



Aquatic and Coastal Ecosystems: Challenges and Opportunities towards Sustainable Development

THURSDAY, NOVEMBER 16, 2023

FRIDAY, NOVEMBER 17, 2023

BOOK OF ABSTRACTS



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Aquatic and Coastal Ecosystems: Challenges and Opportunities towards Sustainable Development

THURSDAY, NOVEMBER 16, 2023 - HANSEMESSE ROSTOCK
ZUR HANSEMESSE 1-2, 18106 ROSTOCK

- 09:00 – 12:30 MORNING SESSION
- 12:30 – 14:00 LUNCH BREAK
- 14:00 – 17:30 PARALLEL SESSIONS
- [Session 1 Coastal Engineering](#)
 - [Session 2 Social, Culture and Human Sciences](#)
 - [Session 3 Life Sciences and Biotechnology](#)
 - [Session 4 Environmental Sciences and Biodiversity](#)
- 18:30 EVENING RECEPTION AT CITY HALL – RATHAUS ROSTOCK

FRIDAY, NOVEMBER 17, 2023 - CITY HALL – RATHAUS ROSTOCK
NEUER MARKT 1A, 18055 ROSTOCK

- 09:00 – 10:30 MORNING SESSION
- 10:30 – 11:00 COFFEE BREAK
- 11:00 – 12:30 PARALLEL SESSIONS
- [Session 1 Coastal Engineering](#)
 - [Session 2 Social, Culture and Human Sciences](#)
 - [Session 3 Life Sciences and Biotechnology](#)
 - [Session 4 Environmental Sciences and Biodiversity](#)
- 12:30 – 14:00 LUNCH BREAK
- 14:00 – 17:00 PARALLEL SESSIONS & CLOSING REMARKS

Thursday, November 16th

HanseMesse, Rostock

Chairperson:

Bettina Eichler-Löbermann (Germany/University of Rostock/Prof)

Wolfgang Schareck (Germany/University of Rostock/Prof)

09:00 – 09:30	WELCOME Jean-Marc Ogier (La Rochelle Université, Chair of the EU-CONEXUS Governing Board), Wolfgang Schareck (Former Rector, University of Rostock)
09:30 – 10:00	TREND IN NATURAL PRODUCT FROM AQUATICS ECOSYSTEMS Keynote Speaker: Pedro Leao (University of Porto, CIIMAR - Interdisciplinary Centre of Marine and Environmental Research)
10:00 – 10:30	WASTEWATER MANAGEMENT IN COASTAL AREAS - A CASE STUDY FROM ALBANIA Keynote Speaker: Gabriel Racoviteanu (Technical University of Civil Engineering Bucharest)
10:30 – 11:00	COFFEE BREAK
11:00 – 11:30	BACTERIOPHAGES: FROM MOLECULAR BIOLOGY TO PHAGE THERAPY Keynote Speaker: Emmanouil Flemetakis (Agricultural University of Athens)
11:30 – 12:00	INTERNATIONAL AND/OR EUROPEAN LEGAL FRAMEWORK FOR SUSTAINABLE COASTAL DEVELOPMENT Keynote Speaker: Björn Schiffbauer (University of Rostock)
12:00 – 12:30	PHD ACTIONS IN EU-CONEXUS Loretta Batali and Ilinca Nastase (EU-CONEXUS)
12:30 – 14:00	LUNCH BREAK

16th November

PARALLEL SESSION 1 - COASTAL ENGINEERING

Chairperson:

Vytautas Paulauskas (Lithuania/Klaipeda university/Prof)

Grigoris Kalnis (Cyprus/Frederick University/Prof)

14:00 – 14:15	WELCOME Florin Baltaretu (Head of the Coastal Engineering Institute/Romania/Technical University of Civil Engineering Bucharest/Prof)
14:15 – 14:30	CÚPLA-TRÁ: FOSTERING COASTAL ECOSYSTEM RESILIENCE THROUGH THE FUSION OF DIGITAL TWIN TECHNOLOGY AND LANDSCAPE BIOGRAPHY Emily Shakespeare (Ireland/South East Technological University/Postdoc)
14:30 – 14:45	URBAN GROUNDWATER SUSTAINABLE MANAGEMENT Stefan Dragos Gaitanaru (Romania/Technical University of Civil Engineering Bucharest/Postdoc)
14:45 – 15:00	IMPROVING COASTAL WATER QUALITY IN PROTECTED AREAS – CASE STUDY HIMARA, ALBANIA Gabriel Racoviteanu (Romania/Technical University of Civil Engineering Bucharest/Prof)
15:00 – 15:15	DIGITAL TWIN TECHNOLOGIES FOR EFFECTIVE URBAN DECARBONIZATION Cristiana Croitoru (Romania/Technical University of Civil Engineering Bucharest/Prof)
15:15 – 16:30	POSTER SESSION
16:30 – 16:45	COASTAL RISK MANAGEMENT: SEA LEVEL RISE IMPACT ON COMPOUND FLOOD RISK IN KLAIPEDA PORT-CITY Inga Dailidienė (Lithuania/Klaipeda University/Prof)
16:45 – 17:00	INVESTIGATION OF MITIGATION MEASURES FOR CARBON DIOXIDE, SOOT AND NITROGEN OXIDE EMISSIONS OF MARINE VESSEL DIESEL INTERNAL COMBUSTION ENGINES AT SEA AND COASTAL AREAS Charalambos Chasos (Cyprus/Frederick University/Prof)
17:00 – 17:15	SIMPLE POTENTIAL ANALYSIS FOR INFILTRATION IN ROSTOCK USING GEODATA Ove Syring (Germany/University of Rostock/PhD Student)
17:15 – 17:30	METHODS FOR REDUCING THE SHIP'S FUEL OIL CONSUMPTION AND EXHAUST GAS EMISSIONS Josip Orović (Croatia/University of Zadar/Prof)

COASTAL ENGINEERING INSTITUTE (CEI) POSTER SESSION

RESEARCH ON WAVE ENERGY ATTENUATION USING SUBMERGED MATS
Alexandru Dimache (Romania/Technical University of Civil Engineering Bucharest/Prof)

CHALLENGES OF ESTIMATING ENVIRONMENTAL IMPACT FROM THE SHIPS EXHAUST GASES
Vlatko Knežević (Croatia/University of Zadar/PhD Student)

QUANTIFICATION AND IMPLEMENTATION CHALLENGES OF WEATHER FORECAST UNCERTAINTIES FOR OPTIMAL SHIP ROUTING
Josip Orović (Croatia/University of Zadar/Prof)

THE IMPACT OF SENSOR NETWORKS ON AIR POLLUTION AWARENESS AND REDUCTION IN CITIES
Florin Bode (Romania/Technical University of Civil Engineering Bucharest/Prof)

COMPARATIVE STUDY OF CORAL ECOSYSTEM FOR MARINE ENVIRONMENTAL SUSTAINABILITY, SEAFOOD SECURITY AND DISASTER RISK MANAGEMENT IN BATTICALOA DISTRICT, SRI LANKA
Thirumal Thayaruban (Sri Lanka/Marine Environment Protection Authority/Other)

16th November

PARALLEL SESSION 2

SOCIAL, CULTURE AND HUMAN SCIENCES

Chairperson:

[Björn Schiffbauer \(Germany/University of Rostock/Prof\)](#)

14:00 – 14:15	WELCOME Björn Schiffbauer (Germany/University of Rostock/Prof)
14:15 – 14:30	DEVELOPMENT OF A FRAMEWORK FOR MICRO CREDENTIALS IN SMART URBAN COASTAL SUSTAINABILITY Niamh O' Brien (Ireland/South East Technological University/Other)
14:30 – 14:45	TOPIC MODELING BASED ON RESEARCH ARTICLES ABOUT ADRIATIC SEA Neven Pintarić (Croatia/University of Zadar/Postdoc)
14:45 – 15:00	THE SUSTAINABLE GOVERNANCE OF PORT ORGANIZATIONAL ECOSYSTEM TO ENHANCE COASTAL REGIONS RESILIENCE: A THEORETICAL MODEL Elena Valionienė (Lithuania/Klaipeda University/Postdoc)
15:00 – 15:15	WHERE DOES THE STORMWATER COME FROM? ANALYZING SOIL SEALING AND LAND USE OF URBAN NEAR-SHORE CATCHMENTS Jannik Schilling (Germany/University of Rostock/PhD Student)
15:15 – 16:30	POSTER SESSION
16:30 – 16:45	LEGAL PERSPECTIVES OF THE CONCEPT OF NATURE-BASED SOLUTIONS IN COASTAL AREAS Yamissa Ouattara Arouna (France/La Rochelle Université/PhD Student)
16:45 – 17:00	PROPERTY AND EXPLOITATION OF THE FISHING WATERS IN THE KINGDOM OF SWEDEN DURING THE LATE MIDDLE AGES (13TH-15TH C.) Tobias Boestad (France/La Rochelle Université/Other)
17:00 – 17:15	EXAMINING THE DRIVERS THAT SHAPE SUSTAINABLE CONSUMER BEHAVIORAL INTENTIONS OF REGIONAL LEISURE AND VISITING FRIENDS AND RELATIVES (VFR) PASSENGERS IN THE IRISH AVIATION INDUSTRY Amy Whelan (Ireland/South East Technological University/PhD Student)
17:15 – 17:30	ENVIRONMENTALISM, ECOREGIONS AND SHARED REGIONAL IDENTITY: A CASE OF THE MEDITERRANEAN ACTION PLAN Deepika Matange (India/Jawaharlal Nehru University/PhD Student)

SOCIAL CULTURE AND HUMAN SCIENCES INSTITUTE (SCHSI) POSTER SESSION

ADVANTAGES AND LIMITATIONS OF INTERNATIONAL COMPARATIVE PUBLIC ADMINISTRATION (ICPA) RESEARCH FOR SUSTAINABLE WASTE MANAGEMENT POLICIES IN COASTAL CITIES
[Alexandre Camino \(France/La Rochelle Université/PhD Student\)](#)

URBAN & COASTAL LAB LA ROCHELLE, A SCIENTIFIC PLATFORM OF DATA AND MODELS FOR INTERDISCIPLINARY RESEARCH
[Anaïs Schmitt \(France/La Rochelle Université/Engineer\)](#)

16th November

PARALLEL SESSION 3

LIFE SCIENCES AND BIOTECHNOLOGY

Chairperson:

Mike Kinsella (Ireland/South East Technological University/Prof)

Jeronimo Chirivella (Spain/Catholic University of Valencia/Prof)

14:00-14:15	WELCOME Emmanouil Fliemetakis (Head of the Life Sciences and Biotechnology Institute/Greece/Agricultural University of Athens/Prof)
14:15-14:30	ANTIMICROBIAL ALGINATE-BASED FILMS FOR BIOMEDICAL APPLICATIONS Alba Cano-Vicent (Spain/Catholic University of Valencia/PhD Student)
14:30-14:45	A SUSTAINABLE APPROACH TO OIL SPILL CLEAN-UP Rafael Picazo Espinosa (Lithuania/Klaipeda University/PhD Student)
14:45-15:00	ADVANCED BIOSENSORS FOR ENVIRONMENTAL POLLUTION MONITORING: A CASE STUDY WITH AZOXYSTROBIN Georgia Tsolomyti (Greece/Agricultural University of Athens/Postdoc)
15:00-15:15	SAFETY EVALUATION OF EDIBLE PACKAGING MEMBRANES FOR FOOD STORAGE Aikaterini Kalliampakou (Greece/Agricultural University of Athens/Postdoc)
15:15 – 16:30	POSTER SESSION
16:30 – 16:45	APPLICABILITY OF THE PURIFIED BIOSURFACTANT OBTAINED FROM PSEUDOMONAS CITRONELLIS 620C IN WATER PURIFICATION Maria Rikkou-Kalourkoti (Cyprus/Frederick University /Prof)
16:45 – 17:00	AQUACULTURE WASTE VALORISATION WITH BLACK SOLDIER FLY LARVAE: A CIRCULAR CONCEPT Shikha Ojha (Ireland/South East Technological University/Prof)
17:00 – 17:15	BEHAVIORAL RESPONSES RELATED TO DOMINATION OF GILT HEAD SEABREAM INDIVIDUALS ON POPULATION STRUCTURE CHANGE Christina Zantioti (Greece/ Agricultural University of Athens/PhD Student)
17:15 – 17:30	VALORIZATION AND CHARACTERIZATION OF WILD AND CULTIVATED SEAWEEDS FROM RÉ ISLAND WITH INTEGRATED MULTITROPHIC AQUACULTURE USING BIOREMEDIATION AND SEASONALITY Jonathan Izambart (France/La Rochelle Université/Other)

LIFE SCIENCES AND BIOTECHNOLOGY INSTITUTE (LSBI) POSTER SESSION

DARK GENOME AND ITS REGULATION BY LONG NON-CODING RNAS

Katerina Pierouli (Greece/ Agricultural University of Athens/PhD Student)

USING MOLECULAR MODELLING PIPELINES FOR THE DESIGNING OF ANTIBODY DRUG CONJUGATES

Eleni Papakonstantinou (Greece/ Agricultural University of Athens/PhD Student)

BIOINFORMATIC ANALYSIS OF MORE THAN 60.000 FULL HUMAN GENOME SEQUENCES: AN IN-DEPTH VIEW OF MOLECULAR INTERACTIONS BETWEEN NUCLEAR RECEPTORS, THEIR COFACTORS, ENZYMES, AND EPIGENETIC MEDIATORS

Thanasis Mitsis (Greece/ Agricultural University of Athens/Postdoc)

16th November

PARALLEL SESSION 4

ENVIRONMENTAL SCIENCES AND BIODIVERSITY

Chairperson:

Jurate Lesutiene (Lithuania/Klaipeda university/Prof)

Zoran Šikić (Croatia/University of Zadar/Prof)

14:00 – 14:15	WELCOME Artūras Razinkovas-Baziukas (Head of the Environmental Sciences and Biodiversity Institute/Lithuania/Klaipeda University/Prof)
14:15 – 14:30	DEEP LEARNING SEMANTIC SEGMENTATION AND TEXTURAL FEATURES EXTRACTION ALGORITHMS FOR BENTHIC HABITAT FEATURES CLASSIFICATION Saulė Medelytė (Lithuania/Klaipeda University/PhD Student)
14:30 – 14:45	A CASE STUDY OF PHYTOSANITARY PRACTICES OF VEGETABLE GROWERS AND AGRICULTURAL PESTICIDE CONTAMINATION LEVELS IN COASTAL LAGOONS OF WEST AFRICA Denis Worlanyo Aheto (Ghana/University of Cape Coast - Africa Center of Excellence in Coastal Resilience (ACECoR)/Prof)
14:45 – 15:00	LIGHT ATTENUATION IN THE SHALLOW COASTAL AREAS OF MECKLENBURG-VORPOMMERN, GERMANY: IMPLICATIONS FOR COASTAL ECOSYSTEMS Aminah Kaharuddin (Germany/University of Rostock/PhD Student)
15:00 – 15:15	POSIDONIA OCEANICA MEADOWS OF CYPRUS; THE MOST IMPORTANT MARINE ECOSYSTEM OF COASTAL WATERS THREATENED MOSTLY BY LAND-BASED ACTIVITIES Demetris Kletou (Cyprus/Frederick University/Prof)
15:15 – 16:30	POSTER SESSION
16:30 – 16:45	THE EFFECT OF TEMPERATURE, ACIDITY, AND THE AVAILABILITY OF NUTRIENTS ON THE INTERACTIONS BETWEEN MARINE BACTERIA AND BACTERIOPHAGES Polyxeni Papazoglou (Greece/Agricultural University of Athens/Other)
16:45 – 17:00	DIVERSITY AND TEMPORAL DISTRIBUTIONS OF FISH PLANKTON IN AMORGOS ISLAND (CENTRAL AEGEAN SEA) Konstantinos Kavakakis (Greece/Agricultural University of Athens/Other)
17:00 – 17:15	ECOLOGICAL STUDY FOR THE REVALORIZATION OF PORT HABITATS: SOLUTIONS BASED ON ECO-CONCRETE Víctor Tena Gascó (Spain / Catholic University of Valencia-IMEDMAR and UPV /PhD Student)
17:15 – 17:30	EMERALD GROWTH: FRAMEWORK FOR THE SUSTAINABILITY OF TRANSITIONAL WATERS Artūras Razinkovas-Baziukas (Lithuania/Klaipeda University/Prof)

ENVIRONMENTAL SCIENCES AND BIODIVERSITY INSTITUTE (ESBI) POSTER SESSION

THE REPRODUCTIVE BIOLOGY OF OCTOPUS VULGARIS CUVIER, 1797 IN THE VALENCIAN COMMUNITY (SPAIN, NW MEDITERRANEAN): AN ESSENTIAL TOOL FOR FISHERIES MANAGEMENT

Marc Duque Femenia (Spain/Catholic University of Valencia/Other)

OXYGEN REGIME, TOTAL PHOSPHORUS AND ORTHOPHOSPHATE ON FISH FARMS

Zoran Zorić (Croatia/University of Zadar/Prof)

STRATEGIES FOR ENVIRONMENTAL ANALYSIS AND MONITORING USING LASER-INDUCED BREAKDOWN SPECTROSCOPY (LIBS)

Haider Al-Juboori (Ireland/South East Technological University/Other)

UTILIZATION OF WATER CARE MATERIAL (WCM) FROM WATER MAINTENANCE AS A CONCEPT TO TACKLE EUTROPHICATION OF SURFACE WATER BODIES

Sebastin Foth (Germany/University of Rostock/PhD Student)

Friday, November 17th

City Hall, Rostock

Chairperson:

Ana de Luis Margarit (Spain/Catholic University of Valencia/Prof)

Charalambos Chasos (Cyprus/Frederick University/Prof)

09:00 – 09:10	WELCOME Bettina Eichler-Löbermann (University of Rostock)
09:10 – 09:35	PEATLAND REWETTING – THE GOLDEN BULLET FOR CLIMATE CHANGE MITIGATION? Keynote Speaker: Nicole Wrage-Mönnig (University of Rostock)
09:35 – 10:00	AI AS A GAME CHANGER FOR SUSTAINABLE MARINE ENVIRONMENTS Keynote Speaker: Oliver Zielinski (Leibniz Institute for Baltic Sea Research (IOW))
10:00 – 10:30	THE ROLE OF THE RESEARCH INFRASTRUCTURES IN BIODIVERSITY AND ECOSYSTEM RESEARCH: INTERFACE BETWEEN SCIENCE AND TECHNOLOGY Keynote Speaker: Christos Arvanitidis (LifeWatch-ERIC, Institute of Marine Biology, Biotechnology and Aquaculture (IMBBC))
10:30 – 11:00	COFFEE BREAK
11:00 – 12:30	PARALLEL SESSIONS
12:30 – 14:00	LUNCH BREAK
14:00 – 17:00	PARALLEL SESSIONS & CLOSING REMARKS

17th November

PARALLEL SESSION 1

COASTAL ENGINEERING

Chairperson:

Cristiana Croitoru (Romania/Technical University of Civil Engineering Bucharest/Prof)

Josip Orović (Croatia/University of Zadar/Prof)

11:00 – 11:15	IMPROVING THE ENVIRONMENT OF PORT CITIES BY OPTIMIZING THE SPEED OF SHIPS THROUGH THE PORT CHANNELS Vytautas Paulauskas (Lithuania/Klaipeda University/Prof)
11:15 – 11:30	SIMULATING COOPERATIVE OPERATIONS OF SWARMS OF AUTONOMOUS UNDERWATER VEHICLES Peter Danielis (Germany/University of Rostock/Other)
11:30 – 11:45	RESEARCH ON HYDRODYNAMIC QUALITIES OF AN ELECTRIC DRIVEN FERRY Vasilij Djackov (Lithuania/Klaipeda University/Prof)
11:45 – 12:00	MANAGEMENT OF URBAN RESILIENCE: A COMPREHENSIVE REVIEW Ionut-Bogdan Gheorghe (Romania/Technical University of Civil Engineering Bucharest/PhD Student)
12:00 – 12:15	A REVIEW REGARDING WATER CARBON NEXUS IN THE URBAN CONTEXT: TOWARDS SUSTAINABLE CITY MANAGEMENT Mihnea Sandu (Romania/Technical University of Civil Engineering Bucharest/Prof)
12:15 – 12:30	EXPERIMENTAL RESEARCH OF INNOVATIVE COMPOSITE OFFSHORE REEL FOR SUBSEA CABLE HANDLING Mantas Atutis (Lithuania/Klaipeda university/Prof)
12:30 – 14:00	LUNCH BREAK
14:00 – 14:15	RESILIENCE-TARGETED PERFORMANCE EVALUATION OF CIVIL INFRASTRUCTURE FOR EXTREME WIND EVENTS Mihail Iancovici (Romania/Technical University of Civil Engineering Bucharest/Prof)
14:15 – 14:30	SUSTAINABLE COASTAL CONSTRUCTION AND URBAN DEVELOPMENT: A CASE STUDY OF LIMASSOL BAY, CYPRUS Grigoris Kalnis (Cyprus/Frederick University/Prof)
14:30 – 15:00	FUNDING OPPORTUNITIES PDSO (EU-CONEXUS)
15:00 – 17:00	NETWORKING & CLOSING REMARKS

17th November

PARALLEL SESSION 2

SOCIAL, CULTURE AND HUMAN SCIENCES

Chairperson:

Anita Pavić Pintarić (Croatia/University of Zadar/Prof)

11:00 – 11:15	URBAN PLANNING FOR THE COASTAL CITY OF THE FUTURE: A MULTIDISCIPLINARY APPROACH Susan Flynn & Richard Hayes (Ireland/South East Technological University/Prof)
11:15 – 11:30	PORTALIS, PROTECTING OUR COASTAL HERITAGE, VISITOR EXPERIENCE DESIGN WITHIN A CITIZEN SCIENCE FRAMEWORK Joy Rooney (Ireland/South East Technological University/Other)
11:30 – 11:45	WATER EDUCATION IN ROMANIA: CHALLENGES AND PERSPECTIVES FOR SUSTAINABILITY Radu Mircea Damian (Romania/Technical University of Civil Engineering Bucharest/Prof)
11:45 – 12:30	FUNDING OPPORTUNITIES PDSO (EU-CONEXUS)
12:30 – 14:00	LUNCH BREAK
14:00 – 17:00	NETWORKING & CLOSING REMARKS

17th November

PARALLEL SESSION 3

LIFE SCIENCES AND BIOTECHNOLOGY

Chairpersons:

[Maria Rikkou-Kalourkoti \(Cyprus/Frederick University/Prof\)](#)

[Shikha Ojha \(Ireland/South East Technological University/Prof\)](#)

11:00 – 11:15	FROM ATLANTIC PREDATORY MURICIDS EXTRACTION TO THE SYNTHESIS OF POTENT BIOACTIV BIOINSPIRED PIGMENTS FOR THERAPEUTIC Valerie Thiery (France/La Rochelle Université/Prof)
11:15 – 11:30	PHYTOCHEMICAL ANALYSIS, ANTIOXIDANT AND ANTIMICROBIAL EVALUATION OF SOLVENT-SOLVENT FRACTIONATION OF CEDRUS BREVIFOLIA (HOOK. F.) A. HENRY NEEDLES, A RARE AND ENDEMIC PLANT OF CYPRUS Sofia Karavergou (Cyprus/Frederick University/PhD Student)
11:30 – 11:45	POLYLACTIC ACID/ALGINATE COMPOSITE SCAFFOLDS PRODUCED BY 3D PRINTING AND VACUUM FILLING MANIFESTED ANTIBACTERIAL AND IN VIVO OSTEOINDUCTIVE CAPACITY Alberto Tuñón-Molina (Spain/Catholic University of Valencia/PhD Student)
11:45 – 12:00	ISOLATION AND CHARACTERIZATION OF INDIGENOUS MICROALGAE STRAINS AND STUDYING THEIR EXPLOITATION ON EFFICIENT WASTEWATER TREATMENT Maria Eleftheria Zografaki (Greece/Agricultural University of Athens/PhD Student)
12:00 – 12:15	ASSESSING THE IMPACT OF BIOSTIMULANTS DERIVED FROM MICROALGAE EXTRACTS ON HYDROPONIC LETTUCE Sofia Marka (Greece/Agricultural University of Athens/PhD Student)
12:15 – 12:30	INVESTIGATION OF THE RESPONSE OF PLANT CALLUSES TO THE EXOGENOUS APPLICATION OF NOS INHIBITORS AND NO DONORS Sofia Mavrikou (Greece/Agricultural University of Athens/Prof)
12:30 – 14:00	LUNCH BREAK
14:00 – 14:15	IMPACT OF WATER MANAGEMENT PRACTICES ON AQUATIC MICROBIAL COMMUNITIES IN THE COASTAL NATURAL PARK OF ALBUFERA (VALENCIA, SPAIN) Ana de Luis Margarit (Spain/Catholic University of Valencia/Prof)
14:15 – 14:30	ACADEMIC RESEARCH INTEGRATION: A TEACHING TOOL USEFUL FOR BOOSTING MULTIDISCIPLINARY RESEARCH TEAMS ON MARINE BIOTECHNOLOGY Jeronimo Chirivella (Spain/Catholic University of Valencia/Prof)
14:30 – 14:45	APPLICATION OF LIQUID CHROMATOGRAPHY MASS SPECTROMETRY, NMR AND OTHER CHARACTERISATION EQUIPMENT FOR CHARACTERISATION OF PHARMACEUTICAL INTERMEDIATES Mike Kinsella (Ireland/South East Technological University/Prof)
14:45 – 15:15	FUNDING OPPORTUNITIES PDSO (EU-CONEXUS)
15:15 – 17:00	NETWORKING & CLOSING REMARKS

17th November

PARALLEL SESSION 4

ENVIRONMENTAL SCIENCES AND BIODIVERSITY

Chairperson:

Demetris Kletou (Cyprus/Frederick University/Prof)

Bettina Eichler-Löbermann (Germany/University of Rostock/Prof)

11:00 – 11:15	NUTRIENT REMOVAL WITH HARVEST AND OTHER BENEFITS PROVIDED BY SMALL CONSTRUCTED FLOATING WETLANDS IN TWO COASTAL LAGOONS OF THE SE BALTIC SEA Jurate Lesutiene (Lithuania/Klaipeda University/Other)
11:15 – 11:30	THE IMPACT OF LAND USE AND CLIMATE CHANGE ON WATER QUALITY OF THE VRANSKO LAKE IN THE CROATIA Zoran Šikić (Croatia/University of Zadar/Prof)
11:30 – 11:45	ENERGY EFFICIENCY STRATEGIES FOR BUILDINGS WITH HISTORIC AND ARCHITECTURAL VALUE IN EUROPE: A CASE STUDY OF ENERGY OPTIMIZATION AND ENERGY SAVING MEASURES FOR ROMANIAN HERITAGE BUILDINGS Simona Elena Serban (Romania/Technical University of Civil Engineering Bucharest/PhD Student)
11:45 – 12:00	FROM WASTE TO WONDER: UTILIZING WASTE SHELLS FOR WASTEWATER PURIFICATION Brakemi Egbedi (Ireland/South East Technological University/PhD Cand)
12:00 – 12:15	THE DISCOVERY AND FUNCTIONAL CHARACTERIZATION OF NOVEL PUTATIVE METALLOTHIONEINS FROM WATER HYACINTH (EICHHORNIA CRASSIPES) AND WATER LETTUCE (PISTIA STRATIOTES) Tapiwa Nyakauru (Ireland/South East Technological University/PhD Student)
12:15 – 12:30	HIGH PREVALENCE OF MICROPLASTICS IN THE DIGESTIVE TRACT OF SCYLORHINUS CANICULA (LINNEAUS, 1758) SHOWS THE SPECIES BIOMONITORING POTENTIAL Samuel Acevedo Quilis (Spain/Catholic University of Valencia/PhD Student)
12:30 – 14:00	LUNCH BREAK
14:00 – 14:15	SIMPLIFYING ECOLOGICAL MODELING: PEST SOFTWARE PACKAGE FOR AUTOMATIC CALIBRATION Burak Kaynaroglu (Lithuania/Klaipeda University/PhD Student)
14:15 – 14:30	CONSERVATION AND SUSTAINABLE MANAGEMENT OF COASTAL SAND DUNES Constantinos Kounnamas (Cyprus/Frederick University/Prof)
14:30 – 14:45	ALTERNATIVE SOLUTIONS FOR REDUCING THE USE OF COPPER IN THE PROTECTION OF GRAPEVINES FROM DOWNY MILDEW (PLASMOPARA VITICOLA) IN CROATIA Tomislav Kos (Croatia/University of Zadar/Prof)
14:45 – 15:00	HRM ANALYSIS FOR THE DETECTION OF FISH SPECIES IN THE GREEK MARKET Evanthia Chatzoglou (Greece/Agricultural University of Athens/Other)
15:00 – 15:15	MAPPING OF FLOODED AREAS IN THE NEMUNAS RIVER DELTA USING REMOTE SENSING METHODS Jonas Gintauskas (Lithuania/Klaipeda University/PhD Student)
15:15 – 15:30	AN EXAMPLE OF THE NEED FOR INTERDISCIPLINARY WORK WHEN STUDYING THE SUSTAINABILITY OF PORT FACILITIES: IMPACT OF CATHODIC PROTECTION ON THE HEALTH STATUS OF BIVALVES: FROM MATERIALS CHEMISTRY TO METABOLOMICS Nathalie Imbert Auvray (France/La Rochelle Université/Prof)
15:30 – 16:00	FUNDING OPPORTUNITIES PDSO (EU-CONEXUS)
16:00 – 17:00	NETWORKING & CLOSING REMARKS



EU CONEXUS



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16th November

PARALLEL SESSION 1 _ COASTAL ENGINEERING

Short Talks Abstracts

Cúpla-Trá: Fostering Coastal Ecosystem Resilience through the Fusion of Digital Twin Technology and Landscape Biography

Dr Emily Shakespeare^{1*}, Dr Robin Stubbs¹

(1) SABRE Research Centre, South East Technological University, Cork Road, Waterford, Ireland

*e-mail: emily.shakespeare@setu.ie

Abstract: This paper outlines a new innovative approach to the sustainable development and management of a coastal ecosystem employing digital twin technology as a platform and repository for relevant existing datasets, whilst being managed and structured around a landscape biography methodological framework. Using the Back Strand in Tramore, South East Ireland, as a case study, this model serves as a potential blueprint for replication in comparable coastal ecosystems. This approach will establish, better understand and communicate the competing influences, priorities and impact on the region from the human and more-than-human activity to allow for improved regional planning and infrastructure initiatives.

The region's delicate ecosystem faces an unparalleled challenge from ongoing climate disruption, increased extreme weather events, rising sea levels, and consequent shifts in local biodiversity. This complex scenario is impacted further by a growing local population, together with a focus by local government to establish the area as a premier tourist destination.

This transdisciplinary project entitled “Cúpla-Trá” (“Twin Beach or Strand”), addresses this challenge by building a digital twin platform that will capture the dynamic nature of the region, particularly its sand dune ecosystem. It will incorporate and integrate existing relevant datasets compiled by governing bodies, community grassroots organisations and publicly-funded organisations, together with socio-economic data. This will allow for a predictive analysis of differing levels of influence and impact from these various human and ecological inter-dependent factors, to feed into future policy to ensure responsible and appreciated usage for the region's sustainable development. It will be complemented by an interactive “mission room” to capture the dynamic nature of the region's ecosystem as well as raise awareness.

The landscape biographical approach is an integrated transdisciplinary analytical framework used to understand the continuous reciprocal dynamic interaction between the human, non-human and the environment, particularly in regions under threat from change. It is increasingly recognised as a useful collaborative tool between policy makers, planners, landscape architects and the local population to feed into local government planning and tourism policy, particularly in the Netherlands. Shakespeare et al (2022) adapted the approach specific to the Irish context and this project will develop the concept into an eco-centric model.

This is the first time these two approaches have been synergistically integrated to formulate a model that holds promise for replication in other vulnerable coastal regions, fostering pathways toward their sustainable development.

Urban Groundwater Sustainable Management

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Abstract: Urban hydrogeology has a multi and interdisciplinary character. The roots of this science are found in hydrogeology, and more precisely in applied hydrogeology, but this branch of science is a conglomerate of knowledge that are coming from both engineering and geoscience.

Knowing all the hydrogeological elements in an urban environment is a key element in developing durable and resilient cities. Terms such as green infrastructure, natural solutions, sustainable development, and climate adaptation are new demands at local level. Implementing these environmental policies and adapting them to the local needs cannot be done on the space occupied by cities without having a minimal basis of urban hydrogeology knowledge.

The expansion of the urban underground environment, and thus the urban hydrogeology boundaries, depends on the way the urban area influences all its component elements. While urban planners can relatively easily assess the limits of spatial expansion in terms of planimetric coordinates - xy, determining the boundaries in depth requires analysis of multiple factors, encompassing both natural and man-made elements.

The urban influence is felt in the underground environment depending on the geological characteristics, the size of the urban settlement, the external climate, and the level of economic development of the region. Adapting and realizing that the underground environment represents a little-used resource leads to sustainable and coherent use.

Improving coastal water quality in protected areas – Case Study Himara, Albania

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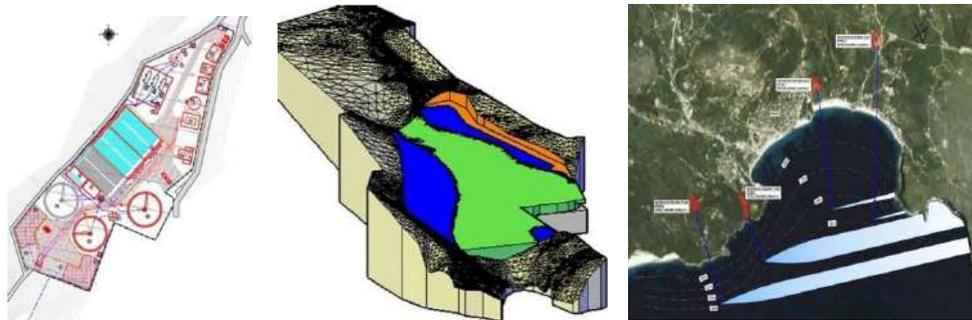
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Abstract: Many localities in the southern coastline of Albania discharge untreated wastewater directly into the sea, generating severe degradation of the sea water quality and consequently affecting public health and economic development of the main activities in the area: tourism and marine fish farming. The paper presents the analysis conducted for the specific case of Himara, for identification of the most feasible solution to remediate the coastal pollution and improve the Ionian Sea water quality.

Two components have been contributing to the success of the project:

- Selection of the wastewater treatment technology, generating low organic content discharge in the sea water;
- Selection of the position and length of the sea outfall, based on hydraulic modeling of the bay currents in order to minimize the impact on the bathing area and on the environment.



Left: Plan view of the WWTP, Middle: 3D terrain model, Right: Modelled effluent plume of sea outfall options

The identified solution is currently under construction and consists of a new wastewater treatment plant including C-removal and UV disinfection as immediate measures and (N+P) removal as a medium-term set of treatment measures. Also, the project includes effluent discharge by a sea outfall, having the length and position established based on a hydraulic model and impact simulation process, aiming to minimize the potential adverse effects on bathing water quality and also on the marine environment.

Acknowledgements: *The paper is based on the studies prepared by the authors within the projects “Consulting Services for Feasibility Study Himara Water Supply and Wastewater Disposal and Fact-Finding Mission Orikum Wastewater Disposal (RWSP IV Albania)” and “Albania Rural Water Supply Project - RWSP IV - Consulting services for project implementation”.*

The authors would like to express their acknowledgements to the Albanian Development Fund, the PMU and to the Himara Municipality, which provided the data and the needed assistance. Also, we wish to express our special thanks to Mr. James Wark, PhD, who prepared the hydraulic model and concept design of the proposed sea outfall, but also to the consulting company CES Consulting Salzgitter responsible for the preparation of the project.

Digital Twin Technologies for Effective Urban Decarbonization

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Abstract: As the world faces the pressing challenge of cities' climate neutrality, the combination of innovative technologies and sustainable practices becomes essential. In this context, the emergence of digital twin technologies has introduced a promising opportunity for revolutionizing urban planning and management. The aim of this study is to investigate the common ground of digital twins and urban decarbonization, exploring how these technologies can reshape our cities into eco-friendly, smart and efficient hubs while mitigating carbon emissions, using integrated approaches that address transportation, energy and infrastructure. At its core, digital twin technology involves creating virtual replicas of physical systems or processes, enabling real-time monitoring, analysis, and simulation. The built environment generates over 40% of annual global CO₂ emissions and represents an important player in the decarbonization process, primarily by transitioning to low-carbon or carbon-neutral energy sources and implementing energy-efficient technologies and practices.

A study conducted by Ernst & Young indicates that the implementation of digital twins could lead to a reduction of over 50% in urban carbon emissions, concurrently lowering operational expenses for asset owners by 35% [1]. Moreover, a smart real-time and predictive management can lead to even more carbon savings from both operational and embodied energy [2]. Digital twins offer a multitude of advantages throughout the lifecycle of buildings. During the design phase, they empower designers to optimize processes, minimizing energy consumption and enhancing efficiency. Additionally, digital twins prove invaluable when data is scarce, generating necessary information for accurate modelling and energy optimization. These twins serve as cost-effective tools for evaluating and validating designs, identifying bottlenecks and assessing extreme operational scenarios early on [3-4].

At urban level, integrating geospatial technologies, the Digital Twin technologies can be used in orchestrating the simulation, monitoring, and management of renewable energy systems with a focus on urban environments, for example identification of optimal PV placement on rooftops and facades, factoring in cost-efficiency and integration considerations. Open 3D city models enable the exploration of scenarios and the rapid assessment of integrated urban planning strategies tailored for decarbonization objectives among the challenges posed by climate change [5].

Thus, using digital twin technologies enhance the predictive capabilities which are able to extend process variation impacts analysis and critical variable predictions, while enhancing process optimization and operation planning by providing real-time monitoring and predictive insights.

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Coastal risk management: Sea Level rise impact on Compound Flood Risk in Klaipeda Port-city

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Abstract: Flood hazards and accurate economic risk assessment for the 21st century should not be limited to past floods or monitoring. Due to the intensification of climate change, it is necessary to assess all factors related to flood hazards in the background of climate change.

This study analyzes the risk of compound flooding in the Dane River under different climate change scenarios and the corresponding extreme river water flows and levels (1% and 10% probability). Extreme phenomena can cause significant damage to the infrastructure of Klaipeda port city, as severe floods of the Dane River may be affected by a further rise in the water level of the Baltic Sea due to climate change. As the average water level of the sea and the Klaipeda Strait rises, the water level also increases at the mouth of the Dane River.

The storm surge of the Baltic Sea and the rise of the water level in the Klaipeda Strait have a more significant impact on the Central part of Klaipeda City, and the maximum discharge rates of the river - on the northern part. If the water level increases as predicted in the end of the century, there will be more inundated areas. In the city center, the Old Town, the Northern Cape, the Cruise Ship Terminal, Dane Square, as well as the Industrial Quarter and the factories there would be in danger. Long-term climate change scenarios need to be considered to reduce the impact of climate change and adapt to ongoing processes. Taking flood risk due to climate change into account in the development of urban infrastructure and the reorganization of areas that are in potential extreme flood areas would help to avoid future economic and social losses.

These research results confirm that, in the long run, climate change will significantly impact the settlements of the south-eastern Baltic Sea coast.

Investigation of mitigation measures for carbon dioxide, soot and nitrogen oxide emissions of marine vessel diesel internal combustion engines at sea and coastal areas

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Abstract: The sea and coastal maritime transport which is serviced by marine vessels mainly powered by diesel internal combustion engines produces high amounts of emissions, which affect coastal and nearby urban areas. The recent unfavourable climate change phenomena are additionally enhanced by maritime transport emissions. Strict emissions' regulations are imposed by the IMO at emissions-controlled areas (ECAs), including the Baltic sea, for the reduction of harmful emissions. In particular, according to the European Environment Agency, 40% of the Europeans living within 50 km of the sea are affected by the emissions of the maritime transport sector. The present work aims to contribute in the recent initiatives of the European Union Green Deal in order to meet net-zero carbon dioxide (CO₂) energy production by 2050. The main objective of the present work is firstly to review and discuss the available technologies that can be used as mitigation measures for maritime emissions for meeting the strict limits imposed by IMO MARPOL Annex VI especially at ECAs. The second objective is to examine the specific mitigation measure for using dual-fuel marine engines instead of conventional marine diesel engines, in order to reduce fuel consumption and emissions. The final objective is to provide conclusions and recommendations for near future emission mitigation measures that can be adopted, in order to reduce pollutant gas emissions from marine vessels. From the literature review, dual-fuel natural gas engines, alternative fuels, improved engine designs, existing engines' retrofit systems and scrubber technologies for emission reduction are summarised and compared. In the present work, a case study for a low-speed two-stroke engine was adopted and analysed for two operating speeds, at part and full load engine operation, respectively. Published data was selected, including engine geometry details, performance data, engine cylinder pressure history, for marine diesel oil (MDO) and MDO injection with natural gas dual-fuel operation. The methodology used equations for brake mean effective pressure, brake power and volumetric efficiency, air-fuel mixture, MDO combustion with a general compound C_aH_b , and ignition delay time period and flame speed. It was found that when the dual-fuel engine is used, then the combustion characteristics are improved, while the fuel consumption, soot, CO₂ and NO_x emissions are reduced around 10-20 %. It is recommended to switch to dual-fuel natural gas marine engines in the near future, as well as examine the use of alternative fuels including methanol, ammonia and hydrogen for future development of marine engines.

Simple potential analysis for infiltration in Rostock using geodata

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Abstract: Cities and urban areas are most affected by the consequences of climate change and often face water management challenges due to drought and heavy precipitation events. In order to adapt cities to climate change and make them more resilient, the principle of the sponge city was developed implementing blue-green infrastructures and decentralised rainwater management measures such as infiltration. The potential of rainwater infiltration in Rostock (Germany) was investigated in the Koop-N project, which aims to implement the sponge city principle on the properties of the five largest housing associations in Rostock. Infiltration, e.g. via infiltration troughs, is an essential measure of decentralised rainwater management and represents one of the components of the water balance.

However, measures for rainwater infiltration cannot be implemented on all areas, but are subject to criteria that must be fulfilled for implementation. These criteria are defined in Germany in DWA Code of Practice 138-1. Relevant feasibility criteria are, among others, a sufficient groundwater flow distance of more than 1 m, a water permeability of the soil of more than $1 \cdot 10^{-6}$ m/s, a minimum distance to built-up areas or the absence of soil contamination, e.g. old deposits. Infiltration is theoretically possible only if all criteria are fulfilled or met.

The relevant data for the criteria were determined from open-access geodata, which are usually available for European cities, and supplemented by self-established criteria. For example, surface infiltration is only feasible on certain land uses or only up to a certain degree of sealing. Typical land use categories with no infiltration are, for example traffic areas, water surfaces or rail roads. The real-use mapping / data set of Rostock city was applied for this purpose. The sealing was taken from Copernicus data of the European Environment Agency.

A major challenge was the area-wide determination of the water permeability of the subsoil in Rostock. Soil information was compiled from various data sources in the geo-information system and soil types were derived. Averaged water permeability values from literature were then assigned to the soil types.

By overlaying (intersecting) the various criteria in the geo-information system, surface infiltration areas in Rostock were identified. For areas or zones where infiltration is not possible, other measures of decentralized rainwater management must be examined.

Methods for reducing the ship's fuel oil consumption and exhaust gas emissions

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Abstract: Shipping of passengers and cargo is increasing every year and is a growing source of exhaust gas emissions. This also contributes to the increased fuel oil consumption and to the growing problem of climate change. Exhaust gas emissions from the maritime sector grew at a faster rate than any other energy consumption sector. Maritime transport accounts for approximately 2-3 % of the total exhaust gas emissions in the world annually and it is expected to grow to a share of 5 % by 2050 unless significant efforts are made to reduce exhaust gas emissions. The International Maritime Organization and the European Union recognized this problem and through their increasingly stringent environmental standards for marine engines require that the exhaust gas emissions into the atmosphere are reduced to the lowest possible levels.

Research activities and practical on board solutions regarding the condition based monitoring in order to reduce fuel oil consumption and exhaust gas emissions are also increasing more than ever. Recent research activities within the projects conducted at the University of Zadar had a goal to research possible fuel savings, exhaust gas emissions reduction, vibration and other positive impacts on the ship's propulsion system.

Weather routing and voyage optimization in sea shipping could be realized when planning the eco-routes for the given forecast of the environmental state. Environmental loads coupled with ship dynamics consequently have a significant impact on performance of ship propulsion system, particularly in terms of fuel oil consumption and exhaust gas emissions.

Vibration measurement data from ships show that certain deficiencies in the propulsion system, from the main engine to the propeller, could be detected which could influence the availability, maintenance and efficiency of the propulsion plant. By optimizing the actual propulsion plant parameters and modifying the propeller design to a better class, it is possible to reduce the fuel oil consumption and consequently reduce the maintenance costs of propulsion systems, fuel oil consumption and exhaust gas emissions.

The results of the scientific research could be useful to the scientific community for creating more relevant databases, performing root cause analysis and engine optimization, modelling of exhaust gas emissions, ship routing and developing similar models. Also, the results could be useful to ship owners and ship operators, engine and propeller manufacturers and all other interested parties in the process of increasing propulsion efficiency, reduction of maintenance costs, fuel oil consumption and exhaust gas emissions.



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PARALLEL SESSION 1 _ COASTAL ENGINEERING

Poster Abstracts

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Research on Wave Energy Attenuation Using Submerged Mats

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Abstract: Coastal erosion, a natural process found worldwide along shorelines, is caused by the action of waves and currents that entrain sediments. In the context of climate change (extreme weather phenomena), a significant intensification of coastal erosion has been observed, especially due to increased wave heights resulting from severe storms. Romania is one of the countries facing this issue, with the most affected areas located in the southern (most developed tourist areas) part of the Romanian coastline. The economic effects of this phenomenon are extremely serious, ranging from the decline in the tourism potential of beaches to the undermining of the stability of important buildings along shorelines, that are at risk of collapse.

Reducing wave energy using traditional coastal protection structures: transverse groins, vertical protection walls, revetments/stabilizing spurs, threshold breakwaters is not always effective in achieving the intended goal. Coastal erosion is an environmental problem with profound socio-economic implications, therefore is a need to find solutions other than the traditional ones which, besides being inefficient, are also extremely costly, both in terms of investment and maintenance. In recent years, new technologies for wave energy dissipation have been developed, such as the use of floaters, submerged air cushions, and even the use of sound waves to attenuate the force of waves.

The project *Research on Wave Energy Attenuation Using Submerged Mats* aims to study the effectiveness of submerged mats in reducing wave energy and amplitude, reducing the erosional power of waves and ensure the coastal protection. Different constructive variants will be studied through small-scale modelling and experimental research in the wave channel. The project aims to optimize these submerged mats, ensuring maximum efficiency at minimum cost, by adjusting the structural characteristics of the mat (length, thickness, elasticity, permeability) to the characteristics of the waves (amplitude, period, wavelength).

The project will involve creating a physical model coupled with a numerical model to study the energy attenuation of waves using submerged mats in two structural forms: the first with a homogeneous core, and the second made of inflatable pillows coupled with baffles. Measurements will be conducted across a wide range of values for wave-determining parameters, as well as for various values of the internal hydraulic resistance of the mats.

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Challenges of estimating environmental impact from the ships exhaust gases

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Abstract: In today's maritime industry, there are numerous regulations at both global and national levels aimed at preventing and minimizing the environmental impact of ships. This impact is primarily caused by the exhaust gases released by marine diesel propulsion, which contains greenhouse gases such as CO₂ and CH₄, as well as other harmful pollutants like NO_x, SO_x, PM, VOC, and BC. A crucial question arises: how can we measure this environmental impact and estimate the amount of pollutants emitted into the atmosphere? In this presentation, two methodologies for estimating ship exhaust emissions are explained, along with their respective advantages and disadvantages. The "top-down" method relies on fuel consumption data, while the "bottom-up" method requires detailed information about the ship's activity (i.e., cruising, maneuvering, at berth) and propulsion characteristics (fuel type, engine type, operating load, and emission factors). Additionally, the challenges of estimating exhaust emissions using both methods are discussed, and examples of calculating the amount of emissions on actual ship routes are provided.

Quantification and implementation challenges of weather forecast uncertainties for optimal ship routing

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Considering the climate change and sensitivity of the Earth's atmosphere, the regulatory requirements for ships are frequently changed and adapted. Approaches to optimal ship routing have differentiated over the years, ranging from modelling the weather routing problem as a constrained graph problem, a constrained nonlinear optimization problem or as a combination of both. Graph theory algorithms were also quite common, such as A* or the well-known Dijkstra algorithm. Some uncertainties in ship routing were studied in the past, incorporating both deterministic and stochastic factors, where the problem was treated as a multi-stage stochastic dynamic process under the constraints of operational ship requirements and probabilistic environmental conditions. Nature inspired optimization algorithms such as ant colony optimization or particle swarm optimization are also effective for solving a multi-objective ship weather routing optimization problem.

Since the future of shipping is in autonomous navigation, recent research focuses on readily available ship performance models, or digital twins, as well as on dynamic optimal control of unmanned ships. Another important occurrence in any voyage optimization and ship routing is the ship's speed loss, which has been studied even under severe environmental conditions. However, the implementation of weather uncertainties into an optimization problem of ship routing still remains a challenge. One of the most important reasons behind this is related to weather forecast providers that use a variety of different algorithms and methods, many of which they never fully disclose for commercial reasons. Hence, not all weather and environmental forecasts are equally accurate and reliable.

This study focuses on the quantification and implementation of weather forecasts and their uncertainties into optimization algorithms, as the basis of more reliable weather routing. By incorporating the weather uncertainties in voyage optimization problems, they can be solved with stochastic programming methods. This approach, along with probability techniques, has proven successful in solving various industrial optimization problems that involve uncertainty.

Two main objectives are discussed in this study, i.e. how to model forecast uncertainties in terms of environmental loads and how to implement that model into an optimal ship routing problem. In addition to weather forecasts, the aspects of wave height and period uncertainty have only recently been quantified using wave hindcasts. Thus, a general framework for a ship routing optimization problem is presented, with its optimal solution strategies complying with specified requirements, along with the implemented weather forecast uncertainty model.

The Impact of Sensor Networks on Air Pollution Awareness and Reduction in Cities

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Abstract: Air pollution in cities has become a major global concern, with significant implications for public health and the environment. However, in recent years, technological advancements have brought about a significant shift in addressing this issue using public and private sensor networks, such as Airly [1], PurpleAir [2], IQAir [3] and others. This article explores the impact that these sensor networks have on raising awareness among urban residents about air pollution and how this awareness can contribute to effective air pollution reduction. In densely populated cities, air pollution becomes increasingly visible and threatening to human health. Yet, for people to take action to reduce pollution, they need to be aware of real-time pollution levels and their impact on daily life. This is where sensor networks come into play, providing precise and up-to-date information on air quality in real-time[4]. For instance, Airly, as an example of a sensor network, collects and distributes detailed information about concentrations of fine particles, chemical compounds, and other air pollutants, allowing residents to monitor pollution in real-time and make informed decisions about their daily activities. One of the key aspects of this technology is its accessibility and user-friendliness. Mobile applications and online platforms of these sensor networks make air quality information readily available to everyone, thus facilitating community engagement. Through these networks, people can check pollution levels in their area, receive alerts about high pollution episodes, and access advice on protecting themselves from the harmful effects of air pollution. Another important aspect of sensor networks is that they enable data collection on a large scale, providing information that can serve as a basis for the development and implementation of pollution reduction policies. The data collected can be used to identify primary sources of pollution and evaluate the effectiveness of pollution reduction measures. Public and private sensor networks, such as the companies mentioned above, have brought about a significant change in how people perceive and manage air pollution in cities. These technologies have increased public awareness and facilitated action to reduce pollution. Through these networks, people become more conscious of their environmental impact and are motivated to change their behavior for a healthier life and a cleaner environment. Thus, sensor networks play a crucial role in efforts to combat air pollution in cities and promote sustainable living.

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Comparative Study of Coral ecosystem for Marine environmental sustainability, seafood security and disaster risk management in Batticaloa District, Sri Lanka.

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Abstract: This research has been done on the basis that the economy of Batticaloa district is dependent on marine resources and the district has been affected by thirty years of civil war and tsunami disasters. Due to New Diamond Ship and X-press pearl ship incident, Sri Lanka faced the threat of sea navigation, Coastal Environment and sea food security. However, today Sri Lanka is very much affected by the economic crisis. This is expected to cause further food shortages and environmental impacts in the future. Research for conservation and management of coral reef resources is therefore essential for future food shortages and environmental protection. Coral reefs could be also reduce the vulnerability of coastal communities and contribute to their well-being by providing them with ecosystem services that can improve their livelihoods and sustain their economies. Reefs serve as an effective first line of defense to incoming waves, storms and rising seas and provide substantial protection against natural hazards by reducing wave energy. However, we have extracted some issues from fishing community and past research results. It included that the quantity of fish has decreased compared to what it was 20 years ago. The daily income rate of fishermen has also decreased. Moreover, Volume of coral reefs have decreased in size simultaneously sea erosion has increased. Here it is also possible to know how it has influenced and incorporate each.



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PARALLEL SESSION 2 _ SOCIAL, CULTURE AND HUMAN SCIENCES

Short Talks Abstracts

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Development of a framework for micro credentials in smart urban coastal sustainability

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Abstract: In 2022, the Council of the European Union (EU) adopted a recommendation on a European approach to micro-credentials for lifelong learning and employability. This recommendation followed the publication in 2020 of 'A European Approach to Micro-credentials,' an output of the Micro-Credentials Higher Education Group (EC, 2020). These publications support the need for a common approach to the development of micro-credentials across Europe to assist in supporting the goals of access, transfer, and progression in the new European Higher Education Area.

A micro-credential is a certified, small volume of learning designed to equip learners with specific knowledge, skills, and competencies that address societal, personal, cultural, or labour market needs. It serves as evidence of the learning outcomes achieved following a brief educational experience. Micro-credentials find utility in various settings, offering a flexible and dependable means to promote and capture continuous professional development. They represent an alternative, accessible, and sustainable educational achievement for EU-CONEXUS, expanding opportunities to facilitate the right to inclusive, lifelong learning, enabling full societal participation.

The development of a framework for micro-credentials forms an important output of the EU-CONEXUS European university alliance. This paper addresses the purpose and philosophy underpinning micro-credentials within the context of EU-CONEXUS and outlines the co-creation procedures of consultation with stakeholders as part of this development process.

The purpose of this abstract is to provide an overview of the development of micro-credential quality assurance and explore the potential impact and benefits of micro-credentials within the context of EU-CONEXUS's commitment to promoting lifelong learning and inclusive education.

The micro-credential quality framework for EU-CONEXUS was adapted from a collaborative European project that conducted a comprehensive review of European policy and literature. A conceptual framework for micro-credentials is currently under development through a Delphi process, aiming to establish an agreed consensus within EU-CONEXUS alliance members that aligns fully with the theme of smart urban coastal sustainability (SmUCS).

Our research findings indicate that emphasising trust and credibility among partners encourages collaborative commitment to transparency, openness, and ethical behaviour in the ideation, design, and implementation of micro-credentials. This body of work clarifies the definition, purpose, and procedures necessary to implement high-quality micro-credentials that align with the goals, values, and identity of EU-CONEXUS.

Topic modeling based on research articles about Adriatic Sea

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Abstract: Sea determines the space in which humans live and act and, among other things, it can influence the ways of movement, communication, feelings and actions. It is object of research in various scientific disciplines and is an area protected by various regulations and policies. In this paper we set out to investigate how the Adriatic Sea is represented in scientific articles which contain various pieces of information and data. Those articles can be linked to various scientific fields (e.g., natural sciences, social sciences, humanities). The aim of this paper is to determine main topics within the scientific domains related to the investigation of the Adriatic Sea. It will provide an overview of topics that have been researched in relation to the Adriatic Sea, as well as determine possible fields for further research. The main research questions are: Which are the main scientific topics related to the Adriatic Sea regarding scientific fields? Are there similar topics in different scientific fields? Topics will be determined by the analysis of scientific articles published on Hrčak - the open access portal of Croatian scientific and professional journals. Texts from research articles published in English and the keyword Adriatic Sea will be extracted. Articles will be categorized according to scientific fields, within which topics will be investigated. Topics are usually described with various words, which means that each text contains sets of words that describe a topic. Texts on the Adriatic Sea will be investigated with open tool KNIME (Konstanz Information Miner), used for topic modeling. First, all articles will be pre-processed. The topics will be clustered based on Latent Dirichlet allocation (LDA) method. Results will be visualized after the analysis. The above topic modeling can be a reference for further scientific research of the Adriatic Sea, as well as for interdisciplinary or multidisciplinary research.

The sustainable governance of port organizational ecosystem to enhance coastal regions resilience: a theoretical model

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Abstract: Aquatic and coastal ecosystems and their sustainable development usually are dependent on the surrounding urban and business areas located in port cities. Research on seaport-port-city interactions is particularly relevant in the case of medium-sized port cities, which are not capital cities, and which are usually at the high risk of regional exclusion and at the highest risk of negative impact on the coastal environment. As it is described in the newest research port organizational ecosystem include this port-city interaction in the context of effective port governance. Environmental problems on the global markets influenced needs look not only for the effective working governance patterns but also develop sustainable business models for the managing the resilience of all port ecosystem and ensure long lasting resilience of coastal regions. **The idea** of a theoretical approach is to create the theoretical model of sustainable business model for port organizational ecosystem which could make influence the enhancement the resilience of the coastal region what is the highest priority of contemporary port ecosystem's governance including the following issues: territory and development; social well-being of the inhabitants of urbanised areas; management of port-related business processes; and the attractiveness of the port to all its stakeholders. **The main research problem** is the looking for the possible synergy effect between organizations working in port organizational ecosystem in the context of sustainable development of port activities. **The goal of the research** is to create theoretical model based on the symbiotic effect transforming port ecosystem's internal and external interaction and triggering changes of its impact on the coastal resilience. As the research is theoretical the applied methods are theoretical analysis and theoretical modelling.

Where does the stormwater come from? Analyzing soil sealing and land use of urban near-shore catchments

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Abstract: Stormwater in the city of Rostock takes a short route to the coast. In urban areas, stormwater runoff is partly discharged directly into the estuary of the river *Warnow* through the drainage system, partly also through smaller near-shore watercourses. Since 2020, a new set of regulations has been published in Germany („DWA-A/M 102“ [1]), which requires an assessment of stormwater runoff with regard to its origin and possible hydraulic and polluting effects in the receiving water body. Urban canalized catchment areas are divided into three load classes, which may require treatment of the precipitation water. The stormwater runoff in urban areas comes from sealed surfaces. Pollution transported by stormwater is largely dependent on the type and intensity of land use.

In Rostock, a GIS analysis was carried out in order to characterize catchment areas in terms of degree of sealing and land use type [2]. Key land use characteristics (industrial/commercial, residential) were determined using local official data. Other data sources included OpenStreetMap (OSM) geometries and aerial photographs. For example, building and land use polygons were extracted from the OSM data and classified (if available) by their associated *tags*. To obtain data on roofs of houses, roof material information was extracted as OSM attributes (e.g. "building:material", "roof:material") to buildings ("building"=*) or to building parts ("building:part"=>"yes"). Additionally, a classification of roof materials was performed based on satellite images using the QGIS extension "Semi-Automatic Classification Plugin" [3]. Areas such as parking lots, bicycle paths and footpaths were identified based on OSM line data and classified by official traffic data into the three load categories of the DWA regulations. As a result, a digital map with sealing levels and expected annual pollution parameters was generated. Such maps can be used to plan centralized or decentralized treatment measures for stormwater or to selectively "disconnect" sub-catchments. Our presentation will show methods and main outcomes of the GIS analysis.

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Legal perspectives of the concept of nature-based solutions in coastal areas

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Abstract: The coastline is simultaneously a place where people, goods and activities are concentrated and a naturally dynamic environment subject to various constraints resulting from complex processes. Consequently, coastal zones are territories where vulnerabilities to atmospheric and oceanic hazards combine which, because of their geographical location and often their size, affect all the land, coastline and ecosystems associated with them. These are vulnerabilities that are still difficult to assess; Hence the importance of adapting to these effects of climate change through a forward-looking approach oriented towards the conservation, protection and restoration of biodiversity. To do this, the European Climate Law of 2021, several public policies and studies propose a global dynamic around "nature-based solutions" to fight against the effects of climate change in general and the erosion of biodiversity in particular. This concept is not defined in law. Only IUCN, the European Commission and the United Nations Environment Assembly offer definitions. This concept, still experimental, could either be an indicator of the effectiveness of environmental law or a fundamentally new approach, or be an in-between concept. Through this concept, the law could translate into legal instruments, the "new" relationship of man to nature. For environmental law to be coherent, legible and intelligible, it must be sufficiently delimited in relation to other concepts forming a large legal system. This study therefore proposes to analyse the legal instruments that could potentially support it.

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Property and exploitation of the fishing waters in the Kingdom of Sweden during the late Middle Ages (13th-15th c.)

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Abstract: This paper examines the modalities of the appropriation of the so-called ‘fishing waters’ (*fiski vatn*) in late medieval Sweden. Indeed, the word ‘fishing water’, is mentioned in many legal texts and judicial decisions pertaining to this Kingdom – which then even included what is now Finland –, which gave precise indications on how this resource was to be exploited and shared between local people and landowners (whether aristocrats, religious institutions or even the Crown). I will start my presentation by discussing the environmental conceptions behind this concept which, by composition, associates a type of space (water) and an economic activity (fishing), at a time when the notion of ‘resource’ did not yet have the meaning we know today. Indeed, although these areas were always clearly delimited and demarcated, their economic value ultimately depended on animal activity and the presence of fishery resources, which by definition were mobile. A study of the corpus thus reveals complex dynamics of appropriation. Individual ownership progressed at the expense of common waters (*allmänningar*) but did not totally supplant the many forms of collective ownership. Local customs also often seem to have guaranteed some form of access to the resources for non-owners, e.g., by allowing them to fish on specific days, or by limiting the owner’s rights to the ‘first [net] throw’. Under these conditions, the mobility of fish gave rise to numerous conflicts of use, particularly well documented in the Turkuregion (in present-day Finland), which will be studied in the second half of the paper. These disputes could pit fishermen against the owners of mills that impeded salmon migration. They could also involve different fishing communities for the control of resources, the one pretending that the other had committed *förfiske*, i.e., that it had captured the fish before it reached the place where it was meant to be captured. The fact that such conflicts often peaked in spring and autumn, i.e., during the spawning periods, raises the question of the awareness that the populations and the royal power had of the limited nature of these resources and of the long-term anthropic pressure that they exerted on them.

Examining the Drivers that Shape Sustainable Consumer Behavioral Intentions of Regional Leisure and Visiting Friends and Relatives (VFR) Passengers in the Irish Aviation Industry.

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Abstract: This research presents the reader with the overarching research topic: *Examining the Drivers that Shape Sustainable Consumer Behavioural Intentions of Regional Leisure and Visiting Friends and Relatives (VFR) Passengers in the Irish Aviation Industry*. The research will explore the underlying factors that drive sustainable leisure and VFR travel in order to contribute to the achievement of the United Nations Sustainable Development Goals (SDGs). The SDGs were adopted by all United Nations Member States in 2015 as a call to end poverty, to protect the planet and to ensure that all people enjoy peace and prosperity by the year 2030.

Individuals are becoming increasingly concerned about environmental, social, and economic issues, and are willing to act on those concerns. This heightened awareness of their environmental footprint has prompted individuals to re-evaluate their purchasing behaviours, often showing a greater willingness to invest in products and services that possess eco-friendly attributes. Consequently, businesses have been compelled to reassess their sustainability efforts in response to this shifting consumer landscape. While passengers may possess a moral obligation to lead sustainable lifestyles, their ability to do so effectively relies on the support provided by governments, non-governmental organisations (NGOs), and the businesses they engage with. Thus, while individuals and passengers alike may recognise the significance of sustainable consumption, the translation of this awareness into actual sustainable consumer behaviour is not always straightforward.

Therefore, this research seeks to understand passengers attitudes and behavioural intention towards sustainable aviation and travel and examine the attitude-behaviour gap in sustainable tourism and aviation in Ireland. Specifically, this mixed-methodology research will: **1.** Explore the topic of sustainable travel and impact this has on Leisure and Visiting Friends and Relatives (VFR) travel segments. **2.** Explore the drivers of sustainable travel within the context of leisure and VFR travel. **3.** Propose a model that will act as a framework for understanding sustainable travel behavioural intention throughout the travel related consumer decision making processes. **4.** Provide a deeper understanding of sustainable travel drivers and implications for travel and tourism related marketers.

Keywords: aviation; consumer behaviour; environment; marketing; sustainability

Environmentalism, ecoregions and shared regional identity: a case of the Mediterranean Action Plan

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Abstract: Existing between the global and national levels of environmental governance, environmental regionalism is considered an efficient spatial scale for managing ecosystems shared across state boundaries. This vertical rescaling helps limit the number of stakeholders, providing a focused approach for standard building while acknowledging the transboundary nature of environmental issues. In the absence of supranational governance, states belonging to an ecoregion identify common environmental challenges that propel cooperation and induce regional integration. In light of this, the paper seeks to analyse the role of a collective regional identity in determining the success of regional environmental regimes with a particular focus on the Mediterranean Action Plan (Med Plan).

Launched in 1976 under UNEP's Regional Seas Programme, the Med Plan was one of the earliest efforts of the international community towards environmental regionalism. Its founding document, the Barcelona Convention, followed by seven protocols, aimed to prevent pollution from multiple sources and preserve the Mediterranean's delicate marine and coastal ecosystem. Subsequent amendments incorporated the principle of sustainable development for reconciling socio-economic growth with environmental protection, giving it a holistic approach.

Despite its early success in regime formation, its effectiveness diminished over time or remained unclear at best. A lack of political will, limited financial resources, and failure of sectoral integration have been cited as the key issues with the regime's functioning. However, the paper contends that it is the absence of a shared regional identity that led to its stunted performance. It posits that for an ecoregion to become the locus of environmental action, there must exist a collective identity coterminous with its spatial boundaries.

While there is growing literature on environmental regionalism, it mainly focuses on the rise of environmentalism in territorially continuous and regionally integrated ecoregions. On the other hand, the Med Plan is a functional institution intersecting the boundaries of multiple regional identities and provides a perspective on shared responsibility in a fragmented region. Moreover, the study of the Mediterranean region contributes by analysing the process of regionalisation, or the lack thereof, in areas predominated by a marine environment. In light of the socio-cultural diversity, contrasting histories, and economic disparities among the Mediterranean states, the paper adopts the social constructivist approach to trace the formation of several divergent regional identities and how it impedes regional integration based on common environmental concerns.



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PARALLEL SESSION 2 _ SOCIAL, CULTURE AND HUMAN SCIENCES

Poster Abstracts

Advantages and Limitations of a European Comparative Approach to Shaping Smart and Sustainable Waste Management Policies in Coastal Cities.

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Abstract: Managing waste in coastal urban areas is an urgent concern due to its detrimental effects on climate and marine ecosystems (Thomas and al., 2021). Waste accumulation on beaches is degrading the environment, while local waste reduction systems are struggling to effectively address the problem (Asmal and al. 2023). Key challenges include community perception and adequate infrastructure (Herdiansyah and al., 2021). Integrated waste management strategies that involve community participation hold the potential to mitigate these problems and preserve the environment (Walalangi and al., 2020). Rapid urbanization stresses the need to effectively manage the relationship between cities and their surrounding environments. Circular economy principles offer promising solutions (Voukkali and al., 2023), but these challenges can vary based on culture, climate, and economic factors, making it imperative to tailor solutions to specific contexts (Ghosh, 2020). Comparative public administration research is essential in developing effective policies; however, they encounter barriers like language differences and limited data availability. To overcome these obstacles, future research should embrace interdisciplinary methodologies and analyze multiple cases (Önder and al., 2022). Furthermore, conducting more localized studies is crucial for a comprehensive understanding of the issue (Kuhlmann, 2019). This situation led French Professors I. Sueur and G. Delalieux, along with German Professor P. Lorson, to propose a co-directed doctoral study comparing public waste management in Rostock and La Rochelle. The intercommunality of La Rochelle supports this research by opening its doors and funding a grant, awarded by the University of La Rochelle. This research has started in October 2022 in France. I arrived on August 28th in Rostock and will stay for seven months, until March 2024, to understand local waste management through reading literature and meeting stakeholders.

We propose our participation in the EU-CONEXUS Research Conference in Rostock. Through a poster presentation, we intend to discuss the advantages and limitations of a European comparative approach to shaping smart and sustainable waste management policies in coastal cities.

From a personal perspective, this communication will allow us to expand our network in Rostock and collect valuable scientific feedback on our methodology. Furthermore, this communication aligns with the alliance's goals by promoting comparative research and collaboration within the EU-CONEXUS network. Moreover, it seeks to enhance the visibility of the collaboration between the management departments of Rostock and La Rochelle.

Importantly, our participation would involve no additional costs as we are already situated in Rostock.

Acknowledgments: *We warmly acknowledge the intercommunality and University of La Rochelle for the financial support of my research; the EU-CONEXUS consortium for proposing this event; Rostock Universität for hosting it.*

Urban & Coastal Lab La Rochelle, a scientific platform of data and models for interdisciplinary research

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Abstract: The Urban & Coastal Lab La Rochelle (UCLR) project represents an ambitious initiative focused on scientific knowledge to enhance the understanding and management of a coastal territory heavily impacted by human activities. This aims to establish a platform for data, models, and digital tools derived from the research laboratories of La Rochelle University.

In the short term, the project focuses on platform development, data collection, and data and model formatting. This initial phase constitutes the development of a common data management policy within the institution. The data will be used by pooled aroundcase studies to demonstrate the usefulness of an overall vision and to highlight the opportunity for the creation of new multidisciplinary research projects.

This collaborative space is produced with particular attention to interoperability. By adopting the principles of open science, such as data sharing, transparency, collaboration, and the reuse of research results, the UCLR project aims to become an accessible and open tool, benefiting both researchers and territory managers. This project aligns with a national perspective through initiatives like [recherche.data.gouv](http://recherche.data.gouv.fr) and with territorial initiatives through collaboration with the implementation of the TERREZE platform within the LRTZC (La Rochelle Territoire Zero Carbone) project. In the longer term, the project aims to develop scientific tools to analyze, simulate, and integrate data and models, to collaborate with other stakeholders, and to promote research results. By contributing to La Rochelle University's goals in research, innovation, and development, the UCLR project seeks to promote a multidisciplinary approach to urban and coastal management and offer innovative solutions to address the challenges of sustainable management in coastal territories.



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PARALLEL SESSION 3_LIFE SCIENCES AND BIOTECHNOLOGY

Short Talks Abstracts

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Antimicrobial alginate-based films for biomedical applications

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Abstract: Alginate is a linear polymer, biocompatible, non-toxic, and biodegradable material, widely used in biomedical applications such as wound dressing, control release, cell immobilization and tissue engineering. Nevertheless, alginate's antimicrobial capacity is limited. In this regard, carbon-based materials such as graphene (G), graphene oxide (GO) and carbon nanofibers (CNFs) have been proposed to enhance the antiviral and antibacterial properties of this biopolymer. Thus, alginate with 0.1% w/w of CNFs has shown antimicrobial activity against Gram-positive *Staphylococcus aureus* and against bacteriophage T4. The incorporation of 0.5% or 1% w/w GO in alginate has demonstrated to inactivate methicillin resistant *Staphylococcus aureus* and methicillin resistant *Staphylococcus epidermidis*, while showing no cytotoxic effects on human keratinocyte HaCaT cells. A combination of alginate with 10% w/w G and poly(3-hydroxybutyrate-co-3-valerate) resulted in an enhancement of antiviral properties against enveloped viruses such as bacteriophage phi 6 as well as an improvement on electroactive properties and cell adhesion. By crosslinking alginate with calcium chloride, antiviral attributes have been proved against enveloped viruses such as bacteriophage phi 6 and SARS-CoV-2 Delta variant. Moreover, alginate crosslinked with other potential antimicrobial compounds such as cobalt or zinc have shown strong antimicrobial activity against methicillin resistant *Staphylococcus aureus*, enveloped and non-enveloped viruses. These crosslinked alginates have also shown anticancer activity against melanoma and colon cancer cells. This research provides sufficient evidence that these new antimicrobial alginate-based materials developed in our lab are excellent candidates for biomedical applications.

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A sustainable approach to oil spill clean-up

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Abstract: The increasing transport of oil and other fuels by cargo ships on the Baltic Sea increases the risk of oil spills, which dramatically can degrade water quality and affect human health, water ecosystem, and the economy.

One of the sustainable and environmentally friendly solutions for cleaning oil-spills is biological material. As an example, straw is inexpensive, abundant, non-toxic and biodegradable. It exhibits high (oil) sorption capacity and specificity for the oil after appropriate modification. In order to obtain even greater oil-spill clean-up and degradation efficiency, it is advantageous if oil-degrading and biosurfactant-producing microorganisms are immobilised in the straw.

Klaipėda University and its spin-off company Inobiostar, funded by the Innovation Agency Lithuania, treated natural materials such as straw for the production of sorbents specific for oil sorption, laced with oil-degrading- and biosurfactants producing-immobilised microbes isolated from the Baltic Sea sediments, and applied them to different cleaning scenarios. The results show that the sorbents successfully sorb oil at the water surface in the laboratory and *in situ*.

The technology has been patented at the European Patent Office.

Advanced biosensors for environmental pollution monitoring: a case study with azoxystrobin

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Abstract: Aquatic environment could be termed as the intercommunicating arrangement of water, sediment and biota that provide food for humanity. Aquatic resources (ponds, lakes, rivers, streams, oceans) and fisheries are especially precious natural assets. The ecotoxicological effects to aquatic environments are substantial due to the accumulation of toxic inorganic and organic pollutants inflicting adverse effects on human health. Although pesticides are used in agriculture to improve crop production and secure global food supplies can cause substantial impacts on non-target environments such as surface- and ground-waters threatening aquatic ecosystems and human health. Aquatic pesticide pollution is a very important issue worldwide and one of the most important pressures affecting Mediterranean coastal wetlands. To protect aquatic environment from further deterioration, EU has issued the Directive 2000/60/EC (European Community, 2000), subsequently Directive 2008/105/EC (The European Parliament and the Council of the European Union, 2008) and Directive 2013/39/EU (The European Parliament and the Council of the European Union, 2013) that set Environmental Quality Standards (EQS) for priority substances and certain other pollutants (including 21 pesticides), while the European 'Farm-to-Fork' strategy initiation, aims for a 50% reduction in pesticide usage by 2030. Monitoring pesticide concentrations in water resources is essential to evaluate exposure risk in order to prevent pollution in aquatic ecosystems. As an example, we developed a cell-based bioelectric biosensor for the detection of azoxystrobin in aquatic solutions. Azoxystrobin and generally strobilurin fungicides have relatively high-water solubility, which may lead to important levels of accumulation in water and sediments posing important ecological risks. The sensor's biorecognition element consisted of mammalian cells (HaK kidney fibroblasts) the membrane of which was engineered by electroinserting tens of thousands of antibodies against azoxystrobin. Consequently, when pesticide molecules bind to the antibodies, a change of the cell membrane potential occurs which is measurable within just three minutes with a specific read-out device according to the principles of the Bioelectric Recognition Assay (BERA). The optimum performance of the biosensor was observed at 5 µg/mL antibody concentration, while a linear range of response was observed between 0-22.5 ppm, with a limit of detection of 1.5 ppm. The perspectives of applying this novel technology for rapid, portable, and ultra-sensitive environmental water monitoring, is discussed.

Safety evaluation of edible packaging membranes for food storage

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Abstract: To reduce the amount of petroleum-based food packaging materials, edible and biodegradable biopolymer-based membranes have been considered as alternatives. Even if all raw materials of these membranes have been approved for human consumption, the current legislation (Commission Regulation (EU) No 10/2011) requires the end-product to be tested concerning putative cytotoxic effects derived from the migration of substances from the packaging materials to the packaged food. Specific solvents are used to simulate food contact. An edible membrane produced by the approved for human consumption raw materials: brown seaweed-derived sodium alginate (E401), carboxymethylated plant cellulose (E466) and glycerol (E422), was tested for putative effects on cell viability due to migration of substances. As control, the approved for food packaging plastic membrane of low-density polyethylene (LDPE) was used. Membrane pieces of specific dimensions were weighed and incubated in pre-weighed glass vials using solvents that simulated food contact: dH₂O (aqueous foods), 10% ethanol (alcoholic foods), 50% ethanol (milky foods), 95% ethanol (fatty foods), and 3% acetic acid (acidic foods). The incubation was performed for 10 days at 20 °C or 4 °C to resemble the room temperature or the refrigerator conditions of food storage, respectively. At the end of the incubation period, the remaining undissolved membrane-related material was withdrawn, the organic part of the solvents was evaporated under a nitrogen stream while the water part was completely dried in fridge-dryer. The remaining of each sample was weighed, rediluted in dimethyl sulfoxide (DMSO) and used in cell-based viability assays. Moreover, a piece of the edible membrane was vortexed to completely dissolve in dH₂O and used also in cell viability assays. Viability assays were performed using cell lines of colorectal (Caco2) and hepatic (Huh7, IHH) origin. Cells were treated for 72 h with culture medium containing serial dilutions of the DMSO-rediluted samples, or different concentrations of the dH₂O-dissolved edible membrane samples and then the cell viability was determined by the alamar blue assay. Our results showed that the edible membrane had no negative effect on the cell viability with any of the solvents used to simulate food contact, in any condition of incubation, as well with any of the concentrations of dH₂O-dissolved edible membrane used. These results suggest that the edible membrane can be used to wrap food of any composition reducing the required amount of plastic for its preservation. Investigation of the effects of the edible membrane on cell gene expression is ongoing.

Applicability of the purified Biosurfactant obtained from *Pseudomonas citronellolis* 620C in water purification

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Abstract: Polysulfone (Psf) is a favorite polymer for the preparation of polymeric membranes due to its sufficient mechanical strength and good thermal and chemical stability. Psf membranes are extensively used in water treatment using ultrafiltration (UF) techniques however often suffer from membrane fouling, subsequently low water flux. Membrane fouling can be reduced by increasing the hydrophilicity of the membrane. Various methods have been reported for enhancing the hydrophilicity of membrane, such as copolymerization, blending, and surface modification. In the literature, bulk modification of Psf was done by adding several polymeric additives such as PEG, polyvinylpyrrolidone (PVP), PES, polyetherimide, non-polymeric additives such as [2,2'-(m-phenylene)-5,5'-dibenzimidazole] (PBI) and Surfactants (Ss). Although chemically synthesized Ss are widely used in household, industry, and agriculture, negative environmental impact caused upon their synthesis and use, constitute an increasing concern worldwide. Over the last decade, bio-based Ss with high biodegradability are in excessive demand. The objective of this study is focused on developing a facile and effective route for fabricating UF membranes with high permeability and excellent antifouling property for water treatment. More precisely, bulk modification of hydrophobic Psf by means of the biosurfactant (BSF) isolated and purified from *Pseudomonas citronellolis* 620C was performed to achieve remarkable changes in the hydrophilicity and pore morphology. The BSF was produced by the specific strain when oily wastewater was used as substrate, which is an inexpensive substrate. The use of wastewater, considerably decreases the costs of the bioprocess contributing to a circular economy concept. The BSF was, then, extracted and purified. Subsequently, the modified Psf membranes were formed using the “phase inversion” technique which is fast and simple and involves the use of rather concentrated polymer solutions. The Psf /BSF solutions were cast on a (coarser) porous support, before being dipped into a precipitation bath which resulted in solvent-non-solvent exchange and also led to (micro)phase separation. Solvents, non-solvents, and the time of the cast film before being dipped into the non- solvent was varied in order to determine the influence of these different parameters in pore size. The morphology and the pore size of the produced membranes were studied using Scanning electron microscope (SEM). The membranes were also tested for their potential applications in water treatment, in terms of their water flux and their pure water permeability. Additionally, the protein adsorption on to the produced membranes and their antimicrobial activity against: *Klebsiella pneumoniae* (DSM 681), *Pseudomonas aeruginosa* (DSM 19880), *Escherichia coli* (DSM 17076), *Acinetobacter baumannii* (DSM 24110) *Enterococcus faecalis* (DSM 20409), *Streptococcus pneumoniae* (DSM 11865), *Staphylococcus aureus* (DSM 799) and *Salmonella enterica* (DSM 26655), was quantitatively evaluated through the agar plate technique.

Aquaculture waste valorisation with Black soldier fly larvae: a circular concept

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Abstract: Aquaculture solid waste (ASW) from the aquaculture ponds is emerging waste and its management is one of the biggest environmental problems connected with the aquaculture sector. A potential approach to integrate waste treatment and nutrient reclamation could involve utilising insects for the bioconversion of aquaculture sludge. The Black Soldier Fly (BSF), scientifically known as *Hermetia illucens*, has been recognised for playing a crucial role in the circular economy. It can efficiently convert various types of organic waste materials into high quality proteins suitable for animal feed, all while complying with the relevant legislation. A BSF rearing system was designed, where five substrates consisting of chicken feed (typical feeding material for the insects) supplemented with different percentages of fresh ASW (0, 25, 50, 75 and 100% of the overall substrate) were tested. Larvae growth and waste bioconversion performances as well as nutrients retention were evaluated. Overall results suggested that fresh ASW could be used for BSF larvae rearing, combining larvae production with waste management. Larval survival and growth index did not show significant differences between the tested substrates. The best performances in terms of larval production, waste reduction and nutrients assimilation were recorded for the substrate with 75% ASW inclusion, which presented physicochemical parameters close to the optimal BSF rearing substrates described in literature. Overall this study showed that BSF larvae has a high potential to be used for managing fresh ASW, combining aquaculture waste reduction with insect biomass production in a circular system. Future research is required to improve growth and conversion performances, as well as the nutritional composition of larvae, by identifying the best inclusion level of aquaculture sludge in the insect diet. Moreover, it is essential to subject these systems to large-scale testing to facilitate broader adoption.

Behavioral responses related to domination of gilthead seabream individuals on population structure change

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Abstract: Fish individuals' interactions are important for aquaculture, since they are directly correlated with animal stress and welfare. Thus, the social environment along with dominant–subordinate relationships can act as a stressor affecting health of the reared species. Gilthead seabream (*Sparus aurata*) is known for displaying social hierarchies regarding the use of space and food competition (Arechavala-Lopez et al., 2020). The aim of this study was to determine the behavioral changes of dominant seabream individuals upon change of their structure. Dominant individuals were distinguished from the subordinate ones through the evaluation of aggression, behavioral characteristics and their influence on the formation of tank hierarchy. A white background tank was used for filming (243L). Filming was performed with a high-definition camera (widescreen, 1080p/60fps, GoPro Hero 8) under white lighting. Twenty fish were randomly selected and grouped in two teams of ten individuals (T1 and T2). Fish were individually tagged, fed at 2% BW/day, and filmed for five minutes before and after feeding for a time period of seven days. The responses examined were “neutral” “attacking/biting”, “avoiding attack”, “hunt/follow”, “prey/ followed” and “conflict”. Solomon Coder software was used for video analysis. The dominant individuals of T1 and T2 were determined as the top five fish exhibiting a higher percentage of attacking behavior. Dominant fish were merged into a separate group (T3) and were filmed anew following the same method. The results were compared with those of groups T1 and T2. At the end of the trial social interactions were observed. Competition and aggressive behavior were noted in all three groups. However, T3 containing only dominant fish exhibited significantly lower aggressive behavior. Competitiveness constituted 11,2% of the daily interactions while fish were mostly under a neutral state. This result is not in accordance with previous findings where seabreams did not exhibit such long periods of neutrality (Castanheira et al., 2013). Feeding did not affect social interactions of T1 and T2, but T3 demonstrated significantly increased aggressive responses after feeding. In conclusion, although reduced, aggression was sufficient to distinguish dominant–subordinate relationships. Aggressive responses however were affected by the composition of the group and more specifically were confined in an environment with only dominant individuals.

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Valorization and characterization of wild and cultivated seaweeds from Ré island with integrated multitrophic aquaculture using bioremediation and seasonality.

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Abstract: Global warming is an environmental concern threatening humanity, biodiversity, and their environment. Seaweeds are gathering interest by investors and researchers for their versatile application such as food, feed, source for bioactive and functional molecules while being one of the solutions to global warming with their potential in carbon sequestration. However, their biochemical composition can vary significantly due to their adaptability to abiotic and biotic factors, and their resistant cell walls limit efficient extraction, inducing industrial bottlenecks. To allow a biochemical stability, it is necessary to understand the behavior of seaweeds to environmental responses. Furthermore, reproduction cycle from each seaweed must be understood and managed to be able to grow them in natural swamps. To do so, a collaborative work between LIENSs laboratory from La Rochelle University and Algorythme, company based on R e Island is conducted (funded by ANR and France relance). This project aims to cultivate selected macroalgae in natural semi-open ponds in integrated multitrophic aquaculture and enabling at the same time a restoration of biodiversity on shores by controlled harvesting. Among selected seaweeds can be found *Ulva lactuca*, *Ascophyllum nodosum*, *Fucus vesiculosus*, *Undaria pinnatifida* and *Porphyra umbilicalis*. In parallel, each wild and cultivated species is sampled at different periods of the year to study their change in biochemical composition while correlating biotic and abiotic factors like temperature, salinity, animal, and vegetal relationships. We also intend to observe whether a semi-controlled culture can reduce the variability compared to their wild counterpart. Selected chemical pretreatments from literature are conducted to assess their biochemical composition, and observe which one is optimal for each species, for protein extraction, polysaccharide, and valorized bioactive compounds. Preliminary data indicated a protein content between 6.53 ± 0.48 % dw and 16.33 ± 1.25 % dw, and a total sugar content between 15.60 ± 2.58 % dw and 35.39 ± 0.47 % dw. Biochemical activity such as antioxidant, anti-inflammatory is studied on each species and pretreatment.



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PARALLEL SESSION 3_LIFE SCIENCES AND BIOTECHNOLOGY

Poster Abstracts

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Dark genome and its regulation by long non-coding RNAs

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Abstract: No more than 2-3% of the human genome translates into proteins. There are various types of non-coding RNAs (ncRNAs) that address to main cell functions and specifically, are interrelated to the regulation of gene expression. Several lncRNAs are associated with chromatin modification and lead the transcription factors to specific genomic DNA targets. Another function of lncRNAs is the regulation of the mRNA translation levels by suspending the miRNAs and for that reason they are associated with various diseases, such as cancer, myocardial infarctions and Alzheimer’s disease. The lncRNA growth-arrest specific transcript 5 (GAS5) is associated with several diseases, mainly cancer, oxidative stress and hypertension. It interacts with various molecules and complexes of the cell’s biochemical pathways that are associated with alternative splicing, apoptosis, and regulation of gene expression mainly through its interaction with small non-coding RNAs. For that reason, we analyzed the GAS 5 functions in gene expression and genome regulation by using big data mining techniques and feature extraction protocols. Under this pipeline a series of repeated motifs and epigenetic modifications in splicing sites was identified, which may dictate alternative splicing of mRNAs producing multiple isoforms of various proteins. In more details, we focused on the effect of GAS 5 on the mTOR signaling pathway, which regulates several cellular functions, such as protein synthesis, autophagy, cell growth, transcription, and cell survival, and its impact on glucocorticoid receptor (GR). All in all, provided that GAS 5 is associate with various diseases, the series of the non-coding regions and motifs that were identified in this study, could constitute potential drug targets leading in more efficient and effective therapies under the prism of precision medicine in the big data, postgenomic era.

Using molecular modelling pipelines for the designing of Antibody Drug Conjugates

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Abstract: Antibodies are proteins that appear to be the first line of defense in the adaptive immune response of vertebrates and thereby are involved in a multitude of biochemical mechanisms and clinical manifestations with significant medical interest, such as the regulation of infection, autoimmunity and cancer. An emerging field in antibody science of huge medicinal interest is the development of novel antibody-interacting drugs. Such entities are the Antibody Drug Conjugates (ADCs), which are a new type of targeted therapy, that consist of an antibody linked to a payload drug. Overall, the underlying principle of ADCs is the discerning delivery of a drug to a target, hoping to increase the potency of the original drug. We have developed a drug design suite as a pioneering platform that employs state of the art computational biology methods in the fight against neurodegenerative diseases using ADCs. Our tool encompasses an up-to-date structural database of specialized antibodies for a repertoire of disorders and relevant drug and drug-like databases with over 96 million entities for the in silico development of ADCs. The pipeline of our suite has been divided into several steps and modules that are closely related in a synergistic fashion under a user-friendly graphical interface.

Bioinformatic analysis of more than 60.000 full human genome sequences: An in-depth view of molecular interactions between nuclear receptors, their cofactors, enzymes, and epigenetic mediators

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Abstract: Complex and multidimensional computer-aided system analyses are becoming essential in the biological sciences. The characterization of complex molecular pathways is often time-consuming and demanding, and the emergence of big data makes the task even more strenuous. The use of supercomputers is pivotal in the analysis of molecular studies because of the immense complexity of biological systems. A dataset consisting of 60.000 full human genome sequences can be analyzed using data mining and management techniques, as well as autonomous machine learning. These procedures may be focused on principal hubs of molecular networks, such as nuclear receptors. There are 48 nuclear receptors (NRs) in the human genome and comprise one of the largest groups of ligand-dependent transcription factors that regulate the transcriptional activity of complex gene networks and, consequently, a wide range of biological processes. The epigenetic modification network of NRs is assisted by a large number of enzymes, cofactors, and epigenetic mediators. The nuclear receptor networks have been evolutionarily built and continue to do so under the selective pressure of circumstantial changes. The analysis of NRs provides a detailed view of the evolutionary, developmental, and current function of the genetic/epigenetic networks organized around them. The identification of mutations and polymorphisms and their effect on the function of the above interactants, along with their comparison, may help elucidate common evolutionary and developmental patterns. These findings may be applied in all stages of prevention, diagnosis and therapy, under the prism of state-of-the-art precision and personalized medicine.



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PARALLEL SESSION 4_ENVIRONMENTAL SCIENCES
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Short Talks Abstracts

Deep learning semantic segmentation and textural features extraction algorithms for benthic habitat features classification

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Abstract: Underwater imagery has become common technique in the realm of marine biology for observing changes in community structure, distribution or, but not limited to, identification and classification of underwater habitats. The cost-effectiveness of this method has made it an increasingly common option among environmental scientists, as it enables them to collect large amounts of data in a shorter period of time during field surveys. Yet, because of the laborious and time-consuming imagery analysis procedure, there is a growing demand for automatic imagery classification techniques.

In our work, deep learning semantic segmentation model and numerous textural features extraction algorithms were investigated for automatic benthic species classification. The main focus was placed on the predominant geological and biological characteristics. Four biological and geological features were used for the semantic segmentation task: red algae *Furcellaria lumbricalis* and *Vertebrata fucoides*, green algae *Cladophora* sp., blue mussel *Mytilus edulis trossulus*, sand (<0.2 cm), pebbles (0.2-6 cm), cobbles (6-25 cm), and boulders (>25 cm). For textural features extraction, we chose the same features; however, we separated the blue mussels based on their size in the image and removed the cobbles from the classification.

Underwater videos were collected in SE Baltic Sea reefs located in the Lithuanian marine area. Extracted frames and 2D underwater video mosaics were annotated using the Labelbox manual pixel-wise segmentation tool. Annotated imagery was then used to train a deep learning model for automatic detection and quantification of biotope features. For textural features extraction, selected images were divided into smaller (100x100 px) patches, and 350 patches were used for each class in the random forest classification algorithm.

A case study of phytosanitary practices of vegetable growers and agricultural pesticide contamination levels in coastal lagoons of West Africa

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Abstract: This research presents a case study on phytosanitary practices of vegetable farmers in West Africa using the catchment areas of Ouidah and Grand-Popo coastal lagoons in Benin as examples. For the first time, an evaluation of the concentrations of agricultural pesticides in these ecosystems were assessed. 240 vegetable farmers from four coastal municipalities were interviewed using a semi-structured questionnaire digitised in KoBoCollect. The municipalities were Abomey-Calavi, Ouidah, Grand-Popo and Kpomassè. Samples of sediment, water, fish (*Sarotherodon melanotheron* and *Chrysichthys nigrodigitatus*) and oyster (*Crassostrea tulipa*) were taken from four sites (Adounko Daho in Abomey-Calavi, Ahouandji and Djègbamè in Ouidah and Avlo in Grand-Popo). Depending on the type of sample, analysis of 33 to 36 pesticide residues such as organochlorines (OC), organophosphates (OP) and pyrethroids (PR) was done. The LOQ was 0.01 µg/L for OC and 0.5 µg /L for OP and PR in water while for the other samples (sediment, fish and oyster), it was 0.01 mg/kg for all the pesticides. The results of the interviews showed that vegetable farming was the main activity for 81.25% of the respondents, all of whom use chemical pesticides. None of the respondents purchase authorised chemical pesticides from the government institutions; 91.25% of them obtain their supplies illegally from local markets in Benin and 8.75% from neighbouring countries, in particular Togo and Ghana. Most commonly used active substances are Lambdacyhalothrin, Emamectin benzoate, Abamectin, Acetamiprid, Chlorpyrifos-ethyl, and Dichlorvos. Only 23.75% of the respondents receives technical support from government services in relation to vegetable farming. 5.83% and 7.08% of the respondents had received training in plant health protection and safe use of pesticides respectively. The vegetable farmer in relation to his experience mainly bases the choice of chemical pesticides on the personal judgement of its effectiveness. Number of treatments and doses applied are generally high than recommended and producers sometimes mix different pesticides. 95.83% of the farmers dispose of empty containers in the environment. 1.67% and 16.67% of respondents use pesticides for fishing and are aware of people who use them for fishing respectively. 95% are ready to abandon chemical pesticides provided that the alternatives proposed are comparable in terms of effectiveness, cost and accessibility. The results of the analyses of pesticides showed that out of the 33 molecules of pesticide analysed in water Chlorpyrifos residue was detected at 0.9 µg /L at Avlo. Lambda-cyhalothrin and Fenvalerate residue levels were respectively 0.10 and 0.60 µg /L at Djègbamè. Pirimiphos-methyl and Lambda-cyhalothrin residues were respectively 0.6 and 1.60 µg /L at Adounko Daho. *C. nigrodigitatus* at Adounko Daho contained Chlopiryphos at a residue level

of 0.032 mg/Kg. *C. tulipa* contained residues of Chlorpyrifos, Pirimiphos-methyl and Gamma-chlordane respectively at the levels of 0.73, 0.31, and 0.028 mg/Kg at Ahouandji. No pesticide compound was detected in *S. melanothron* as well as in the sediment samples out of the 36 molecules analysed. Findings suggest an urgent need of a continued monitoring programme and that of an increased sensitisation on good phytosanitary practices within the communities of vegetable producers in the coastal zone of Benin. Further investigations are ongoing to assess the ecological and health risks associated with the measured levels of pesticide residues.

Keywords: Agriculture, pesticide pollution, aquatic environment, coastal pollution, Benin, West Africa

Light attenuation in the shallow coastal areas of Mecklenburg-Vorpommern, Germany: Implications for coastal ecosystems.

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Abstract: Light availability significantly influences coastal ecosystems, determining primary production and ecological dynamics. Light attenuation (K_d), described as the rate of light absorption and scattering in a medium (or water column), impacts photosynthesis, habitats and species distributions, and organisms' physiological responses. This research aims to understand K_d dynamics in complex, shallow coastal areas, and to investigate the important contributing factors so that suitable approaches can be suggested for sustainable coastal ecosystem management. The field sampling procedures included K_d and essential bio-optical parameters (BOPs) in the shallow (less than 7 m) coasts of Mecklenburg-Vorpommern, Germany, during the summers of 2022 and 2023. K_d was quantified using an underwater spectrophotometer, incrementally lowered in 0.5 m intervals until close to the seabed. At the same time, water samples were collected to estimate the principal BOPs, namely Coloured Dissolved Organic Matter (CDOM), Total Suspended Matter (TSM), Chlorophyll-a (Chla), and Phaeopigments (Pg). Interactions between K_d and BOPs are evaluated using a machine-learning random forest algorithm, to identify significant patterns and contributions. Preliminary findings showed spatial and temporal variability in the measured parameters. BOPs explained nearly 40% of the variability in K_d , with mean squared residuals of 0.18, indicating a reasonably good fit of the model to the data. Among the BOPs, CDOM is found to be the main variable affecting K_d , followed by Chla, Pg, and TSM. Coloured particles from organic matter such as the decays of plant and animal materials, soils, and algae comprise the typical high-CDOM characteristic of the coastal areas in the Baltic Sea. The biologically productive period during the sampling contributed to the measurements of Chla and Pg, while TSM is often due to the combined influence of natural processes and human activities. The outcomes from this study can help with conservation efforts for better management of anthropogenic pathways impacting BOPs to ensure the enjoyment of high-quality coastal waters, along with the preservation of marine ecosystems.

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Posidonia oceanica meadows of Cyprus; The most important marine ecosystem of coastal waters threatened mostly by land-based activities

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Abstract: The Levantine Basin is the warmest and most oligotrophic water body of the Mediterranean, yet despite summer temperatures often exceeding the reported tolerance levels, genetically isolated *P. oceanica* thrives around Cyprus island, occupying 15% of coastal waters up to the 50 m isobath (25% in Natura 2000 sites), with an estimated total coverage 125 km². This dominant primary producer sequesters massive amounts of carbon locking more carbon than any other seagrass species, protects coastlines from erosion, purifies the water, recycles nutrients, is a nursery ground and habitat for thousands of species, sustains local fisheries and recreation. Recent surveys in the Natura 2000 sites revealed that Cypriot meadows have the highest shoot densities across the Mediterranean and possibly the deepest lower limits, raising the conservation value of these climate-resilient meadows. However, side scan sonar mapping also indicated areas around ports and urban centres with extensive dead matte.

Intensified anthropogenic pressures such as: coastal modifications and pollution, dredging and construction of marine jetties, wavebreakers, ports and marinas, laying pipelines, illegal trawling and anchoring, invasive species and climate change are threatening the integrity of seagrass meadows. Recent local die-offs have also been documented by citizen-scientists. To meet the objectives of the EU Habitat Directive, Biodiversity Strategy and the upcoming Nature Restoration Law there is an urgent need to develop capacity for restoring seagrass meadows integrating top-down policy and bottom-up initiatives.

The need for marine ecosystem conservation and restoration is apparent and it is more needed in the Eastern Mediterranean where climate change impacts are more pronounced and widening countries need technological support. Challenges such as maintaining water quality, data uncertainty, low stakeholder awareness and engagement, unreliable quantification of costs and benefits, lack of blueprints and roadmaps are impeding restoration upscaling using nature-based solutions.

The effect of temperature, acidity, and the availability of nutrients on the interactions between marine bacteria and bacteriophages

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Abstract: Climate change adaptations of microbes are going to be pivotal for the future understanding of marine ecology. Increasing temperatures not only impact biological processes but also lead to decreased water density, which in turn affects circulation and stratification, influencing how organisms are dispersed and nutrients transported. Microbial community composition and function are also affected by nutrient inputs from sources such as air, rivers, and estuaries, all of which are affected by climate change. Additionally, due to human activities, atmospheric carbon dioxide levels have increased, which has led to its dissolution into the ocean, and thus to ocean acidification, a reduction in the pH of the ocean. Climate change could influence bacterial interactions with their natural predators. Bacteriophage-bacteria interactions are among the most frequent engagements in marine habitats, contributing to marine biochemistry circles. In this study, we used *Vibrio alginolyticus*, a Mediterranean marine-abundant bacterial species, and two Caudoviricetes lytic bacteriophages, both with a myovirus morphotype but distinctly different genome sizes. Bacteriophage lytic cycles were studied at various temperatures, pH levels, and nutrient availability, and it was discovered that bacteriophages with a larger genomic size had the least impact. An rt-qPCR platform was developed to monitor the differentially expressed patterns of well-known bacteriophagic genes as well as potentially induced auxiliary metabolic genes. Our findings showcase that bacteriophages with larger genomes may endure efficient host cell hijacking in a variety of microenvironments while maintaining normal host lysis. This advantage may favor their abundance in marine habitats in the face of future climate change.

Diversity and temporal distributions of fish plankton in Amorgos island (central Aegean Sea)

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Abstract: Global climate change and overfishing cause significant changes to marine ecosystems. In the context of AMORGORAMA fisheries research project, monthly samplings of fish plankton (bongo net with mesh size of 250 and 500 μ m) were held during the period from 2022 to 2023 at three coastal areas of Amorgos island in central Aegean Sea. Climate change favors the displacement or repulsion of indigenous fish populations and the disruption of the food web. Fish plankton is a crucial component in studies of fish recruitment and essential part of fisheries management. Spatial and temporal variations in eggs and larvae of commercial species can thus provide important information to sustainable fisheries management. A total of 36 species were identified, 21 of which were edible in their adult form, some of which of commercial importance, i.e. Mullet/ *Mugil cephalus* (Linnaeus, 1758), Anchovy/ *Engraulis encrasicolus* (Linnaeus, 1758), Bogue/ *Boops boops* (Linnaeus, 1758) and Annular seabream/ *Diplodus annularis* (Linnaeus, 1758). The results revealed 985 nymphs, from 26 families, with the most numerous in descending order being Sparidae (632 individuals: 525 *Diplodus annularis* and 67 *Pagellus acarne*, respectively), Labridae (95 individuals of *Symphodus esperes*), Gobiidae (89 individuals of *Gobius paganellus*), Myctophidae (48 individuals among which 32 were *Ceratoscopelus maderensis*) and Serranidae (31 individuals among which 29 were *Anthias anthias*). Seasonal variations in the composition and number of species were observed, with April presenting the highest number of nymphs (776 nymphs among which 524 were *D. annularis*) and a majority of eggs (251). We found 17 species in autumn, 14 in winter and 24 in spring. This information can be associated to the increased biomass of zooplankton during the warmer months, constituting food for fish larvae. Two individuals of the extremely rare species *Microichtys coccoi* (Rüppell, 1852) were identified for the first time in the central Aegean Sea, the adult of which is extremely rare, with only few reports worldwide.

Ecological study for the revalorization of port habitats: solutions based on eco-concrete

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Abstract: Currently, almost 60% of the human population is concentrated around the coasts. Furthermore, the trend of maritime traffic is growing, as are the threats due to climate change, such as sea level rise and the frequency of aggressive storms. For these reasons, it is necessary to design and develop maritime-port infrastructures from an environmental and sustainable perspective, assessing alternative compositions, surface finishes and forms, which allow their integration into the marine habitat and the species that live there. Concrete-based coastal and maritime infrastructures, present in ports, harbours, piers, industrial facilities, and coastal shelters, dominate coastal zones around the world. These infrastructures, which replace or encroach on natural habitats, can provide an ecosystem similar to that offered by undisturbed coastlines (Gopalakrishnan y Govindarajan, 2011). However, shorelines with a high presence of this type of infrastructures are considered sacrifice zones with little or no environmental value. Studies show that marine flora and fauna in these areas are less diverse than in natural ecosystems and they are commonly dominated by opportunistic and even invasive species. Within the “Agencia Valenciana de Innovación” projects "Livingreefs" and "Livingports" of the Valencian Government, the colonization of species and C fixation in innovative structures has been studied since 2020. The experiments developed with *Enteromorpha compressa* (Linnaeus) Nees, 1820 showed the effectiveness of the roughness and composition of these structures manufactured with sustainable materials. Likewise, the determination of Total Organic Carbon (TOC) according to the method by Besar *et al.* (2020), showed that the roughest concrete specimens had the more TOC, proving that this characteristic is the most recommended for the fixation of organisms (Koehl, 2007; Sempere-Valverde, 2018). It was also determined that the V3 concrete composition, differing from the others in that it was made with crushed glass, performed the best, combining both, adequate material composition and roughness, to improve the structure of sessile communities (Sedano *et al.*, 2020).

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EMERALD GROWTH: Framework for the sustainability of transitional waters

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Abstract: Emerald Growth is a concept for the sustainable development and management of transitional aquatic ecosystems, both ecologically and socially. It evolved from "green" and "blue" growth and applied the ecosystem principles for managing transitional waters, i.e., lagoons, fjords, and estuaries. In 2008 UNEP created the 'green' economy initiative, which further evolved into the term 'green growth', describing an ecologically sustainable economic growth path. On the contrary, the concept of 'blue growth' is closely related to the 'blue economy' (Pauli, 2010), which aims to exploit marine ecosystems holistically and sustainably. However, neither the concepts of 'blue' nor 'green' growth consider the spatial relationship between ecological and social systems along the river-basin continuum and their interactions in the land-to-sea transition. Defining and further developing the concept of 'emerald' growth proposed by Tagliapietra et al. (2020), there is a need to assess functional and spatial interactions in ecological and social systems associated with transitional waters. We emphasize a spatially consistent river-to-coast continuum and estuary-to-ocean continuum (Xenopoulos et al., 2017) to integrate these interactions into an ecosystem-based approach for sustainable adaptive management consistent with the 10 Tenets of Management Response, i.e., that continuum should be ecologically sustainable, technologically feasible, economically viable, socially desirable/tolerable, legally permissible, administratively feasible, politically expedient, ethically (morally) correct, culturally inclusive and effectively communicative (Borja et al., 2013).

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EU CONEXUS



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PARALLEL SESSION 4_ENVIRONMENTAL SCIENCES
AND BIODIVERSITY

Poster Abstracts

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The reproductive biology of *Octopus vulgaris* Cuvier, 1797 in the Valencian Community (Spain, NW Mediterranean): An essential tool for fisheries management.

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Abstract: The common octopus, *Octopus vulgaris* Cuvier, 1797, is the most important cephalopod species for fisheries along the Valencian Community. Given its dependence on environmental conditions, affecting all stages in its life cycle, and non-overlapping generations, stocks are unstable with significant interannual fluctuations and danger of collapse. This study explored the main features of the reproductive biology of these species via monthly samplings from clay/plastic pot and bottom trawling fisheries of the Valencian Community from September 2022 to August 2023. For a total of 1113 individuals, a 1:1 sex ratio was observed throughout all months. Gonadosomatic index and maturity index obtained the highest and lowest values respectively between June and August for females, showing a distinct reproductive period. For males, the reproductive indexes show higher values during the spring season. However, unlike in females, mature males are present throughout the year. These findings are considered of considerable importance for fisheries management to effectively establish fishing closures.

Oxygen regime, total phosphorus and orthophosphate on fish farms

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Abstract: Oxygen is a gas essential for the maintenance and development of almost all living organisms, as it is involved in many biochemical processes. It enters the sea by diffusion from the air and by photosynthesis by aquatic algae and higher plants. Both processes are restricted to the surface layers, which are therefore richest in oxygen. In cage fish farming, oxygen concentrations may decrease due to fish respiration if sea currents do not provide sufficient freshwater with adequate dissolved oxygen.

Phosphorus is a biogenic element that plays a structural and functional role in the synthesis of nucleic acids (DNA and RNA), phospholipids in cell membranes, and cell fuel in the form of ATP. It is found in natural waters and wastewater, mostly in the form of phosphate. It is divided into orthophosphate, condensed phosphate (phyro-, meta- and other polyphosphates) and organic phosphates.

The study was conducted in fish farm „Kali Tuna“ near Mrđin, and the research results were obtained by laboratory determination of dissolved oxygen concentration and total amount of phosphorus and orthophosphate in fish farm to determine the effects of these compounds on fish in breeding cages.

The results of this study showed that the highest oxygen concentration was found at depths of 10 and 20 meters, and that the oxygen concentration gradually increased from the seafloor to a depth of 20 meters, while a lower oxygen concentration began below 10 meters depth. The highest phosphorus concentration was found at the seafloor, and the concentration decreases with decreasing depth.

Strategies for Environmental Analysis and Monitoring Using Laser-Induced Breakdown Spectroscopy (LIBS)

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Abstract: The issue of global pollution has gotten more challenging in recent years as well as the changes in environmental quality. For timely and accurate evaluation of the circumstances at hand, environmental monitoring is crucial. Additionally, studying the water quality and the services provided by aquatic ecosystems is a key aspect of the connectivity between terrestrial and marine environments research.

As a well-known analytical technique, laser-induced breakdown spectroscopy (LIBS) [1] exhibits a number of benefits, including quick, real-time, in-situ, and simultaneous detection of numerous elements with minimal sample preparation that give the opportunity to be one of the potential technologies in the field of environmental analysis and the studies related to biodiversity.

The presented research is developing the LIBS structural design, system architecture and methodology for the rapid characterization of samples and their precipitates, especially the coastal waters quality monitoring, periodically, which is a critical part of environmental management and protection and qualitatively and quantitatively determining contamination and impurity levels in water that is especially important.

The proposed project, which is based on LIBS-capillary mode to measure the element concentrations in solution, can give the chance to open opportunities towards sustainable development through the EU-CONEXUS network extension as well as related multidisciplinary joint research activities between the active universities and the research centres. Broadening this project and network relating to this research will be beneficial for future European Horizon funding applications.

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Utilization of Water Care Material (WCM) from water maintenance as a concept to tackle eutrophication of surface water bodies

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Abstract: In Germany, the federal states are responsible for the categorization and maintenance of the surface water bodies. The legal regulations for this are contained in the Federal Water Act (WHG) and in the corresponding state water laws. In Mecklenburg-Western Pomerania, 27 independent water and soil associations (WBV) are responsible for the maintenance of second order water bodies. These are medium-sized streams that are important in terms of their characteristics from the perspective of water management. Through the development and maintenance of more than 18,000 km of surface water (e.g. ditches and canals), the WBV contribute to securing flood runoff in the public interest. In the last decades, the WBV are increasingly required to focus their work on the needs of nature conservation and environmental protection. Often the WBV are not able to follow the recommendations and regulations of nature conservation because of economic reasons. For example, the removal and disposal of WCM from the water system after maintenance poses major logistical and financial strains for the WBV. A current study shows that an estimated 36,000 tons of DM are potentially available for material and energy recovery each year throughout Mecklenburg-Western Pomerania.

The harvested material is usually left in the slope area without further utilization. When the biomass rots, the nutrients bound in it return to the profile, which has negative effects on the trophic conditions in the water body. In addition, berms form over time in the slope area, which restrict the surface runoff of surrounding areas. Against the background that the harmlessness of the harvested biomass can be assumed in principle, there are many valuable utilization options in the field of material and energy recovery.

In the context of current status or ecological potential of our water bodies, which do not meet the requirements and objectives of the Water Framework Directive, ecologically oriented water body management is the basic prerequisite for improving water body quality. The approach to harvest and utilize highly productive free available biomass from water maintenance for recovery may therefore serve as a model for an economically and environmentally sustainable water body management.



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PARALLEL SESSION 1 _ COASTAL ENGINEERING

Short Talks Abstracts

Improving the environment of port cities by optimizing the speed of ships through the port channels

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Abstract: A significant number of large ports are located in or near urban areas and the ports try to attract as large ships as possible. Today's large ships mostly have high-powered engines and even when sailing at relatively low speeds, they consume a lot of fuel and generate large amounts of emissions that have a negative impact on the environment in cities.

Ships must travel at a safe speed to guarantee their navigational safety, but many ports have maximum permitted speeds for ships and many ships adhere to them. At the same time, the minimum speed for handling ships can be much lower than the maximum speed allowed in the port. An accurate assessment of the minimum controllable speed of a specific ship, under specific conditions, and matching it with the relative minimum fuel consumption would allow to significantly reducing the emissions generated by the ship and even improve the environment of port cities.

The principles and methodology of the ship's minimum controllable speed and optimal fuel consumption and the generation of minimum emissions are presented when ships navigate port channels and port water areas.

Simulating Cooperative Operations of Swarms of Autonomous Underwater Vehicles

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Abstract: Autonomous underwater vehicles (AUVs) are well suited to perform underwater operations that are too dangerous or inaccessible for humans. Since the power supply of AUVs is limited, communications must be highly energy efficient and the power constraints must be known in order to plan the AUVs' mission. Due to the difficulties, costs, and hazards of real experiments, simulations with appropriate models are essential to plan, test, and optimize AUV swarm missions.

Our research aims to provide simulation models that enable cooperative missions of heterogeneous AUVs, such as monitoring and protection of maritime infrastructures for inspection and control purposes. Enabling mission planning for a swarm of heterogeneous AUVs represents an innovation that combines advances in robotics, artificial intelligence, data management, and communications. These innovations enhance the capabilities of AUVs, making them more efficient, adaptable, and capable of working together to accomplish complex underwater missions, ultimately expanding the opportunities for underwater exploration and research.

Research on hydrodynamic qualities of an electric driven ferry

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Abstract: The main objective of the research is the choice of the hull form for the electric driven passenger ferry, considering the relation between electric propulsion requirements and loading and operation conditions of the vessel. Model tests in open flow channel allowed to develop the hull form with the projected hydrodynamic qualities. The results of model tests have proved that the theoretical calculated propulsion power, necessary to ensure the projected design speed, was estimated correctly.

Acknowledgements: *The research was funded by 2014-2020 Operational Programme for the European Union Funds Investments in Lithuania. Project "Creation of an Autonomous passenger ferry technology prototype." Project No. 01.2.1-LVPA-K-856 Eksperimentas. The authors would like also to thank the staff of the project lead partner company JSC "Western Baltic Engineering" for the support in the current research.*

Management of urban resilience: a comprehensive review

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Abstract: Over the past decade a new field named urban resilience has emerged and the need for its management understanding has increased significantly. This paper aims to provide the progress made in the field of urban resilience in terms of management strategies, appropriate assessment, current frameworks, and types used through a state-of-the-art review of ongoing studies and research. Particularly, it pays attention towards the dimensions of urban resilience, its components and implementation, revealing the dividend character of resilience, an intervention that starts with one purpose and leads to other benefits that reduce fragility and improve resilience. The results highlight how different risks can be treated together rather than addressing them in isolation allowing communities an opportunity to tackle them at once and with efficiency in order to make stronger and more resilient cities. Finally, the critical analysis of literature enhances the management importance of urban resilience to achieve urban sustainability.

A review regarding water carbon nexus in the urban context: towards sustainable city management

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Abstract: Water and energy are linked and dependent on each other. To produce energy, we need water and by the other hand energy is needed to provide drinking water and sanitation services. If we consider the actual development of cities, we know that there is lot of carbon emissions and water consumption related. In this study we try to make a review of the definition of water carbon nexus and of the major methodologies which are already used in the studies. The management of urban water and energy systems is essential to ensure the well-being of populations, the health of the environment and resilience in the face of future challenges. There are several opportunities for us to do this. The integration of renewable energies, such as solar, wind and hydro power, into urban networks offers huge opportunities to reduce the carbon footprint of cities while guaranteeing a more stable and decentralized energy supply. Related to the water supply systems, the water/wastewater treatment and the structure transformation in energy systems are very important for the water-carbon nexus. Then implementing sustainable water management practices, such as the reuse of cleaned wastewater, rainwater harvesting and water-efficient building management, helps conserve this precious resource while minimizing costs and environmental impact. There is also a tendency to sacrifice large water consumption in exchange for carbon reduction in the urban systems, calling for explorations in the water-carbon balance. Innovation in water and energy treatment technologies offers opportunities to improve efficiency, reduce costs and optimize the quality of services provided to citizens. The use of information and communication technologies to improve the management of water and energy networks makes it possible to monitor, control and optimize these systems. Intelligent networks can detect leaks, adjust distribution to demand in real time and optimize energy consumption. Finally, we have reviewed the existing knowledge on the water – carbon nexus and provided support for urban sustainable management and related policy making.

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Experimental Research of Innovative Composite Offshore Reel for Subsea Cable Handling

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Abstract: Sustainable design and manufacturing of low-carbon structures is a major concern for the industry. Fiber reinforced polymer (hereinafter – FRP) composite materials are seen as a suitable alternative to traditional structural materials due to their high strength and light weight. Due to the high potential of offshore wind farms and high expectations from the industry mentioned benefits provide significant savings in subsea and offshore applications of FRP composite materials. Safety, structural integrity, and corrosion resistance are essential factors to consider aggressive offshore and subsea environments. Current research presents a comparative experimental investigation and introduces a new type of the reel considering composite material such as glass Fiber reinforced polymers (hereinafter – GRP) in lieu to conventional carbon steel for high voltage current direct (hereinafter – HVCD) cable storage, sea transportation and subsea installation. Due to lack of standard and experimental results, a new prototype is experimentally tested on site based on large scale experimental program. Identified priorities reflected to this research work by promising application of GRP composite material may find innovative use in offshore environment.

Acknowledgements: *First and foremost, the author expresses his great appreciation to Dr Rima Mickevičienė, the Head of Marine Engineering for providing the guidance, knowledge, and motivation over his research work at the Faculty of Marine Engineering and Natural Science.*

Resilience-targeted performance evaluation of civil infrastructure for extreme wind events

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Abstract: Significant economic losses and societal disruptions due to extreme wind-induced damage to civil infrastructure, generates a strong demand to turn the current design practice into a code plus resilience-based design one. Densely urbanized cities located on coastal areas are mostly exposed to extreme wind events, both- synoptic and non-synoptic. The analysis end- product will provide in a not-too-distant future, loss estimations and associated repairing cost, as well as functional recovery duration estimates to serve for a full resilience- targeted design for individual buildings or clusters of buildings or civil infrastructures. The Database-Assisted Design (DAD) for linear-elastic behaviour building structures was developed in early 2000, was later extended for tall buildings (Iancovici, 2019). For nonlinear behaviour structures however, most of the numerical solvers fail to handle long-duration time-histories of wind loads. An efficient numerical algorithm based on Force Analogy Method, efficiently captures the inelastic structural behaviour of building structures (Iancovici et al., 2022). This opens new frontiers for structural wind-induced damage evaluation and loss estimation, as key-components for a resilience-based design, in a further unified seismic- and wind- Performance-Based Design (PBD) framework. The results of the integrated analysis consisting of linked-in modules like wind tunnel aerodynamic test data and nonlinear dynamic response analyses, that efficiently generate damage quantifications at section, member, story, and structural level, is presented. Simultaneous wind pressures time-histories recorded in the wind tunnel (Wind Engineering Research Center from Tokyo Polytechnic University work is highly acknowledged) are used. The prototype building has a square plan shape of 40 m span and 80 m height. The damage index proposed by Park and Ang (1985) for seismic applications, provides the sectional, member, story and structural evolutive degrading processes for wind loads. The wind directionality and load intensity effects on the associated damage level are thus straightforward obtained from time-domain analysis (Figure 1).

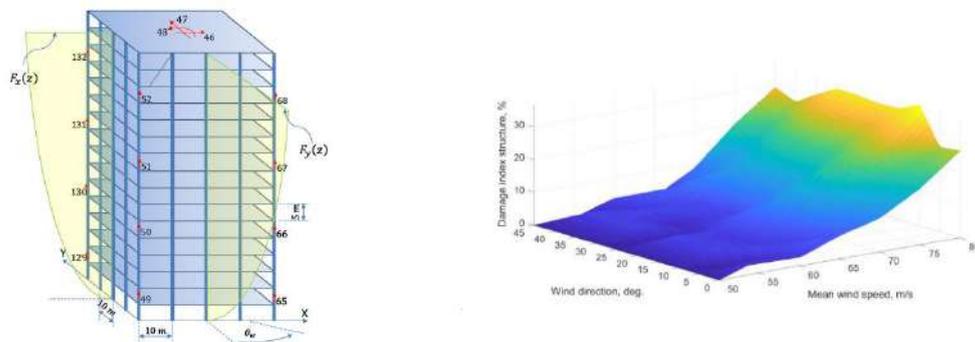


Figure 1. 16 story RC prototype frame building (left figure), wind directionality and wind intensity effects on the peak structural damage index (right figure)

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Sustainable Coastal Construction and Urban Development: A Case Study of Limassol Bay, Cyprus

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Abstract: The coastal zones of Greece, Israel, Turkey, and Cyprus are not only characterized by their natural beauty but also by their significant contributions to the Blue Economy and the well-being of their citizens. This paper is part of the research 'Safety/Environmental Risk Assessment Study: Blue Limassol' (2021-22), carried out by the Department of Maritime Transport & Commerce, FU, and focuses on the case of Limassol Bay in Cyprus, a region where Coastal Tourism accounted for 22% of the national GDP in 2018, employing 23% of the national workforce. With a remarkable 63 Blue Flag Beaches awarded in 2022, Limassol stands out as a coastal destination with unparalleled potential. However, this coastal gem also faces environmental challenges arising from various sectors such as Waste & Sewage Management, Port & Shipping, Construction, Oil & Gas, Aquaculture & Fisheries, and Recreational Water Sports.

This research paper aims to shed light on the current state of the marine environment in Limassol Bay focusing mainly on the construction sector and Urban development impact. It achieves this by establishing a comprehensive understanding of the practices and data collection methods for monitoring water quality, reporting, and responding to environmental incidents. In addition to identifying the primary sources of pollution, this study adopts a holistic approach by assessing the environmental, social, and economic impacts of potential incidents. To conduct this risk assessment, the Formal Safety Assessment (FSA) methodology was employed, emphasizing major risks with collective repercussions on the marine and coastal environment in Limassol.

Recognizing the transboundary nature of environmental incidents, this research aims to extend its scope by fostering collaboration with neighboring countries in the Eastern Mediterranean. The goal is to standardize environmental performance indicators for effective sector comparison and replicate this study in other coastal cities. Through the establishment of a knowledge-sharing network dedicated to risk assessment and leveraging Limassol's inclusion in the EU 100 Cities mission, international collaboration can achieve economies of scale in implementing proven risk mitigation practices.

The findings of this study culminate in a series of recommendations for policymakers and key stakeholders. These recommendations were disseminated through various channels, including dissemination events and a public Blue Limassol Forum in March 2022. By addressing the challenges faced by Limassol Bay and offering practical solutions, this research contributes to the broader dialogue on sustainable coastal development and environmental risk assessment in coastal cities across the Eastern Mediterranean. It underscores the importance of balancing economic prosperity with the preservation of coastal ecosystems, ensuring the well-being of both the local population and the environment.



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PARALLEL SESSION 2 _ SOCIAL, CULTURE AND HUMAN SCIENCES

Short Talks Abstracts

Urban Planning for the Coastal City of the Future: a multidisciplinary approach

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Abstracts: Cultural sustainability has been categorized under the ‘social pillar’ of the three pillars of sustainability, reflecting the significance of socio-political discourse. It refers to maintaining cultural beliefs, practices and heritage for future generations. Cultural sustainability is formulated and buttressed by the cultural and creative industries, who act to promote and sustain human-centred social, economic and environmental well-being; a vital aspect of sustainable development.

However, it can be argued that the role of culture is relatively overlooked in environmental policy, practice and strategy. Regarding the future of our coastal regions in particular, there is a distinct cultural ecology which need to be preserved and enhanced as we work towards a sustainable future. This paper attempts to highlight the impacts of coastal culture on sustainable development and proposes a multi-disciplinary lens for incorporating cultural sustainability into wider coastal development plans. By incorporating cultural resources and heritage management within holistic sustainable planning processes, close cooperation with relevant sectors can be facilitated.

This paper asks how can we prioritize the cultural sustainability of our coastal cities and their locales to ensure economic prosperity and social welfare for our coastal populations. In particular, we look at the city of Waterford and we consider how its cultural ecology can be enhanced and sustained alongside economic and environmental concerns. We consider the culture of Ireland’s oldest city, Waterford, and how we can contribute to future sustainability.

Using our recent book, *Urban Planning for the City of the Future* (2023) we illustrate how a multidisciplinary lens, combining sociological, geographical, technological and political approaches, can equip us to consider the coastal city as a canvas that can be stretched, manipulated, reformed and repurposed; readied for cultural, economic and environmental ‘upgrades’.

We consider, in particular, the aspect of planning strategy and its impact on cultural sustainability. Taking Harvey’s notion of ‘the right to the city’, we explore how power structures often influence city planning, while overlooking the city’s cultural ecology. We ask how best to plan for the coastal city of the future and how to prioritize cultural sustainability in a technological world. We consider how best to engage citizens in making claims for ‘the right to the city’ and how best to empower and facilitate citizen engagement through culture. We seek to utilize a critical and innovative multi-disciplinary imagination, through which we can deliver an optimistic interpretation of the developments and transformations occurring in our coastal regions.

Portalis, protecting our coastal heritage, visitor experience design within a citizen science framework.

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Abstract: The citizen led trans-disciplinary pilot project Portalis explores our earliest Mesolithic coastal communities and how they adapted to survive. The co-creation of our visitor experience design, within a citizen science framework, provided a novel design approach for the exploration of any parallels between our earliest and contemporary communities relationship with their natural and cultural landscape and for identifying lessons learned towards our adaptation to climate change now, facilitating an accessible, authoritative and sustainable visitor learning experience. We investigated, through evidence based research, how early coastal settlers may have adapted to their surroundings. We consolidated existing evidence and provided new data. Long term sustainability of our project outputs is supported by intensive stakeholder engagement.

Cross-border citizen led conservation of natural and cultural landscape was leveraged by a dynamic transfer of knowledge through new cross-border visitor experience designs, linked citizen science activities, public archaeology events and two sustainable experiential and cultural tourism cross-border networks. A range of techniques were used including drilled core sampling, excavation, lab analysis, design ethnography, citizen science and visitor experience design.

Our visitor experience designs harnessed immersive experience hand in hand with user centric, ethically informed, exhibition design, (UCD), delivering curated authority within a multi- sensory collaborative design approach. A Universal Design strategy was implemented throughout, informing accessibility and inclusion considerations within the visual narrative. Film, virtual reality (VR) and Augmented reality (AR) were included, linking our new visitor experiences at two key urban museum sites with established rural coastal destination experiences. Sustainable blue and green economic growth platforms are fostered using interpretive themes such as coastal biodiversity. Our high level of engagement with local governance and key stakeholders is evidenced by the inclusion of our resource outputs within Destination Experience Development Plans, local governance Development Plans and Climate Action Plans.

The co-creation of our visitor experience design provided a novel design strategy to explore parallels between our earliest and our contemporary coastal community relationship with their natural and cultural landscape. Working within the logistics of each museum venue and within the limited resources of our pilot project, our study provides a significant step forward in identifying and exploring key ethical questions and logistical implications. This facilitates an accessible, authoritative and sustainable coastal heritage protection resource and learning experience for our coastal communities and their visitors.

Bibliography, acknowledgements or footnote:

Joy Rooney is a Graphic Designer, Lecturer and Researcher in Design, at South East Technological University, (SETU), Ireland. A graduate of the University of the Arts, London, (UAL), her design research is underpinned by an interdisciplinary approach to innovation and design-led creativity. It employs a citizen science framework in the context of cultural landscape and inter-coastal community climate action and behavioural change. Her work is informed by creative engagement with inter-coastal culture and study visits in Antarctica and the Arctic. She is currently leading the transdisciplinary project entitled Portalis, within the Ireland Wales Co-operation Programme.

Water Education in Romania: Challenges and Perspectives for Sustainability

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Abstract: Representing the signature of our planet, water defines and shapes our lives. More than 96% of the total water is stored in the oceans and seas, the rest is represented by ice caps, groundwater, surface water, atmosphere, and biological water. Water is at the same time a resource, a habitat, and the support for life. Since the beginning of recorded history, water has held a special place in the spiritual and physical lives of people [1]. Human development is bound to water existence and during time we tried to understand the physical, chemical, and biological phenomena that governs water. Water education goes beyond the teaching of hydrological sciences and must be both multidisciplinary and interdisciplinary [2].

Starting from the international perspective (e.g., UNESCO) the article focuses on the trajectory of water learning and education in Romania.

Beside the hydrological sciences (hydrology, hydraulics, water management, etc.) taught only at university level, water related information and knowledge is an important part of many school subjects: physics, chemistry, biology, geography, and environmental science.

The path of water learning within the education system is strongly related to societal development, politics, and media. Each of these actors influence the general perception on water, supported on many occasions by natural water related disasters (flooding, landslides), by water governance and management (water cost, water resource planning, hydro energy production) or by anthropic water resource pollution.

Beginning from kindergarten all the way to university level, the water education should focus on the importance of water resource conservation for a resilient and sustainable society.

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PARALLEL SESSION 3_LIFE SCIENCES AND BIOTECHNOLOGY

Short Talks Abstracts

From Atlantic predatory muricids extraction to the synthesis of potent bioactive bioinspired pigments for therapeutic

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Abstract: In order to widen the range of available therapeutic agents and especially to find even more effective molecules, the search for new active ingredients remains a constant preoccupation for chemists and pharmacologists. With more than 80% of the existing species, the aquatic world contains a multitude of unknown organisms: algae, invertebrates, tunicates, sponges, mollusks, corals... which constitute a formidable source of original molecules. The research activities of the team BCBS (Biotechnologies et Chimie des Bioressources pour la Santé) are at the chemistry-biology interface and are dedicated to the valorization of marine or terrestrial alkaloids in cancerology through two research programs. The team is recognized for its expertise in (i) the synthesis of signaling pathway inhibitors and cell cycle regulation enzyme inhibitors, biological activity tests, (ii) the identification of new pigments that can be used for the prevention, diagnosis and treatment of tumors (chemotherapy, phototherapy and sensitization to cytotoxic agents).

Product with a high added value, purple from marine molluscs is a natural colorant of potential interest for various applications. Many natural dyes extracted from animal species are derived from the hypobranchial glands of Muricidae gastropods. As two drilling gastropods *Ocenebra inornata* and *Ocenebra erinaceus*, have been noticed for their predation on cultured oysters along the Charente-Maritime coast, we first decided to launch a research program dealing with the chemical characterisation of dye precursors and purple dye derived from glandular secretions from these gastropods (collected on the Island of Ré and Fouras near La Rochelle) in the prospect of a potential valorization.

In this talk, the story from the examples of compounds of interest obtained by extraction of *Ocenebra inornata* and *Ocenebra erinaceus* to the chemical synthesis of novel mimics of these pigments, alkaloids, and to the potent biological activity will be presented.

Acknowledgments: V.T. would like to thank the “Fédération de Recherche en Environnement pour le Développement Durable (FR CNRS 3097)” and the “Ligue Nationale Contre le Cancer, comité 17” and for financial supports

Phytochemical analysis, antioxidant and antimicrobial evaluation of solvent-solvent fractionation of *Cedrus brevifolia* (Hook. F.) A. Henry needles, a rare and endemic plant of Cyprus

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Abstract: The genus *Cedrus* (Pinaceae), widely known as cedar, comprises a group of evergreen and coniferous trees, distributed mainly in the mountainous forest ecosystems of the Mediterranean basin and the western part of Himalaya range. Depending on the geographical area, the genus is divided into four individual species, *Cedrus deodora*, *Cedrus libani*, *Cedrus atlantica* and *Cedrus brevifolia*, exhibiting divergent morphological traits. *Cedrus brevifolia* (Hook. F.)

A. Henry is a threatened Cypriot native species, protected by the European Directive 92/43/EEC and characterized as vulnerable based on the International Union for Conservation of Nature Red List of Threatened Species. Confined in Paphos, it is distinct from other species, due to their short needles and resilience to arid environments. Phytochemical studies applied on different parts of *Cedrus* have led to the isolation and identification of several secondary metabolites, belonging to the class of terpenoids, flavonoids, phenolic compounds and alkaloids. These bioactive compounds exerted antibacterial, antifungal, cyanotoxic, insecticidal and repellent activity, displaying promising results for the protection of the ecosystem against phytopathogens and cyanobacteria microcysts. Nevertheless, the endemic *Cedrus brevifolia* species, has not been extensively studied, so far, in comparison to other cedar trees. In this study, crude ethanol needle extract, re-suspended in water, underwent successive liquid-liquid extractions for the preparation of hexane, ethyl-acetate and n-butanol fractions. The crude extract, and all the fractions prepared have been assessed for their total phenolic and flavonoid content, using the Folin-Ciocalteu and aluminum chloride colorimetric assay. Also, they were evaluated for their antioxidant capacity with the *in vitro* 2,2-diphenyl-1-picrylhydrazyl (DPPH) and the ABTS^{•+} (2,2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) free-radical scavenging methods. Their antimicrobial activity was also tested on various bacterial strains, encouraging the exploitation of the plant for environmental purposes. Further investigation is required for the isolation and characterization of the secondary metabolites, constituting *Cedrus brevifolia* needle extracts. Additionally, this study contributes to the existing knowledge on *Cedrus brevifolia* and provides insights on mitigating aquatic pollution.

Poly(lactic acid)/alginate composite scaffolds produced by 3D printing and vacuum filling manifested antibacterial and *in vivo* osteoinductive capacity

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Abstract: Fused deposition modeling was used to create reproducible three-dimensional poly(lactic acid) (PLA) scaffolds for bone tissue engineering applications. These PLA scaffolds were infused with sodium alginate cross-linked with both Ca²⁺ and Zn²⁺ ions. Zinc cations were used to confer antibacterial and osteoinductive properties without compromising the non-toxic properties of the PLA-alginate composite material. These novel scaffolds showed antibacterial activity against Gram-positive methicillin resistant *Staphylococcus epidermis* and Gram-negative *Pseudomonas aeruginosa*. Furthermore, *in vivo* bone regeneration capacity was shown on a rabbit model by tomography and histological analysis. The physico-chemical properties of the scaffolds were evaluated by field emission scanning electron microscopy with energy-disperse X-ray spectroscopy, Fourier transform infrared spectroscopy, water absorption, porosity measurements, and compression tests in dry and hydrated states at body temperature. Their superior compressive properties, water uptake, and osteoinductive and antibacterial capacity thus make them promising scaffolds for bone tissue regeneration. Furthermore, these polymers (PLA and alginate) have already been approved by the US Food and Drug Administration.

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Isolation and characterization of indigenous microalgae strains and studying their exploitation on efficient wastewater treatment

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Abstract: Microalgae exhibit tremendous potential to be an environmentally sustainable solution for bioremediation as they have the capacity of efficiently recovering nutrients from agricultural wastewaters, and at the same time generating high value bioproducts with diverse biotechnological applications [1]. In the present study, effluent water from tomato hydroponic cultures was used for isolating naturally present microalgal species that may possibly be of biochemical interest and play a crucial role in wastewater treatment. Four different strains were isolated and characterized with morphological, biokinetic and molecular taxonomy methods. According to our findings, the four indigenous microalgae were classified as *Chlorella sp.*, *Chlamydomonas sp.*, *Scenedesmus sp.* and class Trebouxiophyceae. The microalgal strains were subsequently cultured under steady conditions in both commonly used media and hydroponic water effluents to estimate microalgae exploitation for wastewater bioremediation by evaluating nutrient recovery. Total biochemical characterization was also conducted on microalgae biomass to determine both primary and secondary metabolites. Specifically, total protein, lipids and sugars contents were evaluated in all strains cultivated in common medium and hydroponic wastewater. In addition, total antioxidant activity, phenolic and flavonoid content were also estimated in microalgae biomass. Our findings emphasized the effective recovery of nutrients as well as the high yield biomass of the isolated strains using hydroponic effluents. Finally, custom made microalgae extracts were produced to evaluate *in vitro* potential bioactivity on human cell line Caco-2.

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Assessing the impact of biostimulants derived from microalgae extracts on hydroponic lettuce

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Abstract: Employing natural biostimulants represents an environmentally friendly cultivation approach aimed at enhancing both the quantity and quality of vegetable yields. Microalgae extracts, due to their high bioactivity, constitute an emerging and ecological approach for the development of new efficient biostimulants [1]. The aim of this work is to evaluate the effect of the application of *C. vulgaris* and *Scenedesmus sp.* extracts at 2 concentrations (10 and 50 mg/L) as biostimulants on the growth, production and biochemical characterization of lettuce plants grown in a hydroponic culture system both under physiological conditions and under salinity stress (50 mmol/L). Ethanolic extract of commercially available *C. vulgaris* was derived from biomass cultivated in common Walnes nutrient medium. Moreover, biomass from indigenous *Scenedesmus* strain isolated from hydroponic tomato effluent, cultivated in a) Walnes nutrient medium, and b) hydroponic effluent, were used to produce ethanolic extracts PR4W and PR4H, respectively. The application of the treatments was carried out by foliar spraying 3 times over a month. Based on the evaluated biometric characteristics, lettuces sprayed with the CHV extracts showed a significant increase in their fresh weight compared to control at both concentrations applied under normal conditions. Furthermore, the application of both concentrations of CHV and PR4H extracts as well as the high concentration of PR4W extract led to a significant increase in the fresh weight of lettuce grown under salinity stress. At the same time, significant differences were observed regarding the evaluation of lettuce quality, with the application of CHV and PR4H biostimulants showing the greatest antioxidant capacity in lettuces grown under salinity stress. In addition, total phenolic and flavonoid content of the lettuce was evaluated, where it was observed that lettuce sprayed with CHV and PR4H presented a statistically significant higher total phenolic content at both concentrations and in all growth conditions compared to control. In conclusion, the application of the above extracts as biostimulants it has a positive effect on both growth and quality of hydroponically grown lettuces, especially in stress conditions.

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Investigation of the response of plant calluses to the exogenous application of NOS inhibitors and NO donors.

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Abstract: Nitric oxide is a vital player in plant physiology, involved in regulating various processes including callus formation, stress responses, defense mechanisms, and gene expression. Its versatile nature and ability to interact with different molecules make it a crucial component in the complex network of signaling pathways that allow plants to adapt and thrive in their environment. Oxidative stress is a crucial factor that can significantly affect the growth and development of plant callus. Understanding and managing oxidative stress is important for successful plant tissue culture and various applications in plant biotechnology. Research has demonstrated that the application of exogenous nitric oxide (NO) can have a positive impact on callus growth and differentiation in a range of plant species, including but not limited to tobacco, tomato, maize, rice, and *Arabidopsis*. In this study, we investigated the complex interplay between aminoguanadine hemisulfate, sodium nitroprusside with NO and ROS biosynthesis in *Arabidopsis thaliana* calluses. For this purpose, the levels of NO, ROS, and reduced glutathione additionally with the bioaccumulation of iron and calcium in callus cultures. Our results that will be discussed can contribute to a better understanding of how these factors interact and influence plant growth and development.

Impact of water management practices on aquatic microbial communities in the coastal Natural Park of Albufera (Valencia, Spain)

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Abstract: Anthropized wetlands are one of the most important ecosystems worldwide, though greatly affected by urban, industrial and agricultural activities. The Albufera Natural Park in Valencia (Spain) is a unique coastal socioecological system including a protected lagoon surrounded by approx. 16.000 Ha of rice fields. This area represents an important reservoir for bird migration in Europe. Moreover, water management within the park is unique due to spatial and seasonal differences. The rice fields can be divided in two main areas: Lowlands and Highlands. In winter, the aquatic ecosystems occupy only the Lowlands with recreative and birding purposes, while in the summer the flooded area covers all the natural park as a result of the agricultural management of the rice fields. Besides, during the summer season the Lowlands are flooded by the lagoon, while the Highlands are irrigated from two different sources: North Highlands are mainly irrigated by a Waste Water Treatment Plant (WWTP) whereas the South Highlands are fed by the Xuquer River. The purpose of this research is to analyze, through microbial metataxonomy analysis, the seasonal and spatial influence of water management on the biological status of the Natural Park. Our results show a clear separation between the summer and winter seasons in the composition of associated microbial communities, together with a remarkable lower microbial richness in summer samples, a fact which could be explained by the regular water renewal from summer flood irrigation. On the other hand, strong differences in microbial communities were observed between North and South Highlands during the summer season, which is consistent with a potential direct effect of water origin on the aquatic ecosystem composition, with a statistically significant higher presence of *Polynucleobacter* in WWTP-irrigated North samples as compared to river-flooded South samples. Finally, our work describes a core microbiota of the Albufera wetland environment including 26 taxa, common to 90% samples from both seasons, whose presence is related to the high anthropization and particular physicochemical properties of this aquatic ecosystem. Overall, our data confirm a high anthropized environment in the Albufera wetland, as well as a remarkable effect of the WWTP water input on the microbial communities present.

Academic Research Integration: a teaching tool useful for boosting multidisciplinary research teams on marine Biotechnology.

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Abstract: R&D activities are very important issues in the current Marine Biotechnology status; R&D activities funding requires of participation of multidisciplinary teamwork from public research centres, universities, and private companies; so, training students in professional skills related to scientific writing, project planning, management, and presentation of research proposals to be developed in multidisciplinary teamwork is the aim of the Academic Research Integration (ARI) course. This course is part in the 2nd year of the Erasmus-Mundus Joint Master Program in Marine Biotechnology (JMPMB), a joint master from the European University for Smart Urban Coastal Sustainability. JMPMB structure is aligned with the marine Biotechnology pipeline, considering all aspects from discovery to market launch, providing students with core thematic areas that include a complete biotechnological toolbox and an overview of the blue Biotechnology business ecosystem, and 4 specialization tracks that allows students to specialize in different aspects of development, testing, production and applications of new products and services to biomedical, cosmeceutical and agrifood sectors based on aquatic organisms. During the ARI, the students from various partner universities and/or several specialisations work together (in groups of 5-7) on a shared and transversal research project. Students compete to choose research lines proposed by professors in the partner Universities, where they get laboratory skills by hand-on training and practice-oriented supervised by researchers, then, students offer their expertise to their classmates to design a proposal of multidisciplinary research project; then, research lines become in work packages of the multidisciplinary research proposals that are evaluate by professors in the partner Universities. The proposed multidisciplinary research projects give to the students the opportunity to apply general academic, research and/or design skills in practice. Each student take part in this multidisciplinary project, carrying out the research activities related to his/her specialisation in one of the partner institutions. At the same time, the transversality is encouraged through the collaboration between students from different specialisations and in different locations, adding up each student's work and thus running a truly multidisciplinary joint research project. Every student work closely with his/her Academic Supervisor, who help him/her to meet the project's milestones. All the members of the team gain an interdisciplinary overview of the whole work because of their singular and collaborative work. Converging research lines from more than 20 researchers for JMPMB purposes is an opportunity to boost multidisciplinary and transnational research groups on marine Biotechnology within EU-CONEXUS.

Application of Liquid Chromatography Mass Spectrometry, NMR and other characterisation equipment for characterisation of Pharmaceutical Intermediates

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Abstract: The Department of Science at SETU Waterford campus is home to a number of research centres, the most significant of these is the Pharmaceutical and Molecular Biotechnology Research Centre and the Eco-Innovation Research Centre. Both centres operate with close interaction between undergrad students, PhD students, postdoctoral researchers and teaching staff. However, a key characteristic is also the very close interaction between these centres and industry. Interaction between the research centres and industry, from small and medium sized enterprises to multinational companies comes in the form of industry advisory boards, flexible part time training opportunities in key scientific skills with stackable or standalone minor awards, collaborative research with undergraduate and PhD projects. This presentation will give an overview of some key research equipment in the Department of Science and PMBRC/EIRC research laboratories, paying particular focus to some of our chromatography, mass spectrometry, and solid-state characterisation techniques to support collaborative research. This equipment and select examples of the types of research which it supports will be represented in the form of case studies as opposed to focussing on a single research project. Examples presented will give a flavour of the equipment capability and research strength areas at SETU Waterford relevant to the Life Sciences and Biotechnology Institute of EU-CONEXUS. This will highlight to attendees in which expertise exists and in which SETU is open and willing to collaborate on Joint Research proposals with our EU-CONEXUS partners.



EU CONEXUS



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**PARALLEL SESSION 4_ENVIRONMENTAL SCIENCES
AND BIODIVERSITY**

Short Talks Abstracts

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Nutrient removal with harvest and other benefits provided by small constructed floating wetlands in two coastal lagoons of the SE Baltic Sea

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Abstract: The SE Baltic Sea's shallow eutrophic lagoons present a dilemma for countries where agricultural landscapes dominate the surrounding watersheds, as they seek to enhance water quality. Recently, there has been a consideration of internal or sea-based measures as nature-based solutions for nutrient removal and water quality improvement. In this research, we assessed the effectiveness of small constructed floating wetlands (Biomatrix®, Scotland, UK) measuring 24 to 28 m² in removing nutrients in the Curonian Lagoon (Lithuania) and Szczecin Lagoon (Poland). We examined plant nutrient stoichiometry as indicators of growth factor in the brackish coastal waters. We calculated the nutrient removal and carbon storage capacity of the constructed floating wetland (CFW).

The total nutrient uptake per installed island area varied based on the plant type and growth conditions. The highest nitrogen and phosphorus contents were recorded in *Carex* biomass, N% = 1.8 ± 0.3 and P% = 0.13 ± 0.04. The lowest phosphorus content was found in *Shoenoplectus* and *Typha* P%=0.08±0.04. The nutrient stoichiometry in plants varied between the two lagoons, implying potential suboptimal growth conditions due to nitrogen limitation. Over the three years, plant biomass increased and eventually stabilized at 2.5 to 3.7 kg WW m⁻². The dry weight content of *Phragmites* (49-52%) is higher than that of *Carex* (32-35%), also reeds accumulated a higher amount of carbon. Using a conversion factor of 3.7, this amounts to 33-63 kg CO₂e assimilated per CFW.

Natural succession should be considered and overall management goals should be defined, whether the islands serve solely as nutrient removal barriers or provide also an aesthetic value. Potentially CFW offers a bundle of regulating and cultural ecosystem services: habitat provision, wave attenuation, tourist attraction, and nature education. CFW nutrient removal and carbon sequestration potential are low compared to other nutrient removal methods (e.g. reed cut). The total socio-economic value of the ecosystem service provision is still to be estimated in order to evaluate the overall applicability of CFW in coastal waters, along with the optimal size of CFW and the investment payback period.

The impact of land use and climate change on water quality of the Vransko Lake in the Croatia

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Abstract: Vransko Lake is the largest freshwater lake in Croatia, under the significant influence of the Adriatic Sea, and has great value from the point of biological diversity. It is protected at all levels of protection, nature park, special reserve, Natura 2000 area and Ramsar site. In the area of the Vransko Lake Nature Park, there is a large number of different Mediterranean karst, swamp and water, and typical cultivated habitats. Vransko Lake has lost the cryptodepressal character by penetrating Prosika channel in the 18th century and merging with the Adriatic Sea. The wetland area was brought to the edge of survival, and with it the living world that depended on it, but the malarial problem was solved then, which until then seriously threatened the health of the surrounding population. Due to karst features of the entire Vransko Lake area and also of anthropogenic influences, relatively fast penetration of harmful substances into groundwater and open water sources is possible, making this area a particularly sensitive ecosystem. Intensive agricultural production in such a sensitive area can become a cause of water pollution and the most significant pressure impulse to the natural ecosystems of Vransko Lake. Water quality of Vransko lake belongs to the lagoon of variable salinity with the highest measured with a value of 1.2 ‰. However, due to the more dry years and the low water levels of the Vransko Lake due to climate change, the increasing penetration of seawater through the channel Prosika is also possible. In addition, because of low water levels, the water is rapidly and very hot and warm water significantly reduces the oxygen solubility, massive flooding of organisms in Lake and large disturbances throughout the ecosystem. The improper influence of man on the ecosystem of the Vrana Lake area is also reflected in the fires. People have always changed the environment of the Vransko Lake and adapted it to itself, and it has only become so expressive in the last few centuries that it poses a threat to the survival of living communities or biocenoses developed in these areas or habitats, which significantly endangers the health of the Vransko Lake ecosystem. Additional progression to this negative trend has been the result of recent climate changes that rapidly alter the freshwater ecosystem in saline. The good governance of this area implies defining activities and tools for the protection and improvement of ecosystem services and social benefits.

Energy efficiency strategies for buildings with historic and architectural value in Europe: A case study of energy optimization and energy saving measures for Romanian heritage buildings

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Abstract: For most European cities, villages and settlements, heritage architecture is the element that emphasizes the personality, culture and history of the built environment, giving it an identifiable character, becoming recognisable symbols for the European cultural heritage and the identity of European society. The current existing building stock contributes greatly to greenhouse gas emissions in Europe, thus a large-scale energy optimization and regeneration for the existing heritage buildings is a key step needed to be taken towards implementing sustainable policies in European cities.

The article will illustrate the main heritage buildings typologies in Romania, focused on public heritage buildings with historic and architectural value; the main objective of this paper is to showcase current legislative framework regarding the energy efficiency measures for heritage buildings, identify key strategies and solutions for implementing the above mentioned measures and also present a study made on a heritage building in Romania, showcasing the benefits of using such a methodology. The study, results and conclusions presented in the article, will also include DesignBuilder and EnergyPlus models.

In addition, the article will also underline the importance of involving the key stakeholders into the modernization process of heritage buildings, and provide a series of behavioral change measures and strategies based on the study, emphasizing the importance of being directly involving the end users into the whole process, in order to make sure the interventions will be easily sustained throughout the buildings new extended usage period.

Keywords. energy efficiency, heritage buildings, buildings with architectural and historic value, thermal comfort, heritage buildings, public architecture, behavioral change, DesignBuilder

From Waste to Wonder: Utilizing waste shells for wastewater purification

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Abstract: The fisheries sector plays a paramount role in ensuring food security worldwide through the supply of both finfish and shellfish for consumption. In Ireland, scallop and whelk shells are some of the major shellfish species landed and exported. Their processing leads to the generation of significant quantities of shell waste. The disposal of these wastes poses a threat to the sustainability of aquatic and coastal environments and to the shellfish-processing sector. Are these waste shells of any value? This research aims to utilize scallop and waste whelk shells in their natural and calcined powder form for the removal of phosphate from wastewater. It also aims to determine their antibacterial activity against a water-borne bacterium, two applications of both local and global environmental relevance. The shells were utilized as adsorbent materials for the removal of phosphate from synthetic wastewater in a batch mode using optimized process conditions. In addition, the antibacterial activity of the shells was tested against *Escherichia coli* using the agar well diffusion method. Characterization of the shells was done using Scanning Electron Microscopy (SEM) equipped with Electron Dispersive X-ray analysis (SEM-EDX), Fourier Transformed Infrared (FTIR) Spectroscopy and X-ray Diffraction (XRD). In addition, a strength-weakness-opportunity-threat (SWOT) assessment was conducted to inform strategic planning and sustainability development frameworks for the proposed applications. The results of the batch experiment proved that calcined shells had a higher phosphate removal efficiency (100%) when compared to the natural shells within 30 minutes of application. The shells in their natural state had no zone of inhibition against *E. coli* while a strong zone of inhibition (10-20 mm) was observed with the calcined shells. The characterization study demonstrated that scallop and whelk shells changed from calcium carbonate to calcium oxide after the calcination process. This study indicates that the shells in their calcined state exhibit an increased antibacterial and phosphate removal capacity when compared to the natural shells. The utilization of these waste shells is in tandem with the zero-waste circular blue economy approach. It is anticipated that their use for these applications will promote environmental sustainability of ocean resources and the aquatic ecosystem.

The discovery and functional characterization of novel putative metallothioneins from water hyacinth (*Eichhornia crassipes*) and water lettuce (*Pistia stratiotes*)

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Abstract: Water lettuce (*Pistia stratiotes*) and water hyacinth (*Eichhornia crassipes*) are aquatic plants native to South America and have been identified as hyperaccumulator plants. Studies have shown the capability of *P. stratiotes* and *E. crassipes* to accumulate toxic concentrations of heavy metals without showing any symptoms of abiotic stress. Phytoremediation by aquatic plants can alleviate heavy metal contamination of water bodies arising from anthropogenic activities and natural processes. Phytoremediation of heavy metals by plants is achieved through several mechanisms including phytoextraction. Phytoextraction involves the uptake of heavy metals into the aerial tissues of the plant and during this process, plants protect themselves from toxic effects of heavy metals by expressing metal chelating peptides such as metallothioneins.

Metallothioneins (MTs) are gene-encoded polypeptides that have highly conserved cysteine-rich motifs contributing close to 30% of the polypeptide chain. Studies have shown that MTs participate in various heavy metal tolerance processes in plants because of their capability of chelating and sequestering heavy metal ions such as zinc, copper, and cadmium using thiol groups present in cysteine residues. While MTs have been discovered in several plants and their response to heavy metal exposure is widely studied, little information is known regarding MTs from *P. stratiotes* and *E. crassipes* and their potential function during heavy metal exposure.

The aim of this study was to identify novel MT genes from *P. stratiotes* and *E. crassipes* and to investigate their potential function in aiding to heavy metal tolerance. The work presented here outlines the discovery of novel putative MTs from *P. stratiotes* and *E. crassipes* using bioinformatics, and relative gene expression analysis using real time PCR to assess the response of MTs in *P. stratiotes* subjected to copper. Furthermore, the potential ability of recombinant MTs in aiding heavy metal tolerance and accumulation in transgenic bacterial hosts was assessed. Up-regulation of MTs in *P. stratiotes* in response to exposure to copper was observed. In addition, an increase in tolerance to copper was confirmed in transgenic bacteria harbouring novel putative MTs from *E. crassipes* and *P. stratiotes*. The results presented here improve our understanding of molecular mechanisms of MT genes contributing to heavy metal tolerance and accumulation by *P. stratiotes* and *E. crassipes*, which is also important for eco-engineers to effectively use these plants to alleviate heavy metal contamination in water.

High prevalence of microplastics in the digestive tract of *Scyliorhinus canicula* (Linnaeus, 1758) shows the species biomonitoring potential

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Abstract: Plastic pollution is widespread in oceans and the ingestion of plastic by marine organisms is causing concern about potential adverse effects. The purpose of this study was to analyze the different types of plastics in the digestive tract of the small-spotted catshark (*Scyliorhinus canicula*). An alkaline digestion method using 10% KOH, was used. The samples were filtered and visually observed to classify the plastics according to size, shape, and color. Raman spectroscopy was employed to identify the polymer types. The study found the presence of plastics in 89.5% of the 200 females analysed, including 14 polymers polymers, with polystyrene (PS), polyamide (PA), polyvinyl chloride (PVC), and silicone rubber (SR) being the most common. The polymers identified largely reflect the results of similar studies in the marine environment and are also similar to global polymer diversity of microplastics, which highlights the potential of *S. canicula* females for biomonitoring microplastic pollution.

Enhancing an environmental modeling framework by Pest, an automatic calibration software solution

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Abstract: The Curonian Lagoon, situated as a crucial biogeochemical link between land and the Baltic Sea, encountered a substantial inflow of nutrients from various sources like agriculture, municipal wastewater, and brackish water from the Baltic Sea. This nutrient loads, including with seasonal dynamics and varying ecological nutrient stoichiometry, leads to phytoplankton blooms, impacting the entire ecosystem. This complexity of the ecosystem requires complex environmental modeling efforts with numerous model kinetic parameters and stoichiometric, necessitating precise calibration for accurate predictions.

To address eutrophication processes in the Curonian Lagoon, the Aquatic Biogeochemical Cycles (AQUABC), pelagic NPZD model, and the Ecosystem and Transport Simulator (ESTAS), a box modelling approach, coupled with the SHYFEM hydrodynamic finite element model. The AQUABC model encompasses 21 state variables, including a zooplankton sub-model accounting for varying stoichiometry, primary production, and nutrient cycles. Manual calibration based on field data was initially used, but the study introduced automated parameter optimization tool, PEST, to enhance model calibration.

This study integrated the PEST tool with the ESTAS-AQUABC pelagic model to determine optimal parameter values fitting observed data for the Curonian Lagoon model. PEST interacted with the model through text files, and template files were designed to identify areas in the input file requiring modification. Instruction files facilitated objective function value extraction. To enhance parameter optimization, first, global sensitivity analysis with the method of Sobol conducted. Through the application of this approach, we were able to reduce the overall quantity of model constants needed for calibration to 174 parameters.

While we've made notable progress in eutrophication related variables such as ammonium, nitrate, and phosphate, our aim is to employ the model and the tools we've created for more extensive research. This will allow us to more accurately evaluate the effects of climate change and nutrient loadings on the Curonian Lagoon and the Baltic Sea continuum.

Conservation and sustainable management of coastal sand dunes

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Abstract: Conservation and sustainable management of coastal sand dunes is of utmost importance for financial and ecological reasons. Sand dunes mitigate the impact of extreme natural events, such as strong winds and waves, at coastal areas and they host remarkable biodiversity. LIFE CALLIOPE project (LIFE17 NAT/IT/000565) focuses on the preservation, protection and mitigation of the direct and indirect human threats on coastal dunes, sublittoral sandbanks and marine reefs in Italy and Cyprus. More specifically, the project takes place along the Italian coast of central Adriatic and the north- west coast of Cyprus and is co-funded by the European Commission through the LIFE programme. In the targeted areas, large dune ecosystems and sublittoral marine habitats are threatened by development and tourism activities, which result in habitat degradation, removal of the dune vegetation and reduction of the natural coastal resources.

These pressures and threats are addressed through specific actions of the LIFE CALLIOPE project, which promotes the conservation and sustainable management of the habitats and the flora and fauna they host. These actions include, amongst others, the installation of boardwalks, fences and barriers to mitigate the trampling impact and reduce illegal vehicle access; propagation of dune plant species to restore the degraded habitats; removal of invasive alien species and demarcation of marine habitats using buoys to reduce impacts by boats.

In Cyprus, the actions undertaken include the removal of quarry waste in collaboration with the competent governmental authorities; the removal of the alien species *Acacia saligna* and the restoration of the habitat using dune species; the propagation and strengthening of the population of an endangered dune plant species (*Maresia nana* var. *glabra*), the collection of seeds from various dune species and seed dispersal in selected locations and the creation and installation of infrastructure to mitigate visitor impact. The project partners seek the awareness and involvement of the local communities in the conservation and management actions, recognizing that these actions are more likely to be successful if the project secures the participation and support of the local people.

Alternative solutions for reducing the use of copper in the protection of grapevines from downy mildew (*Plasmopara viticola*) in Croatia

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Abstract: Grapevine (*Vitis vinifera* L.) is an important crop in the Mediterranean region, which makes up to the 40% of the world's vineyard area. An economically important grapevine disease is grape downy mildew (*Plasmopara viticola*). It is known for its destructive ability in most European wine-growing areas; where the conditions are favorable for this disease, several treatments through the vegetation are necessary. Zoospores are sensitive to copper ions. Numerous new synthetic active substances have been introduced over the years that have facilitated post-infectious control, unfortunately not allowed in organic production, where copper is the only reliable choice. During epidemic years, amount of copper per year is exceeded and elevates residues in the soil and on the fruits. Alternative solutions recently tested has to be more environmentally sustainable. Use of zeolites are among them. Zeolites are a natural group of minerals mined in unmetamorphosed sedimentary rocks worldwide or synthesized. The LIFE21-ENV-IT-LIFE MICROFIGHTER project investigates the effectiveness of the innovative Zeo-Biopesticide, in controlling *P. viticola* in Croatia, consecutively during 2023 and 2024. An experimental vineyard area of the Cabernet Sauvignon variety (vine rootstock Kobber 5BB) of 1 ha under an integrated cultivation system was chosen for the trial according to a randomized block design with 4 treatments in 4 replications. The treatments of the experiment are: 1. Cu100: 0.4ha - the proposed dose of copper, 2. Cu50/Zb50: 0.4 ha - combination of copper and Zeo-Biopesticide in a 50/50 ratio mixture, 3. Zb100: 0.1ha - full dose of Zeo-Biopesticide and 4. Cu0: 0.1ha - control, without treatment. At the beginning of June, the first occurrence of the disease was recorded in the period of early flowering when the vine dropped about 30% of the flowers (BBCH 63). In mid-June according to EPPO guidelines, the first evaluation of *P. viticola* damage was carried out when the vine had shed 70% of its flowers (BBCH 67), then in early July when the berries became larger and the bunches began to hang (BBCH 73). The last evaluation was carried out in mid-August when the berries developed the varietal color (BBCH 83). Based on the collected data and their statistical processing, it could be concluded that in the given weather conditions Zeo-Biopesticide alone (67.4%), but also in combination with copper (69.4%) showed the same level of effectiveness as copper (70.6%) and therefore can be justified as an alternative solution for copper-based products substitution in early applications against *P. viticola*.

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HRM analysis for the detection of fish species in the Greek market

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Abstract: Fish have a significant role within the Mediterranean diet, offering a rich source of high-quality protein, essential vitamins, minerals, and substantial quantities of ω -3 polyunsaturated fatty acids. Although aquaculture contributes substantially to the Greek fish market, consumers still hold a preference for wild-caught varieties.

Two species from the Sparidae family, the red porgy (*Pagrus pagrus*) and the common dentex (*Dentex dentex*) and two species from the Serranidae family the dusky grouper *Epinephelus marginatus*, and the white grouper *E. aeneus*, are widely traded in the Greek market as well as featured in restaurant menus at premium rates. The high prices of these fish as well as the complex and valuable supply chains, create the possibility of fraudulent activities as fish mislabeling. The term encompasses the incorrect designation of a specimen's species name, weight, and geographical source for economic profit by the substitution of expensive species with cheaper ones. By this way consumers are exposed to the risk of buying harmful products that may contain allergens, while at the same time, unsustainable or illicit fishing practices are promoted and endangered species are threatened since they are exploited without reporting.

Fish are vended in various forms, such as whole or filleted, fresh or frozen, as well as cooked dishes in restaurants. In this context, their morphological traits undergo changes, making species identification frequently unfeasible. DNA-based methods and taxonomy have proven to be valuable tools in accurate species identification.

In this study, species-specific real-time PCR coupled with HRM analysis, based on SNPs, were developed to discriminate raw, frozen and cooked samples of (a) *P. pagrus* and *D. dentex*, from Greek fisheries, either from aquaculture specimens (*P. major*), their imported counterparts or other Sparidae species (i.e. *D. gibbosus*, *P. erythrinus*) and (b) *E. marginatus* and *E. aeneus* from Greek fisheries compared to their imported counterparts and/or other species that are sold in the Greek market and are often found be used in mislabeling incidents in the European market (i.e. *Lates niloticus* or *Polyprion americanus*). DNA sequencing identified incidents of species mislabeling, as well as of escapes from aquaculture fish to the wild, which were also detectable by HRM. By analyzing a large number of samples within a few hours, HRM methodology proved to be rapid and cost-effective. It is therefore proposed, that this methodology could be used in extensive market controls to prevent fraud as well as for biodiversity conservation monitoring.

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Mapping of flooded areas in the nemunas river delta using remote sensing methods

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Abstract: Flooded areas in Nemunas River delta are dynamic and ever-changing environments, depending on weather, hydrology, and other conditions, such as river flow, precipitation, topography, soil, and land cover. Areas that are flooded for a long time can affect vegetation communities and types. Flooded areas can cause significant changes in physical processes, such as water flow and water evaporation in a river basin. Due to these environmental traits, it is important to determine hotspots of flooded areas to assess the problems and find the solution for improvement of ecology in river delta.

In this study 3 drone flights were completed in two areas in Nemunas River delta (near Kintai village and Sakūčiai forest) during the period between 2019-2021. Images taken from drones were mosaicked using photogrammetry and used for the validation of flooded areas retrieval results from Synthetic Aperture Radar (SAR) images and supervised classification training. Flooded areas in the Nemunas River delta in Lithuania and Russia were investigated using SAR Sentinel-1. SAR image preparation and classification was done using Google Earth Engine. For flooded areas, the mapping was done using two different methods: Random Forest Classification and Change detection. With the Random Forest Classification method, it was possible to detect land, open water, and temporally flooded vegetation, while with the change detection method only open water could be separated from the land. Eventually, using change detection method, hotspots were compared with soil type, land cover, and topographical wetness index (TWI) data.

Hotspots analysis showed that most often flooded areas were found on the right bank of Nemunas River, which is part of Lithuania. The most common flooded areas were spotted around Sakūčiai forest, around Žalgiriai forest, and around Bundalai forest. The longest-lasting hotspots on soil were found on various sandy loams and clay loams, while the least lasting hotspots were found on gravely sand surfaces. The longest-lasting hotspots on land cover type were found in swamps in the Nemunas River delta while the least lasting hotspots were found on natural grasslands.

An example of the need for interdisciplinary work when studying the sustainability of port facilities: impact of cathodic protection on the health status of bivalves: from materials chemistry to metabolomics

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Abstract: Cathodic protection of immersed steel structures using galvanic anode is commonly used to protect numerous structures against corrosion in port area. Zinc has been a common material for these galvanic anodes due to its high efficiency. Nowadays, aluminum-based alloys, and in particular the Al-Zn-In alloy, are considered to offer the best performance in seawater. Given the large number of galvanic anodes required to protect the infrastructure of a port such as the Port Atlantique de La Rochelle, the amount of corrosion products resulting from anode degradation appears to be significant.

To study the environmental effects of metal ions released by galvanic anodes on species present in the port, we have exposed oysters (*M. gigas*) to the two different systems of galvanic anodes, zinc (Zn-anode) and aluminum (Al-Zn-In anode), for 2 weeks in a control environment. Our experimental set-up has allowed the oysters to be exposed to the products of the galvanic anodes dissolution under conditions close to those *in situ*, while avoiding the meteorological conditions. The conditions considered for the present study corresponded to a daily released metal concentration that is 25 times higher (Al) or 42 times higher (Zn) to that estimated above for the particular case of the commercial seaport of La Rochelle.

This study has combined, in an integrative way, a chemical modelling of species released by the galvanic anodes, and ecotoxicological and metabolomic approaches to assess the impact of these products on oysters. Whereas no bioaccumulation of any ion was detected in oysters digestive gland, the analysis of the oyster metabolome by a non-targeted metabolomic approach revealed that many more metabolites were impacted by the Zn-anode exposure than by Al-Zn-In anode. These metabolites are involved in a variety of physiological functions such as energy metabolism, osmoregulation and oxidative stress and many others. For Al-Zn-In anodes, our chemical modelling study indicates that the main dissolved species among degradation products is $\text{Al}(\text{OH})_4^-$. But even though Al is the overwhelmingly majority constituent and Zn is a very minority constituent of anodes, there could be a higher level of exposure to Zn^{2+} ions than to $\text{Al}(\text{OH})_4^-$ ions. Thus, the effects observed in the presence of the Al-Zn-In alloy anodes could mainly be due to Zn^{2+} ions, hence the interest in limiting the percentage of zinc in this type of alloy to a minimum. However, the effects on oyster metabolism seem to be less pronounced than for the Zn-anode, which is an important finding of this study.