Littoral 24

European Coastal Challenge Summit

17th EUCC International Conference

Book of Abstracts

September 2024

Constanța, Romania

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LITTORAL24 EUROPEAN COASTAL CHALLENGE SUMMIT

The 17th EUCC International Conference

September 24th-27th 2024, Constanta, Romania

Book of Abstracts

Title
17th International Conference Littoral24 Book of Abstracts

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Abstracts are organized by the chronological order of presentation.
The authors are solely responsible for the contents of their abstracts.

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GENERAL CONFERENCE PROGRAM

Venue: Ovidius University of Constanta, Campus, 1 University Alley, Building B

Monday, 23 September

14:00 – 20:00 **Ice-breaker event:**

- Doctor Honoris Causa Ceremony for Prof. Ioan Ianoș, University of Bucharest
- Celebration of 25 Years of Geography at Ovidius University of Constanta
- Welcome dinner

Tuesday, 24 September

09:00 – 10:00 **Registration**

10:00 – 12:00 **Opening ceremony**

- Official addresses
  Rector of Ovidius University of Constanța
  Dean of Faculty of Natural and Agricultural Sciences, Ovidius University of Constanța
- **Celebration of 35 years of EUCC**
  Natasha Bradshaw, President of the Coastal & Marine Union - EUCC
  Maria Ferreira, Director of International Programme of the Coastal & Marine Union – EUCC
- **Keynote speeches (I)**
  Céline Frank, Directorate General of Maritime Affairs and Fisheries, European Commission
  Christoph Klockenbring, Directorate General for Structural Reform Support, European Commission

12:00 – 12:30 **Coffee break**

12:30 – 14:00 **Session I.1. Climate change adaptation strategies** *(oral presentations)*

14:00 – 15:00 **Lunch break**

15:00 – 17:00 **Session II.1. Coastal and marine protected areas and ecosystem services assessment** *(oral presentations)*

17:00 – 18:30 **EUCC Board meeting**

Wednesday, 25 September

10:00 – 11:30 **Keynote speeches (II)**

Dr. Priscila Lopes, Federal University of Rio Grande do Norte (UFRN), Brazil
Silencing the shore: consequences of ignoring socioecological systems in ocean planning and conservation
Ramūnas Povilanskas, EUCC Baltic States Office, Lithuania:
Transboundary transitional waters: arenas for cross-border Cooperation or Confrontation?

11:30 – 12:00 **Coffee break**

12:00 – 14:00 **Workshop I. Smart Technologies and Community Engagement with EBA for Climate Resilience (SCORE)**

14:00 – 15:00 **Lunch break**

15:00 – 15:30 **Poster session (I)**

15:30 – 17:00 **Workshop 2. EUCC Young Professionals Coastal Community (YPCC)**

15:30 – 17:00 **Session II.2. Coastal and marine protected areas and ecosystem services assessment** *(oral presentations)*

18:00 – 20:00 **Guided tour in the Historical centre of Constanța** (meeting point: Archaeological Park, Ferdinand Blv., Constanța)

Thursday, 26 September

09:00 – 10:30 **Keynote speeches (II)**

Dr. Anna-Katharina Hornidge, German Institute of Development and Sustainability (IDOS), Germany:
International Sustainability Politics in times of Global (Dis-)Order
Patrycja Enet, European Maritime Spatial Planning (MSP) Platform, Aktis Hydraulics, The Netherlands
Climate change and technology needs for ocean-based adaptation and mitigation in Sustainable Blue Economy

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11:00 – 14:00 **Workshop 3. Integrated research and sustainable solutions to protect and restore Lower Danube Basin and coastal Black Sea ecosystems (ResPonSE)**

11:00 – 12:30 **Session III. Challenging conditions and transformations for coastal communities during current crises** *(oral presentations)*

12:30 – 14:00 **Session IV. Perspectives in support of Sustainable Blue Economy through participatory approaches and engagement with the stakeholders** *(oral presentations)*

14:00 – 15:00 **Lunch break**

15:00 – 15:30 **Poster session (II)**

15:30 – 17:00 **Session I.2. Climate change adaptation strategies** *(oral presentations)*

15:30 – 17:00 **Session V. Improving coastal and maritime governance and cross-sectoral collaboration** *(oral presentations)*

17:00 – 17:30 **Coffee break**

17:30 – 18:00 **Closing session**

19:00 – 23:00 **Gala Dinner: Dobrogea Traditional Dinner and Show** (Dorna Hotel, Mamaia Blv., Constanta)

Friday, 27 September

09:00 – 20:00 **Field trip Danube Delta & the Black Sea coast:** *Jurilovca – Argamum Fortress – Traditional Tourist Farm (Suvenir din Dobrogea) – Gura Portiței* (meeting point: Mistral Tours & Events, Telegondola, Mamaia Blv.)

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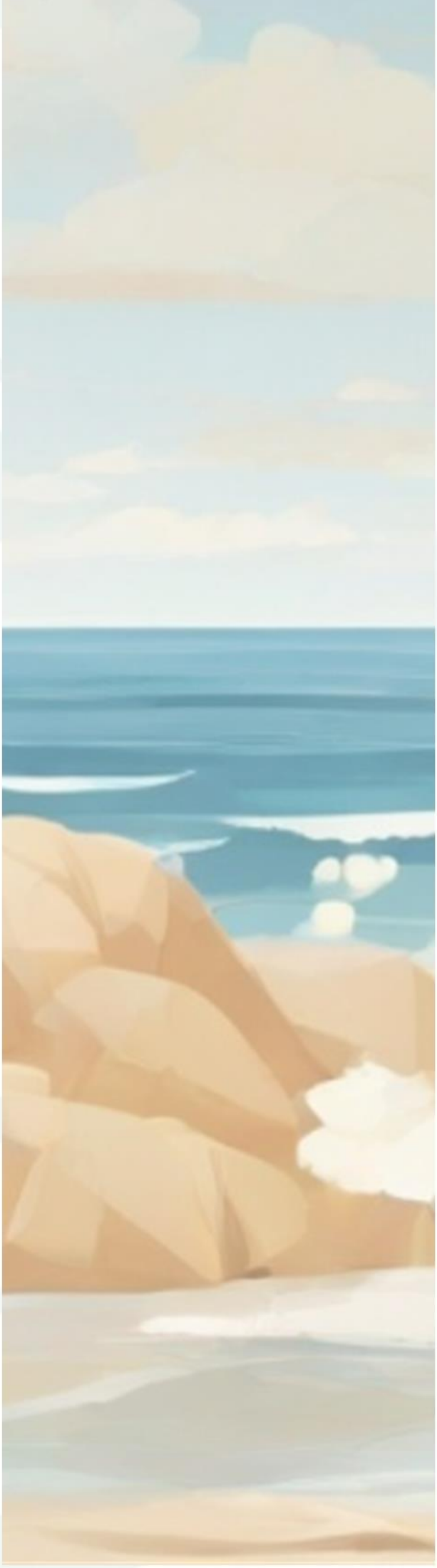
ORAL PRESENTATION ABSTRACTS



Session I. Climate change adaptation strategies

CLIMATE CHANGE AND TECHNOLOGY NEEDS FOR OCEAN-BASED ADAPTATION AND MITIGATION IN SUSTAINABLE BLUE ECONOMY

Patrycja Enet[1,2]

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[2] *Aktis Hydraulics, The Netherlands*

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Unprecedented impacts of climate change surging alarmingly with acceleration in ice melt, sea level rise, heat and climate extremes, impose amplifying challenges on humanity and the environment. The Intergovernmental Panel on Climate Change (IPCC) communicates in the Assessment Reports that emissions need to be significantly reduced by 2030 to achieve the Paris Agreement's goal to limit global temperature rise. Yet, the available science and IPCC reports inform how far off-track we are and that climate action is critical. The recent European Climate Risk Assessment emphasizes that all seas in the European Union (EU) are strongly affected by climate change with key climate risks that have evident impacts on the blue economy. At the EU-level, the European Green Deal highlights urgent integration of climate mitigation and adaptation in planning and sustainable blue economy. This presentation will illustrate how technology needs are central in the ocean-based action on climate change to incorporate into country-led instruments, such as Maritime Spatial Plans (MSP), National Energy and Climate Plans, coastal adaptation plans and strategies; as well as Nationally Determined Contributions and National Adaptation Plans under the United Nations Framework Convention on Climate Change (UNFCCC) process. The presentation will explore the current state and future prospects of technologies for advancing climate-based ocean action in terms of the development and acceleration of existing technologies for deploying them at scale; technological transformation and uptake; and demonstration of new and emerging ocean-related technologies. It will address integration of these climate-smart technologies into the existing spatial planning frameworks; strengthening their synergies and complementarity in plans and across the marine/coastal-related processes and strategies; and proper recognition and integration of science and innovation for transforming our understanding of climate action and mitigating the adverse effects of climate change. Key considerations will be presented for integrating mitigation and adaptation in the European seas.

Keywords: *Climate Change, Loss and Damage, Adaptation, Mitigation, Ocean-based Technologies, Climart-smart maritime spatial planning (MSP), Ecosystem-based management approaches*

Acknowledgements: As part of the presentation, the background technical study of the European MSP Assistance Mechanism will be presented: "Future uses/needs of the seas: Integration of climate-smart trends and new technologies in maritime spatial planning" (European Commission, European Climate, Infrastructure and Environment Executive Agency, Patrycja Enet, 2024). The European MSP Assistance Mechanism and the European MSP Platform are financed by the European Commission under the European Maritime, Fisheries and Aquaculture Fund (EMFAF). The European MSP Platform is a result of the MSP Assistance Mechanism implemented by the European Climate, Infrastructure and Environment Executive Agency (CINEA) on behalf of the Directorate-General for Maritime Affairs and Fisheries (DG MARE) of the European Commission.

Session I. Climate change adaptation strategies

INNOVATION PATHWAYS FOR COASTAL CLIMATE CHANGE ADAPTION AND RESILIENCE

Alice Guittard[1*], *Ebun Akinsete[2], Lydia Papadaki[1], Noelia Cruz Pérez[3], J Sarai Rodríguez Alcántara[3],* Eden Mamut[4], Yordan Zdravkov[5], Charis Stavridis[6], Nicolas Theodossiou[6], Yannis Kontos[6], Dimitra Frysali[6], Mustafa Yucel[7], Pinar Uygurer[6], Maria Paraschiv[7], Matin Drews[8], Bodil Ankjær Nielsen[8], Sarah Ward[9], Jess Penny[10], Conrad Landis[1], Dimitrios Spyrou[12], Pavlos Filippidis[13], Olympia Nisiforou[14], Alexandros Charalambides[14], Noemí Monterde Higuero[15], David Calduch Verduch[15], Marina Arroyo Bovea[15,] Isabelle LaJeunesse[11], Phoebe Koundouri[1]

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Given the complex and interconnected nature of climate change with other global challenges such as food security, water scarcity, biodiversity depletion, and environmental degradation, conventional management and planning approaches focusing on singular aspects of the issue are inadequate. The ARSINOE project aimed to address this deficiency by developing a methodological framework that integrates the System Innovation Approach (SIA) with the Climate Innovation Window (CIW) to facilitate the emergence of resilient European regions. This was achieved through the co-identification of climate change adaptation solutions, forming the basis of innovation pathways serving as climate adaptation strategies. This research paper examines the climate adaptation of several European coastal regions facing diverse climate risks, including infrastructure vulnerability, flooding, water scarcity, food security, habitat degradation, and biodiversity loss. Employing a participatory approach, the study aims to bridge the gap between societal needs and existing solutions addressing local climate risks. The methodology involves a 3-step process with active stakeholder participation: 1) identifying challenges from various perspectives to establish a common understanding within the local community; 2) developing a shared long-term vision for coastal region sustainability; and 3) co-designing innovation pathways to realize the vision. These pathways serve to integrate innovations (social, technological, institutional) into strategic implementation plans, addressing questions regarding the necessity, utilization, prioritization, and gaps of innovations in climate change adaptation. Preliminary findings highlight the significance of social innovations alongside technological innovations and emphasize the importance of nature-based solutions and digital tools in managing water and addressing climate risks within coastal regions.

Keywords: *Innovation, Adaptation, Pathways, Coastal region, Stakeholder engagement*

Acknowledgements: This research has received funding from the European Union's Horizon H2020 innovation action programme under grant agreement 101037424 (ARSINOE project).

Session I. Climate change adaptation strategies

INTEGRATING CLIMATE CHANGE ADAPTATION INTO BEACH MANAGEMENT AND COASTAL TOURISM PLANNING IN THE BALTIC SEA REGION

Lena Schall[1*], Nardine Stybel[1], David Cabana[2], Louis Celliers[2]

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Coastal tourism along the Baltic Sea (BS) is a significant driver of the EU Blue Economy, providing over 330,000 jobs (Blue Economy Report, EU 2021). However, this sector is extremely climate-sensitive, and impacts of climate change e.g. sea-level rise, extreme weather events or changes in biodiversity threaten the ability of the sector to maintain its economic benefits. Effective adaptation strategies supported by climate change data and information are essential for coastal management and coastal tourism planning. Yet, there is a significant gap between scientific knowledge and tourism practice, as assessing, understanding and integrating climate change data and information into decision-making remains challenging. Local projections and the exact timing of climate-related impacts often lack precision, further complicating adaption efforts. Moreover, the planning horizon of tourism planners is much shorter and long-term adaptation is not a priority. Communication and the development of adaptation measures are crucial to address this gap. The project BEACH-SOS tackles these gaps in the BS by rising local awareness and providing accessible and user-friendly climate change information at municipal level in Germany, Latvia and Denmark. For this various methods are employed. Firstly, the collaboration with pilot regions, in this case Warnemuende and Zingst in Mecklenburg-Western Pomerania, already certified with the Blue Flag, will be used to identify and disseminate best practices and share local knowledge. Secondly, conducting workshops involving key stakeholders from local public authorities, the tourism sector, coastal communities, scientists and NGOs to identify and addressing the most pressing climate issues affecting BS beaches and their implications for the tourism sector to develop joint solutions and empower these stakeholders to become "climate-smart". Thirdly, indicators for practical implementation and measuring changes will be developed. Concrete adaptation measures will be later created based on these methods and resulting insights. The presentation will introduce these methods and present initial results.

Keywords: *climate change, stakeholder engagement, beach management, tourism planning, Baltic Sea*

Acknowledgements: The BEACH-SOS project, co-funded by the Interreg Baltic Sea Region Programme 2021-2027, helps coastal communities to adapt to climate change.

Session I. Climate change adaptation strategies

COASTAL VULNERABILITY ASSESSMENT OF VENETO BEACHES AND BARRIER ISLANDS, NORTHERN ADRIATIC, ITALY

Annelore Bezzi [1*], Casagrande G. [1], Fracaros S. [1] ,Spadotto S[1]., Pillon S[1]., Martinucci D. [1], Popesso C. [1], Fontolan G. [1]

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The assessment of coastal vulnerability to sea storms is critical in coastal management since sea level rise and human pressure affect both the morphological and sedimentary constraints, thus increasing coastal risks. In this work we present an assessment of sea storm vulnerability for the 170 km of coastline of the Veneto area (Northern Adriatic, Italy), using an adaptation of the Coastal Vulnerability Index. The methodology relies on a comprehensive coastal geodatabase and includes the estimate of the Intrinsic Vulnerability (Vi): several variables were analysed and weighted to define the physical and evolutionary conditions of the coast, under the assumption that there is no defence against sea storms. Subsequently, the classification and evaluation of coastal defences (hard and soft) allows the shift from intrinsic to Real vulnerability (Vr). Owing to a methodological adjustment made for the various coastal types (barrier islands or beaches), the results show varying grades of Vi depending on distinct morpho-evolutive conditions. Low values of Vi are typical of coastal tracts acting as sedimentary traps in proximity to jettied or unjettied tidal inlets. At the same time, along the Po delta, some barrier islands have dissipative characteristics and positive sedimentary budget due to the sandy load from river branches. In many cases, beaches with moderate Vi benefit from the widespread distribution of hard coastal defences and the presence of coastal dunes, which mitigate vulnerability. Finally, littoral sections with high Vi are mostly afflicted by a persistent sedimentary deficit, resulting in absent or narrow beaches with steep shoreface. Overall, the massive use of hard defence works ensures safety, although impeding any resilience of the morpho-sedimentary system.

Keywords: *coastal vulnerability index, sea storm, beach, barrier island, Northern Adriatic sea.*

Acknowledgements: Research funded by the consortium iNEST (Interconnected North-Est Innovation Ecosystem) funded by the European Union Next-GenerationEU (Piano Nazionale di Ripresa e Resilienza (PNRR)-Missione 4 Componente 2, Investimento 473 1.5-D.D. 1058 23/06/2022, ECS_00000043), and Interreg Italy - Croatia Stream. This research was supported by the Civil Protection of the Autonomous Region of Friuli Venezia Giulia as part of a collaboration with the Department of Mathematics, Informatics, and Geosciences at the University of Trieste.

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INTEGRATED RISK ASSESSMENT FOR COASTAL CITIES MANAGEMENT: TENES CITY, ALGERIA

Ahmed Yahia Meddah

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This study examines the application of integrated risk assessment for the management of coastal cities, with a focus on Tenes City, Algeria. Given the increasing threats of climate change, including rising sea levels, storm surges, and extreme weather events, Tenes City faces significant environmental, social, and economic challenges. Traditional risk assessment methods are often inadequate for addressing the multifaceted nature of these risks. Our research proposes a comprehensive framework that integrates environmental impact analysis, infrastructure resilience, and community adaptation strategies tailored to Tenes City. By employing a combination of technical tolls, such as GIS mapping and simulation models (INtegrated DisRuption Assessment, INDRA model), and qualitative approaches, including stakeholder consultations, we identify and prioritize the key risks facing the city. Case studies from Tenes City demonstrate the practical application of our framework, emphasizing the importance of adaptive architectural design and sustainable urban development. Our primary findings suggest that a holistic approach to risk assessment significantly enhances the city's resilience, preparing it to better manage future uncertainties. The study concludes with policy recommendations for urban planners, architects, and local authorities in Tenes City, advocating for collaborative efforts to build a resilient and sustainable coastal community.

Keywords: *risk assessment, climate change, coastal cities,integrated management.*

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COASTAL PROTECTION AND ADAPTATION STRATEGIES FOR MEDITERRANEAN MEMBER STATES: THE MALTESE ISLANDS

Natasha Bradshaw[1*], Maria Ferreira[2], Patrycja Enet[3], Jara Martinez[4] and Ritienne Gauci[5]

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[2] *EUCC – The Coastal and Marine Union (The Netherlands)*
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It is well recognised that coasts are on the frontline for experiencing the impacts of climate change. Sea level rise, increased storms, flooding and erosion threaten coastal infrastructure, and cause problems such as saline instrusion and biodiversity loss through coastal squeeze. In particular, Mediterranean countries have low-lying coastlines with infrastructure and environments that are integral to people's socio-economic health and well-being. Several European Union (EU) Member States have requested support towards climate resilience planning from the European Commision's Directorate General for Structural Reform Support (DG REFORM). In response, the EU has appointed EUCC (The Coastal and Marine Union), in cooperation with international experts as partners, to provide the much needed technical support to Members States in, among others, the development of national strategies for coastal protection and adaptation. This paper will demonstrate how EUCC partnered with international experts to develop a Coastal Protection Strategy for the Maltese Islands, one of the recent projects led by EUCC in close collaboration with experts from IHCantabria, Aktis, University of Malta and other international experts. The approach is designed and delivered in close cooperation with government departments, academics, national and regional stakeholders. Key issues and hotspots are identified through an integrated diagnosis which brings physical, environmental and social data together. Lessons learned from international experiences enhance the dialogue between specialists advising the Member State beneficiary. Recommendations are provided towards policy and governance options at multiple scales, involving stakeholders from the local to Ministerial level. This helps to ensure the establishment of an inclusive approach to decision-making, while Member States are encouraged to consider adaptation strategies alongside protection for resilience planning. The presentation will illustrate how the EUCC-led team of experts are responding to specific requests from the European Commission in conjunction with Member State beneficiaries to design a supportive and engaging approach to coastal protection and adaptation planning.

Keywords: *Climate, Coast, Resilience, Protection, Adaptation*

Acknowledgements: These projects are funded by the European Union via the Technical Support Instrument and implemented by EUCC in collaboration with its experts, in cooperation with the European Commission.

Session I. Climate change adaptation strategies

COASTAL HAZARDS ON THE ROMANIAN BLACK SEA COAST

Florin Tătui[1*], Sorin Constantin[1,2], Florin Zăinescu[3], Florin Miron[1]

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The Romanian Black Sea coast is a very complex area comprising two sectors with different characteristics: Danube Delta – low-lying sandy beaches, spits and coastal barriers; natural processes; poorly inhabited and Southern Coast – loess cliffs and nourished beaches; densely inhabited; increased human pressure. Besides the extensive environmental problems related to pollution, eutrophication or loss of biodiversity, most of them shared with the entire Black Sea basin, the Romanian coast is highly affected by coastal erosion and rip currents.
More than one third of the Romanian coast is retreating, especially the low-lying areas along the Danube Delta coast. Moreover, the analysis of the automatically extracted shorelines from satellite images showed an extension of erosional processes in the last three decades. In the context of poorly awareness in the public space, rip currents pose a great danger on beach safety of the Southern Romanian Black Sea coast. Approximately 75% of the touristic beach sectors are affected by various types of rip currents, with high potential to generate strong offshore flows even during low-energy wave conditions. In this context, the present-implemented costly engineering works for adaptation to coastal erosion, yet necessary on specific areas, created dissatisfaction among scientists, tourists and local stakeholders due to the use of oversized hard protection structures and extensive beach nourishment, which changed the beach configuration and its morpho- and hydro-dynamic behaviour, creating conditions for decreased beach safety. This urges for better communication and cooperation between coastal scientists, engineers, decision makers and public authorities for optimum management of coastal hazards on the Romanian coast.

Keywords: *coastal erosion, rip currents, coastal management.*

Acknowledgements: This work was supported by the following projects: PNRR-III-C9-2022-I8 #760054 – JUST4MPA (Romanian Ministry of Research, Innovation and Digitalization); PN-III-P1-1.1-TE-2019-1444 – RORIP (Romanian Ministry of Education and Research, CNCS - UEFISCDI) and 4000126776/19/I-LG – Space for Shore (European Space Agency).

Session I. Climate change adaptation strategies

ECOLOGICAL AND SOCIO-ECONOMIC SERVICES OF RIVER DON DELTA AND TAGANROG BAY UNDER CLIMATE CHANGE AND ANTHROPOGENIC PRESSURE UPSTREAM

Matishov,G.G.[1], Venevsky,S.V.[1,2*], Berdnikov,S.V.[1], Kulygin,V.V.[1], Bulysheva,N.I.[1], Titov,V.V.[1], , Sorokina,V.V.[1], Grigorenko,K.S.[1]Sushko,K.S.[1], Kovalenko,M.V.[1], Kleshchenkov,A.V.[1], Sheverdyaev,I.V.[1], Misirov,S.A.[1], Parfenova,A.V.[1], Oganesyan,A.A.[1], Smirnova,E.A.[1]

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The River Don, is the fifth longest in Europe and its delta is by all major parameters (socio-economic and environmental) should be included in the list of 50 major deltas of the world. The most eastern of Mediterranean-Black Sea delta basins, the Don River Delta is under-represented in international studies. We found that the Don Delta has changed its functional type recently from river dominated over centuries to a wave dominated due to intensive river runoff regulation upstream and that marine forcings in form of interaction between waves and surges now determine the geomorphological stability of the Don Delta. Estuary of the River Don, Taganrog Bay lays in the most northern-eastern part of the Sea of Azov. The Sea of Azov is the shelf sea (depth 14 metres), sensitive to external forcing including anthropogenic activities and regional climate change. The amount of runoff and sediment delivery to the Sea of Azov and their seasonal distribution has significantly changed due to the river engineering and land use upstream in the last sixty years. This combines with never before observed increase in sea water temperature and in salinity posed by regional climate change in the last two decades. Physical and chemical alterations are reflecting on the structure of diatoms and benthic communities, giving a road to non-native, often predator, invasive species, especially in Taganrog Bay. We are now making an assessment how radical changes in the delta, the estuary and the Sea are affecting major ecological and socio-economic services in our area. We study an ability of the Delta and Taganrog Bay to sequester carbon and to be the object of nature-based solution for climate mitigation. We also investigate fish stock, which is radically decreasing, habitats of rare species (notably birds), which are radically diminishing and surge floods, which are radically increasing.

Keywords: *no more than five words, Times New Roman, Italic, Font size 11*

Acknowledgements: The study was financially supported by the Ministry of Science and Higher Education of the Russian Federation (Agreement No. 075-15-2024-528 of 24.04.2024 on the implementation of a large-scale research project within the priority areas of scientific and technological development).

Session I. Climate change adaptation strategies

SOCIAL ACCEPTANCE OF NATURE-BASED SOLUTIONS FOR COASTAL FLOOD AND RISK MANAGEMENT

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Rising global mean sea levels are increasing the risk of coastal hazards such as flooding and erosion. Coastal communities are already experiencing the impacts of storms and accelerated coastal erosion on property, infrastructure and livelihoods. In parts of the world, coastal flood and erosion risk management has traditionally relied on hard-engineered structures. However, such man-made structures and urban development lead to "coastal squeeze" - coastal habitat loss and degradation. Nature-based solutions (NbS) such as habitat restoration and managed realignment are increasingly being considered for coastal flood protection and biodiversity benefits. Yet, the implementation of NbS for coastal resilience on a local level is still relatively slow, often due to low social acceptance. However, the involvement of communities is key for climate change adaptation and building coastal resilience. In this study we explored the social acceptance of NbS on community and socio-political levels and the main factors influencing them. We deployed a mixed-method approach combining quantitative and qualitative research data collection methods. Postal surveys and focus groups conducted in four strategic sites in the UK (N=328) identified that nearly half of respondents had not heard of NbS. While NbS generally were deemed to be more suitable than grey schemes, when prioritising a solution, site characteristics, past experience and perceived scheme effectiveness were key determinants. Therefore, grey schemes still were chosen as the main preferred solutions for certain sites. UK-wide Q methodology showed clear acceptance of NbS among risk managers, but there was a disagreement about whether the discussions of potential relocation should be happening now. The findings indicate that there is a strong socio-political acceptance of NbS, yet local communities are not always well informed about the types of NbS, their benefits and effectiveness and therefore might prefer solutions that already exist in their locality.

Keywords: *nature-based solutions, social acceptance, interdisciplinary research, coastal resilience, coastal flooding*

Session I. Climate change adaptation strategies

ENHANCING VITICULTURE: INTEGRATING IOT, WIRELESS SENSORS AND MACHINE LEARNING FOR PRECISION VINEYARD MANAGEMENT

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Maintaining crop health and achieving optimal grape production depend significantly on efficient vineyard management. With the use of innovative technologies, precision agriculture has become an essential tool for closely monitoring and managing vineyards. This paper introduces a solution integrating Internet of Things (IoT), Wireless Sensors, and Machine Learning (ML) to improve precision agriculture in viticulture. Using IoT, real-time monitoring of vineyards and climatic conditions is achieved through sensors and drones, significantly improving the health and quality of grapes. Data from sensors is sent to a software platform for analysis, providing farmers with immediate alerts about conditions that may affect the vineyard. User-friendly interfaces display data graphically, facilitating real-time monitoring of parameters critical to grape production. Drones have an important role in detecting disease-affected vineyard areas. Images captured by drones are analyzed using ML algorithms to identify specific diseases such as powdery mildew, downy mildew, and gray rot. The aim of this study is to integrate multiple technologies into a single system, providing users with a comprehensive solution for vineyard management, which provides essential information about meteorological parameters and detects grapevine diseases. The IoT technologies provided by Libelium enable real-time monitoring of vineyard conditions through high-precision sensors, with the collected data stored in a database for analysis and processing. Convolutional neural networks (CNNs) are used to analyse drone images, identifying and classifying vine diseases, facilitating the prevention of disease spread, ensuring vineyard health and optimising grape production.

Keywords: *Precision Agriculture, Sensors, Machine Learning, Drones, Vineyard Management*

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GOLF COURSE 2030 – COASTAL MANAGEMENT GOLF LINKS SURVEY

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As outlined in the GC2030 Coastal Change Action Plan (The R&A 2019), the key physical challenges from coastal change concern increased risk of flooding and erosion and the related potential need to adapt to the resulting changes which could affect key characteristics of coastal golf courses, or could ultimately even lead to the loss of these courses altogether. Links courses tend to be on, or at least very near to, a coast, and the term is typically associated with coastal courses, usually on coastal dunes but occasionally on cliff tops. Links topography favours a controlled style of golf, as hazards abound. This makes them an atractive sporting challenege. As such, links golf is a significant contributor to the economy, both locally and nationally. The project as a whole aimed to achieve an improved understanding of how aware the managers of golf courses/clubs are of the risks of coastal change and how they have adapted or developed plans to mitigate impacts to inform action plans and strategies both within the golf clubs and the wider environmental sector. It is intended that this understanding and the development of appropriate plans and strategies will help to address constraints and realise opportunities in response to coastal change. A survey was distributed to 333 golf links clubs/courses across the British Isles. The study aimed to identify current levels of coastal management understanding and engagement across (dune) links and cliff top courses in the British Isles. The survey findings reinforce the need to undertake further engagement with clubs, establish a network which provides clubs with access to all key relevant stakeholders and decision makers at the right levels, and provide them with a toolbox to allow them to play their part in coastal management to secure a sustainable long-term future for their clubs.

Keywords: *coastal change, golf, dunes, adaptation*

Acknowledgements: This research was funded by The R&A's Golf Course 2030 (GC2030) initiative.

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COASTAL PROTECTION WORKS IMPACT ON THE COASTAL ENVIRONMENT. A CASE STUDY OF THE ROMANIAN COAST OF THE BLACK SEA

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The impact of the coastal protection works extension on the environmental and socio-economic sector in the area of Mamaia touristic resort, requires special attention due to its harmful effects on the marine environment attractivity, as well on the seasonal touristic activities. The main effects of this beach sand nourishment in the area are the disruption of beach and bathing areas access. The sand engine solution applied in an inadequate manner brings a subsequent hydro-morphological effect that implies additional maintenance works of beach access, but also a touristic impact on beach operators' activities, due to the loss of tourist interest. The increasing awareness of the impact of such imposed technical solution has led to a decrease in the tourists' preferences as well as a significant decrease in the numbers of tourist in the protected areas. The main purpose of this research is to analyze and determine the medium-term impact on the touristic season and of the expected dynamics of the nourishment project in a coastal pocket beach area.

Keywords: *coastal works, beach nourishment, coastal tourism, bathing areas*

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LITTER DISTRIBUTION IN MARINE AND COASTAL ENVIRONMENTS: CASE STUDIES FROM THE APULIA REGION (SOUTHERN ITALY)

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Litter accumulation in marine and coastal environments represents a global issue with severe, negative effects on ecosystems and human health. This study illustrates the results of the ongoing research activities focused on the assessment of beach litter (BL) distribution on sandy beaches and microplastics (MPs) in marine sediments. To this aim, tailored sampling procedures and innovative analysis approaches have been proposed and tested. Case studies are located along the Adriatic and the Ionian coast of the Apulia region and include both natural and urbanized areas (*e.g.*, Torre Guaceto beach, close to Brindisi, and Mar Piccolo basin of Taranto). In detail, the evaluation of the BL distribution along the beach profile was performed by applying both standard in-situ procedures and innovative methods, based on the use of Unmanned Aerial Vehicles (UAVs) surveys and the application of manual and automatic imaging classification approaches. According to the international guidelines, 100 m long beach sectors were monitored and identified items were classified based on the European codes. Sediment samples for the MPs analysis were collected at different points along the backshore while marine sediments were sampled at different depths in the shoreface and offshore. MPs classification is performed by the exploitation of hyperspectral imaging (HSI) working in the short-wave infrared range (1000-2500 nm). Obtained results highlight that plastic represents the most abundant material identified along the investigated beaches and that BL items tend to accumulate in the upper part of the backshore with density values up to 1.24 items/m^2. Furthermore, MPs detected in the analyzed samples were mainly represented by PP, PS, PE, and textile fibers. In compliance with the objectives of sustainable development, our investigations aim to develop rapid analysis methods to support the effective management of coastal areas and to reduce litter accumulation in marine and coastal ecosystems.

Keywords: *beach litter, microplastics, geo-environmental characterization*.

Acknowledgements: Research activities are carried out in the frame of RETURN Extended Partnership supported under the National Recovery and Resilience Plan (NRRP), Mission 4, Component 2, Investment 1.3-D.D. 1243 2/8/2022 - European Union NextGenerationEU (no. PE00000005, CUP: B53C22004020002). Furthermore, activities belong to the project “Beach & Marine Litter Monitoring in Apulia”, funded by the Apulia Region under the program RIPARTI (CUP: B83C22004070002) and promoted by the Department of Earth and Geo-Environmental Sciences of the University of Bari Aldo Moro in collaboration with Environmental Surveys S.r.l.

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ASSESSING HABITAT AND ECOSYSTEM SERVICE CHANGES IN SHALLOW EUTROPHIC COASTAL WATERS USING REMOTE IMAGERY

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Coastal waters are home to a variety of ecologically important habitats and species that contribute to human well-being through the provision of ecosystem services. Macrophytes, for example, are used as an indicator to assess the quality of coastal waters under the Water Framework Directive (WFD) and are included in the list of habitat types of Community interest in need of conservation and protection under the Habitats Directive (HD). In addition, they provide valuable ecosystem services such as food, erosion control, nutrient regulation and recreation. Despite regular monitoring of macrophytes in coastal waters to meet policy requirements under the WFD and HD, spatial distribution data are largely lacking. Employed monitoring methods, such as the use of divers, are limited to the assessment of transects, while sonar systems, which can cover larger areas, are technically hampered in shallow coastal waters. Marine ecosystem service assessments, which commonly link ecosystem service potentials to ecosystem components such as species and habitats in a matrix-based approach, are particularly challenging in coastal waters due to the lack of spatial data. As a result, they typically reflect only a single point in time or remain entirely hypothetical. Using Greifswald Bay in the German Baltic Sea as a case study, we explore the potential of remote sensing methods, including aerial and underwater drones, and satellite imagery, to map habitats in shallow eutrophic coastal waters. We conduct applications for different years and use the resulting maps to assess changes in ecosystem service potential over time using the matrix-based approach. We present our key findings, highlighting the strengths and weaknesses of the approaches, and provide recommendations for improving habitat monitoring and ecosystem service assessments.

Keywords: *monitoring, ecosystem services assessment, drones, macrophytes*

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DOWN THE RABBIT HOLE: GRAZING MAMMALS IN A DUTCH ECOSYSTEM

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Nearly all Dutch dunes are protected under Natura 2000 legislation. Most of the dune habitats are however in an unfavourable condition. The habitats suffer from unnaturally high nitrogen depositions and fixation of outer dunes as a safety measure against flooding. In order to preserve dune habitats and their high and often unique biodiversity, grazing by mammals is crucial. The dominant mammalian grazers of the Amsterdam Water Supply Dunes are semi-natural (rabbits; heavily in decline due to deceases), feral (cattle used by the site manager as a management instrument) or invasive (fallow deer). What can a site manager do in order to find the right balance?

Keywords: *dune ecosystem, grazing, deer management, reintroduction*

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DO MARINE PROTECTED AREAS FULFILL THE EXPECTED EFFECTS ON COASTAL SOCIAL-ECOLOGICAL VULNERABILITY? A PERSPECTIVE FROM EUROPE AND LATIN AMERICA

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Coastal management has become a global priority, yet many coastal communities that rely heavily on coastal resources remain poor managed. Consequently, these communities face increased vulnerability due to growing environmental pressures and changes, including climate change and overfishing. Marine protected areas (MPAs) are designed to promote biodiversity conservation, which ultimately supports human communities that depend on coastal fisheries, but some MPAs have failed to achieve these goals. Thus, understanding the factors affecting coastal vulnerability is a crucial step to create management actions that benefit social-ecological systems (SES) as a whole. This study combines an integrative approach to explore social-ecological vulnerabilities together with spatial analysis and species distribution range, to analyze the effectiveness of MPAs on coastal vulnerability. Coastal vulnerability was estimated from species and ecosystem vulnerabilities, and the adaptive capacity of the SES. We also investigate differences between European and Latin American MPAs by compiling different datasets from MPAs in seven countries (Brazil, Costa Rica, Mexico, Uruguay, Portugal, Spain, and Romania). We expect to find that effective MPAs, those with lower coastal vulnerabilities, benefit both social and ecological systems. We also expect to demonstrate that benefits from most effective MPAs spillover to nearby communities. Results will deliver qualitative and quantitative insights for the future design of MPAs and improvements of the already established ones for sustaining biodiversity, fisheries sustainability, and human well-being.

Keywords: *adaptation, global environmental change, governance, marine conservation, resilience*

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MICROBIOME AND RESISTOME STUDIES OF THE LITHUANIAN BALTIC SEA COASTAL AND THE CURONIAN LAGOON WATERS AND SEDIMENTS

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The discovery of antibiotics is considered one of the most important scientific advances of the 20th century, revolutionizing medicine, veterinary medicine, and agriculture. However, recently antibiotics have been recognized as a new class of environmental pollutants due to overuse and bioaccumulation of residues, which may alter the environmental microbiome and resistome by increasing antibiotic resistance genes (ARG). In this study, metagenomic population dynamics and changes in antimicrobial resistance profiles were investigated in the coastal Baltic Sea and Curonian Lagoon sites of Lithuania in 2017, 2018, 2021, and 2023 using full-length amplicon metagenomics sequencing of 16S rRNA (V1-V9 region) and highly parallel qPCR array with 384 primer set. The top phyla of microorganisms identified in the water and sediment samples were classified as *Cyanobacteria, Proteobacteria, Bacteroidota, Actinobacteriota* (50 - 80% of the community), and others. The specific top 15 phyla in the water samples were *Verrucomicrobiota, Armatimonadota, and Desulfobacterota*, while in the sediment samples, they were *Gemmatimonadota, Myxococcota,* and MBNT15. Pathogenic genera such as *Flavobacterium, Staphylococcus, Streptococcus, Enterococcus,* and *Pseudomonas* were also found in water and sediment samples from the lagoon and the Baltic Sea. More than 300 ARGs were found at all study sites. The S1 and 3 Integron class genes and transposons of MGE were found at all study sites. The top 15 ARGs detected in water and sediment samples were 4 aminoglycosides, 3 macrolides, lincosamides, and streptogramin group genes, one of each of quinolones, tetracyclines, vancomycin, multidrug group gene, and others. As the sites investigated in this work (excluding the harbor area) are used for recreational activities, the detection of certain genes considered to be sources of anthropogenic pollution (e.g., *intI, sul1, blaOXA*), as well as genes of clinical and veterinary importance raise concerns about water quality and human health risks from exposure to microorganisms harboring these ARG.

Keywords: *microbiome, resistome, ARG, Baltic Sea, Curonian Lagoon*

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A METHODOLOGICAL FRAMEWORK FOR ASSESSING THE VULNERABILITY OF ATLANTIC SALT MEADOWS TO EXTREME CLIMATIC EVENTS

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Recent research has highlighted that extreme climatic events such as tidal surges, heavy rainfall, heatwaves, droughts, cold snaps, and storm winds are affecting marine ecosystems and species, altering the ecosystem's associated services that are essential for human well-being. The impacts of such extreme events are likely to increase in the face of climate change. In this context, understanding the vulnerability of protected habitats and species to extremes is vital for developing adaptation strategies for biodiversity conservation and management. This study proposes a methodology for assessing the vulnerability of a protected marine habitat to extreme climatic events, using Atlantic salt meadow (Glauco-Puccinellietalia maritimae) habitats as a test-bed. Atlantic salt meadows are protected in EU member states under Natura 2000 sites protection. In general, vulnerability assessment methodologies aim to quantify the susceptibility of ecosystems, habitats, and/or species to various stressors, including extreme climatic events. Here, we propose a general framework to assess habitat vulnerability based on the widely used concepts of exposure, hazard magnitude, susceptibility, and lack of adaptive capacity as defined by the Intergovernmental Panel on Climate Change. We apply expert knowledge, literature review, and climate projection models to develop exposure, sensitivity, and adaptive capacity indicators and synthesize the best available science towards vulnerability assessment. We suggest a standardized procedure for defining and combining these components, as well as a list of readily applicable indicators of primary hazards to ecosystem/species associated with extreme events. More detailed results and conclusions will be presented in the conference and illustrated in the submission of a full paper or final in-depth abstract.

Keywords: *Atlantic Salt Meadow, Extreme Climatic Events, Marine Ecosystems, Special Areas of Conservation (SACs), and Special Protected Areas (SPAs)*

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Session II. Coastal and marine protected areas and ecosystem services assessment

ECOSYSTEM SERVICES OF THE BALTIC SEA – STATE AND CHANGES DURING THE LAST CENTURY

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For centuries, the Baltic Sea has been intensively utilized by humans. It is subject to multiple pressures and increasing impacts such as eutrophication, biodiversity degradation, pollution, land use and resource extraction as well as from climate change. These pressures have led to substantial changes in the Baltic Sea, especially in the 20th century. Despite existing and largely implemented environmental policies, the recent comprehensive assessment reveals that the state of the Baltic Sea ecosystem is still not good and has not improved in recent years. The assessment concludes, that a more holistic approach to management and governance, focusing on the entire ecosystem, is required. This includes ecosystem services assessments. In the Millennium Ecosystem Assessment, ecosystem services are defined as benefits that humans derive from ecosystems. It is expected that ecosystem service assessments provide a comprehensive understanding of the structures and (inter-)dependencies between humans and the environment, thereby supporting the required 'Ecosystem Approach to Management'. Because of a lack of data, large scale spatial and/or temporal approaches that assess ecosystem services in seas are still rare. 3D ecosystem models covering entire seas are a possibility to overcome the lack of data and enable a new era of ecosystems service assessments. We provide a concept that links marine ecosystem services to the output of a high resolved 3D-ecosystem model, calculate state and changes of ecosystem services on a large scale and over a long-period, namely covering the entire Baltic Sea and the period between 1880 and 2010, and complement monetary ecosystem service assessments that enable direct comparisons between services. Finally, we discuss the practical consequences for managing the Baltic Sea.

Keywords: *Marine managent, European policies, socio-economic systems, monetary valuations*

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JOINING APPLICATION OF UNMANNED AERIAL VEHICLES WITH GIS FOR COASTAL MONITORING AND CONSERVATION

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We created and tested a pilot monitoring programme of coastal dynamics for the Seaside Regional Park, an IUCN Category V, peri-urban Baltic Sea coastal and marine protected area (HELCOM MPA) in Lithuania, Northern Europe. The monitoring programme optimizes measures of coastal protection based on the objectives of Lithuania's National Coastal Protection Programme. We developed a methodology for applying unmanned aerial vehicles with the geostatistical tools of the *ArcInfo*® GIS for interpreting and forecasting coastal erosion processes according to the established coastal management principles of the National Coastal Protection Programme. The semi-automated coastal erosion surveillance system comprises the use of an unmanned aerial vehicle for taking a series of spatially-referenced photos of the Olando kepurė soft bluff of glacial sediments in the geomorphological managed reserve of the same name in the Seaside Regional Park. The interpretation and forecast of the bluff's erosion processes was a two-step remote sensing data processing procedure combining the application of the Delphi method and GIS geostatistical tools. Using the Delphi method, a team of five coastal erosion and conservation experts described visual features and classified particular areas and specific features of coastal erosion processes from the spatiotemporal series of images of the 3-km-long stretch of the Olando kepurė bluff taken by an unmanned aerial vehicle after three calm-season (March to August) storm events in 2023. The first pilot results show that if we meet strict remote sensing precision requirements in the comprehensive surveillance process and apply a consequent data interpretation procedure, developing a semi-automated programme for monitoring the coastal dynamics of soft bluffs after storm events is feasible. The following research steps anticipate supplementing the system with an Innodata® data interpretation algorithm based on machine learning from the collected data.

Keywords: *Baltic Sea, Coastal bluff, Delphi method, Geostatistical tools, Unmanned Aerial vehicles*

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COOPERATION NETWORKS BETWEEN FISHING COMMUNITIES IN EUROPE: THE IBERIAN PENINSULA FLAGs

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The incorporation of the LEADER method into the Common Fisheries Policy from 2007 onwards has meant a paradigm shift in the governance of fisheries-dependent areas. The main result has been the consolidation of local systems of actors, the Fisheries Local Action Groups (FLAGs), aimed at promoting endogenous territorial development. The method includes among its principles working in networks and ensuring the participation of actors from different territories through inter-territorial and transnational cooperation. This work builds on previous research (Piñeiro and Lois, 2019; Felicidades and Piñeiro, 2021) and represents a further step in the analysis of the level of cooperation achieved, on an international scale, by Spanish and Portuguese groups after 15 years of application of EU funds for the sustainable development of fishing areas, with special attention to the role of the European network of groups (FARNET) in promoting this cooperation. Data published by official bodies and by the FLAG networks on projects and beneficiaries are analysed. The results show that, in recent years, cooperation has become more intense and diverse between groups and territories, and has allowed the development of transnational projects, which have encountered difficulties in their consolidation due to the diversity of the FLAGs, with different levels of organisation, cohesion, technical capacity and capacity for integration of local actors. In addition, there are regulatory, linguistic, financial and cultural obstacles that the groups are trying to overcome in order to respond to common problems, such as climate change or the ageing of the most rural and peripheral coastal areas. This research highlights the implications for the advancement of transnational cooperation between fishing areas of the integration of FARNET into FAMENET, a much broader network not specifically focused on the interests of FLAGs.

Keywords: *desarrollo sostenible, áreas de pesca, cooperación transnacional, FLAGs, Península Ibérica*

Session III. Challenging conditions and transformations for coastal communities during current crises

TRANSBOUNDARY TRANSITIONAL WATERS: ARENAS FOR CROSS-BORDER COOPERATION OR CONFRONTATION?

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The Russian Federation's invasion of Ukraine in 2022 and Venezuela's territorial claims to Guyana, including the transboundary Rio Barima Delta, evoked academic interest in various aspects of international security. Hence, the focus is on cross-border cooperation and risks of confrontation in and around transboundary transitional waters, i.e., those transitional waters where two or more countries share an estuary, a delta, or a lagoon while having a contiguous border in the territorial waters. The Cooperation and Confrontation Index comprises five facets and 25 indicators spread equally among the five aspects. The following facets rely on the calculated integrated values of the Cooperation and Confrontation Index for each transboundary transitional water body: 1. Socioeconomic Cohesion; 2. Environmental Coherence; 3. Transboundary Connectivity; 4. Transboundary Cooperation; 5. Confrontation Risk. We created a comprehensive worldwide inventory of 115 transboundary transitional waters. The conclusion is that the risk of confrontation closely correlates with the level of corruption in a more belligerent country sharing the transboundary transitional water body.

Keywords: *international security, cross-border cooperation, transitional waters, Cooperation and Confrontation Index*

Session III. Challenging conditions and transformations for coastal communities during current crises

PIONEERING COASTAL ADAPTATION MEASURES: URBAN DECONSTRUCTION AND NATURE-BASED SOLUTIONS IN THE BEACH OF CALAFELL (NE IBERIAN PENINSULA)

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Coastal adaptation measures are indispensable in the coming decades for habitats and populations situated along the shoreline. While deconstruction has proven effective in natural areas, it has not yet been tested in urban areas where massive de-urbanization is not feasible. Likewise, artificial beach regeneration, applied repeatedly without morphological criteria, is both inefficient and economically unsustainable. Between the extremes of permanent artificial regeneration and massive deconstruction, there lies a middle ground: the de-urbanization of promenades and breakwaters, along with sustainable beach management. This study presents a pioneering case in Spain of preventive deconstruction of the promenade in a densely populated municipality with compact urbanization and high touristic interest. The site is Calafell, located on the northern Costa Daurada (Catalonia, Spain), where coastal management tasks initiated in 2021 involve the removal of jetties perpendicular to the beach, progressive boardwalk deconstruction, and dune creation using nature-based solutions. To date, over 1,500 m^2 of the boardwalk has been deconstructed, and 80% of the beach area has been allocated for dune restoration. These actions have been monitored using drone flights equipped with RGB and LiDAR sensors, enabling the analysis of the coastline evolution, topographic profile, and sediment volume of the system. Digital terrain elevation models reveal that wind traps implemented on the upper beach have increased the average height and volume by up to 35%, altering the natural beach profile and reducing exposure to risks associated with eastward storms. Moreover, the partial deconstruction of the boardwalk has modified the coastal dynamics, favoring the beach's progradation in this area.

Keywords: *coastal erosion, urban deconstruction, dune restoration, nature-based solutions, coastal adaptation measures.*

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Session III. Challenging conditions and transformations for coastal communities during current crises

TRENDS IN LAND USE CHANGE IN THE CONTEXT OF URBANIZATION IN THE ROMANIAN BLACK SEA COAST AREA

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This study examines trends in land use change along the Romanian Black Sea coast under the pressure of urbanization. Using CORINE and ESRI Land Cover data, we analyze spatial and temporal variations in land cover/use over the last 3 decades. The integration of Geographic Information Systems (GIS) and advanced statistical methods allows for a comprehensive assessment of the transformation dynamics. The Romanian Black Sea coast, characterized by its diverse ecosystems and strategic economic importance, has experienced significant alterations due to urban expansion, tourism development, and agricultural shifts. Our findings highlight an increase in urban and built-up areas, accompanied by a decline in agricultural lands and areas with natural vegetation. These changes are mapped and quantified, highlighting hot spots of transformation, the driving forces behind them and their consequences. Our results stress the need for sustainable land management policies to balance development gains with environmental conservation values. We believe that our study contributes to developing a new perspective in understanding coastal land use dynamics and provides valuable insights for policymakers and urban planners in the region.

Keywords: *land use change, Romanian Black Sea coast, CORINE Land Cover, urbanization pressure*

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URBAN FUTURES IN FOCUS: ADVANCING NATURE-BASED SOLUTIONS USING GEOBIA AND PPGIS IN CONSTANTA, ROMANIA

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Urbanization, alongside the pressing need for sustainable development, demands innovative strategies for understanding urban landscapes and effectively incorporating Nature-based solutions. This paper introduces a comprehensive analysis undertaken in Constanța City, merging Geographic Object-Based Image Analysis (GEOBIA) and Public Participation GIS (PPGIS) approches. The GEOBIA analysis provides insights into the spatial distribution and attributes of urban areas, facilitating a nuanced comprehension of urban dynamics by using medium resolution Planet Imagery. Simultaneously, PPGIS methods are utilized to assess citizen perceptions and preferences concerning nature-based solutions. Through the integration of these approaches, the study seeks to bridge the divide between technical analyses and community viewpoints, fostering inclusive and well-informed decision-making processes. The results underscore the effectiveness of GEOBIA in extracting detailed urban features from satellite imagery, while PPGIS sheds light on citizen preferences regarding nature-based solutions. This synergistic approach offers a comprehensive understanding of urban environments and empowers the development of locally relevant, community-driven interventions for sustainable urban growth.

Keywords: *GEOBIA, PPGIS, Nature-Based Solutions, Constanta*

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THE IMPACT OF WAR ON BLACK SEA CETACEANS AND MEASURES FOR THEIR PRESERVATION

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Whales and dolphins have historically washed up on beaches due to algae blooms, disease outbreaks, forest fires, floods, cyclones, and earthquakes. Human-induced exploitation of marine resources cause additional impacts from oil and other forms of pollution, invasive species, poaching and fishing. Since February 2022, military action in the Black Sea has placed significant additional pressure on cetaceans. Powerful bombs are killing Black Sea dolphins, separating their families, causing disruption to breeding patterns, feeding strategies and migration. Exposure to intense sonar from military equipment leaves dolphins and whales acoustically traumatized and unable to communicate or navigate. It is difficult to determine the exact physiological effects, but evidence is demonstrating that it can paralyze and kill them. Black Sea cetaceans (porpoise, common dolphin, and bottlenose dolphin) usually die naturally and are thrown ashore, but since the beginning of Russia's war against Ukraine, thousands of additional cetaceans have washed up dead. The behavior of confused and wounded animals is hard to watch. Such high numbers of dead or distressed Black Sea cetaceans have never been recorded before. Scientists of the national park 'Tuzlivski Lymani', a nature protected area in Ukraine, have witnessed unprecedented mortality rates over the past two years. There is a high risk that this rapidly moving ecocide will lead to the extinction of cetaceans in the Black Sea. We propose urgent measures to save Black Sea cetaceans by creating a large marine protected area in the North-Western part of the Black Sea, including Snake Island. This would allow the cetaceans to safely reproduce and replenish their drastically falling numbers. EUCC and others have appealed to the regional and national Government of Ukraine to bring this issue to international attention.

Keywords: *Cetaceans, Black Sea, War, Marine Protected Area (MPA)*

Acknowledgements: EUCC (The Coastal & Marine Union)

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SOCIO-ECONOMIC ASPECTS OF WASTEWATER TREATMENT FACILITIES IN TOURIST HOTSPOTS OF RURAL AREAS AROUND THE BALTIC SEA

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During summer, the influx of tourists to the Baltic Sea coast strains wastewater treatment systems that were initially designed for the year-round population. The health of the sea and beaches, crucial factors in attracting visitors, is at stake due to the impact of tourism on the wastewater systems, leading to pressing environmental challenges. The discharge of wastewater (WW) from coastal tourist destinations along the Baltic Sea is characterized by significant seasonal variability, often manifesting in small treatment plants (<2000 Person Equivalent, PE). This variability poses a challenge to the consistent achievement of effluent quality standards, potentially jeopardizing these regions' environmental health and tourist appeal. The NURSECOAST-II project aims to address these issues by exploring various technological solutions designed to mitigate nutrient pollution from wastewater in tourist areas, thereby reducing nutrient flow into the Baltic Sea. Pilot installations, tailored to specific geographical and environmental conditions across the Baltic Sea Region (BSR), serve as case studies for local authorities and tourist site operators, providing practical insights into effective wastewater treatment practices at tourist destinations in the high season. To complement this work, a comprehensive assessment of the socio-economic components related to the subject is carried out. The socio-economic study is conducted to take into account the consequences deficiently managed wastewater poses to the region socially and economically and analyses how the pilot solutions can contribute to mitigating social problems. Thus, local authorities' understanding of the social relationship between tourism development, investments relating to wastewater management, and environmental quality will be improved. The study involves a survey targeting local experts. Based on the concept of ecosystem services, it asks for information on the current conditions and the predicted impacts generated by the new pilot solutions. From there, mitigation options and solutions will be discussed. The findings from this socio-economic study will inform discussions and guide decision-making on managing wastewater in a way that supports the sustainability of tourism, protects the environment, and promotes public health. This approach, with its potential to revolutionize wastewater management in coastal regions, has far-reaching implications not only for the Baltic Sea Region (BSR) but also for similar coastal areas worldwide grappling with the challenges of seasonal wastewater flow and nutrient pollution.

Keywords: *Wastewater treatment, rural, tourism, socio-economic impact analysis*

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THE SUITABILITY OF SEAS AND SHORES FOR BUILDING SUBMARINE POWER INTERCONNECTIONS

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This presentation analyses the suitability of seas and the attractiveness of shores for the construction of submarine power interconnections. Water depth and distance between shores are considered to assess the suitability of seas, while potential for electricity consumption (estimated through population size and density) and potential for power generation from renewable energy sources are taken into account to evaluate shore favourability. Scores are attributed to these variables by using four classes of suitability. Individual scores are added to map the overall suitability of seas and shores for building submarine power interconnections. It is found that more than 20% of the global surface of seas and more than 40% of the global shore length are highly favourable. Most of the submarine power interconnections built so far are located in these highly favourable areas, confirming the validity of the presented methodology. The study offers a useful tool for planning submarine power interconnections, which play an increasingly important role in ongoing energy transitions.

Keywords: *GIS; spatial analysis; renewable energy resources; power interconnection; submarine power cable*

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ACCEPTANCE FACTORS FOR GREEN ENERGY IN GERMAN COASTAL AREAS

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Transforming the energy system from fossil-based to zero-carbon is key to reaching climate neutrality. The success of this energy transition relies on new and emerging technologies and the development of existing technologies to produce and provide renewable energies. However, non-technical factors such as costs, potential environmental impacts, regulations, consumer choices, and public acceptance are also crucial considerations that will determine the pace and scale of progress. Public acceptance, in particular, has been shown to be of great importance, as resistance from the public can slow down or even hinder the implementation of energy technology projects (Baur et al. 2022). Many studies show that transparent information flow and possibilities for participation in the planning process are essential for opinion-making and for building public acceptance. The North Sea in particular is regarded as the center of offshore wind energy and is set to become Europe's green power plant. In addition to the further expansion of offshore wind energy, there are efforts to produce green hydrogen and derived products directly at wind turbines or in wind farms. These are to be transported ashore by ship or pipeline for further use. While the development of the technologies is progressing steadily and the establishment of a hydrogen economy is seen as a major structural policy opportunity, not only for northern Germany, the topic has hardly been taken up by society to date. Based on two case studies in the German coastal region - the island of Helgoland and Wilhelmshaven - the local perception of the population is shown. It also discusses which acceptance factors play a central role in shaping transformation processes for the energy transition.

Keywords: *energy transition, social acceptance, North Sea*

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TYPOLOGIES OF THE ROMANIAN BLACK SEA COAST ECONOMY: A DYNAMIC ANALYSIS AT THE COMMUNE LEVEL

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Over the past 20 years, the Romanian economy has experienced a series of events with a major impact on local communities. From political events such as joining NATO and the European Union to economic events such as the 2008 financial crisis and the effects of the COVID-19 pandemic, all have had an impact on the local economic structure. In this sense, the present analysis addresses the typology of economic sectors, through the activities of companies in the settlements on the Black Sea coast, specifically, sea-coast communes between Corbu and the Romanian-Bulgarian border. The main source of data used in the analysis is centred on the BorgDesign database, which contains data grouped by economic activities codes and broken down by the main indicators: number of companies, number of employees, turnover and profit. The use of such economic data aims at a better understanding of the economic particularities at the territorial level, but especially at identifying how the local economy has responded to exogenous challenges. The identification of economic phenomena within the Black Sea coast settlements is closely linked to the standard of living of the Romanian population. The psycho-cultural factor, namely the practice of seaside tourism, leaves its mark on the settlements that have based their activity on a seasonal economic sector. Thus, the analysis also aims at the typological particularities of the different settlements according to their demographic importance.

Keywords: *Analysis of economic activities, Dynamics of economic typologies, Principal Component Analysis, Romanian Black Sea coast*

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ARE WINE WEBSITES A GOOD PROMOTER FOR WINE TOURISM? A CASE STUDY OF DOBROGEA WINERIES

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This research examines the effectiveness of wine websites as promoters of wine tourism, the focus being set on the particular case of Dobrogea wineries. Featuring one of the greatest diversity of attractions in Romania, which are both important for mass and alternative tourism, Dobrogea annually hosts more than 1.5 mil. tourists (12.3% of all tourist arrivals in 2023) that could also enjoy the picturesque winescapes and cellar experience. In a time when numerous tourists easily turn to online information in order to plan or diversify their holiday experiences, wine websites in Dobrogea are significant for attracting visitors. As winegrowing and winemaking are traditional and already extended activities in Dobrogea, the more recent wine tourism holds significant potential for economic development. However, its success heavily relies on effective promotion, especially through digital platforms. This study comprehensively evaluates the content, user engagement, and overall effectiveness of Dobrogea wineries' websites, also drawing attention to social media integration and to certain marketing strategies. The findings suggest that websites that actively engage stakeholders and incorporate their feedback tend to perform better in attracting tourists. Moreover, the research highlights the importance of aligning wine tourism promotion with Sustainable Blue Economy (SBE) principles. By promoting sustainable practices and showcasing environmentally friendly initiatives, wineries can attract a growing segment of eco-conscious tourists. The study also underscores the role of cross-sectoral collaboration, where partnerships between wineries, tourism boards, and local businesses can amplify promotional efforts and create a cohesive tourist experience. The research clearly indicates that wine websites can be powerful tools for promoting wine tourism when they effectively engage stakeholders and adhere to sustainability principles. By leveraging participatory approaches, Dobrogea wineries can enhance their digital presence, attract more visitors, and contribute to SBE. This study offers valuable insights for wine producers and tourism promoters aiming, to achieve sustainable growth in the wine tourism sector.

Keywords: *wine tourism, Dobrogea wineries, website content analysis, inclusive economic development*

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PATHWAYS TOWARDS A SUSTAINABLE BLUE ECONOMY IN THE BLACK SEA

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The Blue Economy within the Black Sea region remains largely underdeveloped, despite holding substantial reserves of untapped economic potential. Its significance for regional development has been formally acknowledged by key stakeholders in documents such as the Burgas Vision paper and the Common Maritime Agenda. Despite its wealth of resources, the Black Sea is afflicted by significant environmental degradation, rendering it one of Europe's most polluted bodies of water. This degradation has led to profound impacts on marine biodiversity, exacerbated by the introduction of invasive species, deoxygenation, and climate change. These environmental challenges inevitably translate into socio-economic ramifications, affecting employment, food security, tourism, and public health. Consequently, there is an urgent imperative to transition towards a more sustainable development pathway within the Blue Economy framework. This research endeavors to offer insights into the sustainable trajectory of the Black Sea's blue sectors through two complementary participatory initiatives at both local and national levels. These initiatives aim to facilitate the early adoption of technological and social innovations, the replication of successful practices, the formulation of national sustainable blue economy strategies, and the implementation of adaptive management measures. By examining the case of Romania, with a focus on the aquaculture and fishery, maritime transport, renewable energy, coastal and maritime tourism and biotechnologies sectors, this study will demonstrate how the integration of national innovation pathways to support Blue Economy policies, alongside local transformative pathways enabling sectoral blue transformation, can foster economic and social benefits for coastal communities while safeguarding the marine environment.

Keywords: *Sustainable Blue Economy, transition, Black Sea, participatory approach,*

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BORDERING THE ROMANIAN COASTAL ZONE WHAT DELIMITATION CRITERIA FOR WHICH INTEGRATED COASTAL MANAGEMENT SYSTEM

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Conceptually, the coastal area is a system of social, economic and ecosystems components. Population concentration (local and/or visitors) along with the infrastructures and activities based on the coastal resources causes serious pressures to the dynamic and fragile coastal-marine ecosystems, leading to all kinds of conflicts that must be managed. It means that the coastal zone management is a system which relates to Who is doing, What is Doing, according to what Mandate and what Resources are allocated in order to keep the balance between the social, economic and environmental components of the coastal area. From all these resoures, some of the most important ones are the planning tools. According to the actual legal framework, the Romanian coastal zone is a limited space at the sea – land interface, where the land is mostly publicly owned. This area is providing the most important development resources for the limitrophe territories but farther ones, as it is the case of Constantza port infrastructure. In the meantime, lots of pressures over the coastal area are comming from farther geographical areas. That's why physical/spatial delimitation of the coast as a system, in addition to geographic and ecological characteristics of the coast, is of major importance for the coastal zone management. There are three different geographical units within the Coastal Spatial System: Shoreland, Coastal uplands and Coastal-influence lands. The proposed presentation is focusing on the delimitation criteria I proposed within the framework of "The National Strategy and the Integrated Management Plan of the Romanian coastal zone": geographical proximity to the shore land, functional linkage of activity sectors with the shore and sea resources, and territorial administrative organization. An inventory of the main impacts on the coastal zone management system is included.

Keywords: *Castal area – sysem of social, economi and ecologial subsystems; Coastal Spatial System; Coastal management system;* Delimitation criteria of the coastal zone

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IDENTIFYING SUCCESS FACTORS FOR INTEGRATED COASTAL ZONE MANAGEMENT – DEVELOPMENT OF A COASTAL PLAN IN MOROCCO.

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Integrated coastal zone management is a policy framework that serves to achieve sustainable development of limited space and resources of densely populated coastal areas, balancing environmental protection, societal needs, and economic development. In this work, the theoretical reasoning on the integration, science and policy interface, implementation, and governance as key components influencing the success of integrated coastal zone management is first given. Secondly, the understanding of the case study of coastal plan preparation for the region in Morocco is compared and the lessons learned are drawn. Finally, the conclusions to integrated coastal zone management as still relevant policy after more than thirty years of existence are generalized, by identifying factors that influence the context-specific interpretation of integrated coastal zone management. The effective integration of science and policy and policy implementation demand time, energy, and unwavering institutional commitment. Scientific knowledge must be both credible, legitimate, and relevant for policymaking, without limiting the available alternatives. Collaborative knowledge creation between science and policy, ideally extended to include civil society, is essential for sustainable solutions to shared broad issues of concern, such as climate urgency we are living. Governance, surpassing management, shapes decision-making processes and stakeholder engagement levels, bearing responsibility for decisions that shape the coastal Moroccan and Mediterranean future.

Keywords: *integrated coastal zone management; governance; science-policy; Mediterranean coasts*.

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CAN COASTAL FLOOD PREDICTIONS AFFECT REAL ESTATE MARKETS?

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Coastal flood model predictions are undeniably important for informing coastal management, but contain considerable uncertainty related to model structure, parameterisation, and input data. With these predictions becoming increasingly available through online flood maps, the uncertainty in these predictions presents considerable risks related to property devaluation. Such risks relate to real estate demand, measured by location preferences and willingness-to-pay (WTP) to buy and rent properties, based on access to flood predictions. Here, we evaluate the impact of flood predictions on coastal real estate demand in the UK by adopting an interdisciplinary approach, involving coastal flood modelling, a novel experimental WTP real estate survey of UK residents in response to flood model outputs, statistical modelling, and geospatial analysis. Our findings show that access to flood predictions dominates coastal real estate demand decisions in relation to personal preferences for location aesthetics, reflecting a shift in demand towards risk-averse locations. We also find that people do not consider flood prediction uncertainty in their real estate decisions, possibly due to an inability to perceive such uncertainty. Therefore, we argue that caution is needed when communicating flood predictions and using these predictions to inform coastal management. We advocate for the need to get flood models 'right' but recognise that this is a contentious issue as it implies having an error-free model, which is near impossible. Hence, we place greater emphasis on effectively communicating coastal flood predictions and their uncertainty to minimise real estate risks.

Keywords: *coastal flood modelling; flood prediction; real estate risk; uncertainty; willingness-to-pay.*

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DEVELOPMENT CHALLENGES IN A CONFLICTING COASTAL AREA: THE CASE STUDY OF CORBU COMMUNE (ROMANIA)

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Coastal areas represent a combination of development opportunities, natural amenities, and important areas for biodiversity conservation. Frequently, development efforts threaten the purposes of nature conservation efforts, creating conflicting land use intentions. Recent dynamics of natural and socio-economic systems, related to consequences of either global warming or economic crises, complicate even more the life of the local coastal communities, generating a set of development challenges. Among such challenges, we should highlight those related to climate change and sea-level rise, such as increasing coastal erosion, flooding and salt water intrusion into freshwater complexes (aquifers and coastal lowlands). Human pressure manifests through industrial, transportation and household pollution, which, along with over-exploitation of available materials lead towards habitat losses and resource depletion. Various regulatory systems are designed to overcome existing challenges by balancing conservation needs with development opportunities. Romanian seacoast area is exposed to all the above-mentioned challenges, however, their pressure varies depending on the local setting. Currently, Corbu commune, selected as a case study, is a hot spot of conservation-development contradictions, in which the conflict intensity is among the highest within the Romanian Black Sea coast area. By examining the causes and consequences of this conflict in Corbu, we identify the possible reconciliation solutions, which would make use of the economic development opportunities without harming natural ecosystems. Among the measures proposed we highlight enforcing environmental regulations, adequate decision-making related to land-use planning with appropriate public participation. The measures are targeted towards diversification of local economy as well as respecting social justice.

Keywords: *Environmental change, Protected areas, Tourism development, Romania*

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COASTAL ADAPTATION IN THE EU POLICIES

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Coastal zones have been identified as hotspots of climate change due to the severity of risks that are concentrated in these areas. They are characterized by high vulnerability (due to concentration of population, socio-economic activities both on land and at sea) and are facing several types of natural hazards and stressors, which are expected to increase due to climate change (e.g., extreme natural events like storms and floods, eutrophication, coastal squeeze). The management of these complex zones has been guided for several decades by Integrated Coastal Zones Management (ICZM), which emerged at international level and has then been encouraged in the European Union (EU). The approach in the zone corresponds toa governance through experimentations, based on the financing of projects by the European Commission and the development of Recommendations of the European Parliament and of the Council concerning the implementation of Integrated Coastal Zone Management in Europe in 2002 (2002/413/EC). No binding framework on ICZM were adopted for its Member States, as the "integrated coastal management" section of the proposal by the European Commission of the 2014/89/EU Directive on Maritime Spatial Planning (MSP Directive) has not been fully included in the final text. The paper will analyze how the coastal adaptation issues have been considered under the EU policies and in EU-wide international efforts since the proposal for the ICZM Directive was not adopted. Today, in EU, the coastal zones are not targeted by any direct policy action at EU level and instead are encompassed under the label of "Land-Sea Interactions" (LSI) in the MSP Directive and related EU projects. The presentation will illustrate how coastal adaptation issues are now scattered across several directives and strategies, leading to national responses at different speeds for coastal zones.

Keywords: *Coast, Adaptation, Climate, ICZM, LSI*

Session V. Improving coastal and maritime governance and cross-sectoral collaboration

ENHANCING COASTAL GOVERNANCE THROUGH SCIENCE COMMUNICATION: BRIDGING DISCIPLINES FOR SUSTAINABLE DEVELOPMENT

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The quantity of scientific articles and sources has increased exponentially in recent years. Worldwide, the availability of information is the highest in history due to open access and the internet. However, it seems like scientific information is not reaching high government officials. This raises the question: What is the main barrier between science and governance stakeholders? Scientists are the stakeholders that generate the information to support policymakers in making informed decisions, contributing to improving both current and future life for individuals and society. Nevertheless, scientists are accustomed to communicating mainly with other scientists within the same discipline. This has hindered scientists' ability to communicate across disciplines, policymakers, and society. As a result, scientific participation has decreased, distancing them from contributing to society. Coastal areas provide an example of this challenge, as they host diverse socio-economic activities intersecting with the environment. Communication gaps among stakeholders have led to the degradation of many coastal areas. To address this, a framework is being developed to facilitate holistic coastal assessment and improve communication with the public and decision-makers. Based on the "Circles of Coastal Sustainability" concept, this framework aims to engage scientific specialists in assessing coastal sustainability and proposing collaborative solutions involving governance officials. Complex scientific information will be conveyed through high-quality images to enhance understanding among stakeholders. Different levels of information representation will facilitate interdisciplinary discussions. The framework encompasses environmental, social, economic, and governance domains, each with five categories that are applicable to different coastal settings. Due to the complexity of the socio-ecological system, ongoing research is needed to improve the framework understanding of disciplines in the context of sustainability. This presentation aims to engage the scientists to see how their specific expertise and research can be used to bring collaborative solutions toward sustainable development through coastal governance.

Keywords: *Coastal Management, Science communication, Sustainable development.*

Workshop. Smart Technologies and Community Engagement with EBA for Climate Resilience (SCORE)

LOW-COST REMOTE SENSING APPROACHES FOR COASTAL EROSION MONITORING AND PREDICTION IN NORTHWEST OF IRELAND

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Coastal erosion in Ireland is one of the pressing environmental challenges, particularly affecting the numerous beaches in the northwest region, which remain largely unmonitored. Despite the critical need, there is a lack of comprehensive research on these beaches. This study aims to address this gap by utilising low-cost data sources, specifically open-source satellite data from the past 20 years, to track changes in the shoreline. By analysing this extensive historical data, the goal is to predict future coastal erosion trends for the 21st century, examining both long-term changes and specific 20-year intervals. To achieve this, the CoastSat tool is used, allowing extraction of shoreline data from Landsat and Sentinel-2 satellite imagery, providing a comprehensive historical dataset for analysis. The Digital Shoreline Analysis System (DSAS) is then utilised to calculate shoreline change rates and other important statistics, enabling tracking of shoreline dynamics and development of predictive models. To enhance predictive capability, the Coastal Storm Modelling System (CoSMoS-Coast) projects future shoreline positions under various forcing conditions, such as sea-level rise and increased storm intensity. These models provide valuable insights into potential future scenarios, aiding in the development of effective coastal management strategies. To validate findings, a drone imagery survey was conducted on selected beaches, creating Digital Surface Models (DSM) and comparing them with the satellite data. This validation step ensures the accuracy of the remote sensing data and models, providing a robust methodology for monitoring and predicting coastal erosion. This research highlights the potential of cost-effective, real-time data sources in developing sustainable coastal management strategies, ultimately contributing to the protection and preservation of Ireland's vulnerable coastal regions.

Keywords: *Remote Sensing, Climate risks, Coastal Erosion, Shoreline*

Acknowledgements: This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003534.

Workshop. Smart Technologies and Community Engagement with EBA for Climate Resilience (SCORE)

THE CHANGING STATISTICS OF STORM SURGE IN THE NW OF IRELAND

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Unequivocal change in the climate system has put coastal regions around the world at increasing risk from climate-related hazards like storm surge flooding. With studies demonstrating an increase in the frequency of storm surges along the Northwest coast of Ireland, within the EU H2020 project SCORE (Smart Control of the Climate Resilience in European Coastal Cities) a numerical modelling approach has been undertaken using SHYFEM (System of HYdrodynamic Finite Element Model) to simulate the storm surges into 2100 for the NW of Ireland under different Climate scenarios. Using the significant grid flexibility offered by the finite elements within SHYFEM, unstructured grids are implemented for two computational domains. One confined to the region of interest, specifically the Donegal Bay, namely the Limited Area Model (LAM) and the other extended to span the entirety of the North Atlantic Basin namely the Basin Scale Model (BSM). The two model applications are designed to capture the development of storm surges due to wind shear stresses and barometric pressure fluctuations associated with the passage of storm systems across the North Atlantic and to quantify the influence of the tides on the tide surge interaction. Given the large tidal excursion in the region, baroclinicity is neglected and the models are implemented in the barotropic mode. The LAM is forced with surface atmospheric forcing (pressure and winds) from ECMWF and sea surface height (SSH, including eleven tidal components) from CMEMS at its open boundary, whereas the BSM is solely forced with the atmospheric forcing. Extensive calibration of wind drag and bottom friction coefficients for the LAM and BSM using tidal gauge observations for 2020, shows high P. Corr and acceptable RMSE. Only negligible differences, around 3 cm, are seen in the surge magnitudes between the LAM and the BSM implying the negligible non-linear interaction of the tides on the storm surge dynamics in the Donegal Bay. Thus, the BSM has been forced with high resolution atmospheric forcing obtained from EURO-CORDEX to predict the impact of climate changes on storm surge intensity and frequency under different climate scenarios up to 2100. Finally, by accounting for the tidal contribution, total water levels projections have been determined thus facilitating the generation of useful statistics (for instance Annual exceedance probabilities) and flood maps to inform relevant policies for coastal resilience.

Keywords: *Climate change, numerical modelling, storm surge*

Acknowledgements: This work is supported by SCORE, funded by the European Commission's Horizon 2020 programme under grant agreement No. 101003534

Workshop. Smart Technologies and Community Engagement with EBA for Climate Resilience (SCORE)

ADVANCING COMMUNITY-DRIVEN CLIMATE RESILIENCE THROUGH SMART INTEGRATED SYSTEMATIC CO-CREATION METHODOLOGIES

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This abstract explores the integration of living labs, social innovation, and systems thinking as critical tools to enhance climate resilience and support community action on climate change. A coherent framework for fostering sustainable and resilient development is presented based on methodologies from the SCORE, EmpowerUs, and PRO-CLIMATE European Commission's funded research and innovation projects. Living labs, as demonstrated by the SCORE project, provide a participatory platform where adaptive solutions are co-created and co-designed with the involvement of citizens, researchers, and stakeholders. This approach ensures that solutions are practical and socially accepted, enhancing climate resilience through the integration of nature-based solutions (NBS) and smart technologies. The EmpowerUs project introduces the dimension of social innovation, supporting the socio-economic empowerment of communities. Integrated and flexible strategies are developed to address the challenges posed by climate change, urban pressures, and evolving cultural practices, thus enhancing overall resilience and sustainability. The PRO-CLIMATE project contributes a systems thinking approach, identifying social tipping points and policy actions that drive systemic transformation. Communities are viewed as interconnected systems influenced by multiple socio-economic and environmental factors, and strategies are devised to promote proactive behavioural change and social adaptation. By integrating these methodologies, a comprehensive framework that combines living labs, social innovation, and systems thinking is proposed to effectively enhance climate resilience. Diverse European case studies from the three EU projects illustrated serve as practical examples for testing and validating these integrated approaches. This framework not only addresses immediate climate challenges but also facilitates a systematic transformation towards long-term sustainability and resilience. This integrated approach underscores the need for multidisciplinary, community-driven solutions to better equip societies to withstand and adapt to future climate challenges.

Keywords: *Living Labs, Systems Thinking, Smart Technologies, Climate Action*

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Workshop. Smart Technologies and Community Engagement with EBA for Climate Resilience (SCORE)

CITIZEN SCIENCE IN COASTAL EROSION MONITORING - SMART PEBBLES IN SLIGO, IRELAND

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Coastal communities around the world are dealing with significant challenges caused by coastal erosion. Addressing this issue requires not only scientific and technological interventions but also the involvement of local citizens in data collection and analysis. This study explores the use of *Smart Pebbles* to demonstrate how low-cost sensors and citizen science can be used to monitor coastal erosion on a beach in Sligo, Ireland. It introduces a community-based approach to an innovative method for tracking sediment movement and understanding coastal processes by embedding RFID tags in *Smart Pebbles*. As citizen scientists, high school students collected pebbles from local beaches and inserted RFID tags to make the pebbles *Smart*. To gain insight into sediment dynamics and erosion patterns, these pebbles were tracked using an RFID reader. They were analysed for weight, roundness, and shape prior to deployment, and then measured again after recovery to gain insights about abrasion. As part of this paper, we describe the methodology used and emphasise citizen science's role. In addition to enhancing understanding of coastal erosion processes, the extensive data collected by a large number of non-specialist collaborators proved invaluable. It also demonstrated that scientific research activities can be educational, offering participants a hands-on learning experience. By , engaging communities with low-cost sensors, and raising public awareness about climate change challenges, the study illustrates the potential for integrating citizen science into environmental monitoring. As a result of the study, we conclude that RFID technology, combined with citizen science, offers a promising tool for tracking sediments and monitoring coastal erosion.

Keywords: *smart pebbles, citizen science, sediment tracking, coastal erosion*

Acknowledgements: This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101003534. This output reflects the views of the authors and the European Commission is not responsible for any use that may be made of the information contained therein.

Workshop. Smart Technologies and Community Engagement with EBA for Climate Resilience (SCORE)

ANALYSING THE ROLE OF ECOSYSTEM-BASED ADAPTATION TO BUILD COASTAL RESILIENCE IN EUROPEAN LIVING LABS (EBA WORKSHOP)

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As climate change exacerbates crises in coastal cities around the world, it is pertinent to find novel solutions that not only build adaptive capacity and resilience, but also offer 'win-win' solutions for socioeconomic challenges. Ecosystem-based adaptation (EBA) enables this, by offering co-benefits whilst reducing the impact of climate risks, and can be easier to maintain, cost effective, and longer-lasting. However, their uptake has been limited to lack of understanding amongst policymakers; lack of monitoring and data; limited stakeholder engagement; limited knowledge of the impacts of climate risks and EBAs on communities; absence of systematic governance mechanisms etc. This research tries to address these challenges, using the living lab model which enables effective stakeholder engagement through co-creation and co-design, thus contextualising the decision-problem by incorporating local needs and requirements in co-production of scientific data. This research emphasises the importance of effective stakeholder engagement, using tools like power-interest stakeholder mapping, quadruple helix, etc to avoid mal-adaptation. The study conducts large-scale surveys/interviews to analyse the public perceptions of adaptation strategies and socioeconomic vulnerability in the context of increasing climate risks, using fuzzy cognitive mapping in diverse European living lab regions. This research also uses approaches like multi-criteria analysis, enabling stakeholders across European living labs to engage in dialogue and select optimum EBA measures to reduce regional flood-risk. This research shares outputs from a cost-benefit analysis exercise conducted in the Irish living lab of Sligo, to study the role of EBA (sand dune management) in reducing coastal erosion. The outputs have been shared with local policymakers to improve decision-making processes in the face of climate uncertainty. The overall objective of this research is to demonstrate the scalability and replicability of EBAs, whilst encouraging knowledge-transfer across diverse European regions (part of the EU SCORE project), and improving the effectiveness of EBAs through better stakeholder engagement.

Keywords: *climate change; ecosystem-based adaptation; living labs; climate policy; stakeholder engagement*

POSTER ABSTRACTS

Poster session I

ENHANCED METHYLENE BLUE ADSORPTION USING GEOPOLYMERS SYNTHESIZED FROM MINE WASTE AND METAKAOLIN

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This study explores the effectiveness of geopolymers synthesized from mine waste and metakaolin for the adsorption of Methylene Blue (MB) dye. The mine waste, sourced from an abandoned Pb-Zn site in Northern Tunisia, was utilized to replace metakaolin in the formulations, aiming to improve adsorption capacity and minimize environmental impact. Two types of metakaolin — commercial 1200S MK from AGS Mineraux, France, and Vicente Pereira VPMK from Portugal — were used. The mechanical properties and microstructure of the geopolymers were analysed, revealing promising results, particularly in formulations based on VPMK metakaolin. The synthesized geopolymers exhibited high adsorption capacity due to their microstructure, characterized by voids and pores. The adsorption process of MB was studied by varying the amount of adsorbent and shaking period, fitting best into the pseudo second-order kinetic model. Isotherm modelling indicated that the Langmuir isotherm model best described the adsorption mechanism. The study found that samples with 40 wt.% VPMK and 100 wt.% MK demonstrated the highest adsorption capacity, highlighting the potential of using mine waste to enhance the performance of alkali-activated metakaolin-based geopolymers in dye adsorption applications.

Keywords: *waste, inorganic polymer, dye, adsorption, porosity*

Poster session I

STAKEHOLDERS' USE OF MARINE SPACES UNDER A CHANGING CLIMATE

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Changes in climate are affecting the marine ecosystems worldwide. However, these changes have an uneven spatial distribution. In this work, we aim to explore the overlap of the use of marine spaces by different stakeholders (i.e. different fleets and protected areas) with the spatial distribution of the current changing climate, focusing on Romanian waters and the Black Sea. For this purpose, we performed climate velocity analyses for various physical and biogeochemical variables, such as temperature, salinity, mixed layer depth, chlorophyll, net primary production and oxygen concentration. This type of exploration can integrate multiple stressors and help identify vulnerability hotspots as well as refugia. For climate velocity, long-term temporal trends were calculated as linear regression slopes of annual variables against time, with a spatial resolution. Protected areas and areas used by the various fleets were overlaid to identify regions where stakeholders could be particularly vulnerable to climate changes. We observe that the spatial variability within the basin is not uniform, with overall changes occurring faster in the western area compared to the eastern side. This could translate into heterogenous social and economic impacts across the different coastal areas. This type of analysis can help to assess the impacts for different users and inform the management of the protected areas, as well as identify potential areas that might need further protection.

Keywords: *climate velocity, Black Sea, protected areas.*

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Poster session I

ENERGY FROM THE SEA: THE SUSTAINABLE DEVELOPMENT GOALS AS A GUARD RAIL FOR GREEN HYDROGEN

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Green hydrogen is seen as the energy source of the future. It can help to achieve international goals such as climate protection. So far, green hydrogen is still developing and is mainly the subject of research and politics. To ensure that a green hydrogen economy is sustainable, sustainability criteria should be defined early. These should take equal account of economic, ecological and social aspects. The 17 Sustainable Development Goals of the United Nations (SDGs) could serve as a first guide. In H_2Mare, one of Germany's three flagship projects on green hydrogen, the project partners were sensitised to the need for a holistic approach from the outset. As a first step, green hydrogen was classified in the SDGs and communicated to stakeholders from science and industry via an online information module. In the second step, a survey was conducted among the project partners in 2023. It served to further sensitise the partners to the topic and, simultaneously, incorporate their expertise into the rating of green hydrogen in the context of the SDGs. The assessment was based on the personal knowledge and experience of experts from science and business in the field of green hydrogen. Regarding developing sustainability criteria, the 40 participants in the survey assigned at least medium, if not high or very high importance to 13 of the 17 SDGs.

Keywords: *Climate protection, Sustainability, Energy transition, Green hydrogen, Sustainability criteria*

Acknowledgements: The project H_2Mare is funded by Federal Ministry of Education and Research (BMBF) & European Union/NextGenerationEU.

Poster session I

MESHOPTIMISATIONFORMODELLINGMICROANDMESOTIMESCALE SHORELINEEVOLUTIONALONGSANDYCOASTS

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Hybrid two dimensional (2D)/one-line shoreline models provide a more computationally efficient process for modelling shoreline change over both the micro (<10 years) and meso (10 - 100 years) timescales. An important aspect of this shoreline modelling approach is to ensure that the outputs are mesh independent (i.e., predictions are due to the underlying physics being solved, and not due to mesh resolution), which is achieved through identifying an optimal mesh resolution for the area of interest. In this paper, we apply the MIKE 21 hybrid 2D/one-line model to examine the influence of mesh resolution on the simulation of shoreline change in individual cross-shore coastal profiles at equal intervals alongshore, with focus on a sandy coastline along Absecon Island, New Jersey. Our findings suggest that the optimal mesh resolution varies based on the slope of the coastal profile, where finer resolutions more accurately represent steeper profiles while coarser resolutions are better for gentler sloping areas. Based on these outcomes, the recommendation is that researchers would need to have more dynamic mesh resolutions to better discretise coastal environments for modelling shoreline positions, particularly since active coastal profiles vary alongshore. These results have important implications for optimising mesh generation to facilitate more robust applications of hybrid 2D/one-line shoreline models along sandy coastlines in order to better inform coastal risk management decisions.

Keywords: *Mesh Generation, Shoreline Evolution Modelling, Sandy Coasts, Coastal Profile, MIKE 21*

Acknowledgements: We are grateful to DHI Water Environments UK Ltd for providing access to MIKE 21 and Lisbeth Birch Pedersen for ongoing technical advice and assistance with the software.

Poster session I

SHORELINE DYNAMICS AND BREEDING COASTAL BIRDS IN THE MARANO AND GRADO BARRIER ISLANDS

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Covering almost 12% of the world's coasts, barrier islands are ideal habitat for many species of coastal birds. The functionality and benefits related to these coastal environments have recently been threatened by the reduction in sedimentary input, sea level rise, and human activities. Part of the Natura 2000 network, the system of sand banks and barrier islands of the Marano and Grado Lagoon (NE Italy) maintains a high degree of naturalness. Here, the Oystercatcher (Haematopus ostralegus), the Little tern (*Sternula albifrons*), and the Kentish plover (*Charadrius alexandrinus*) are the most distinctive bird nesting species of conservation concern. We examine the monitoring of target species during the nesting phase over a ten-year period (2013 to 2023) and look into the possible effect and/or constraint exerted by the morphodynamic setting of the nesting habitat. The analysis focuses on key geomorphological indicators, such as coastline advance or retreat, as well as variations in the island extent. The results indicate that the barrier system is self-sustaining despite a general rollover process. An external longshore sediment input is responsible for supplying a compensating longshore process that counteracts short-term, localised morphological changes such as spit progradation and washover development. In this morphodynamic context, the nesting population of Oystercatchers has grown over the years, while greater difficulties have been registered for the Little tern and the Kentish plover, whose breeding success has been more limited and is probably more constrained by the high dynamism and ephemeral characteristics of the barrier islands habitat. This underlines how, despite sharing the same nesting habitat, the response to different pressures could vary from species to species. Furthermore, our results allowed to provide a first set of management indications for species protection, based on the principles of adaptive management and maintenance of morphodynamic processes.

Keywords: *barrier islands, coastal birds, morphodynamics, monitoring,*

Acknowledgements: The monitoring activity is founded by the Biodiversity Office, Regione Friuli Venezia Giulia. We especially thank Dr. Umberto Fattor.

Poster session I

CURRENT COASTAL CHANGES' EVALUATIONS DEVELOPED FOR THE WESTERN BLACK SEA SHORE, BASED ON EARTH OBSERVATION PRODUCTS

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In order to efficiently assess the evolution of erosion hazard and the vulnerability of coastal areas to climate change, regular coastal monitoring is necessary. This monitoring should provide data and information that characterizes the dynamics of the coastline at different scales in terms of space and time. This work, supported by EO products, has enabled the coverage of the western shore, including the Romanian coastline, which represents 6% of the Black Sea coasts. Several algorithms, designed for image analysis have been the basis of this synoptic scale work, including specific attention for several local hotspots, widely used to monitor complex and vulnerable coastal areas over a long historical period. A complex analysis for a period of 25 years has been extended compiled, describing historical and recent changes affecting Constanta County and Danube Delta coastlines using satellite data, including those from the European Copernicus programme (Sentinel-1 and Sentinel-2), but also various EO data sources, providing a support to traditional methods of monitoring the evolution of beaches and coastlines (field topographical monitoring), in a context of climate change and rapid evolution.
The works emphasize a relevant multi-scale vision of the processes affecting coastal areas, but also a significant added value for coastal managers, by providing them with permanently updated data, in a very short time and at a lower cost, on the entire territory, synthesized into up-to-date information on the exposure of their coastline to erosion.

Keywords: *Black Sea shore, coastal changes, beach erosion, vulnerable areas, barrier islands dynamics*

Poster session I

STAKEHOLDER PERCEPTIONS OF INNOVATIONS TO IMPROVE THE MONITORING OF WATERBIRDS AND THEIR HABITATS ALONG THE EAST ATLANTIC FLYWAY

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The East Atlantic Flyway (EAF), a migratory route for millions of waterbirds between Europe and Africa, connects the Arctic region between NE Canada and Siberian Russia with the European and African west coast. The Wadden Sea, a crucial intertidal area along the EAF, provides food and safety to millions of waterbirds. The current integrated bird monitoring program, a joint effort by the Wadden Sea Flyway Initiative (WSFI), Wetlands International, and BirdLife International, relies on the dedication of approximately 15,000 volunteers. This program equips national governments and site managers with data, enabling early detection of environmental changes and declining population trends of waterbird species. However, data and knowledge gaps still exist. These gaps could be efficiently filled using innovative remote sensing techniques, such as drones and satellite imagery, tracking, and advanced statistical analyses. This study aims to collect expert input and opinions on innovative technologies and methods that could be introduced into the EAF monitoring program to improve data quality and coverage. The consultation process for this study involved two main activities: a questionnaire and a workshop. The questionnaire gathered expert opinions on introducing new monitoring techniques and understanding data requirements, while the workshop brought together international experts to discuss innovative technologies. Results from these activities provided insights and recommendations across three main areas: EAF monitoring governance and policy, management and conduct of monitoring, and innovation and digital techniques. This work supports the planning processes for improving bird and habitat monitoring along the EAF, specifically relevant to managing the Wadden Sea area.

Keywords: *Migratory birds, habitats, monitoring techniques.*

Acknowledgements: This study was undertaken within the project' Innovations for Migratory Bird Monitoring along the East Atlantic Flyway' (FLYWAY), an initiative funded by the European Commission's (EC) Technical Support Instrument (TSI) upon the request of the Dutch Ministry of Agriculture, Nature and Food Quality submitted on behalf of its counterparts in Germany and Denmark.

Poster session I

THE ISTRO-PONTIC HARBORS: PLACES OF INTERFERENCE OF CULTURES AND CIVILIZATIONS OVER THE MILLENNIA

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By "Istro-Pontic region" we mean the area that runs along the course of the Lower Danube, starting from Belgrade and ending at its delta in the Black Sea, including its eastern coastline. Considering the recent developments in the region, generated by the war in Ukraine, the research wants to propose futures perspectives and approaches to the area in the spirit of a model of peaceful cultural-civilizational integration and coexistence. Starting from a cartographic perspective, the main axis of the research approach is the systematic analysis of the past of this area, with a special focus on the port cities here, taking into account that the region is at the intersection of influences coming from three continents: Europe, Asia and Africa. Modern geopolitical theories place the Danubian-Pontic region in the meeting zone of the tellurocratic space of Eurasian origin with the thalassocratic one of Euro-Atlantic origin - coming to the present day, starting from the 19th century, British and American influences become more and more present. These particularities of the Danubian-Pontic region left their mark on the evolution of the port cities here and the role they played in different historical periods in harmonizing all the influences, which eventually ended up generating a distinctive cultural pattern of the region.

Keywords: *Istro-Pontic region, harbors, cultural pattern, developement.*

Poster session II

ECOSYSTEM SERVICES OF ARTIFICIAL FLOATING WETLANDS AT THE GERMAN BALTIC SEA COAST

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Eutrophication remains a challenge in the Baltic Sea, especially in lagoons with reduced water exchange and high pressures like agriculture and wastewater. In several projects, EUCC-D tested floating wetlands made of sustainable materials (thermowood, glass gravel), that aimed at reducing nutrients in eutrophic coastal waters by growing and harvesting macrophytes and halophyte plants on the floating construction. The results have shown that floating wetlands can contribute to the improvement of local water quality and in addition offer manifold ecosystem services. The following research focused on assessing ecosystem services provided by artificial floating wetlands at three German case study sites, in Rostock, Born (Darss-Zingst-Bodden Chain) and Bansin. Ecosystem services supplied by floating wetlands include provisioning services (e.g. production of food, medicine), regulating services (e.g. nutrient retention, improvement of water quality, provision of habitats, enhancing biodiversity) and cultural services (e.g. landscape aesthetics, local recreation, use for educational purposes and scientific issues). The Ecosystem Service Assessment of the floating wetlands at the case study sites can serve as a basis for the planning of future floating wetlands. Depending on the requirements for the ecosystem services preferred at a location, the material of the floating structure (creation of underwater habitat, development of the root zone), the shape and size of the island (biomass production, aesthetics), the selection of plants (flowering plants for aesthetics and bee pasture, plants with high biomass production and nutrient binding for improving water quality) and the distance of the island from the shore (aesthetics, educational purposes) should be selected, to meet the needs at future installation sites, e.g. in urban areas or marinas.

Keywords: *Floating wetlands, halophytes, ecosystem services, nature-based solutions*

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Poster session II

INSECTICIDES SCREENING USING BIOSENSOR WITH CO-IMMOBILIZED ACETYLCHOLINESTERASE AND BUTYRYLCHOLINESTERASE

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The organophosphorus and carbamate neurotoxic insecticides are analyzed with monoenzymatic biosensors usually based on acetylcholinesterase or rarer on butyrylcholinesterase. These monoenzymatic biosensors are not able to detect the entire spectrum of insecticides since there are some compounds that inhibit only one of the two enzymes, e.g. pirimicarb inhibits at butyrylcholinesterase at much lower concentrations than acetylcholinesterase while methomyl inhibits only acetylcholinesterase. We have developed a bienzymatic biosensor that contains both acetylcholinesterase and butyrylcholinesterase co-immobilized on the same electrode and each insecticide is determined by the enzyme with the highest affinity. The electrodes were modified with a stabilized copper containing Prussian blue electrodeposited on electrodes modified with 4-aminothiophenol monolayer using diazonium chemistry and copper nanoparticles for improved sensitivity.

Keywords: *acetylcholinesterase, butyrylcholinesterase, bienzymatic biosensor, stabilized copper containing Prussian blue*

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Poster session II

FROM SEA TO SUCCESS: THE EVOLUTION OF BLUE CAREERS

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The ocean, covering over 70% of Earth's surface, plays a crucial role in sustaining life on our planet. Blue careers, encompassing a wide range of professions related to marine and aquatic environments, are key to ensuring the health and sustainability of our oceans. This study explores the importance of blue careers in addressing environmental and sustainability challenges, highlighting the economic, social, and environmental significance of these professions. It provides an overview of various blue careers, including marine biology, oceanography, marine engineering, fisheries management, and aquaculture, discussing the skills and qualifications needed for each. Current trends in blue careers, such as advancements in technology and increasing focus on sustainability, are examined, along with the challenges faced by professionals in the field. The study also explores emerging areas within blue careers, such as marine biotechnology and marine renewable energy, and discusses opportunities for career growth and development.

Keywords: *Blue careers, Marine and aquatic environments, Sustainability, Blue Economy*

Poster session II

SHELL SCARS AND MALFORMATIONS IN TORTOISES: AN ARCHIVE OF HUMAN IMPACT

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Tortoises are slow moving and long-lived animals and are often impacted by human activities. Compared to similar size mammals, tortoises are less mobile, acquiring during their life-span permanent or temporary scars on the shells due to direct and indirect interactions with humans. This study aimed to quantify the nature and frequency of scars to evaluate the extent of human impact on a population of Spur-thighed Tortoises (*Testudo graeca*), inhabiting Histria Archaeological Site, in Danube Delta Biosphere Reserve, Romania. We hypothesized that (i) scars on carapace and plastron serve as indicators of direct impact. Since time can be a determining factor, we expect (ii) larger tortoises to have more scars, and since males and females have different activity pattern, (iii) genders could be differently affected by anthropogenic scars. During visual transects in 2019-2021, adult tortoises were photographed on site, measured, and weighed. The scars were classified in two broad categories, i.e., anthropogenic (large wounds and burnt tissue) and natural (substrate scratches, canid marks, or fungal infections). From 298 adult tortoises, only 17.4% had healthy shells, not affected by natural or anthropogenic scars. Nine percent had anthropogenic scars on their shells, while the rest had natural scars. A Generalized Linear Models showed a significant effect of size, larger tortoises gaining more scars of anthropogenic origin (p = 0.002). The gender, in contrast, did not reveal any significant difference between the anthropogenic scars present on males and females (p = 0.408). In our study, a relatively small percent of the tortoises was affected by humans. However, our results showed that larger animals and thus older individuals, have a higher potential of revealing the past impact of human activities. Scar analysis can become a simple and valuable tool for inferring the protection status received by tortoise populations and gain support from citizen science involvement.

Keywords: *shell marks, scar analysis, conservation status*

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Poster session II

A PROPOSAL OF INNOVATIVE MACHINE LEARNING-BASED TOOLS FOR THE INTEGRATED MONITORING OF SANDY BEACHES

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The presence of beach litter (BL) and the mismanagement of beached seagrass banquettes are increasingly an environmental issue affecting coastal systems and associated ecosystems. Modern Machine Learning (ML) and Computer Vision techniques are proving increasingly effective and useful for automated feature detection by exploiting images from various sources such as, for example, UAVs and video surveillance cameras. The activities reported here were conducted as part of ongoing research projects and show two ML-based tools developed for integrated coastal management. The first of them exploits a useful algorithm for the identification and classification of BL on sandy beaches. The experiments were performed with a dataset consisting of high-resolution UAV images acquired over coastal sites in Italy, Portugal, and Spain. A preliminary model training was performed with 450 masks and several labels. The result showed 95% accuracy and an F1 score of 0.93. These results allowed the tool to be considered valid for BL monitoring and the identification of potential sources. The second tool is useful for automated detection of seagrass from video surveillance images. The system was tested with images of Torre Canne beach (Puglia, Italy) and trained with a dataset of 100 labelled images. The results were very positive with a recognition rate of seagrass banquettes of about 99% and with an Intersection over Union of 0.50-0.95. The proposed tools could be of interest for immediate monitoring following extreme events, marine ecosystem health checks, coastal erosion assessment, and tourism activity. The applications discussed here may offer considerable benefits for institutions and parties involved in coastal conservation and management.

Keywords: *Coastal management, coastal monitoring, machine learning, beach litter, seagrass banquette.*

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Poster session II

CHALLENGES FOR THE URBAN SPATIAL PLANNING IN THE ROMANIAN COASTAL ZONE

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According to the Romanian legal framework, the spatial planning system is made up of hierarchized tools with both directive and regulatory character. As regulatory tools, the land use plans have an important control role. Even though legal provisions regarding the Romanian coastal zone management are in service since 2002 its integrated management plan is not yet approved. The analysis of the existing land use plans identified problems that make them less effective and efficient control tools: 1. The actual narrow coastal zone delimitation (as coastal protection zone – coastal public property) don't correlate with the delimitation of the territorial units that are matter of the land use plans; 2. Lack of spatial directive tools such as the coastal zone development plan; 3. The existing land use plans have been mostly elaborated and approved 20 years ago. All this time the pressure of the urban sprawl in the southern sector of the coastal zone (mainly for residential and tourist uses) incresed whilst the population and residential area is declining in the northern sector (the Danube Delta). Excessive and uncontrolled urban sprawl were facilitated by derogation land use plans; 4. Provisions of the land use plans enhanced old land use conflicts and developed new ones. The pressures and risks in the Romanian coastal zone have increased; 5. The existing spatial planning system and procedures are not appropriate to the specific context of the coastal area; 6. Weak integration of the coastal landscape in the land use planning process; 7. The public consultation and participation are not effective and efficient; 8. The supervision task of the land use plans is spread out between two Territorial Environmental Protection Agencies in one hand and the Coastal Zone National Committee on the other hand. An effective and efficient spatial planning system must/should challenge all these problems.

Keywords: *Directive and regulatory spatial planning tools, Control role of land use planning tools, Extensive, uncontrolled and illegal urban sprawl, Land use conflicts, Community participation in the land use planning processes.*

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Poster session II

EMERALD GROWTH PERSPECTIVES FOR TRANSITIONAL WATERS UNDER STRESS

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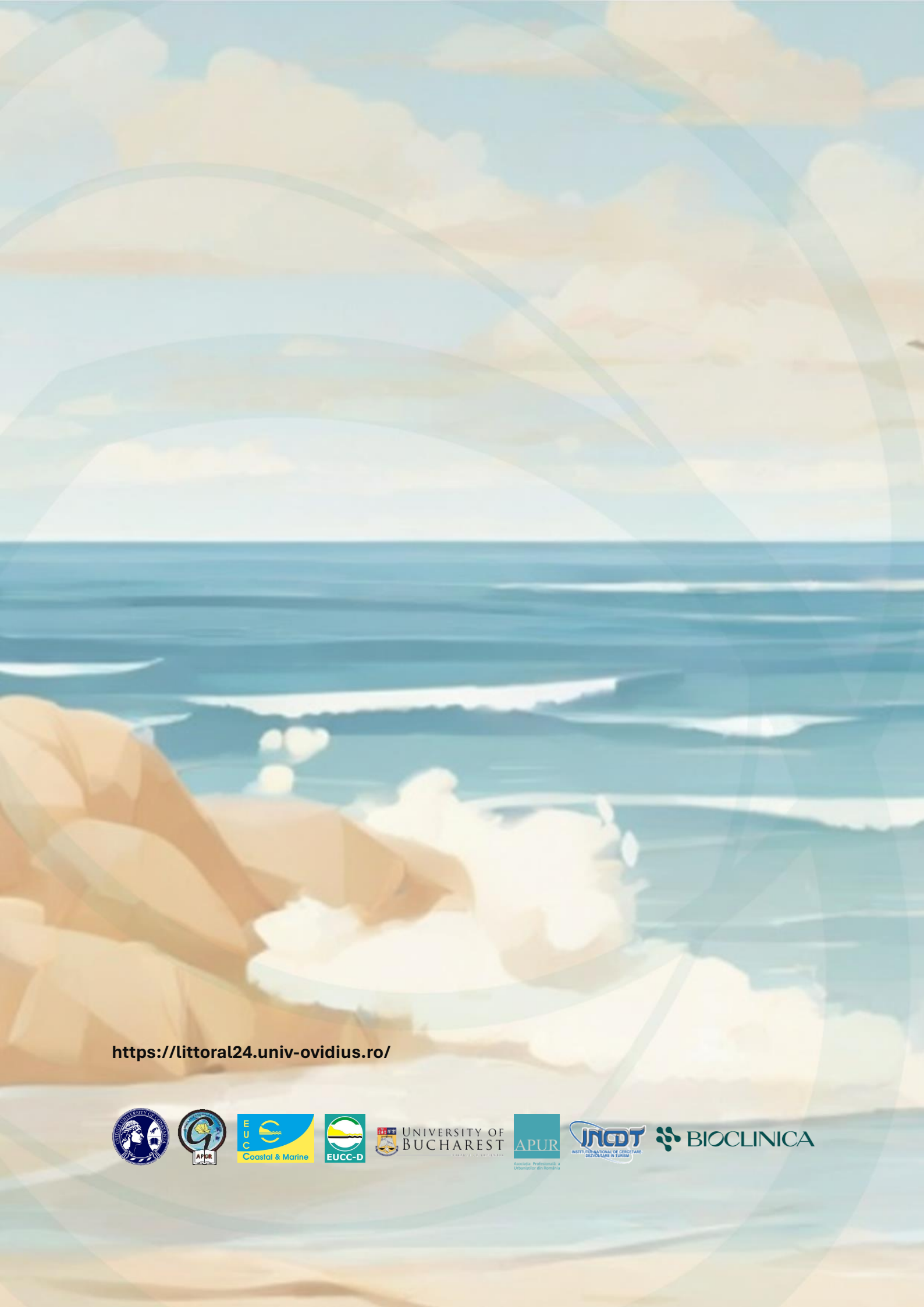
Our research focuses on transitional waters, an overlooked physical and ecological domain, which is critically essential for the resilience of coastal and marine systems and, hence, for the sustainability and well-being of coastal urban and peri-urban areas. In the legislation of the European Union, "transitional waters" are defined as "bodies of surface water in the vicinity of river mouths which are partially saline in character as a result of their proximity to coastal waters but which are substantially influenced by freshwater flows". Transitional waters suffer more impacts, resulting in a worse ecological status than lakes and coastal waters. The worst areas in Europe concerning ecological pressures and the environmental status of transitional and coastal waters are along the Baltic and Greater North Sea coastlines. 'Emerald Growth' is an overarching concept to address sustainable development issues of transitional waters within a wider river basin and coastal and marine interplay framework. It is essential for the European Union due to its maritime geography. 'Emerald Tourism' is one of the principal sectors of Emerald Growth, being a complex activity combining Green Tourism and Blue Tourism agents and actors, features, destinations, interests, and focus. We adapted the Circles of Coastal Sustainability (CCS) framework for coastal lagoons and other transitional waters. It comprises four domains (Environmental and Ecology, Social, Cultural, Economics, and Governance), each with five categories. Our case study focuses on Lake Liepaja lagoon, a transitional water body in southwest Latvia linking the Barta River basin with the Baltic Sea. We used locally adapted comprehensive indicators to assess each category according to the scale of Bad to Excellent. The results of our research show that provisioning ecosystem services in Lake Liepaja is good, except for the lagoon's trophic status due to the abundant nutrient input from agriculture and municipal wastewater.

Keywords: *Baltic Sea, Coastal lagoons, Circles of Coastal Sustainability, Transitional waters*



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