water retention technologies.

36. EXPERIMENTAL RESEARCHES FROM THE NAVODARI AREA REGARDING THE PRESENCE OF HYDROCARBONS IN THE SOIL OF THE ROMANIAN BLACK SEA COASTLINE

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Hydrocarbon spills from diverse sources pose a significant threat to marine ecosystems, with adverse effects on water quality and biodiversity. This study focuses on assessing soil pollution along the Romanian Black Sea coast between 2021 and 2023, primarily targeting hydrocarbon contamination. Samples of dredged material were collected and analyzed in accredited laboratories to determine chemical indicators, including heavy metals, pesticides, and various hydrocarbon compounds. Reference values established by environmental regulations were used to compare and establish alert thresholds. The analysis particularly emphasizes polycyclic aromatic hydrocarbons (PAHs), persistent organic pollutants known for their harmful effects on ecosystems and human health. The calculation of standard deviation for PAH concentrations provides insights into the dispersion and variability of data, crucial for understanding the extent of pollution. The findings underscore the urgent need for effective mitigation strategies to safeguard the marine environment and mitigate the detrimental impacts of hydrocarbon contamination on aquatic life and ecosystem balance.

37. SHIFTING RESTORATION FOCUS: FROM MINIMUM TO OPTIMUM LIGHT REQUIREMENTS RE-ESTABLISHING SUBMERGED MACROPHYTES

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Our 28-year lake restoration study highlights the critical importance of managing light conditions to promote macrophyte re-establishment. Our results suggest that achieving a Secchi disk transparency of at least 3.5 meters is essential for supporting substantial growth of macrophytes over phytoplankton, of charophytes over Myriophyllum spicatum in oxbow lake Alte Donau (Vienna). We propose, however, a shift in focus from minimum light requirements (1% surface ambient light, euphotic depth) to optimum light conditions, specifically targeting 12% of surface ambient light across more than half of the lake's sediment surface area. This threshold appeared crucial for initiating massive macrophyte growth over phytoplankton dominance, pivotal for sustained lake recovery. With the onset of this large macrophyte biomass yield, the phosphorus storage pool of submerged macrophytes exceeded the annual peak concentration of total phosphorus of pelagic water body by about one order of magnitude for the first time. Macrophytes thus acted as significant sink for phosphorus, trapping this nutrient at least during growing season. Further, the submerged macrophyte bio-surface exceeded the size of lake bottom surface, also by about one order of magnitude, providing a vast spatial dimension as additional habitat increasing biodiversity. Mature submerged macrophyte formations thus go beyond producing large biomass yield, but create a unique macrophyte habitat architecture as a third main component in the network between benthic (lake bottom) and pelagic (lake water) habitat at clear water state. Water clarity serves as a socio-ecological indicator accessible to the public, facilitating assessments of lake restoration progress and overall ecosystem health.

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

38. DECARBONISING DANUBE DELTA: BUILDING UPON EXISTING INITIATIVES AND THE ROLE OF 3D NETWORK

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The process of decarbonising places and regions is engaging with several activities which are both demanding and complex, particularly because they require solutions on green energy and commitment(s) to scaling up and implementing innovations on climate mitigation.
The EU-Grean Deal initiative is clarifying several aspects of this process, shaping activities and strategies associated to action plans, while also addressing milestones to check the implementation.
Mission Cities is also supporting the decarbonisation process(es) through the selection of *100 Climate-Neutral and Smart Cities* which need to priorities their sectors and select proper tools and instruments on their pathway towards decarbonisation.
However, the decarbonisation of regions remains a challenge, as the process is complex, and several actors are engaged with conflicting interests. Such example is decarbonising Danube Delta, where biodiversity status will impose respective limits in implementing certain technological solutions.
This paper will present an overview of the decarbonisation processes, underlying success stories in decarbonising places, but also identifying gaps and barriers, while providing solutions. An illustration of 3D(Decarbonising Danube Delta) network+ will be presented, its road toward current success illustrated, and current achievements recorded. The paper will also present the 3D strategic pillars and their interconnection & specific role in decarbonising deltas and wetlands.
The paper concludes with an invitation to engagement and cooperation on several topics related to decarbonising mobility, sustainable agriculture, renewable energy, biodiversity, climate change, circular economy, tourism and digitalisation.

39. ADVANCEMENT OF GREEN MATERIALS AND CIRCULAR ECONOMY

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There is no universal definition of sustainable materials. These materials increase process efficiency, reduce pollution, and have a low impact on health and the environment. Because of environmental concerns, there is a growing demand for sustainable materials. These environmental impacts, however, can be mitigated with the help of advanced alternative materials. Furthermore, using advanced nanomaterials in lubricants/coolants will improve performance. Fabricating composites from end-of-life products/industrial waste is also a better way to reduce pollution. Most importantly, using green synthesis procedures for advanced material development rather than conventional synthesis that uses toxic chemicals is a promising solution for sustainability. As a result, developing lightweight materials, utilising green procedures, utilising waste materials, and effectively applying advanced materials in appropriate applications will promote sustainability.

40. CO-DEVELOPMENT OF EXPERIMENTATIONS ROOTED IN AGROECOLOGICAL PRINCIPLES IN BIO DANUBIUS HUB

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Innovation Hubs differ in their degree of pursuit knowledge on agroecology. Innovation hubs or clusters in farming area pursue localized knowledge and rely on monitoring results in order to refine their agroecological interventions. But they may use advocacy, scaling-up purposes for market benefits in a wide range of business models. These differences emphasized the need to develop a flexible framework suited to the different objectives across the agroecological hubs. This paper deals with initial reflections to better understand the extent to which the 13 agroecological principles are being mobilized in agroecological farming systems in IH Bio Danubius, located in the Danube Delta . This may bring contributions to local best practices in the process of co-development of experimentations based on specific or general indicators , enabling a transversal analysis on the impact of agroecology in farm systems along the Danube.

41. DECARBONIZATION OF NILE DELTA IN EGYPT: CHALLENGES AND OPPORTUNITIES

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The Nile Delta in Egypt is situated in the middle of the Egyptian Mediterranean, and it covers approximately 2% of Egypt's area but hosts about 41% of the population of Egypt. It represents one of the world's most fertile areas that supports about 63% of the country's agricultural land. It is home to several cities that are centers of delta's economic growth, anthropogenic activities, and cultural heritage. Northern Delta lakes that are directly connected to the Mediterranean Sea except lake Maryut, are economically important for fish production that represents about 12.54% of the total fish production in Egypt. Ecologically, it is one of the most important migratory passageways for millions of birds between Europe and Africa. Nile Delta faces various challenges that may include increasing salinity levels, rising sea levels, poorer soils of the floodplains, impacts of climate change. pollution, poor water and land management, population growth, and urbanization. Given the economic and cultural importance of the Nile Delta to Egypt's economy Needed efforts are crucial to assess the current challenges and to suggest sustainable solutions and required strategies for water management, coastal protection, decarbonization and environmental conservation to maintain sustainable development in the region. The current proposal is targeting several strategic pillars that may include decarbonization of Nile Delta, restoration of Nile Delta wetland, limiting pollution and its ecotoxicological impacts, circular Economy and valorization of wastes, jobs and social support.

42. ANALYSIS OF RAINFALL DISTRIBUTION PATTERNS ON THE CENTRAL PART OF THE TISZA RIVER FLOODPLAIN

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One of the most significant impacts of climate change both on Hungarian agriculture and nature conservation is an adverse change in rainfall patterns and an increased frequency of droughts. Our study analyzed the daily rainfall data at the automatic hydro-meteorological measuring station of the Lower Tisza Water Directorate (ATIVIZIG) in Szentes from 1981 to 2000 and 2001 to 2020. Our study focused on changes in precipitation patterns and water availability in the Tisza floodplain due to climate change. The vegetation of the recent floodplains along the Tisza in the Szentes district and the wider region is directly dependent on the river, its water quantity and quality, while on protected floodplains the area is dominated by agriculture and old oxbow lakes. Determined by the frequency and duration of flooding, floodplain vegetation along the Tisza differs at different elevations. The river valley also functions as a classic ecological corridor - providing habitat for a number of protected animal and plant species, among others. The extreme mesoclimate is threatening the habitat of these species, as well as agricultural production and the water supply of oxbows along the protected floodplain of the river. We found that in the second period under study, the dispersion of both annual and monthly rainfall totals increased strongly but in an insignificant way. The number of days with high rainfall increased by 19.3% and the number of days with extreme rainfall increased by 40.9%. Even larger increases were observed for the highest five-day rainfall totals (62.1%).
Keywords: rainfall distribution, rainfall patterns, Tisza river, floodplain, climate change

43. ANALYSIS OF FLOODPLAIN AGGRADATION PATTERNS ALONG THE DANUBE, TISZA AND HERNÁD RIVERS IN HUNGARY

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In our study we present a research on the sediment aggradation of floodplains along three rivers in Hungary, the Danube River, the Tisza River (which is the second largest primary tributary to the Danube) and the Hernád River (which is a tributary to the Tisza).
We investigated the problem with numerical (computer) modeling and fieldwork (sampling) and laboratory analyses for two particular goals. (1) to contribute to the quantifying of sediment aggradation as the aggradation hinders the flood conveyance capacities of floodplains thus it contributes to the increase of flood levels and increases flood risk downstream; (2) to quantify the organic matter and nutrient content of deposited sediments, because the organic matter and nutrient retention capacity of floodplains is very much related to the quality of aggrading sediments which, as they settle in the floodplain, reduce the concentrations transported along the rivers and thus improve the water quality reaching the downstream areas as well as the Black Sea.
In our presentation we show the preliminary results of the research and we conclude in terms of the research goals. Our research was carried out in frame of the Hungarian National Laboratory for Water Science and Water Security project (RRF 2.3.1 21 2022 00008).

Sectiunea IV: Geographical Information System and Application System Modeling

44. IMPACT OF CLIMATE CHANGE ON THE MAXIMUM DISCHARGE ON THE DANUBE AT ISACCEA

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Currently, the Danube River's flow regime is experiencing changes due to a series of more frequent extreme events. These modifications are challenging the known exceedance values crucial for flood protection measures and insurance levels. In this study, we examine the evolution of extreme flows at the Ceatal-Ismail gauging station for the return periods of 10, 100,100 and 1000 years. Our analysis is based on daily discharge results from E-HYPEcatch models, which use Copernicus EuroCordex climate change data as boundary conditions. The covered period is 1971–2100, employing eight hydrological model configurations for ensemble forecasting. We selected four climate change boundary conditions, resulting in 32 hydrological time series for the RCP8.5 scenario. The results were analyzed for two periods: mid-future (2030–2060) and high-end projections (2070–2100). Maximum discharge was assessed using the General Extreme Value model, calculating return periods for historical and projection periods, as well as the comparison with the observations. The 10, 100, and 1000-year return period discharges were compared, revealing a 20% increase for the 10-year return period in the mid-future and 35% in the high-end projection. The 100-year return period shows a rise from 46% to 41%, while the 1000-year return period suggests a 31% increase in the mid-term and 43% in high-end projections. These increases pose challenges to current flood protection measures, necessitating dedicated analysis for the lower Danube floodplain and its delta.

45. MAPPING RIPARIAN CONDITION INDEX IN THE COTMEANA WATERSHED BASED ON GIS AND REMOTE SENSING TECHNIQUES

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The riparian zones are important related-river areas, having the role of stabilizing the banks, protecting the ecosystems against floods, providing habitats for different species and maintaining good water quality. The damage to the riparian areas and their poor management will lead to the impairment of related functions. That is why it is necessary to know these areas and their condition and vulnerability, in order to act, when necessary, with appropriate protection and conservation measures. The purpose of this study is to develop a Riparian Condition Index (RCI) using GIS and remote sensing techniques, and to map this index in order to get information on the riparian quality and vulnerability in different sectors of the basin.

The study is focused on the Cotmeana watershed (495km^2), located in the central-southern part of Romania. The methodology includes: i) extracting the main parameters that influence the state of the riparian zone from different spatial data sources (e.g.maps, remote sensing products); ii) ranking them according to their importance iii) establishing the impact of each class of parameters iv) mapping of the Riparian Condition Index. The calculation of the RCI is based on the integration of several parameters, such as: slope, lithology, soil texture (extracted from cartographic databases), and land use and NDVI values (extracted from satellite images). In addition to these parameters, the distances to the localities and the main roads, which have a significant impact on the landscape, were also used. After establishing the hierarchy of these parameters through the AHP method, 5 classes of values were considered, from a very low to a very high condition. Finally, the obtained data were transformed into a raster and summed, resulting in the riparian condition index map. In order to extract the riparian areas, a buffer of 100 m from the hydrographic network was considered, thus being able to observe the differences from one sector of the river to another.

In conclusion, GIS and remote sensing techniques can be useful tools to establish on a larger scale the condition of riparian zones, allowing to identify the areas where it is necessary to intervene in order to improve the quality.

46. CREATION OF A SPATIAL DATABASE USING CORINE LAND COVER VECTOR MAPS, REGARDING THE EVOLUTION OF FORTIFICATIONS IN THE LOWER SECTOR OF THE DANUBE

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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 fortifications.
This study focuses on the evolution of the Lower Sector of the Danube and the fortifications, reflected on CORINE Land Cover vector thematic maps. A spatial database was used for data processing. This spatial database is portable and developed using GRASS GIS (GRASS - https://grass.osgeo.org/), a complex remote sensing data management system. This system is provided both independently and included in an application for analysis, management and processing of remote sensing data Quantum GIS (QGIS - https://www.qgis.org/en/site/).
Organizing data in a GRASS database is easy and offers a solution to systematize data, both vector and raster images.
To study the evolution of human settlements, the distribution of fortifications and fortified settlements, were chosen. The distribution being analyzed at the commune and archaeological site level. The study of the evolution of human settlements used as a base map the CORINE Land Cover, edited in 2018, cropped and redesigned in Stereo 70 (EPSG: 31700). To these was added information from the National Archaeological Register database and Google Earth to analyze the data.
This study results in the anticipation of the discovery of new archaeological sites in Tulcea county and the evolution of the Danube course based on remote sensing data in the lower sector of the Danube included in a GRASS GIS spatial database.

47. SMARTSENSE – DEMONSTRATOR OF AN INNOVATIVE APPLICATION FOR SUSTAINABLE RESEARCH AND PROMOTION OF TOURIST AREAS USING ADVANCED 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 developed by ALTFACTOR SRL in partnership with BEIA CONSULT INTERNATIONAL SRL

48. CRITICAL ROLE OF WATER CONDITIONS IN THE RESPONSES OF AUTUMN PHENOLOGY OF MARSH WETLANDS TO CLIMATE CHANGE ON THE TIBETAN PLATEAU

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The Tibetan Plateau, housing 20% of China's wetlands, plays a vital role in the regional carbon cycle. Examining the phenological dynamics of wetland vegetation in response to climate change is crucial for understanding its impact on the ecosystem. Despite this importance, the specific effects of climate change on wetland vegetation phenology in this region remain uncertain. We investigated the influence of climate change on the end of the growing season (EOS) of marsh wetland vegetation across the Tibetan Plateau, utilizing satellite-derived NDVI data and observational climate data. We observed that the regionally averaged EOS of marsh vegetation across the Tibetan Plateau was significantly delayed by 4.10 days/decade from 2001 to 2020. Warming preseason temperatures were found to be the primary driver behind the delay in the EOS of marsh vegetation, whereas preseason cumulative precipitation showed no significant impact. Interestingly, the responses of EOS to climate change varied spatially across the plateau, indicating a regulatory role for hydrological conditions in marsh phenology. In the humid and cold central regions, preseason daytime warming significantly delayed the EOS. However, areas with lower soil moisture exhibited a weaker or reversed delay effect, suggesting complex interplays between temperature, soil moisture, and EOS. Notably, in the arid southwestern regions of the plateau, increased preseason rainfall directly delayed the EOS, while higher daytime temperatures advanced it. Our findings underscore the need to incorporate hydrological factors into terrestrial ecosystem models, particularly in cold and dry regions, for accurate predictions of marsh vegetation phenological responses to climate change.

49. REMOTE SENSING-BASED MAPPING OF ABOVEGROUND BIOMASS IN THE DANUBE DELTA

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The use of space-based LiDAR data and multispectral imagery is a major breakthrough in mapping aboveground biomass (AGB), essential for carbon monitoring and climate change mitigation efforts, in all types of forest ecosystems. Using data from NASA's Global Ecosystem Dynamics Investigation (GEDI) mission, along with Landsat imagery and digital elevation models (DEMs), this study investigates the optimization of predictors for AGB estimation, taking into account geographic stratification such as elevation, aspect and several multispectral derived indices. The integration of the GEDI mission's accurate terrestrial vegetation structure data with Landsat imagery facilitates improved mapping of AGB, thus addressing the critical need for accurate regional estimates to inform forest resource management and help with climate change mitigation strategies. Through a case study from the Danube Delta, the importance of refined AGB mapping for understanding biodiversity, ecosystem function and carbon biomass dynamics due to factors such as deforestation, development or fires is highlighted.
This emphasizes the indispensable role of remote sensing technology in advancing understanding of terrestrial ecosystems and facilitating informed environmental management.

50. CHANGES OF THE HYDRO-MORPHOLOGICAL CONDITIONS OF THE SFÂNTU GHEORGHE ARM AS A RESULT OF THE HYDROTECHNICAL WORKS TO REGULATE THE WATER COURSE

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This study evaluates the current situation of the meanders of the Sfântu Gheorghe arm from the morphologic point of view and its fragile longitudinal and lateral connectivity, through morphometric analysis methods, with the help of GIS and remote sensing techniques. The foundation of this study was based on existing literature, historical and current field data. In addition, this research facilitates the assessment of the new conditions of sedimentary transfer in the lower area of the Danube and the impact on the morphological course of the Sfântu Gheorghe arm. The main purpose of this study is the updating of hydrological information and the analysis of the hydromorphological evolution of the Sfântu Gheorghe arm on its meandering sectors and on its rectification channels. The reference information is presented in the literature which dates from the 1990s for the aerial images, and 1994 for the hydrological data. In the analytical part, all the processed information is concatenated to allow a holistic approach in order to determine some correlations between the morphometric parameters of the emerged and submerged surfaces. Comparisons are made between all the studied meanders to determine an evolutionary pattern, taking into account the rectifications brought to the Sulina arm. In order to appreciate the degree of morphodynamic balance but also to characterize and frame the typologies of the studied meander curves, the ratio between the wavelengths of the meanders and the width of the water body (rm/d) was calculated according to the R. A. Bognold 1960 methodology. The study continued to determine and research the possibility of correlating certain morphometric values of the meanders, highlighted by the regression coefficients and their degree of confidence. Based on all the results of the analyzes, discussions, maps and available publications, hypotheses are proposed concerning the evolution of these meanders and groups of meanders.

51. EMODNET: ADVANCING EUROPEAN BATHYMETRY INITIATIVES FOR ENHANCED MARINE DATA INTEGRATION AND ACCESSIBILITY

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The importance of marine data is a valuable resource that needs a swift access to reliable information to address threats, develop protective policies, understand trends, and forecast changes in the marine environment. Unfortunately, in Europe, the collection, storage, and accessibility of marine data have been fragmented for many years, with data gathering often tailored to individual organizational needs, leading to a lack of cohesion in the overall approach. The European Marine Observation and Data Network (EMODnet) was formed as a collaborative initiative supported by the EU's integrated maritime policy. It involves organizations working together to observe the sea, process data to international standards, and provide freely accessible, interoperable data layers and products. This "collect once and use many times" approach benefits various users, including policy makers, scientists, industry, and the public and potentially saving expenses. The Bathymetry segment of the EMODnet initiative offers a platform for accessing and downloading the most accurate harmonized Digital Terrain Model (DTM) for European sea regions. Alongside this, various other bathymetric data, products, and services are also available. The EMODnet Bathymetry partnership continually generates and updates the DTM using a growing array of bathymetric datasets. Additionally, the platform provides services for discovering and requesting access to these datasets, ensuring ongoing maintenance and accessibility. DDNI has become a participant in the EMODnet initiative, contributing by sharing metadata and data related to the coastal area of the Danube Delta Biosphere Reserve. This dataset encompasses coastal LiDAR and bathymetry information for both the lakes within the Danube Delta and the main channels of the Danube River. Regular updates, incorporating recent surveys, are intended to augment the database, thereby improving the accuracy of riverbed and coastal morphology data.

52. INTEGRATING CATCHMENT-SCALE MONITORING AND MODELING APPROACHES TO ENHANCE RESEARCH AND WATER QUALITY MANAGEMENT

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Accurately predicting changes in water quality faces persistent challenges due to constraints in available datasets and necessity for a deeper understanding of the multitude of processes involved. This includes understanding crucial driving factors and navigating the intricate interactions among different state variables. Overcoming these hurdles demands robust data acquisition and analysis techniques, alongside an interdisciplinary modelling approach. This is crucial to effectively address the complexity and interconnectedness of water quality dynamics, enhance predictive accuracy, and facilitate effective water quality management strategies. In this presentation, we present a holistic approach to combing monitoring program and modelling system at the catchment scale. It includes: 1) the integration of various data sources such as real-time sensor data, grab sampling measurements, and modelling outputs to ensure comprehensive input datasets; 2) a sophisticated watershed modelling system that incorporates hydrological/hydraulic models, emission and transport models to capture the complex interactions within the catchment; 3) the implementation of a coupled 3D receiving water body modelling system, integrating hydrodynamic and water quality models to accurately simulate the dynamics of the change of water quality ; and 4) the utilization of data assimilation techniques to improve the accuracy and reliability of model outputs. This integrated approach enables a thorough understanding of water quality dynamics at the catchment scale, facilitating effective long-term planning, management, and short-term forecasting. It provides valuable insights for future research endeavors and ensures sustainable practices for water resource management.

➢ MISSION OCEAN LIVING LABS
➢ DANUBE LIGHTHOUSE AND BLACK SEA LIVING LAB

53. CLIMATE, ATMOSPHERE AND WATERS RESEARCH INSTITUTE AT THE BULGARIAN ACADEMY OF SCIENCES

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The DaWetRest Project: an Element of the Black Sea Lighthouse System

The project project "*Danube Wetlands and flood plains Restoration through systemic, community engaged, and sustainable innovative actions* (DaWetRest)", co-funded by the European Commission, aims at restoring and revitalizing the wetlands and flood plains of largest river basin in Central and Western Europe – the Danube – and prominently includes the respective coastal areas of the Black Sea. Innovative, replicable solutions, based on in-situ observation, aerial, and remote sensing, and centralized data, information, and knowledge platforms, are designed to address the main Danube Basin challenges - biodiversity, water quality, climate change impacts, and developing a circular economy at the respective, most efficient geographic scale. Three sites, situated in the Middle, Lower Danube, and the Danube Delta, each with a number of sibling locations, will introduce, replicate, test, and demonstrate the expected environmental and socio-economic benefits for the local communities, while a minimum of six associated regions across the European Union will implement the positive results. The expected outcomes represent a step towards integrated Black Sea/Danube watershed-based environmental management that transcends state and administrative borders, enables collaboration, supports regionally specific investments, and engaged, sustainably governed communities.

54. QUANTIFYING THE EFFECTS OF GLOBAL CHANGE ON WETLAND PLANTS FROM A TRAIT-BASED PERSPECTIVE

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Trait-based approaches have been widely applied to plant ecology to reveal the ecological strategies of plants in adaptation to their habitats. However, plants living in wetland conditions may face even more complex habitat conditions than other non-wetland terrestrial plants. The specific adverse environmental factors in wetlands, including anaerobic soil, low redox potential and toxic organic compounds formed in highly reduced environments may cause additional stress on wetland plants. In addition, the impacts of global change may further threaten the survival of wetland plants. To quantify the effects of global change on wetland plants and the ecological adaptive strategies of wetland plants to their habitats, a traitbased framework is proposed to reveal the response of wetland plants to environmental stressors and global changes, where trait-trait and trait-environment relationships are especially emphasized. However, relevant studies are rather limited due to data scarcity and difficulties in field sampling in wetlands. If we look into the TRY database as an example, we will see only a very small proportion of wetland plant trait data is covered yet. Therefore, worldwide networks and collaborations on wetland plants are addressed (e.g. MAP project) to enhance the functional biogeography of wetland plants at a broader scale.

55. INTEGRATING CATCHMENT-SCALE MONITORING AND MODELING APPROACHES TO ENHANCE RESEARCH AND WATER QUALITY MANAGEMENT

Jingjie Zhang

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➢ Notes