



**MINISTRY OF RESEARCH AND INNOVATION**  
**„DANUBE DELTA” NATIONAL INSTITUTE**  
**FOR RESEARCH AND DEVELOPMENT – TULCEA**

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# **DELTAS AND WETLANDS**

## **(Book of Abstracts)**

# **Vol. 6**

## **2019**

## **Tulcea**

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**„Deltas & Wetlands” DDNI Scientific Event Community, 27-th edition**

**Program: Tulcea, June 03 – 09, 2019**

1. **D&W** DDNI Symposium (June 05 – 09, 2019)
2. **DANS** (DANUBIUS Support RI) International Conference (June 06 - 08, 2019)
3. **REPEAT** Conference & Roundtable (June 05 – 09, 2019)
4. **FLOOD-Serv** Conference & Roundtable (June 07 - 08)
5. **Geohistoire** des zones humides d'ici et d'ailleurs (June 03 – 08, 2019)

**Deltas & Wetlands DDNI International Symposium,**

**DANS International Conference, FLOOD-serv Conference**

- ✓ **June 05, 2019 (Wednesday)** - Arrival of participants
- ✓ **June 06, 2019 (Thursday)**

- 8.30 – 9.30 - Registration of participants

**Venue: „Mihail Kogălniceanu” City Hall / Păcii Street no.20, Tulcea**

➤ **Convener: Dr. Biol. Marian Tudor**

- 9.30 – 10.00 - Opening ceremony
  - 10.00 – 10.30 - Keynote speaker: **Prof. dr. Ming Jiang:**
    - **Wetland changes and adaptive conservation strategies under global change in China**
  - 10.30 – 10.45 - Coffee break
  - 10.45 – 13.00 - **DANS** International Conference

➤ **Convener: Dr. Eng. Iulian Nichersu**

- |             |                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                          |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10.45-11.15 | <b>Sidoroff Elisabeta</b>                                                                                                                                                                                                                                                                                | DANUBIUS – RI HUB                                                                                                                                                        |
| 11.15-11.45 | <b>Stanică Adrian</b>                                                                                                                                                                                                                                                                                    | DANUBIUS-RI International centre for advanced Studies on River – sea Systems, future distributed pan-European infrastructure dedicated to the study of River-Sea Systems |
| 11.45-12.15 | <b>Ungureanu Viorel Gh.</b>                                                                                                                                                                                                                                                                              | Danube Delta Supersite – Concept, role and foreseen results                                                                                                              |
| 12.15-12.45 | <b>Iticescu Catalina</b>                                                                                                                                                                                                                                                                                 | Danubius - RI – International Data Center                                                                                                                                |
|             | <ul style="list-style-type: none"> <li>▪ 13.00 – 14.30 - Lunch (<i>Select Restaurant</i>)</li> <li>▪ 14.30 – 15.00 - Sect. I, Keynote speaker: <b>Dr. Tom Buijse:</b> <ul style="list-style-type: none"> <li>▪ <b>Balancing large river regulation and ecological functioning</b></li> </ul> </li> </ul> |                                                                                                                                                                          |
- ✓ **DDBRA – Scientific Council**



**15.00 – 17.00 Sect. I, Presentations  
Biodiversity and nature conservation**

➤ **Convener: Dr. Eng. Ion Năvodaru, Co-convener: Dr. Tom Buijse**

- |             |                                                                                                                                                                                  |                                                                                                                                                                                              |
|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 15.00-15.15 | <b>Petrișor Alexandru-Ionuț</b> ,<br>Petrișor Liliana Elza                                                                                                                       | Are the Romanian natural protected areas properly covering the wetlands?                                                                                                                     |
| 15.15-15.30 | <b>Negrea Bogdan Mihai</b> , Doroftei Mihai, Covaliov Silviu                                                                                                                     | Coastal habitats and plant species that are likely to become endangered on North-Western Black Sea shore, Romanian sector                                                                    |
| 15.30-15.45 | <b>Negrei Costel</b> , Craciun Anca, Tudor Marian                                                                                                                                | Possibilities of setting priorities for biodiversity conservation plan in the Danube Delta Biosphere Reserve                                                                                 |
| 15.45-16.00 | <b>Kohlmann Klaus</b> , Kersten Petra, Geßner Jörn, Eroğlu Oğuzhan, Firidin Şirin, Memiş Devrim, Taflan Elena, Tošić Katarina, Holostenco N. Daniela, Suciu Radu, Ciorpac Mitică | Sturgeons of the Lower Danube River, Romania<br>Part 1: Population genetic structure of beluga, Russian, stellate and sterlet sturgeon                                                       |
| 16.00-16.15 | <b>Ciorpac Mitică</b> , Taflan Elena, Holostenco N. Daniela, Tošić Katarina, Kohlmann Klaus, Kersten Petra, Geßner Jörn, Eroğlu Oğuzhan, Firidin Şirin, Memiş Devrim, Suciu Radu | Sturgeons of the Lower Danube River, Romania<br>Part 2: Recommendations for management and conservation                                                                                      |
| 16.15-16.30 | <b>Ciubuc Constantin</b> , Lupu Gabriel, Spiridon Cosmin, Ibram Orhan                                                                                                            | Preliminary data on the specific diversity of carabids (Insecta, Ord. Carabidae) captured by multiple sampling methods from different specific habitats in ecotone areas of the Danube Delta |
| 16.30-16.45 | <b>Tamari Edisherashvili</b> , Ketevan Janashvili, Fleur Scheele, Radu Suciu                                                                                                     | Recruitment of sturgeons in the Rioni River, Georgia, in year 2018                                                                                                                           |
| 16.45-17.00 | <b>Farkas Attila</b> , Náhlik András, Jánoska Ferenc                                                                                                                             | Feeding strategy of the golden jackal ( <i>Canis aureus</i> L.) as European wetland's apex predator species                                                                                  |

▪ 17.00 – 18.00 **Posters presentations & Business approaches & Coffee  
Venue: Avramide HOUSE**

➤ **Convener: Dr. Alexandru Doroşencu, co-convener: Dr. Xiagjin Shen**

**Apostol Mihaela**, TechnoInstrument  
**Bogdan Sorin**, MDS Electric

Integrated quality monitoring systems for environmental factors  
Equipment and solutions for water and environment



▪ 18.00 – 19.00 **PICO - PhD Thesis presentations**

➤ **Convener: Dr. Eng. Iulian Nichersu, co-convener: Dr. Xianguo Lyu**

- |             |                                                                                                                                                               |                                                                                                                   |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|
| 18.00-18.10 | <b>Holostenco Daniela Nicoleta</b> ,<br>Ciorpac Mitică, Paraschiv Marian, Iani Marian, Honț Ștefan, Taflan Elena, Toșić Katarina, Suciu Radu, Rîșnoveanu Geta | Overview of the Romanian sturgeon supportive stocking programme in the Lower Danube River system                  |
| 18.10-18.20 | <b>Crăciun Anca</b> , Negrei Costel, Cioacă Eugenia                                                                                                           | Ecological impact assessment of the ecological restoration projects on the ecosystem services in the Danube Delta |
| 18.20-18.30 | <b>Spiridon Cosmin</b> , Burada Adrian, Teodorof Liliana, Despina Cristina, Tudor Iuliana-Mihaela, Tudor Marian, Georgescu Puiu-Lucian                        | Spatial distribution of phytoplankton in Razim Lake                                                               |
| 18.30-18.40 | <b>Trifanov Cristian</b> , Dumitriu Dan, Romanescu Gheorghe, Mihu-Pintilie Alin, Stoleriu Cristian, Mierlă Marian                                             | “Checking the Pulse” of Sf. Gheorghe’s Arm Meanders from the Danube Delta Biosphere Reserve                       |

▪ **20.00** - Festive dinner (*Delta Restaurant*)

✓ **June 07, 2019 (Friday)**

- 9.00 – 09.30 - Sect. II, Keynote speaker: **Prof. dr. Thomas Hein:**
- **River floodplains in a changing world – their role and challenges ahead**

**9.30 – 11.15 Sect. II, Presentations**

**Environmental factors, Ecological restoration and Anthropogenic Impact**

➤ **Convener: Dr. biol. Marian Tudor, Co-convener: Prof. Dr. Ming Jiang**

- |             |                                                                                                                                                         |                                                                                                                                                             |
|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9.30-9.45   | <b>Xiangjin Shen</b> , Zhenshan Xue, Ming Jiang, Xianguo Lyu                                                                                            | Spatiotemporal Change of Vegetation Coverage and its Relationship with Climate Change in Freshwater Marshes of Northeast China                              |
| 9.45-10.00  | <b>Bogdevich Oleg</b> , Cadociniov Oleg, Culighin Elena, Nicolau Elena, Grigoraș Marina                                                                 | The evaluation of chemical status of Beleu lake                                                                                                             |
| 10.00-10.15 | <b>Fălcuță Elena</b> , Marinov Mihai, Cotar A., Dinu S., Doroșencu A., Alexe Vasile, Ceianu C., Vladimirescu A., Purcărea – Ciulacu V., Prioteasa Liviu | A two-year comparative survey (2015 – 2016) of West Nile virus circulation in Sălcișoara – Jurilovca area                                                   |
| 10.15-10.30 | <b>Pipirigeanu Vasile</b>                                                                                                                               | GREEN DANUBE - Integrated transnational policies and practical solutions for an environmentally-friendly Inland Water Transport system in the Danube region |



10.30-10.45	<b>Gorelits Olga</b>	Lower Volga Wetlands – hydrological regime and anthropogenic impact in XX-XXI cent.
10.45-11.00	Pepenel Ilie, Crăciun Nicolae, Dinu Catalin, Dulubei Denis, Jujea Valentin, Dumitrescu Adelina, Varcolici Anca, Hanganu Dorin, <b>Stoian Gheorghe</b>	Study of the biochemical parameters of sapropelic sludge of salt lakes from Buzau County protected area, with different degrees of microbiological degradation
11.00-11.15	<b>Golumbeanu Mariana</b> , Messal Fabrice, Mateescu Razvan	Regional Copernicus Marine Service Training Workshop for the Black Sea Stakeholders
	<ul style="list-style-type: none"> <li>▪ 11.15-11.30 - Coffee break</li> <li>▪ 11.30-12.00 - Sect III, Keynote speaker: <b>Dr. Delia Dimitriu</b> <ul style="list-style-type: none"> <li>▪ <b>Climate change impact on Danube Delta: decarbinising inland waters</b></li> </ul> </li> </ul>	
<b>12.00-13.30 Sect III, Presentations</b>		
<b>Natural Resources and Socio-Economic Aspects</b>		
➤ <b>Convener: Dr. Mihai Doroftei, Co-convener: Prof. Dr. Thomas Hein</b>		
12.00-12.15	<b>Covaliov Silviu</b> , Mihai Doroftei, Bogdan Negrea	Natural vegetal resources of Danube Delta territory - present status and trend
12.15-12.30	<b>Marin Eugenia</b> , Sicrieru Florentina, Mierlă Marian	Assessing the perception of local community on the transition from economic capitalization to biodiversity conservation in Danube Delta
12.30-12.45	<b>Statache Ramona</b>	Sustainable Tourism and the Danube Delta: Tourism Development Strategies Designed to Promote Natural Resource Conservation and Local Socio-Economic Benefits
12.45-13.00	<b>Sicrieru Florentina</b> , Marin Eugenia, Mierlă Marian	Current status of transport system in a fragile environment: Sulina case study
13.00-13.15	<b>Năstase Aurel</b> , Cernișencu Irina, Năvodaru Ion	Fish fauna status from lake-complexes of Danube Delta Biosphere Reserve (DDBR) in condition of growing population of <i>Perccottus glenii</i> in 2018
	<ul style="list-style-type: none"> <li>▪ 13.30 – 15.00 - Lunch (<i>Select Restaurant</i>)</li> </ul>	



15.00-15.30 - Sect IV, Keynote speaker: **Prof. dr. Elchin Hafiz Sultanov**  
**Biodiversity and nature conservation importance for**  
**Europe of Deltas and Wetlands in Azerbaijan**

**15.30-16.15 Sect. IV, Presentations**

**Geographical Information System and Application System Modeling**

➤ **Convener: Dr. Ion Grigoraș, Co-convener: Dr. Delia Dimitriu**

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|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| 15.30-15.45 | <b>Nichersu Iuliana I.</b> , Nichersu Iulian, Balaican Dragos                                                                                                                                                                                                                           | Consistent ontological scenarios analysis on the information management towards the adaptative management of Danubius RI       |
| 15.45-16.00 | <b>Mierlă Marian</b> , Grigoraș Ion, Trifanov Cristian, Covaliov Silviu, Doroftei Mihai                                                                                                                                                                                                 | Contribution to study on evolution of climatic parameters and some environmental components, in Danube Delta Biosphere Reserve |
| 16.00-16.15 | <b>Balaican Dragoș</b> , Tudor Marian, Nichersu Iulian, Hanganu Victoria, Sicieru Florentina, Bănescu Alexandru, Sbarcea Mădălina, Anore Ciprian, Livanov Oliver, Mierlă Marian, Covaliov Silviu, Ciorpac Mitică, Bolboacă Lucian, Trifanov Cristian, Mișu-Pintilie Alin, Negrea Bogdan | The LUCAS project roller coaster                                                                                               |
| 16.15-16.30 | <b>Nichersu Iuliana I.</b> , Nichersu Iulian, Bratfanof Edward, Balaican Dragos                                                                                                                                                                                                         | Implementation of a citizen-centric public service application in Danube Delta area for Flood-Serv Horizon2020 project         |
- 16.30 – 16.45 - Coffee break

**16.45-17.45 Parallel events:** Roundtables of debates

**1. „Biodiversity Monitoring: Taxonomic approach vs. Molecular approach ”**

➤ **Convener: Dr. Eng. Ion Năvodaru, Co-convener: Dr. Mitică Ciorpac**

**2. Danube Delta Challenges – Flood - Serv Responses** (venue Dobrogea Hall, Tulcea County Council)

➤ **Convener: Dr. Iuliana Nichersu, Co-convener: Daniela Petroschi**

- **17.45 – 19.00 DANS – DANUBIUS RI Conclusions**
- 20.00 - Dinner (*Delta Restaurant*)
- ✓ **June 08, 2019 (Saturday)**
  - 9.00 – 19.00 - Field trip in the Danube Delta Biosphere Reserve (*Sfântu Gheorghe*)
- ✓ **June 09, 2019 (Sunday)**
  - Departure of participants



## POSTERS

### Section I: Biodiversity and nature conservation

1. Alexe Vasile, Dorosencu C. Alexandru, Marinov Mihai, Kiss J. Botond, Bolboacă Lucian-Eugen, Mierlă Marian, Murariu Dumitru      White-tailed Eagle (*Haliaeetus albicilla*) active nests and *Pelecaniformes* and *Ciconiiformes* waterbird colonies in the Danube Delta Biosphere Reserve-a rough spatial analysis
2. Andrei (Guriencu) Raluca-Cristina, Cristea Victor, Crețu Mirela, Dediu Lorena      The importance of respiratory studies in sturgeon conservation
3. Cachaza Marta Peraita, Dorosencu Alexandru      Why does the White Stork (*Ciconia ciconia*) breed colonially in Doñana and does not in the Danube Delta?
4. Eruz Coşkun, Duzgüneş Ertug, Kandemir Raif      Alpine wetlands of Ağaçaşbaşı , Barma and Yılantaş in Trabzon Province, Turkey
5. Iani Ion Marian, Paraschiv Marian, Honț Ștefan, Holostenco Daniela, Tošić Katarina, Taflan Elena, Suci Radu, Georgescu Puiu Lucian, Iticescu Cătălina, Țopa Cătălina, Murariu Gabriel, Ciorpac Mitică      A glimpse of a better future for the Danube's flagship species - first return of stocked sturgeons into the river
6. Lupu Gabriel, Tudor Mihaela Iuliana, Sali Iasemin, Spiridon Cosmin, Ibram Orhan      Entomofauna species – indicators for environmental quality
7. Marinov Mihai, Dorosencu Alexandru, Alexe Vasile, Bolboacă Lucian Eugen      The assessment of colonial waterbird species from Danube Delta Biosphere Reserve (Romania) in 2018
8. Munteanu Andrei, Zubcov Nicolai, Bogdea L., Buciuceanu L., Crudu N.      Current state of aquatic passeriformes (*Locustella*, *Acrocephalus*) in the Republic of Moldova
9. Pricop Emilian, Negrea Bogdan Mihai      Researches on the invasive alien plant species of Bistrita river basin, Romania
10. Pricop Emilian, Negrea Bogdan Mihai      The rarest fairyflies (Hymenoptera: Mymaridae) from Romania, with regards to species distribution - linked to the natural environment and some rare habitats
11. Sava Daciana, Afanasyev Dmitry      Overview of Rhodopyta (red algae) from Romanian Black Sea coast and possible first record of new species





## Section II: Environmental factors, Ecological restoration and Anthropic Impact

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|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| 12. Catianis Irina, Constantinescu Maria Adriana, Grosu Dumitru                                                                                                                | Assessment of the freshwater quality: a case study of the Carasu, Rotund and Cuzmânțu Mare shallow lakes - Danube Delta, Romania                    |
| 13. Cioacă Eugenia, Năstase Aurel, Paraschiv Marian, Iani Marian, Mierlă Marian, Doroftei Mihai, Covaliov Silviu, Pindic Paula, Anore Ciprian, Bănescu Alexandru               | Researches on the conservation status of the fish natural breeding areas from the Somova-Parcheș hydrographic unit - Danube Delta Biosphere Reserve |
| 14. Kozlova Maria, Gorelits Olga, Zemlyanov Igor                                                                                                                               | The assessment of wetland recovery after the extreme drought in the Volga-Akhtuba Floodplain by multispectral satellite imagery                     |
| 15. Marinov Mihai, Burada Adrian, Doroșencu Alexandru, Alexe Vasile, Teodorof Liliana, Țigănuș Mihaela, Bolboacă Lucian Eugen, Tošić Katarina, Kiss Janos Botond, Tudor Marian | Preliminary data regarding the trace elements residues from the feathers of waterbirds in Danube Delta (Romania) in 2015                            |
| 16. Scholz Miklas, Török Liliana                                                                                                                                               | Research-based Assessment of Integrated approaches to Nature-based SOLUTIONS (RAINSOLUTIONS)                                                        |
| 17. Vlad E. Sabina, Iosif Ruben, Stănescu Florina, Cogălniceanu Dan                                                                                                            | Perception of visitors regarding the wildlife inhabiting an archaeological site from the Danube Delta Biosphere Reserve                             |
| 18. Vladimirescu Alexandru Filip, Ciulacu-Purcărea Valeria, Priotesa Liviu Florian, Fălcuță Elena                                                                              | The West Nile Virus (WNV) molecular detection in vectors: from the benchtop to the field-deployable laboratory                                      |
| 19. Zaved Hossain Khan, Hasan M. R., M. R. Al-Mamun                                                                                                                            | Water and Sediment Pollution Near Sundarbans Forest: Toward Sustainable Development                                                                 |

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- |                                                                                    |                                                                                                                                                                                                   |
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| 21. Crăciun Nicolae, Negrea Bogdan Mihai, Pop Emilian, Miu Bogdan, Stoian Gheorghe | Experimental aquaculture research; the genus <i>Lemna</i> sp. highlighting environmental requirements and specific adaptations to environmental polytrophic conditions of some aquatic ecosystems |
| 22. Marin Eugenia, Török Liliana, Mierla Marian, Török Zsolt                       | The perception overview of main stakeholders on algal blooms in Danube Delta                                                                                                                      |



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

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| 23. Alexandrov Laura, Nicolaev Simion, Nita Victor, Radu Gheorghe, Anton Eugen, Niculescu Dragos                                                                                                                 | Maritime Spatial Planning in Romania – Black Sea, support for the marine fisheries and aquaculture development                                                                                              |
| 24. Nenciu Magda, Alexandrov Laura, Angela Szultze, Lisa Simone de Grun, Clare Waldmann, Spinu Alina, Laura Boicenco, Madalina Rosca, Vlasceanu Elena                                                            | New Contribution the Focal Point for Black Sea Maritime Spatial Planning, for the European MSP Platform                                                                                                     |
| 25. Niculescu Dragos, Nita Victor, Spinu Alina, Alexandrov Laura, Vassilopoulou Celia, Irida Maina, Mairi Maniopoulou, Eugen Anton, Gheorghe Radu, Alexandru Nicolaev, Madalina Rosca                            | Assessment of cumulative impacts of marine fisheries and aquaculture on Romanian coastal ecosystem components with special focus on priority conservation features, under COFASP - ECOAST Project           |
| 26. Nicolaev Alexandru, Spinu Alina, Niculescu Dragoș, Bastardie Francois, Alexandrov Laura, Anton Eugen, Radu Gheorghe, Nita Victor, Roșca Mădălina                                                             | Analysis of fishermen's behaviour to spatial management options and assessment of the economic and ecological performance of alternative spatial plans, under COFASP - ECOAST Project                       |
| 27. Panait Valentin, Marian Mierlă, Stănică Aurel Daniel                                                                                                                                                         | Black-box Model for G.I.S. analyzing of the lower sector of the Danube evolution                                                                                                                            |
| 28. Petroschi Daniela- Camelia                                                                                                                                                                                   | Challenges in Wetlands- FLOODserv Responses                                                                                                                                                                 |
| 29. Rosca Madalina, Alexandrov Laura, Niculescu Dragos, Nicolaev Alexandru, Olsen Erik, Guldborg Søvik, Nita Victor, Anton Eugen, Radu Gheorghe, Cernisencu Irina, Spinu Alina, Danilov Cristian, Tiganov George | Identification of spatial and temporal potentials and limitations for the integration of fisheries, aquaculture and other marine activities through stakeholder consultation, under COFASP - ECOAST Project |
| 30. Török Liliana, Politi Eirini, Török Zsolt, Philipson Petra, Lebreton Carole                                                                                                                                  | CyanoAlert-Space Based Cyanobacteria Services for Danube Delta                                                                                                                                              |

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6.	Ciubuc Constantin, Lupu Gabriel, Ibram Orhan, Spiridon Cosmin	Preliminary data on the specific diversity of carabids (Insecta, Ord. Carabidae) captured by multiple sampling methods from different specific habitats in ecotone areas of the Danube Delta	15
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➤ **Section I - Biodiversity and nature conservation**

**1. White-tailed Eagle (*Haliaeetus albicilla*) active nests and *Pelecaniformes* and *Ciconiiformes* waterbird colonies in the Danube Delta Biosphere Reserve – a rough spatial analysis**

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During our research from 2018, we identified in Danube Delta Biosphere Reserve and its surroundings a number of 49 active White-tailed Eagle (*Haliaeetus albicilla*) nests. From these, 42 are located near colonies of waterbirds belonging to *Pelecaniformes* and *Ciconiiformes* orders, localized on trees or reed beds. In our analysis we took in consideration only those White-tailed Eagle nests that had waterbirds colonies on a maximum radius of 9000 m. Our analysis shows that 74% (31) of the White-tailed Eagle nests are located at a distance of maximum 5000 m from at least one waterbird colony, while 26 % (11) are located at a distance between 5001 and 9000 m. Those 42 White-tailed Eagle nests that are located in Danube Delta Biosphere Reserve and its surroundings have a number of 20 waterbird colonies on a radius of 5000 m. 6 waterbirds colonies have in their vicinity (5000 m radius) one White-tailed Eagle nest, 4 have 2 White-tailed Eagle nests, 2 have 3, 6 have 4, one has six and one waterbird colony has ten White-tailed Eagle nest. Our research suggests that the vicinity of a waterbird colony may be a determining factor for the establishment of the hunting territory and the nest location of White-tailed Eagle.

**2. The importance of respiratory studies in sturgeon conservation**

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Habitat degradation, overexploitation and loss of migration routes brutally affect sturgeons. In comparison to other fishes, sturgeons have a limited behavioral and physiological capacity to respond to diverse environmental factor's fluctuation. Water pollution and siltation can have negative effects on sturgeon's spawning and wintering sites, physiology and fertility of spawning fish, or the development of embryos and the abundance of sturgeon food. Water can be challenging as a respiratory medium and the physiology and oxygen demands of fishes as ectothermic animals can be highly affected by environmental factors fluctuations. Sturgeons sensitivity to a broad range of environmental factors (temperature, light, dissolved oxygen, dissolved carbon dioxide, salinity, substrate, depth, velocity preference) can be evaluated through respirometry experiments. Such experiments can be used in a direct way, in experimental situations, or indirect, to build models and project the potential effects of environmental changes upon the metabolic rate of sturgeons. For example, during summer when the temperatures >20°C, the effect of hypoxia on sturgeons is amplified, in the bottom waters this interaction results in substantial reduction of habitat; in dry years, sturgeon nursery habitats in the in dry years, sturgeon nursery habitats may be reduced or even eliminated. Respirometry data (i.e. represented through standard, routine and active metabolic rate measurements), measured as oxygen uptake can also be converted into energy units. Further, respirometry is much easier to perform than direct calorimetry, particularly in water, and almost all studies of metabolic rate in fishes used respirometry as a proxy for metabolic rate.

### **3. Balancing large river regulation and ecological functioning**

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Many large rivers have been regulated and modified so heavily resulting in a tremendous loss of biodiversity and ecological functioning. Restoring such regulated large rivers is de facto impossible and even partial rehabilitation is already extremely costly and complex. Despite these insights there still is an on-going development to modify near-natural and pristine large rivers in an outdated and destructive manner. The challenge is to balance regulation while conserving the characteristic river and floodplain ecosystems. Such integrated river management requires profound knowledge of the river-floodplain ecosystem to decide to which extent large rivers can be exploited. Conceptual understanding and interdisciplinary research combining hydrology, geomorphology with water quality and ecology is pre-eminently suited to gain the knowledge on key processes and ecosystem values.

Ecological traits i.e. characteristics and environmental requirements of species are an effective approach to link biodiversity to environmental conditions.

The presentation is supported by examples of the environmental consequences following the regulation of the rivers Rhine and Danube and of the implementation of the Water Framework Directive in the last two decades.

### **4. Why does the White Stork (*Ciconia ciconia*) breed colonially in Doñana and does not in the Danube Delta?**

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Colonial breeding behavior appeared several times over the evolution trend of birds, which suggest that it might be related to particular environmental conditions. The White Stork is a facultative colonially breeder and in this poster we will try to clarify which factors drive the change in the commitment to coloniality.

In the Danube Delta Biosphere Reserve, Romania, the species population trends are slowly decreasing and breeds mostly in solitary nests with higher densities in some locations. In contrast, in other areas, like Doñana National Park, Spain, it shows a remarkable growth in population size and breeds in colonies well over hundreds of breeding pairs.

Three are the main factors traditionally supposed to make a bird breed colonially. The lack of adequate available nesting sites is one of the main restrictive factors for colony formation. In addition, low predation pressure and non patched distribution of feeding resources benefit solitary breeding behavior. There are probably a lot of other synergic and derived factors to consider. Comparing both areas and strategies might bring light into some of them.

The scarce presence of the species might not be a cause to breed mostly isolated but a consequence (in part) of breeding that way and thus the consequence of the factors promoting this behavior.

How do we think that the situation will evolve?



## 5. Sturgeons of the Lower Danube River, Romania, Part 2: Recommendations for management and conservation

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The sturgeons are one of the most valuable wildlife resources. Caviar-producing species are particularly vulnerable due to overexploitation and habitat fragmentation, which has brought them to the brink of extinction. Therefore, the sturgeon wild stock evolution in the Lower Danube River was monitored since 2002, and is continuing. Conservation management of the wild stock is a highly important task, which can ensure remnant populations recovery. To develop long-term strategies able to preserve and restore migratory sturgeon species population is necessary to set up a framework and the implied principles. Into the wild, a population, compiles individuals with variable levels of fitness, environment adaptability, reproductive success and so on, usually normal distributed among individuals. Therefore, the alleles of a certain gene, are undergone to a natural selection process, advantageous alleles for individual fitness will reach fixation in population gene pool, while harmful alleles will appear with low frequency, being progressively excluded from the gene pool over time. Controlled propagation of a species exhibits a high risk to induce a shift of haplotypes fixation in population, by increasing the frequency of haplotypes which naturally should have a constant frequency or should have been removed from the gene pool. The shift of haplotypes fixation in population will determine an anthropic selection breaking the proposed scope, preserve and restore, by selecting individuals with low fitness and/or disease resistance. Conservation genetics has the potential to 'set things straight', or restore what we can, rather than just preserve what's left. Since the genetic information about the actual status of the sturgeon species are available, herein we have compiled recommended strategies for LDR sturgeon species, able to preserve the remnant populations, and to restore them self-sustainability, through habitat connectivity re-establishment, stocking programmes, and associated genetic breeding schemes.

## 6. Preliminary data on the specific diversity of carabids (Insecta, Ord. Carabidae) captured by multiple sampling methods from different specific habitats in ecotone areas of the Danube Delta

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In the paper are presented the first results on the specific diversity of Carabides (Cls. Insecta, Order Coleoptera) obtained by multiple sampling methods, barber traps and light traps. It is also a comparison between the results obtained in this campaign and the results obtained by us in the period 2003-2004 as well as the results from the literature over 30 years ago.

## 7. Recruitment of sturgeons in the Rioni River, Georgia, in year 2018

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Aiming to link hydraulic characteristics of the river to spawning and recruitment success by organizing a systematic monitoring of recruitment of sturgeons in the Rioni, as part of a project conducted by Fauna & Flora International (FFI Georgia), we used daily water levels and temperatures recorded by NEA Tbilisi at Zemo Chaladidi / rKm 40, and fishing with stationary or drifting trammel nets (25 mm mesh size of the inner net) during July to October 2018, on feeding grounds situated on the two branches of the Rioni estuary. Two young of the year (YOY) sturgeons born in the Rioni were captured and sampled for genetic species identification. One stellate sturgeon (*A. stellatus*) (TL=12 cm; TW ≈ 7 g) was captured on 15 August on the southern branch of the Rioni delta, and one hybrid between Russian and Persian/Beluga sturgeons (*A. gueldenstaedtii* x *A. persicus* or *A. gueldenstaedtii* x *H. huso* TL=11 cm / TW ≈ 6 g) was captured on the northern branch of the Rioni on 24 October. Based on the size of the YOY we estimate that the stellate sturgeons spawned during early June and the Russian x Persian/Beluga sturgeon hybrid was born during late August. This is a proof that, despite the heavy anthropically modified hydrological conditions in the lower Rioni River due to damming at rKm 126, and hydropeaking by irregular release of large amount of water for electricity generation, some of the sturgeon species managed to find suitable spawning conditions. To our knowledge this is the first attempt of monitoring spawning success and recruitment of sturgeons in rivers of Georgia.

## 8. Alpine wetlands of Ağaçaş, Barma and Yılantaş in Trabzon Province, Turkey

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Trabzon Alpine wetlands of Ağaçaş, Barma and Yılantaş are located at the Northeast part of Turkey, in the summer plateaus of Araklı, Sürmene and Koprubaşı districts, which are 50-70 km away from sea side and located between 1900 to 2100m altitudes. These plateaus of peatlands are 3-7 km away from each other and receive high levels of rain. Climate is characterized with snowy winter and rainy and foggy other seasons. Peatlands are also humid for two thirds of summer months. The site is a remarkable and startling peatlands and it is hard to over-state its conservation importance within Turkey, and indeed internationally.

Thicknesses of peatlands are changing between 50 and 300 cm. Ağaçaş Peatland and plateau has been defined as Strictly Protected Natural Reserve and this protected area could be exploited by sustainable manner only under control. Total area is 650 hektars and Strict Nature Reserve area is about 50 hectares at present. Other high plateau peatlands (Barma and Yılantaş) are not under protection yet.

Ağaçaş peatland is the largest high plateau peatlands of Turkey which is one of the most important natural heritages on the global scale. Ağaçaş and surrounded peatlands are very important due to their unique location in the most southern border of the northern hemisphere as high altitude peat lands.

Trabzon peatlands have ombrotrophic characteristics in which water and plant nutrients provided only by precipitations forming the swamps. The sites have several plant species that are extremely rare in Turkey. The main plants in the swamps are Sphagnum and Carex species. There are also endemic species only known from the Black Sea region. Peatlands are 8-10 thousand years old and have rich history in terms of ecological and climatological data of the region.

## 9. Feeding strategy of the golden jackal (*Canis aureus* L.) as European wetland's apex predator species

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Despite of their indigenous status, the range expansion and population growth of the golden jackal (*Canis aureus* L.) are ongoing processes in Europe with exponential trends, showing characteristics of invasive species. Dispersal patterns seems to be related to medium and large rivers, their valleys, wetlands and lakes as well as forests of the catchment areas. At the same time, Danube is recognized as one of the main colonization routes to central Europe. On most of these habitats there are designated Natura 2000 sites to protect core areas for a sub-set of species or habitat types listed in the Habitats and Birds Directives. As a new predator species, in recently colonized ecosystem, the golden jackal is suspected to cause biodiversity losses. Effects on local fauna should get special attention particularly inside Natura 2000 sites and can be assessed through diet studies.

In period of 15.02.2013 – 09.01.2016 we collected during legal hunting activity 103 golden jackal stomachs and performed dietary studies based on content analysis. The samples were collected from 3 neighboring Game Management Units (GMU-s): 4 – Turnu Măgurele, 9 – Între Olturi and 11 – Beciu; which area is in 78.03% overlap with 3 Natura 2000 sites: ROSCI0044 – Corabia-Turnu Măgurele, ROSPA0024 – Confluence Olt-Danube and ROSPA0106 – Lower Olt Valley. Our dietary study results show that the most important food items – expressed as relative frequency of occurrence – are those of animal origin (vertebrates: 47.70%, insects: 9.20%); followed by the seeds, fruits, and other plants (39,08%) and anthropogenic food items (4.02%). Wild game species such as brown hare (1.15%), roe deer (0.57%) and pheasant (2.30%) were present generally in small amounts in stomachs, except the jackal's wild boar consumption which was 12.07%. Protected species could appear in jackal's diet under the unidentified birds' category which consumption was 4.60%. Feeding strategy was tested through yearly and seasonal trophic niche-breadth values, diversity of food items, and analyses of empty stomach's occurrences. We found that the golden jackal has a food generalist-, behaviorally omnivorous feeding strategy without evident specialization periods and we could not confirm any major threats on the native biodiversity.

## 10. A glimpse of a better future for the Danube's flagship species - first return of stocked sturgeons into the river

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In the present study, 4 specimens of sturgeons from stocking-programmes were recorded, out of a total 34 Danube River upstream-migrants towards their spawning grounds. The catches were recorded over a period of 42 days of scientific fishing on an area of 50.23% of the Danube River width. Three out of four native species were recorded during scientific fishing: 4 *Huso huso*, 27 *A. stellatus* and 3 *A. gueldenstaedtii*. CWT reading showed that all four individuals from stocking-programmes were males, three *A. gueldenstaedtii* and one *A. stellatus*. The captured specimens represent not only the first registered individuals returning to their home river but also a real chance for restoration of the *A. gueldenstaedtii* population into the Danube River. To the best of our knowledge, this is the first time in the world when the return of stocked sturgeons to their home river is reported. Consequently, identifying the main factors which have enabled this is crucial and represents a real breakthrough in sturgeon conservation. Our data suggest that the stocking program success is more likely

dependent on the presence of wild individuals from whom stocked individuals can “learn” the way to the spawning grounds, than on the intrinsic traits of the stocking programme. Therefore, there is a need for additional studies to further understand if this return is an isolated case or it is the beginning of a better future for Danube River sturgeon populations. More information is also needed to assess the contribution of the stocked individuals to spawning events.

### **11. Sturgeons of the Lower Danube River, Romania; Part 1: Population genetic structure of beluga, Russian, stellate and sterlet sturgeon**

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Sturgeons are among the most endangered fish species worldwide due to habitat loss and overfishing. Their decline is also highly evident in the Danube River and Black Sea. In these regions the native populations of the beluga sturgeon (*Huso huso*), Russian sturgeon (*Acipenser gueldenstaedtii*), stellate sturgeon (*A. stellatus*) and sterlet sturgeon (*A. ruthenus*) represent the last self-sustaining stocks of Europe. In order to provide the necessary population genetics information for an improved stock assessment, conservation and management, nuclear and mtDNA markers were analyzed in all four species. Based on multi-locus microsatellite genotypes the most likely number of genetic clusters in the Lower Danube River was two for *A. ruthenus* and *A. stellatus*, and three for *H. huso*. However, all three species showed high levels of admixture between clusters. For *A. gueldenstaedtii* an insufficient sample size did not allow a similar structure analysis. Nevertheless, it could be shown that the Romanian wild individuals were genetically clearly distinct from German and Turkish farmed ones. All species displayed a very high level of mtDNA haplotype diversity indicating that the sampled individuals were unrelated and that the detected numbers of genetic clusters were not biased by kinship. Moreover, the nuclear and mtDNA markers were able to identify naturally occurring hybrids between female *A. stellatus* and male *A. ruthenus*. It is concluded that the observed admixture of genetic clusters within species as well as the hybridization between species in the Lower Danube River are forced by a loss of spawning grounds due to navigation construction and migration barriers. Spawners now aggregate on the remaining spawning grounds leading to an increased probability and risk of intra- and interspecific hybridization.

### **12. Entomofauna species – indicators for environmental quality**

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The assessment of status on 5 quality classes (according to the "Manual for the Modernization and Development of the Integrated Water Monitoring System in Romania") it is realizing in accordance with the provisions of the Normative regarding the Classification of the Surface Water Quality for the purpose of establishing of the ecological status of the water, the presentation of the results and the classification of the ecological status being in accordance with the data in the above mentioned document.

Classifications are indicated based on the level of tolerance to pollution of organisms found in the aquatic basin and based on the diversity of organisms detected and collected during research.

Monitoring can target different aquatic macro-invertebrates as water quality indicators: insects, crustaceans, gastropods and bivalves, oligochaetes (water worms), leeches, turbellaria. The most common and most frequent

being insects such as *Ephemeroptera*, *Plecoptera*, *Trichoptera*, *Coleoptera*, *Hemiptera*, *Diptera*, etc. Not all aquatic macro-invertebrates identified in the field can be considered as indicators of the quality of the water they live in. However, during the monitoring of aquatic areas, other species of macro-invertebrates that are not water quality indicators can be found and collected and cannot be used in biological monitoring.

The adult forms of some of the aquatic macro-invertebrates have the final development stages outside the aquatic environment - species belonging to the *Odonata*, *Ephemeroptera*, *Trichoptera*, *Diptera*, *Coleoptera*, etc., can be used as an environmental quality indicator for the observation area.

### **13. The assessment of colonial waterbird species from Danube Delta Biosphere Reserve (Romania) in 2018**

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The survey of colonial waterbird species from the Danube Delta Biosphere Reserve (Romanian part) have been carried out in 2018. The location and breeding population have been assessed for 24 waterbird species belonging to *Pelecaniformes*, *Ciconiiformes* and *Charadriiformes* orders. In 2018 the Pallas's Gull – *Larus ichthyaetus* and Little Tern – *Sternula albifrons* were not found nesting in Danube Delta Biosphere Reserve perimeter. The dominant species were the Great White Pelican – *Pelecanus onocrotalus*, Great Cormorant – *Phalacrocorax carbo*, Whiskered Tern – *Chlidonias hybrida* and Pigmy Cormorant - *Microcarbo pygmeus*. Less than 100 pairs were recorded for Mediterranean Gull – *Larus melanocephalus*, Sandwich Tern – *Thalasseus sandvicensis*, White-winged Tern – *Chlidonias leucopterus* and Cattle Egret - *Bubulcus ibis*. The number of colonies in 2018 was 86, higher than in 2017 (70 colonies) but much smaller than in 2016 (142 colonies). A general delay in the nesting of colonial aquatic birds have been recorded in 2018, similar to 2017. The total number of pairs evaluated in 2018 for the 24 colonial species was 45,734. The exact identification of colony site and the status of colonial waterbirds species enable's Romanian authorities to adapt the management actions for this area. Multiannual data offer the possibility to identify the trend and driving forces for colonial species in Danube Delta Biosphere Reserve.

### **14. Current state of aquatic passeriformes (*Locustella*, *Acrocephalus*) in the Republic of Moldova**

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Aquatic passeriform habitats have an intrazonal, marginal distribution and the bird species of the genus *Locustella* and *Acrocephalus* that are true insectivores, are an indicator of wetland status, including entomofauna. In the 60's of the XX century (Averin, Ganea, 1970) 3 species of birds of the genus *Locustella* and 6 species - of the genus *Acrocephalus* were recorded on the territory of the republic. At present, the species *Acrocephalus agricola* and *A. paludicola* are missing from the avifauna composition. As a result of the ponds drainage and the recovery of meadows of the rivers and streams, the drought and the process of aridization of the landfill have intensified, leading to the degradation of the wetlands.

These species of aquatic Passeriformes have different preferences for habitats. Researches of different habitat types demonstrate that the dominant species is *Acrocephalus arundinaceus*, which inhabits most of the reeds, with a density of 7-8 to 70-80 individuals/ 100 ha. The highest densities are recorded in stripes of a few tens of meters wide and marginal reed strips. *A. scirpaceus*, subdominant species, occupies the same reed thicket, but it is installed at the bottom of the reed, near the water, with a flock from 13-14 (Bac river) to 45-50 individuals / 100 ha (lower Prut's basins). It has a more tolerant behavior. It is looking for food or hiding at the reed's base. Inconclusive interspecific relationships between *A. arundinaceus* and *A. scirpaceus* are explained by the segregation of the ecological niche (feeding and nesting) at different vertical levels of the reed strips. *A. arundinaceus* occupies the top of the reed, and *A. scirpaceus* - the median area. *Acrocephalus palustris* nests

in the high grassy vegetation along the shore, in weeds of agricultural crops or dried reeds, with densities from 39 individuals/ 100 ha (meadow of Bac river) to 63 individuals/ 100 ha (the peripheral area of the reserve Plaiul Fagului). *Acrocephalus schoenobaenus*, the rare guest of the summer, nests in reedbeds and tall palustrine vegetation. The most affected are the species of the genus *Locustella* with sporadic presence. *Locustella luscinioides* is more common than *L. fluviatilis* and *L. naevia* on nesting. In the palustrine vegetation in the area of the irrigation channels reaches the density of 36 individuals/ 100 ha. The drought in the spring of 2018 caused the disappearance of nesting habitats of the *Locustella* species.

#### **15. Fish fauna status from lake-complexes of Danube Delta Biosphere Reserve (DDBR) in condition of growing population of *Perccottus glenii* in 2018**

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Native fish species from Danube delta has recently a new threat from growing and expanding of population of non-native species *Perccottus glenii*. The paper is analyzing how this invader has integrated or impacted local ichthyofauna. During growing season of year 2018 were sampled 15 representative lakes in 210 stations from what: 40 sites with electric fishing (fishing effort over 6 hours), 143 sites with multimeshes size Nordic gillnets (4,290 m-net<sup>-1</sup>·night<sup>-1</sup> fishing effort), 19 sites with commercial gillnets (1710 m-net<sup>-1</sup>·night<sup>-1</sup> fishing efforts) and 2 sites using seine fishing (in the Razim lake). In 2018 in 6 lake-complexes were identified majority limnophilic species, included *Perccottus glenii* first recorded in 2016 in Razim-Sinoie lakes-complex in Holbina gulf extending in all Razim lake in 2018. Totally were captured 43 fish species including over 21,000 fish individuals with almost 713 kg weighting. The standardization was at Catch Per Unit Effort (CPUE) for relative biomass (grams·h<sup>-1</sup> electric or 100 m<sup>2</sup>·net·night<sup>-1</sup>) and Number PUE (NPUE) for relative abundance (individuals·h<sup>-1</sup> electric or 100 m<sup>2</sup>·net·night<sup>-1</sup>). It was analyzed species richness and ecological parameters, like relative abundance, relative biomass, dominance (D), constancy/frequency (C), ecological significance (W), biodiversity index (Shannon-Wiener indices Hs and Evenness indices E). Present work will characterize the ichthyocoenoses and eventually modifications in fish fauna structure from lake-complexes of DDBR in condition of integration and naturalization of *Perccottus glenii* non-native species.

**Keywords:** fish fauna, Danube Delta, lakes, ecological status, ichthyodiversity

#### **16. Coastal habitats and plant species that are likely to become endangered on North-Western Black Sea shore, Romanian sector**

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The coastline areas are defined as transition areas between sea and land. These, separate by various outlines; depending on the fluvial and marine sediment intake, the current intensity along the shore and the distribution of the sediments. Globally, the coastline areas, with specific vegetation, are subject to changes, either natural or induced. Change sometimes cumulates with the anthropic impact, which adds a progressive pressure. Within this context, we identified particular habitats in the north-eastern area of the Black Sea littoral, respectively the Danube Delta sector. The aim of the present work is to review and estimate on large scale the habitat trends along the Romanian coast. The presentation of these results aims to reveal the importance of the areas regarding biodiversity and conservation. We also want to offer some relevant and useful information for the coastline management of the area. Recent coastline morphodynamic assessment indicates a decrease in natural surfaces caused by marine erosion processes. Part of the community-interest species are in decline. One of the main reasons are invasive and ruderal species also identified by us. These deteriorations are also increased by the anthropical activities done in a disorganized way and without planning based on a rigorous scientific organization.

**Keywords:** coastline changes, specific habitat, biodiversity, marine erosion processes.

### **17. Possibilities of setting priorities for biodiversity conservation plan in the Danube Delta Biosphere Reserve**

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The structure and volume of activities for biodiversity conservation are determined mainly by the vulnerability of its various components and resources that can be used to this purpose.

The decisional factor intervention in the limited time and the limited character of the resources which can be allocated require setting priorities for action in the field, starting from the following principles:

- Prioritizing activities in terms of the impact on biodiversity conservation
- Ensuring the resource allocation limit.

To prioritize activities, given the complexity of the matter, we propose a multi-criteria method based on structuring the data and results in the form of a matrix.

### **18. Are the Romanian natural protected areas properly covering the wetlands?**

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Wetlands host an important biodiversity, provide important ecosystem services, and are threatened and vulnerable ecosystems, representing a priority for the conservation of biodiversity. Previous studies have attempted to assess the efficiency of conservation in Romania through the natural protected areas. The current study attempts to provide an overall picture, using free available geospatial data on natural protected areas and land cover. The methodology consisted of computations performed using the GIS. The results indicate a very good conservation of wetlands (90% of their area). However, if the Danube Delta Biosphere Reserve is excluded, the percentage drops down to 62%. Wetlands make up an important share of biosphere reserves, world heritage sites, and Ramsar sites. Overall, 11% of the land cover of natural protected areas consists of wetlands. The results indicate that the natural protected areas system accounts for wetlands in particular, but improvements are still possible.

### **19. Researches on the invasive alien plant species of Bistrita river basin, Romania**

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Is well known that the uncontrolled spread of invasive alien plant species is among the most urgent nature conservation issues of this century. Our aim is to study and publish a few notes linked to some observations regarding the presence, distribution and the negative impact of some invasive plant species from Bistrita river Basin. There are more than 80 adventive species of plants that are spreading in the middle basin of Bistrita River. In this paper we present new data regarding the distribution and impact of the most problematic invasive plant species. These species cause losses, economically and from the biodiversity point of view. Other species have a more local impact by the dimension of the populations and the territory they occupy. We will also mention and discuss the spread of these alien plant species.

**Keywords:** aggressive species, adventive plants, Bistrita river basin, ecosystem degradation, eastern Romania.

## **20. The rarest fairyflies (Hymenoptera: Mymaridae) from Romania, with regards to species distribution - linked to the natural environment and some rare habitats**

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It is well known that fairyflies (or mymarids) are the smallest insects in the world, the majority of the adults are smaller than 1 mm in length. These small insects are important egg parasitoids, keeping under control the spread of other insects (belonging to Heteroptera, Homoptera, Coleoptera etc.), insects known as pest species; in our case these pests are the hosts of this fairyflies or mymarids. The purpose of our paper is to present the rarest species of Mymaridae from Romania. These rare Mymaridae species have been collected from different environments and different habitats over the past 14 years. These rare specimens (belonging to this rare species) are stored in the private collection of the first author. Most of the rarest fairy species have been linked to the natural environment, to the reservation and to national parks (area with natural vegetation, old growth forests, areas with low anthropogenic impact).

**Keywords:** mymarids, natural environment, rare species, fairyflies, areas with low anthropogenic impact.

## **21. Overview of Rhodopyta (red algae) from Romanian Black Sea coast and possible first record of new species**

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The submersed vegetation of the world's seas and oceans, represents a very important ecosystem component, participating in the synthesis of organic matter, being a substrate for the epiphytic algae, feeding and breeding area for invertebrates and fish, protecting the fauna against the disturbing water action and offering a shelter against excessive light.

At the Romanian Black Sea coast phytobenthos is made up of green, brown and red algae, of which those last mentioned, represent an important component at Black Sea ecosystem, even though the number of species have decreased over time.

In this paper we pay special attention to the Rhodophyta group, because a dramatic decline is observed regarding the number of species over the years, this being explained by the fact that this group is very sensitive to pollution, even though some genera (e.g. *Ceramium*), can also develop in eutrophic waters, sometimes covering the hard substratum up to 80%.

Besides presenting the situation of red algae, our paper draws attention to two red algae species; one is *Lomentaria clavellosa*, considered lost for many years to Romanian sublittoral. The other, that could be a new appearance in the Romanian shore, is *Rhodymenia pseudopalmata*, which was noted in the Black Sea on the shelf of the Crimea only once more than 100 years ago, so we considered its presence worthy of special attention.

Both species were found in different areas along the sea shore, teared away from the rocky bottom, so further investigations are necessary in order to obtain more data about location and origin.



## 22. Biodiversity and nature conservation importance for Europe of Deltas and Wetlands in Azerbaijan

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Azerbaijan is country of wetlands and waterbirds. 16 potential and 2 registered Ramsar sites (wetlands of international importance) including Kur River Delta. Up to 1,5 mln waterbirds had wintering in Azerbaijan in 1990s - 2000s and up to 1 mln in 2010s (third country in Europe). Only along Caspian Sea coast more 700 000 waterbirds have wintering and more 200 000 have nesting (from them 40 000 on islands and old oil platforms). Azerbaijan is 4<sup>th</sup> country of Europe according to number of birds' species included in IUCN Red List and from these 36 species 22 are waterbirds including Dalmatian pelican, White-headed Duck, Lesser White-fronted Goose etc. The number of migratory birds we estimate in 8-10 times more than wintering birds. During wintering majority consist ducks, coot, geese and different waders, also cormorants and grebes. Swans and pelicans are especially numerous (up to 30 and 2 thousand consequently) in cold winters when frost and snowing occur. During breeding mainly herons, ibises, terns, gulls, pygmy cormorant, purple gallinule and other Rallidae, some waders. Only along Caspian coast more 700 000 wintering and more 200 000 nesting waterbirds occur. Main threats for wetlands and waterbirds are unsustainable water supply on some lakes in result of wrong water management, illegal hunting and fathering, low level of ecological education of local population. From 18 most important wetlands of Azerbaijan 4 are National Parks, 5 – hunting economies, others have not any protection status including Kur River Delta.

### ➤ Section II – Environmental factors, Ecological Restoration and Anthropic Impact

## 23. The evaluation of chemical status of Beleu lake

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The aim of the study was an analysis of the surface water and sediment quality of the lake Beleu, natural reserve of Republic of Moldova in Low Prut River region. This area is under intensive anthropogenic impact from petrol mining, agriculture and transport. The analysis of POPs, PAHs substances and heavy metals in river and sediment samples was made for the evaluation of the chemical status of water and sediments. Water and sediment samples were taken from the area of petrol mining and from other territory of Beleu lake. The analysis was made by Gas Chromatography and Atomic Absorption Spectrophotometry methods in accredited laboratory. The total PAHs value in water samples was detected from detection limit (<0,001) to 0,117 mg/L, Benzo[a]pyrene concentration was below of the detection limit 0,001 mg/L. The total PAHs value in sediment samples was in the interval from 0,022 – 0,900 mg/kg. The total POPs concentration in water samples is ranged from detection limit 0,001 to 0,053 mg/L. The total POPs concentration in sediment samples is in the interval from 0.030 to 1,448 mg/kg. Near 20 % of sediment samples had a total POPs value more that 0,10 mg/kg. The principal POPs were chlororganic pesticides in 70 % of sediment samples and PCBs for 30 % of sediment samples. The conclusion is that natural lake Beleu is under strong anthropogenic impact from different pollution sources including POPs polluted sites from past pesticide storages. The specific sediment monitoring is required for the more correct assessment of the status of this water body.

## 24. Assessment of the freshwater quality: a case study of the Carasu, Rotund and Cuzmânțu Mare shallow lakes - Danube Delta, Romania

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Deltaic freshwater ecosystems, *i.e.*, rivers, lakes, riparian areas and other wetlands sustain diverse flora and fauna and provide essential environmental services. These environments are defined by specific deltaic features and their associated biodiversity. Deltaic natural water resources are highly vulnerable to a multitude of anthropogenic and natural stressors *e.g.*, agricultural activities and land use, domestic and industrial pollution, eutrophication, invasive species, climate regime and change, siltation etc., and therefore, require attention for their protection and conservation. Carasu, Rotund and Cuzmânțu Mare are shallow lakes situated in the fluvial delta plain that belong to the Danube Delta Biosphere Reserve (DDBR), and are important for environmental studies and surveys in terms of the importance of the DDBR area worldwide (*i.e.*, World Cultural and Natural Heritage, Biosphere Nature Reserve and Ramsar Wetland). The assessment of the water quality was carried out to determine the concentrations of different physical-chemical environmental indicators present in the surface freshwaters. The objectives of this study were to assess the water quality in these lakes and provide information for future natural water resource analysis. The temperature (T: °C), water reaction (pH units), dissolved oxygen (DO: mg/l, DO: %), nitrite-nitrogen (N-NO<sub>2</sub>: mg/l), nitrate-nitrogen (N-NO<sub>3</sub>: mg/l), orthophosphates (P-PO<sub>4</sub><sup>3-</sup>: mg/l), chlorophyll "a" (Chla: µg/l), electrical conductivity (EC: µS/cm), total dissolved solids (TDS: mg/l), sulphates (SO<sub>4</sub><sup>2-</sup>: mg/l), total suspended solids (TSS: mg/l), turbidity (NTU units), water transparency/Secchi Disc Visibility (SDV: m), oxido-reduction potential (ORP: mV) and silica (SiO<sub>2</sub>: mg/l) were monitored at 13 sampling points in the lakes, during August 2018. The results of the water quality investigation, showed values that overall agreed with reference environmental standards, and individual values only incidentally exceed the maximum recommended level. These values reflect that the investigated water samples maintain appropriate levels (good to moderate water quality status) that are suitable for the aquatic life.

**Keywords:** *assessment, physical-chemical parameters, stressors, surface water, water quality*

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## 25. Researches on the conservation status of the fish natural breeding areas from the Somova-Parcheş hydrographic unit - Danube Delta Biosphere Reserve

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The researches' results presented in this paper are based on the field measurements unfolded in 2018 under the Danube Delta NUCLEUS research Program. They are focused to emphasize the actual status of the fish natural breeding areas from the Somova-Parcheş hydrographic unit, from the water flow regime, morpho-hydrographical, and vegetation conditions points of view. Its surface is 9178 has, out of which 1672 ha is the lacustrine one. The study zone is located upstream of the Danube Delta, directly connected to the Danube river (MM 43 – 53). This condition leads to a high rate of alluvial sedimentation process of this zone's upstream inner hydrographic network part, compared to the other hydrographical units of the Danube Delta Biosphere Reserve. In order to assure a good water flow regime, hydrotechnical works have been executed within 2008-2012, to improve the channels and lakes functionality, especially in low water level conditions. The breeding areas,

identified for the chain species in the DDBR, are generally concentrated in the Danube and Danube's arms flood plains, the brooks and channels, the freshly flooded spaces and, in particular, the reed edges of the lakes. There is a crooked relationship between macrophytes and some fish species, as they will not reproduce in the absence of plants. Many species actively seek plants to reproduce (as is the case of many Cyprinids). Spawning areas for these species are located in shallow waters and with rich vegetation, usually along the banks of rivers and lakes or in flood areas. The importance of plants is due to the fact that some species, to which adults, in addition to benthonic organisms, such as insect larvae, crustaceans, worms and mollusks, also feed on plants or plant substances and organic detritus. The study area actual status data have been compared to the reference ones. From the fish species study, carried out for 2 years, data show the same number of species. It can be concluded that this study area fulfils good conservation status conditions for fish species.

## **26. A two-year comparative survey (2015 – 2016) of West Nile virus circulation in Sălcioara – Jurilovca area**

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West Nile virus (WNV) is by far the most widespread arbovirus in the world, implicated in significant outbreaks in humans and animals every year. WNV is maintained in nature in an enzootic cycle between birds, as main hosts, and ornithophilic mosquitoes, as main vectors. Located on a major migration route and hosting a remarkable diversity of birds, Danube Delta Biosphere Reserve (DDBR) is an area where was recorded the most intense circulation of the WNV in Romania.

The main objective of our study was to evaluate the influence of weather conditions on the intensity of WNV circulation in an area belonging to the DDBR. For this purpose, the survey was conducted in the same area for two consecutive years under significant climatic differences. The following parameters were evaluated: diversity and migration period of the wild birds; diversity, abundance and seasonal dynamic of the mosquito species; feeding preferences and infection rate of the mosquito vectors and the seroconversion rate in sentinel birds.

Comparative analysis of collected data showed significant differences between the two successive years for all the considered parameters and, as well for the meteorological conditions. Our results suggest that weather factors may play an important role in WNV circulation intensity and can be important parameters for epidemic prediction.

## **27. Regional Copernicus Marine Service Training Workshop for the Black Sea Stakeholders**

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The Copernicus Marine Environment Monitoring Service (CMEMS) provides regular and systematic reference information on the physical and biogeochemical state, variability and dynamics of the ocean and marine ecosystems for the global ocean and the European regional seas. The observations and forecasts produced by the service support all marine applications, including: marine safety; marine resources; coastal and marine environment; weather, seasonal forecasting and climate.

The European Union has delegated to Mercator Ocean the role and responsibility of implementing an EU program that consists in delivering the Copernicus Marine Service (CMEMS) on its current multi-annual financial framework 2014-2020. Mercator Ocean pays particular attention to users and potential users by organizing

regular CMEMS users and training workshops. The Copernicus Marine Service supports all maritime regions in their activities ranging from harbour management, aquaculture to water quality monitoring in the frame of national and European policies.

The Training workshop on Black Sea Region is designed to train existing Copernicus Marine Service users and also gain new users with the support of the Mercator Ocean International and the National Institute for Marine Research and Development "Grigore Antipa" Constanta.

**The general objectives of the training workshop are:**

- To increase the knowledge of users about the EU Copernicus Programme and the CMEMS capacity (products portfolio releases, new services, opportunities).
- To listen to users/potential users' expectations
- To facilitate the acquisition and improvement of skills and competencies of users and potential users linked by a common region, by common needs or common domain of interests
- To ensure the adaptation of the service by collecting direct feedbacks and requirements

The practical sessions will be focused on: Black Sea Model Products (ocean currents, sea level, waves, chlorophyll-a); Satellite Ocean Colour products; Satellite Wave Products; Satellite Sea Level Products; In Situ Products.

The training will cover the main issues on implementing the EU policies - protecting the marine and land environment and biodiversity, combating climate change, responding to disasters, and managing transport.

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## **28. Lower Volga Wetlands – hydrological regime and anthropogenic impact in XX-XXI cent**

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The Volga River Basin is the biggest in Europe with catchment area about 1360000km<sup>2</sup>. In the unified interconnected ecosystem of the Volga River Basin and Caspian Sea the Lower Volga Region, including Volga-Akhtuba Floodplain and Volga Delta, represents the unique wetlands complex. The features of wetlands development are directly defined by seasonal and long-term variability of Volga river hydrological regime. Since 1961 Lower Volga water runoff is artificial water release by the Volzhskaya HPP, which integrates all natural climate and hydrological changes and anthropogenic impact at the whole Volga Basin. The analysis of long-term variability of the Lower Volga annual water runoff is carried out on the basis of the hydrological data by Volgograd gauge station since 1881 under natural conditions (1881-1956) and under Volzhskaya HPP impact (1961-2018).

The average annual water runoff for the natural and artificial periods are rather close –  $W_{nat}=256\text{km}^3/\text{year}$  and  $W_{art}=248\text{km}^3/\text{year}$  accordingly, but in artificial conditions the water runoff is characterized by low interannual variability than in natural conditions. Seasonal water runoff distribution has considerably changed under Volzhskaya HPP impact. After 1961 April-July water runoff has decreased for 30 %, but December-March water runoff has grown more than 2 times, in comparison with natural period.

The Spring-Summer high water flood period has the main ecological importance for Lower Volga, the annual extended floods are necessary for all components of wetlands ecosystem. The parameters of floods are crucial for the development and reproduction of plants, fish, birds and animals, and very important for population in the Lower Volga region.

The analysis of long-term variability of flood waves parameters has shown the significant reduce of flood duration (to 32%), and duration of a phase of a high water rise (to 50%), the high water peak comes in artificial conditions for 20 days earlier. Reduction of a phase of a high water rise has led to sharp increase in intensity of a water level rising and, as result, to change of Lower Volga temperature regime. Water temperature on high water peak has decreased on 40%, amplitude of temperature – on 60%. The water heat accumulation in a high water has decreased on 50%, and on a phase of a high water rising - more than 60%.

## **29. River floodplains in a changing world – their role and challenges ahead**

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Rivers are key ecosystems providing a multitude of ecosystem services that are vital for human societies. Moreover, rivers have a high strategic importance for global ecological functions and biodiversity. As many large rivers in the world, the Danube River is a highly complex socio-ecological systems and a hotspot of biodiversity and ecosystem services, especially considering the floodplain systems, but is also affected by multiple human activities like navigation, hydropower, urban development or agriculture, making river-floodplain systems to one of the most threatened ecosystems worldwide. Conservation and restoration of the systems biodiversity and ecosystem service provisioning is an important task, but challenging because the diversity of human activities and policy targets (including WFD, Habitats and Birds Directive, Flood Risk Directive, Biodiversity Strategy or Green Infrastructure Strategy), scarcity of data compared to the complexity of the systems, heterogeneity of environmental problems and strong differences in socio-economic conditions along the Danube. Therefore, in this presentation we provide an overview on the status of Danubian floodplains, their biodiversity and their strategic importance at larger whole river network scales and present examples how combined assessment approaches for biodiversity and ecosystem services could support restoration planning and furthermore, the effect of implemented restoration measures on these floodplain properties. In future also emerging issues such as climate change and invasive non-native species will need careful consideration in ecosystem management of floodplains to minimize unintended effects.

## **30. The assessment of wetland recovery after the extreme drought in the Volga-Akhtuba Floodplain by multispectral satellite imagery**

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Volga-Akhtuba floodplain is the part of the Lower Volga region. The territory of the Volga-Akhtuba floodplain (VAF) is an unique arid wetland, where the dynamics of ecosystems are largely determined by the hydrological regime of the Lower Volga, which is regulated by the Volzhskaya hydroelectric power plant dam – Europe's largest HPP.

The extreme drought in the VAF occurred in the 2015, arised from the lowest water flow and water level during the spring-summer flood for the entire period of hydrological observations. This drought of 2015 resulted in the lowest flooded areas for the entire period of satellite observations, and thus the ecological catastrophe in the whole VAF territory. A dynamics of VAF key ecosystem components - plant cover and water bodies - was examined. Their recovery after the disastrous water deficit in 2015 was assessed on the basis of the joint analysis of multispectral satellite data and ground observations on VAF water bodies, and geobotanical descriptions.

A special attention was paid to the 14 test sites where the authors conduct the long-term monitoring of the local ecosystem dynamics by the remotely sensed data. For these test sites the data on the extremely dry 2015, and relatively wet 2016-2018, was assessed and compared with the data for the preceding period of low water 2006-2014. The water bodies, and plant community dynamics in the VAF were examined on the basis of water and vegetation index value dynamics.

After the extreme drought in 2015, the VAF ecosystems in general, has undergone the significant changes, when compared to the preceding low-water period 2006-2014. The disappearance, drastic shallowing and overgrowth by hygrophytes observed in the significant number of the permanent water bodies all over the floodplain has reduced the stability of VAF wetland ecosystems. Currently, even a slight water deficit may lead to the progress of desertification, and VAF contamination with weeds, the loss of inland VAF water bodies and

its ecosystems (water body silting and thus, withering of VAF parts), as well as the loss or the substantial transformation of native wetland phytocenoses. Similar processes have been observed in other arid wetlands like floodplain and Delta of the Ural river (Kazakhstan), and Gavkhuni wetlands (Iran).

### **31. Preliminary data regarding the trace elements residues from the feathers of waterbirds in Danube Delta (Romania) in 2015**

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In the Danube Delta Biosphere Reserve (Romanian part) the authors have carried out in 2015 an estimation regarding the heavy metal residues from the feathers of wild birds living near water. The concentration of trace elements (As, Cr, Mn, Ni, Pb and Zn) was determined in feathers of White Stork, Pygmy Cormorant, Common Tern, Western Marsh-harrier, Little Egret, Common Little Bittern, Great White Pelican and Ferruginous Duck. The procedure was done by using acid mineralization necessary for trace elements determination, with the help of Anton Paar Multiwave 3000 microwave oven. The trace elements contents were analyzed using the ICP-MS Elan DRC-e which is applicable for the determination of small concentrations of a large number of elements. Arsenic concentrations varied between 1,610 mg / kg for Ferruginous Duck and 3,437 mg / kg for the Great White Pelican. The highest chromium concentrations were found in Pygmy Cormorant (11.063 mg/kg) and Great White Pelican (12.368 mg/kg); the highest zinc concentration was found in Ferruginous Duck (163.237 mg / kg). The highest concentrations of manganese and nickel were found in White Stork (66.541 mg/kg – Mn; 6.276 mg/kg - Ni), Western Marsh-harrier (59.037 mg/kg; 4.075mg/kg) and Little Egret (64.347 mg/kg; 5.900 mg/kg). The concentration for lead presented values between 3.474 mg/kg (Western Marsh-harrier) and 0.426 mg/kg (Ferruginous Duck); the other studied species had a concentration of up to 0.9 mg / kg. Investigations carried out on heavy metals and arsenic determined from feathers of 8 bird species revealed important interspecific differences caused most probably by the trophic and ecological peculiarities of each species. Laboratory analyzes revealed that the waterbirds have a high capacity of storing heavy metals in plumage. All six heavy metals studied are bioaccumulative and causes toxic effects in organisms.

**Keywords:** heavy metals, feathers, waterbirds, Danube Delta

### **32. Study of the biochemical parameters of sapropelic sludge of salt lakes from Buzau County protected area, with different degrees of microbiological degradation**

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The purpose of the present study was to evaluate the potential of selected enzyme activity assays in correlation with microbial abundance and heterotrophic activity in sapropelic sludge of salt lakes from Buzau County protected area (Balta Albă, Amara, Jirlau and Coşteiu lakes) during the summer of 2018. In waste sludge, esterase and dehydrogenase activities were found to correlate with microbial abundance measured as colony forming units of heterotrophic bacteria published by other authors one year before (Lazar & all., J. Environm. Protection 8, 1474, 2017). A panel of five enzyme activity assays, acidic and alkaline phosphatase, urease, catalase and total dehydrogenase were used to characterize activated sludge and the results were correlated with resazurin viability test.

**Keywords:** salt lakes, enzyme activity, correlation, waste sludge.

### **33. GREEN DANUBE - Integrated transnational policies and practical solutions for an environmentally-friendly Inland Water Transport system in the Danube region**

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This is a study summarising work on a Green Danube project dedicated for a medium and long term perspective of Inland Water Transport in the EU.

Our specific objectives are:

- Contribute to limit impacts of IWT on the Danube ecosystem
- Contribute to emissions reduction in the Danube ecosystem
- Raise public awareness

Without policy intervention in the year 2020 the average emission level of air pollutants of inland navigation vessels will in many cases be higher than that of trucks. The transport sector is recognized as a major contributor to emissions, therefore it is important to support environmentally sound transport modes like IWT.

The Danube region includes one of the air pollution “hot spots” in Europe. From its spring to Black Sea, the Danube River passes through countries with different level of emissions, due to the different kind of technologies and fuels used and to different level of implementation of the environmental policies.

Green Danube comes as a response to these specific needs in the Danube inland transport sector through the project activities focused on innovative and practical solution for:

- Capacity building of inland regulatory bodies in view of compliance of new emissions standards by determining and assessing the level of pollutant emissions in pre-selected Danube areas and by developing indicative actions for meeting the emissions standards to be enforced by appropriate EC Regulations and Directives currently under development-
- Reduction of emissions by use innovative technologies through conducting a survey on characteristics & operating regimes of inland navigation vessels passing through pre-selected areas, proposal for erection of alternative fuel supply facilities & optimum sailing behaviour recommendations.
- Set up innovative tools - IWT Environment Information Centres and organization of transnational pilot actions leading to increased public awareness on inland transport environment protection.

### **34. Perception of visitors regarding the wildlife inhabiting an archaeological site from the Danube Delta Biosphere Reserve**

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Cultural heritage sites are often located within biodiversity hotspots, which may induce human-wildlife conflicts despite their effectiveness in attracting tourists. Mitigating these conflicts requires targeted conservation and education measures based on a solid understanding of how visitors perceive wildlife within these sites. We assessed visitors’ perception of the major wildlife groups (i.e., amphibians, reptiles and water birds) that were detectable during visiting hours within Histria archaeological site, located in the Danube Delta Biosphere Reserve. We explored whether age, gender, education, nationality, and awareness (i.e., prompted by guided tours, previous visits, or protection level of the area) influenced visitors’ perception towards the different wildlife groups. Visitors were disturbed or felt repulsion mostly towards the less charismatic wildlife groups: snakes, frogs and toads, perception significantly explained by gender, nationality and awareness. These results enabled us to provide practical recommendations for a shared management of natural and cultural heritages.

### 35. Research-based Assessment of Integrated approaches to Nature-based SOLUTIONS (RAINSOLUTIONS)

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RainSolutions assesses innovative *nature-based solutions* (NBS) for the sustainable management of nature, addressing a combination of societal challenges such as *climate change, water security, water pollution, human well-being and risk management*. With specific focus on drought alleviation (water supply and management), different relevant NBS products and technologies such as sustainable flood retention basins, integrated constructed wetlands as well as rainwater harvesting and reuse techniques will be evaluated.

RainSolutions aims to develop an integrated framework of methodologies to assess NBS for the restoration and rehabilitation of urban water resources systems.

The objectives are as follows:

- a. to identify stakeholder and urban ecosystem needs to inform planning/design;
- b. to review and capitalize upon existing experiences of good practices;
- c. to simulate the impact of climate variability and existing urban infrastructure on NBS within scaled pilot laboratory and field installations;
- d. to develop an integrated indicator system for the evaluation of key NBS in terms of closing the water quantity and quality gap addressing also socio-economic aspects such as well-being and costs;
- e. to map ecosystem services delivered by NBS for an evaluation of the best technology to implement in different urban contexts to support sustainable water management;
- f. to create a NBS planning and design framework supported by machine learning to generate recommendations addressing challenges associated with climate resilience and well-being in urban areas
- g. to disseminate the self-sustainable web-based framework in collaboration with national stakeholders fostering the transfer of NBS knowledge and communicate the project impact. The project consortium consists of the following partners: Lund University; University of Johannesburg (UJ); University of Pretoria (UP); VESI Environmental (VESI); Federal University of Technology (UTFPA); Oslo Metropolitan University; Wageningen University (WUR); Técnica y Proyectos S.A. (TYPESA); University of Tartu (UT); Danube Delta National Institute for Research and Development (DDNI).

### 36. The West Nile Virus (WNV) molecular detection in vectors: from the benchtop to the field-deployable laboratory

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The WNV molecular detection was well documented and studied in Romania since the urban outbreak in 1996 occurred. A lot of molecular methods (classical Reverse-Transcription PCR, Real-Time PCR, sequencing) were used and described during this time.

The presence of WNV in Romania was established by integrative studies (entomological, serological and molecular approaches). Nowadays is well known that WNV is present in different localities along the Danube River including Tulcea and the Danube Delta.



The WNV is a flavivirus with a single positive strand RNA genome of approximately 11000 nucleotides, the virus is transmitted by mosquitoes and the reservoir is represented by birds, the virus causes encephalitis and meningo-encephalites in humans.

Due to the advances in equipment platform and reagent chemistry we are able today to investigate WN viral-load in mosquitoes (vectors) in a field –deployable laboratory.

The present work describes how a benchtop method for WNV detection (developed in 2005 by our team) was modified for field purposes in conjunction with the use of Mini8 Plus™-thermocycler and MD-BOX-LAB from Coyote-Bioscience Co.Ltd.

The results pledge for: 1) one-tube RT-PCR detection and 2) use magnetic beads for RNA extraction to avoid prolonged centrifugation steps. In conclusion the deployable bio-mol. laboratory is subject to continual improvement.

### **37. Water and Sediment Pollution Near Sundarbans Forest: Toward Sustainable Development**

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Sundarbans mangrove ecosystem, is a unique, productive and highly valued ecosystem in terms of economy, environment and ecology. Sundarbans is the world's largest contiguous mangrove forest and is a designated world heritage site. Shared by India and Bangladesh, it is home to several species including tigers. The present paper has attempted to highlight the long term pollution effect on ecological studies undertaken on Sundarbans Mangrove Ecosystem. The details of water and sediment quality was monitored and discussed. Different spectroscopic and analytical techniques were used to determine the quality of pollutants and compared with standard limits. Some recommendation was addressed and will be discussed with policy makers.

### **38. Spatiotemporal Change of Vegetation Coverage and its Relationship with Climate Change in Freshwater Marshes of Northeast China**

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Based on the normalized difference vegetation index and climate data, this study investigated the spatiotemporal change of fractional vegetation cover (FVC) and its relationship with climate change in freshwater marshes of Northeast China from 2000 to 2016. Although freshwater marshes in Northeast China have undergone loss during the past nearly 20 years, the FVC of unchanged marshes has increased by 0.34% per year over the study area, with the largest increases in Songnen Plain. Correlation analysis results showed that warm growing season temperatures could enhance the FVC of marshes in the Greater and Lesser Khingan Mountains, but reduce the FVC in arid and semi-arid grassland regions of Songnen Plain and Eastern Inner Mongolia. By contrast, the increased growing season precipitation could significantly enhance the FVC of marshes in semi-arid grassland regions of Northeast China, but reduce the FVC of marshes in the Lesser Khingan Mountains and Sanjiang Plain. Under the background of future climate change, we can predict lower FVC of marshes in Songnen Plain and Eastern Inner Mongolia, but higher FVC of marshes in the Changbai Mountains in the future. This research is expected to provide valuable implications for the protection and restoration of wetland vegetation in Northeast China.

### **39. Restoration of degraded wetlands in Northeast China: integrated theory and technology**

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Northeast China (NC) distributes one-fifth of the national wetlands and one-third of the palustrine wetlands that playing important roles in conserving water sources, providing biological habitats and maintaining biodiversity. Large area of wetland loss and degradation have occurred in NC mainly due to wetland reclamation and draining. In the past 25 years, 72% wetlands in NC have been threatened by various factors and their ecological functions are declining. In July 2016, a national key R&D program of wetland restoration and reconstruction was launched by the Ministry of Science & Technology of China, led by the Northeast Institute of Geography and Agroecology (IGA), this program proposed 1) to systematically study the wetland ecosystem distribution pattern, function evolution and driving mechanisms in NC, 2) to develop ecological water replenished and eco-hydrologically regulated techniques, 3) to develop ecological restoration and reconstruction techniques of dominant plants, 4) to develop function enhanced techniques of important habitats, 5) to develop structural restored and carbon sequestration upgrading techniques in peat wetlands, and 6) to implement comprehensive demonstration of "hydrology-vegetation-habitat" integrated restored and reconstructed techniques in typical degraded wetlands. A technical scheme for wetland restoration and reconstruction framework, a plan for coordination of water conflict between wetlands and farmlands and new approaches for the development of wetland ecological industry have being tackled.

#### ➤ **Section III - Natural Resources and Socio-economics aspects**

### **40. Natural vegetal resources of Danube Delta territory - present status and trend**

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Danube Delta Biosphere Reserve territory, has a great potential concerning natural vegetal resources such: edible mushrooms, medicinal herbs, beekeeping important plant species, pastures and reed.

The Administrator of this area has a great challenge in taking right decisions and keeping the balance between nature conservation and sustainable use or natural resources.

Since 2002 our institute was conducting studies of sustainable harvesting potential estimation of the natural vegetal resources. This database is a valuable information that can be used to assess the evolution of the harvesting potential of the above-mentioned resources and draw scenarios if different approach is taken from the administration of the Danube Delta Biosphere Reserve. Therefore, we will draw attention on different perspectives that can be taken in order to help the decisionmaker in he's activity.

#### 41. Bicycle touring - based ecotourism in the Danube Delta Biosphere Reserve

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Developing ecotourism in accordance with the ecosystem carrying capacity means promoting a tourist flow monitoring system that allows the assessment of tourist dynamics by type of tourism.

Developing ecotourism in the Danube Delta Biosphere Reserve, as one of the main goals, may contribute to the ecological education of visitors. Moreover, since natural resources are not unlimited, they have to be used in a reasonable manner, in the context of sustainable development. Therefore, the tourism/environment relation should be a stable and lasting one. Ecotourism is also an important tool for the conservation of nature.

Practicing ecological tourism in protected areas of international value, such as the Danube Delta Biosphere Reserve is of paramount importance. The aim is to correlate tourism strategies with nature-protection goals and provide new jobs for the local population to help increase family incomes.

The entire local community can benefit from the development of bicycle tourism: from creating new jobs, increased demand for certain products and services to increased flow of tourists.

#### 42. Experimental aquaculture research; the genus *Lemna* sp. highlighting environmental requirements and specific adaptations to environmental polytroph-eutrophic conditions of some aquatic ecosystems

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In this paper I have detailed some aspects regarding the yield and the production of vegetal biomass in the cultivation of *Lemna* genus. The species of this genus presents a complex enzyme device that can decompose a wide range of potentially polluting substances. Our study follows the complex enzyme, productivity and adaptability of *Lemna* species in various trophic conditions of aquatic environment with varying degrees of pollution or intervention.

**Keywords:** *Lemna* genus, vegetal biomass, trophic conditions, aquatic environment.

#### 43. Assessing the perception of local community on the transition from economic capitalization to biodiversity conservation in Danube Delta

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The biosphere reserve concept assumes that environment and human society to be an integral part. Ignoring local people's perception of the biosphere reserve fundamental objectives can attract conflicts of interests between managers/decision-makers on the one hand, and the local communities on the other. This paper examines local communities' knowledge and perceptions towards Danube Delta Biosphere Reserve in the context of the stipulation by law of certain rights, obligations and restrictions for the population, including access to natural resources. Data was collected by means of questionnaires and focus-groups within four localities of Danube delta, in order to provide an account of the locals' perspectives on the changes happening in their region over the past three decades, in the context of transition from the concept of economic exploitation to biodiversity conservation.

#### 44. The perception overview of main stakeholders on algal blooms in Danube Delta

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Danube Delta is faced by serious algal bloom risks due to eutrophication and climate change being vulnerable to ecological decline, which also involves challenging issues of biodiversity conservation, restructuring of the wetlands and improving the human well-being. The awareness and the effects of algal blooms on aquatic ecosystems represent an issue of stakeholders' interest, mainly for administrators of protected area, but as well for water resource managers. This paper aims to assess the level of perceptions of stakeholders on algal blooms in aquatic systems of Danube Delta in order to apprehend potential adaptation and mitigation strategies for the future, and to analyse for political targets and deficits. Hence, by means of questionnaires were engaged 24 stakeholders representing natural resource managers, authorities, scientists, NGO's. The focus was to assess how they perceive the severity of aforementioned phenomenon in aquatic ecosystems, if they have common understandings of the impact and risks arisen and which are the vulnerabilities in terms of potential adaptation and mitigation strategies for the future. Even though the results indicated that not all stakeholders are aware with algal bloom scientific terminology, stating a lack of institutional communication and availability of information to the public in the area, it was an overall consensus that the phenomenon represent more than a serious issue for deltaic aquatic ecosystems. The level to which national, regional and local resources can be focused on treating algal blooms issues depends in part of the strengths and interest in the deltaic area.

#### 45. Fish fauna status from lake-complexes of Danube Delta Biosphere Reserve (DDBR) in condition of growing population of *Perccottus glenii* in 2018

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Native fish species from Danube delta has recently a new threat from growing and expanding of population of non-native species *Perccottus glenii*. The paper is analyzing how this invader has integrated or impacted local ichthyofauna. During growing season of year 2018 were sampled 15 representative lakes in 210 stations from what: 40 sites with electric fishing (fishing effort over 6 hours), 143 sites with multimeshes size Nordic gillnets (4,290 m-net<sup>-1</sup>·night<sup>-1</sup> fishing effort), 19 sites with commercial gillnets (1710 m-net<sup>-1</sup>·night-fishing efforts) and 2 sites using seine fishing (in the Razim lake). In 2018 in 6 lake-complexes were identified majority limnophilic species, included *Perccottus glenii* first recorded in 2016 in Razim-Sinoie lakes-complex in Holbina gulf extending in all Razim lake in 2018. Totally were captured 43 fish species including over 21,000 fish individuals with almost 713 kg weighting. The standardization was at Catch Per Unit Effort (CPUE) for relative biomass (grams·h<sup>-1</sup> electric or 100 m<sup>2</sup>-net·night<sup>-1</sup>) and Number PUE (NPUE) for relative abundance (individuals·h<sup>-1</sup> electric or 100 m<sup>2</sup>-net·night<sup>-1</sup>). It was analyzed species richness and ecological parameters, like relative abundance, relative biomass, dominance (D), constancy/frequency (C), ecological significance (W), biodiversity index (Shannon-Wiener indices Hs and Evenness indices E). Present work will characterize the ichthyocoenoses and eventually modifications in fish fauna structure from lake-complexes of DDBR in condition of integration and naturalization of *Perccottus glenii* non-native species.

**Keywords:** fish fauna, Danube Delta, lakes, ecological status, ichthyodiversity

#### **46. Current status of transport system in a fragile environment: Sulina case study**

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Inland waterway transport is an efficient, economical route of transport for long distances and high freight, but also a less polluting means of transport. The Danube River is a major catalyst for creativity and intercultural dialogue, a source of inspiration and bridge over time, which has ensured communication between cultures and civilizations developed under the influence of commercial, social and cultural relationships due to its proximity. Traditionally, the Danube and its secondary branches have been one of Romania's transport routes.

Sulina city is located at the end of Sulina International Black Sea Canal. Sulina is the only city in "the heart" of the Danube Delta, which is located on the priority axis of the trans-European transport network Rin-Main-Danube. The present study shows the current situation of Sulina Canal navigation, although the share of inland waterway transport is reduced compared to other modes of transport, which has a very high development potential, but it is not used at full capacity.

#### **47. Sustainable Tourism and the Danube Delta: Tourism Development Strategies Designed to Promote Natural Resource Conservation and Local Socio-Economic benefits**

**Statache Ramona**

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Tensions often appear between the conservation needs of ecologically sensitive and remote areas and the socio-economic development needs of the local population. The natural attractions of such areas (landscape, flora, fauna, cultural heritage) easily favour the development of a local tourism industry. While economically attractive, tourism development in such areas can lead to pollution, resource degradation, loss of biodiversity etc. Also, although potentially profitable for the local population (employability opportunities, increase of income, development of infrastructure etc.), tourism development can also open the door to multinational large scale developments at the detriment of the local community and business environment. This presentation will explore sustainable options of tourism development in the Danube Delta, options that can help minimise its impact on natural resources, increase its conservation profile and ensure that its socio-economic benefits remain targeted at the local population. The advantages and weaknesses of several competing concepts will be explored: sustainable tourism, responsible tourism, eco-tourism etc. Avenues of possible collaborations will be discussed in the areas of tourism destination development, SME support, and development of a conservation-friendly entrepreneurial knowledge base.

#### **➤ Section IV - Geographical Information System and Application System Modeling**

#### **48. Maritime Spatial Planning in Romania – Black Sea, support for the marine fisheries and aquaculture development**

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The European Directive 2014/89/EU regarding Maritime Spatial Planning elaborated by the European Parliament and the European Council on 23 July 2014 established a framework for maritime spatial planning started to be implemented in Romania and Bulgaria, as Member States of the Black Sea Basin. In 29 august

2016 the Romanian Emergency Ordinance no. 18/2016, regarding Maritime Spatial Planning was published in the *Official Monitor* no. 658, including all terms of implementing, according to EU legislation and rules.

The paper presents the main experience obtained by NIMRD under the own MSP projects development and implementation including also the fields of marine fisheries and aquaculture. These projects being:

- MARSPLAN BS (DG-MARE) aiming to help the MSP Directive 2014/89/EU implementation in Romania and Bulgaria as Black Sea countries MS. This developed six cases studies including one dedicated to the marine fisheries and aquaculture and one to the transboundary area Shabla, Bulgaria and Mangalia, Romania. All Case Studies finalized by a written reports and books which are presented.
- ECOAST Project-COFASP Program is a project dedicated totally to the Marine Fisheries and Aquaculture activities, using very new methods for the spatial and temporal analyses and relation with other maritime uses and activities. Maps resulted from these methods used (DISPLACE, GRID, matrix, cumulative impact and footprints in aquaculture traces) were analyzed.
- European MSP Platform permitted us to develop an MSP Focal Point for the Black Sea is our involvement in a DG MARE project for MSP Assistance in the EU.

The paper concerning Fisheries and Aquaculture under Maritime Spatial Planning (MSP) is focused on the main important aspects regarding these important fields by the spatial and temporal point of view taking into account the both development and relation with other maritime activities.

The paper includes the dimension of marine fisheries and aquaculture in the world, Black Sea and Romanian Economic Exclusive Zone (EEZ).

The main environment characteristics in relation with these domains spatially and temporally speaking.

The definition of MSP and its very short history in the world, Black Sea and Romania, adding relation with this with EU Directives, including those relating marine fisheries and aquaculture.

The boundaries establishment, mapping of human existing activities in the sea space, mapping future demands of marine space, useful for the elaboration, developing and evaluating of the maritime spatial and management plan are the main steps of MSP, including marine fisheries and aquaculture.

Reasons for MSA including in the marine fisheries and aquaculture are detailed and also the suitability of spatial planning to regulate fisheries.

Conflicts analyses and the stakeholder's consultation are also important processes in the MSP relation with marine fisheries and aquaculture.

#### **49. The LUCAS project roller coaster**

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The Statistical Service of the European Commission, EUROSTAT, has carried out the LUCAS 2018 survey on the land cover, land use situation and landscape changes in the European Union. The survey had taken place between March and December 2018. This monitoring activity called LUCAS, concerning many aspects such as: land use, land cover, soil sampling and so on, is taking place once every three years. Starting 2018, the "Danube Delta" National Institute for Research and Development (DDNI) was given the opportunity to participate once again in this project that demanded 99.99% accuracy. The project leader, a company based in Munster, Germany, called EFTAS have subcontracted DDNI to implement and manage this project in Romania. The methodology of the LUCAS project was to survey 11612 points in the field and 5111 points for photo interpretation. The field points were divided in three main categories: core points, core points plus soil collection, core points plus grassland evaluation, also points that had mixed categories in between. For this survey DDNI had to send in the field his own experts plus 46 surveyors trained and employed for a limited time. This project

started in 2017 in the EU partner countries but Romania joined in spring 2018 and this delayed the field survey in order to prepare all documentation and most important to find the surveyors needed for this task and train them. In the field campaign, the surveyor had to navigate to these specific points and describe the land cover and land use of the plot where the point was located, take landscape pictures and further describe certain aspects according to the methodology. In order to complete one LUCAS point, the surveyor had to visit the point, describe it according to the methodology, insert the data from the field into an online database using a smartphone, collect soil sample (1421 points), evaluate a grassland (544 points) and then complete the information for this point within the database at a computer terminal. Sometimes the time spent at a computer terminal would be much longer than the time spent in the field for the same point. The surveyors had many tasks and rules to fulfill for this 2018 LUCAS field campaign that determined some errors in applying the correct methodology in the field which propagated further into the database. The project demanded data collection accuracy to be 99.99% and a surveyor can apply the LUCAS methodology perfectly but is still a subject to subjectivity when estimating distances, areas, percentages and so on that could not be 100% agreed by their supervisors in order to validate their work. Another delay for the field survey was induced by the capricious weather during two summer months: June and July. The survey was supposed to end in October but the weather in the whole Europe in 2018 determined a month delay for most of EU countries and for Romania two months by adding on top of the unstable weather, the surveyor availability. Thus, the survey in Romania ended in December 2018. The data collection in the field for this project was a rollercoaster ride from the beginning till the end of the field campaign, with ups and downs concerning the weather conditions and the restrictions and delay that came with it. Concerning the surveyor availability, which represented the main issue: some surveyors could not continue their task, other abandoned without notice, other kept generating systematical mistakes in the data no matter the interventions from the managing body. Finding new surveyors in such a short notice, train them, stimulate them to continue the survey in other areas than in the ones they were familiar with etc., was a challenge from which valuable lessons have been learned. All in one, the field campaign ended successfully with a valuable database but with a great deal of efforts and compromises.

#### **50. Contribution to study on evolution of climatic parameters and some environmental components, in Danube Delta Biosphere Reserve**

**Mierlă Marian, Grigoraş Ion, Trifanov Cristian, Covaliov Silviu, Doroftei Mihai**

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Studies on climate change in a narrow way bring the very first information very useful to human society and, together with the research where there are studied also the effects of them that can be induced to the environment by modifying its various components, can provide important information. Thus, human society can at least be warned about changes caused by climate change, which leads to better preparation for changes in adaptation. In the scientific world, there are two important sides for defining climate change: the first category includes researchers from all spheres of research who say that these climate changes are induced by man's "industrial" behavior, especially after the second stage of the other industrial revolution, and the second side is formed by the specialist which state that these changes are natural variables and has no link with the human activities. This paper attempts not to be in neither the both mentioned sides. The purpose of this paper is to show the evolution of important climatic parameters (such as precipitation, average, maximum and minimum temperatures). In addition to the evolution of these parameter values, there will be some changes to the water component. These changes are related, so a more authentic "X-ray" of these can lead to a more accurate diagnosis. Useful diagnosis to prevent and mitigate the effects of changes that are often unpredictable. The data used are for the entire Romanian territory but in this paper the focus will be on the Danube Delta Biosphere Reserve.

## 51. New Contribution the Focal Point for Black Sea Maritime Spatial Planning, for the European MSP Platform

**Nenciu Magda\***, Alexandrov Laura\*, Angela Szultze\*\*, Lisa Simone de Grunt\*\*, Clare Waldman\*\*, Spinu Alina\*, Laura Boicenc\*, Madalina Rosca\*, Vlasceanu Elena\*, Alina Spinu\*, Luminita Lazar\*, Andra Oros\*, Valentina Coatu\*

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Maritime Spatial Focal Point for Maritime Spatial Planning (MSP) hosted by NIMRD, under the Project DG-MARE/2014/23, *Assistance Mechanism for the Implementation of Maritime Spatial Planning* and under the European MSP Platform has continued:

- to collect MSP information from Black Sea area,
- to make an inventory of the most important MSP projects, practices, events, trainings, etc.,
- to contribute to the main important MSP studies, guidelines, manuals and reports elaboration, including the field of data base for MSP,
- to participate to the most important MSP events (MSP conferences, workshops, public events, etc.) and exercises regarding the most important MSP processes, land-sea interaction, Blue Growth, transboundary approach, ecosystem approach, stakeholders consultation, fisheries and aquaculture mapping in relation with other maritime activities,

A huge quantity of information has been collected, classified, sent and installed on the web-site (<http://www.msp-platform.eu/>). This paper shows the most relevant examples of them, quantifying the Romanian contribution to the European, regional and national implementation of MSP Directive – 2014/89/EU. The necessity of continuity for a clear transparency and knowledge of maritime Spatial Planning has been done.

**Keywords:** Black Sea, Romanian coast, maritime spatial planning, European MSP Platform, MSP inventories, objectives, approaches, projects, practices, applications, case studies, lessons learnt.

**Acknowledgement:** This work has been supported by the European Commission through the European Maritime and Fisheries Fund, 2014/DG MARE/23, Project „*Assistance Mechanism for the Implementation of Maritime Spatial Planning*” (2015-2017), EASME/EMFF/2014/1.3.1.7/SI2.721508, SERVICE CONTRACT #320-4

## 52. Consistent ontological scenarios analysis on the information management towards the adaptive management of Danubius RI

**Nichersu Iuliana I., Nichersu Iulian, Balaican Dragoş**

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According to the DANUBIUS-RI first information, European research on river-sea systems and their transitional environments is world- leading but fragmented, largely discipline-specific and often geographically isolated. Unfortunately, the lack of interdisciplinary research infrastructures has fuelled this fragmentation. DANUBIUS-RI will fill the gap, drawing on existing research excellence across Europe, enhancing the impact of European research while maximising the return on investment. DANUBIUS-RI is planned to be a pan-European distributed research infrastructure supporting interdisciplinary research on large river-sea systems that will provide access to a range of European river-sea systems, facilities and expertise; a 'one-stop shop' for knowledge exchange in managing river-sea systems; access to harmonised data; and a platform for interdisciplinary research, inspiration, education and training. The relationship between the DANUBIUS-RI components must be geared towards knowledge as detailed as their functions in each of the Danube-Delta-Sea system components in order to achieve cooperation between them and a reciprocal and intensive exchange of information. DANUBIUS-RI's management is undergoing continuous restructuring and aims to capture the dependency and functionality relationships of the various aspects, components and parts of DANUBIUS-RI in the integration process in the



context of adaptive management. This analysis follows the elaboration of the information flow scenarios in the DANUBIUS-RI system and proposes a series of perfectly consistent scenarios in the combination of some hypothesis developed to improve information management in a system with many interdisciplinary components.

### **53. Implementation of a citizen-centric public service application in Danube Delta area for Flood-Serv Horizon2020 project**

**Nichersu Iuliana I., Nichersu Iulian, Bratfanof Edward, Balaican Dragoş**

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FLOOD-serv Horizon 2020 project developed a pro-active and personalised citizen-centric public service application that enhances the involvement of the citizen and harnesses the collaborative power of ICT networks (networks of people, of knowledge, of sensors) to raise awareness on flood risks and to enable collective risk mitigation solutions and response actions. For this, the project team implements pilots, verifies and validates the project solutions in different conditions and different areas of Europe.

The activities implemented by the team of the project enhance the role of the user (the citizen) in the society. DDNI team members testes the Flood-Serv platform using attractive participatory approaches by involving existing communities of people, public authorities, water management officials, planning officials, emergency services but also regular citizens and academia institutions.

Close collaboration with the end-users plays an important role in the transformation of public services. Given the high availability of data, trough the knowledge base of Danube delta National Institute, users were provided more pro-active, higher quality and valuable flood risk management services. This makes services more attractive and increased collaboration between all the parties, speeding up the information flow from citizen to public administrations in case of a flood event. The activities presented in the study enhanced societal resilience towards an improved cooperation and collaboration of all stakeholders: government, private sector, NGOs and other civil society organizations as well as citizens.

### **54. Analysis of fishermen's behaviour to spatial management options and assessment of the economic and ecological performance of alternative spatial plans, under COFASP - ECOAST Project**

**Nicolaev Alexandru, Spinu Alina, Niculescu Dragos, Bastardie Francois, Alexandrov Laura, Anton Eugen, Radu Gheorghe, Nita Victor, Rosca Madalina**

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ECOAST Project-COFASP Program is a project dedicated totally to the Marine Fisheries and aquaculture activities, using very new methods for the spatial and temporal analyses and relation with other maritime uses and activities. Maps resulted from these methods (DISPLACE, GRID, matrix, cumulative impact and footprints in aquaculture traces) were analyzed.

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The main objectives of the presented spatial and temporal method are:

- to develop an operational modelling framework to analyse fishermen's behaviour and predict their likely responses to spatial management options;
- to measure economic and ecological performance of alternative spatial plans by scenario evaluations including delineating locations and space limits that ensures certain levels of production to local fishers and farmers;
- to identify recommendations for a better integration of fisheries and aquaculture in Maritime Spatial

## Planning.

The operational modelling framework for the analysing of the fishers' decision making and predict likely responses of fisheries to spatial management options should assess whether actual Maritime Spatial Planning (MSP) measures are dedicated to the best placements for priorities areas for fisheries, aiming to minimize the effects on fishing or harbours communities. The developed tools operate with MSP-relevant resolution in time, space and fishing units with specific exploitation patterns, using a set of parameterization routines incorporated to a user - friendly interface, handling high amounts of quantitative data in a unified modelling framework. The main steps are:

- development of the fine-scaled mapping and investigation of the determinants for the spatial distribution of fishing effort;
- further measure how well the existing spatial patterns fit the optimal allocation of the fisheries predicted by spatial optimization tools e.g. MARXAN or given by site suitability index studies;
- use and application of the identified drivers to predict the static spatial effort re-allocation induced by the drivers in response to various spatial MSP settings. By including the fish and shellfish population dynamics and the responses of the fish populations to fishing, the approach also evaluates the sustainability of the harvesting under spatial plan alternatives and potential external risks (low productivity scenarios, etc.).

By accounting parameters determining the fisher and vessel's behaviour, the framework adapt the model builds upon flexible decisions trees and flow charts that fit to what drive and motivate the fishers during the fishing operations, by regional stakeholder's consultations and surveys.

A quantitative analysis by generalization of the impacts of the micro-decisions have to be done in the future at the regional scale, including document analysis of costs and benefits from the perspective of the various fishing communities at stake when restrained by other utilization of the seas (aquaculture sites, shipping lanes or offshore constructions) are registered.

Alternative scenarios from ongoing regional spatial plans and alternatives can be ranked against fishery economic performance indicators and essential areas and fishing locations ensure certain levels of production to local fishers.

**Keywords:** spatial and temporal analyses, fishermen's behaviour, GIS, economic analyse

**Acknowledgement:** This work has been supported by the COFASP Program, ECOAST Project *New methodologies for an ecosystem approach to spatial and temporal management of fisheries and aquaculture in coastal area*, Contract 45/2016-UEFISCDI, 2015-2019

## **55. Assessment of cumulative impacts of marine fisheries and aquaculture on Romanian coastal ecosystem components with special focus on priority conservation features, under COFASP - ECOAST Project**

**Niculescu Dragos, Victor Nita, Alina Spinu, Laura Alexandrov, Celia Vassilopoulou, Irida Maina, Mairi Maniopoulou, Eugen Anton, Gheorghe Radu, Alexandru Nicolaev, Madalina Rosca**

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- MARSPLAN BS (DG-MARE) aiming to help the MSP Directive 2014/89/EU implementation in Romania and Bulgaria as Black Sea countries MS. This developed six cases studies including one dedicated to the marine

fisheries and aquaculture and one to the transboundary area Shabla, Bulgaria and Mangalia, Romania. All Case Studies finalized by a written reports and books which are presented.

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The paper includes the dimension of marine fisheries and aquaculture in the world, Black Sea and Romanian Economic Exclusive Zone (EEZ).

The main environment characteristics in relation with these domains spatially and temporally speaking.

The definition of MSP and its very short history in the world, Black Sea and Romania, adding relation with this with EU Directives, including those relating marine fisheries and aquaculture.

The boundaries establishment, mapping of human existing activities in the sea space, mapping future demands of marine space, useful for the elaboration, developing and evaluating of the maritime spatial and management plan are the main steps of MSP, including marine fisheries and aquaculture.

Reasons for MSA including in the marine fisheries and aquaculture are detailed and also the suitability of spatial planning to regulate fisheries.

Conflicts analyses and the stakeholder's consultation are also important processes in the MSP relation with marine fisheries and aquaculture.

## **56. Black-box Model for G.I.S. analyzing of the lower sector of the Danube evolution**

**Panaït Valentin, Mierlă Marian, Stănică Aurel Daniel**

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In this paper, a particular approach was taken to the evolution of the lower sector of the Danube compared to the one before. Although black box theory is very old (appears in the work of behaviourists), an approach to natural processes based on it is hard to implement. Because, in using black box theory, continuous sets of data collected at similar intervals for each input and output are required. That is why the study of the lower sector of the Danube evolution from the perspective of the black box theory was avoided by the scientists.

But, the accumulation of data on the spatial and temporal distribution of archaeological sites, in the lower sector of the Danube and the evolution of the Black Sea level have led us to try this approach. In order to determine the correlation between the evolution of the Black Sea level and the spatial and temporal distribution of archaeological sites, the cluster analysis and the correlation between values were used. These methods of analysis were used in parallel to highlight both the value and the sign of the correlation between the data, as well as the classification of the data according to the main stages of the evolution of this sector. The use of these data analysis methods has shown a negative correlation for the Mesolithic Period and a positive correlation from the Neolithic to the Byzantine Period.

## 57. Challenges in Wetlands- FLOODserv Responses

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Flash floods frequently catch unawares those who live or work in the flood zone. Early warning can reduce the human consequences of a rainfall-generated flash flood event significantly, but it is difficult to provide early warning for structural failure that can occur without any warning, when the distance between the failure and the population is minimal.

FLOOD-serv platform provides personalized public services which arises from enabling and empowering citizens and businesses to directly participate in the design, creation, selection and delivery of some of the **public services**. The FLOOD-serv platform has the following capabilities:

- ✓ Forecasting and Early warning by collecting, processing, analysis, and dissemination of information gained through monitoring human and machine intelligence
- ✓ Supporting online deliberation and collective decision-making on flood disaster risk reduction via social media
- ✓ Collective sensing and crisis communication for emergency response coordination.

The technical feasibility of FLOOD-serv technology solution was tested in a set of real-world scenarios involving citizen and public authorities from five pilot sites- Italy (Genova region), Romania (Danube Delta region), in Spain (Bilbao region) in Slovakia (Bratislava region) and in Portugal (Vila Nova de Famalicão region, near Porto). The intent was to accelerate the delivery of innovative capabilities by demonstrating the capability and technical feasibility of the technology. A thorough impact and process evaluation, on the basis of a common framework using a clear baseline in each pilot site, provided qualitative and quantitative information on the results of the local solutions implemented and on its broad deployment potential. The barriers to broad deployment were identified together with recommendations on how to overcome them.

## 58. Identification of spatial and temporal potentials and limitations for the integration of fisheries, aquaculture and other marine activities through stakeholder consultation, under COFASP - ECOAST Project

**Rosca Madalina, Alexandrov Laura, Niculescu Dragos, Alexandru Nicolaev, Erik Olsen, Søvik Guldborg, Victor Nita, Eugen Anton, Gheorghe Radu, Irina Cernisencu, Alina Spinu, Cristian Danilov, George Tiganov**

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Objectives of this project, through a stakeholder process, are to identify spatial management goals for the project case studies, including the Black Sea Case. It apply state of the art stakeholder involving spatial use and trade-off analyses based on a natural capital approach, using: (i) open-source tools such as INVEST to identify optimal spatial area allocation; (ii) develop maps for scenarios on integrating human activities in the coastal zone, including social indicators and ecosystem-impacts.

The main goal of these are synthesize key results, specifically the identification of spatial and temporal potential and limitations for the integration of fisheries and aquaculture in the coastal areas. It evaluates possible scenarios taking into account the results produced by the other project methods, *DISPLACE*, *GRID*, *Cumulative impact*, as well as the stakeholder consultation. Maps of spatial management scenarios also include a new module for social indicators. Broadly, the aim is to follow the approaches of Arkema et al. (2014) for conducting

the stakeholder involved trade-off analysis of spatial management options for the various case studies of ECOAST project using freely available computer tools like *Integrated Valuation of Ecosystem Services and Tradeoffs* (InVEST) (Nelson et al., 2009), <http://www.naturalcapitalproject.org/InVEST.html>, which is an approach based on stakeholder involvement, both for scoping the management question(s) and for interpreting the model results. Various InVEST models templates still exist to be customized to the specific requirements of each case study area and combine biophysical and economic models to run a range of future management scenarios developed through stakeholder interactions in workshops and correspondences. The models yield maps of interactions in addition to trade-off curves and balance sheets between environment, fisheries and aquaculture, as well as monetary values of the different scenarios. The maps, trade-off curves, balance sheets and associated monetary value of the various scenarios present and discussed with stakeholders to give guidance on which scenario options should be prioritized for future management.

**Keywords:** spatial and temporal analyses, InVest, DISPLACE, GRID, stakeholder consultation

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### **59. CyanoAlert-Space Based Cyanobacteria Services for Danube Delta**

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Harmful algal blooms (HABs) pose a global environmental issue with reported impacts on local economies as well as human and animal health, affecting ecosystem services such as the availability of clean drinking water, fisheries and recreation. Exploiting satellite data archives has offered in recent years the unprecedented opportunity to monitor HABs in aquatic systems at high frequency and, thus, provide new insight into the ecological status of many vulnerable ecosystems globally.

Over the past 20 years, in-depth studies on the presence and distribution of risk areas exposed to algal blooms have been carried out in the Danube Delta. Using this wealth of information, the H2020 CyanoAlert project (2016-2020) is developing a fully automated application for assessing potentially toxin-producing cyanobacteria blooms in water resources in the Danube Delta Biosphere Reserve (DDBR) and globally. The on-going project exploits satellite data (mainly Sentinel-3 and Sentinel-2) provided by the Copernicus space component to deliver an innovative service of satellite-based assessments of cyanobacteria blooms, aiming to support, complement and add value to existing water monitoring activities in DDBR.

The project consortium consists of three service development and implementation partners (Brockmann Geomatics (Sweden), Brockmann Consult (Germany), Odermatt & Brockmann (Switzerland)) and three user partners, who are potential customers of the service after the project period and include a public government authority (The Information Office for the Baltic Sea (Sweden)), and two research institutes linked to routine monitoring programs and laboratory analysis (Istituto Superiore di Sanità (Italy) and Danube Delta National Institute for Research and Development (Romania)).

➤ **Business Approaches & PICO (Presenting Interactive Content)**

**60. Integrated quality monitoring systems for environmental factors**

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With an experience of more than 20 years in Romanian market and after implementing multiple solutions to monitor various pollutants in environmental filed, Tehnoinstrument is coming to underline how important is to have an integrated quality monitoring systems for environmental factors for helping authorities to take important management decision to protect nature and finally the human health.

Speaking about Danube Delta, the second largest Delta in Europe after Volga Delta, an UNESCO protected area, in the context of developing tourism infrastructure and improvement for better life of local people, one integrated quality monitoring system for environmental factors become mandatory.

Air quality , water quality, soil quality, noise level, solar radiation, climate changes are notions defining the quality of our life. All of them could be monitored using the best technology and using all data integrated for taking proper measures to improve life and nature relationship.

This presentation aims to bring it to the forefront the tools for the implementation of integrated monitoring system and its benefits in daily activity.

**Keywords:** quality monitoring, environmental solutions, environmental technology

**61. Overview of the Romanian sturgeon supportive stocking programme in the Lower Danube River system**

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Due to the worldwide decline of the sturgeon population, stocking programmes were developed for many of these species. The critically endangered anadromous sturgeon populations inhabiting the NW Black Sea and spawning in the Lower Danube River are not an exception. Despite no knowledge of the genetic diversity of the remnant populations, the Romanian supportive stocking programme started in 2005, along with the fishing ban in 2006 aiming to restore these populations. We present and discuss this programme implemented in Romania and its achievements. Our screening revealed that the minimum effective number of breeders ( $N_e$ ) could not be achieved for beluga sturgeon (*Huso huso*) in 2006 and for Russian sturgeon (*Acipenser gueldenstaedtii*) throughout the entire programme due to the lack of spawners in the wild. Evaluation of the supportive stocking programme success came later, and revealed a good survival rate and adaptation of fish stocked to the wild conditions in the river and sea. Also it showed that beluga (*H. huso*) and stellate sturgeon (*A. stellatus*) still spawn naturally in the wild. Russian sturgeon population do not exhibits any improving sign so far as the majority of fish captured during the evaluation are of hatchery origin, first generation from wild spawners. Therefore, for beluga and stellate sturgeon, conservation measures should be revised based on the genetic structure of the spawners and a well-defined breeding schemes. For Russian sturgeon the supportive stocking programme should continue, being highly demanded in order to produce a continuum age structured population. The crucial moment for sturgeon conservation will be when hatchery reared specimens return in the river as adults and spawn, an event expected within the next years

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