Book of Abstracts

8 - 11 June, 2025

Coastal Zone Canada Conference 2025

Charlottetown, Prince Edward Island, Canada

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“The lake is nature too”: Exploring support for barrier removal and tidal river restoration in Atlantic Canada

Ms. Keahna Margeson [1], ***Dr. Kate Sherren*** [2], ***Dr. Patricia Manuel*** [1], ***Dr. Enda Murphy*** [3], ***Dr. Ian Stewart*** [1], ***Dr. Mike Smit*** [1]

1. *Dalhousie University,* ***2.*** *School for Resource and Environmental Studies, Dalhousie University,* ***3.*** *University of British Columbia*

High modernist thinking during the 1960s-80s led to reliance on engineered solutions which perpetuated the idea that nature could be controlled and manipulated to serve industrial development. A surge of worldwide dam and causeway building throughout the mid-20th century means that many are now approaching the end of their functional lifespan. The effects of widespread dam and causeway construction continue to be far ranging, including siltation, blocked passage for migrating and spawning fish species, rerouted rivers and streams, and human development around modified rivers and reservoirs or head ponds. Unique to coastal contexts, many barriers were built across tidal rivers, that blocked tidal connectivity and reshaped coastal river landscapes. In this study, we explore the development of two dammed tidal river landscapes in Atlantic Canada (the Petitcodiac River in New Brunswick and Avon River in Nova Scotia). We are using mixed methods, including surveys and longitudinal media analysis, and employing Stephenson’s (2008) landscape cultural values model. Our objectives with this research were to: 1) Explore how experiences of residents living along a restricted tidal river and estuary changed over time with causeway modifications; and 2) Investigate how residents’ experiences influence their perceptions and understanding of tidal river restoration. While our findings are rooted in particular case study locations, the technique of exploring human practices and natural processes as a continuum of dynamic action may be applied to other coastal communities facing landscape adaptation involving human and environmental trade-offs in the face of climate change.

A modeling framework for PEI's coastal hazard assessment

Mr. Tianze Pang [1], ***Dr. Xander Wang*** [1]

1. *University of Prince Edward Island*

In the context of climate change, coastal erosion and flooding have been regarded as typical natural hazards in shoreline environment and communities worldwide. Canadian's smallest province, Prince Edward Island (PEI), has been regarded belonging to one of the vulnerable regions facing these challenges in the recent years. The causes of the hazardous processes are associated with the local geographic conditions, not only the geological characteristics, but also the nearshore marine processes. Especially as the changing climate can directly affect the marine processes, such as waves, sea level variations and storm surges, to assess the prospective resulting coastal hazards becomes a significant objective for the relevant disaster risk reduction in PEI. Here, we propose a systematic modeling framework to analyze the regional marine processes and their changes, and the correlated impact on the occurrence of coastal hazards, including wave modeling, sea level variation analysis, and climate change impact projection. Our investigations are applied on both long-term variation and short-term extreme events. Based on the initial findings of this study, it is suggested that multiple marine processes should be regarded as the emphasis of coastal hazard assessment and corresponding adaptation strategies in the following phase. The results of our research work are expected to support the resilient coastal management of PEI and to provide supportive information for the application in similar study areas.

A Nation to Nation Relationship: Collaboration between DFO and the Mi'kmaq of Nova Scotia to Co-Govern the St. Anns Bank Marine Protected Area

Mx. Bec Borchert [1], ***Ms. Catherine Schram*** [2]

1. *Kwilmu'kw Maw-klusuaqn,* ***2.*** *Department of Fisheries and Oceans*

Managing and governing Marine Protected Areas (MPAs) with Indigenous Peoples is a practice that is being explored and implemented around the world, including in Canada. It is well understood that Canada's conservation targets cannot be met without Indigenous support and Canada must adhere to commitments adopted in 2016 on the Rights of Indigenous Peoples as a step towards reconciliation. To this end, there are examples of collaborative agreements to jointly manage MPAs in Canada's, Pacific and Arctic regions, but no formal agreements have yet to be signed with DFO in the Maritimes Region. However, strong relationship building between nations has led to the Mi'kmaq of Nova Scotia expressing a desire to establish a co-governance structure for the existing St. Anns Bank (SAB) MPA.

The SAB MPA is in Unama'ki, part of the unceded ancestral territory of the Mi'kmaq. Over millennia the Mi'kmaq have witnessed changes in landscapes and shorelines, including around St. Anns Bank which was, at one point, dry land and inhabited by early Mi'kmaw ancestors. St. Anns Bank has been significant to the Mi'kmaq since time immemorial and the desire for governance authority is strong.

This presentation will be jointly delivered by representatives of DFO and the Kwilmu'kw Maw-klusuqn (Mi'kmaq Rights Initiative) and will highlight the origins of the Nation-to-Nation relationship regarding the St. Anns Bank MPA and the collaborative process to date. Our presentation will move through accomplishments and challenges in working towards meaningful co-governance in the St. Anns Bank MPA.

A Phase-by-Phase Approach in Developing Hybrid and Nature-Based Coastal Protection Measures Alongside Municipalities, and the Influence of Ice on Dune Restoration – Early Stages Case Study in Maisonnette, NB

Mr. Christopher Mea [1], ***Dr. Thibaut Peterlini*** [2]

1. *CORBO Engineering; Saint Mary's University,* ***2.*** *VALORES*

On the Acadian Peninsula in New Brunswick, there is both a gap in information and communication on coastal stewardship. While most residents are aware of the effects of climate change on coastal hazards, there is a common reluctance in considering hybrid or nature-based alternatives to hard protection measures, or a lack of faith in their effectiveness. Residents may not always have the means to implement their own solutions, and municipalities equally struggle to find the resources to adequately support their communities. In Maisonnette, one of the first sites around the Acadian Peninsula where CORBO Engineering and Valorēs Research Institute have partnered to recommend and design informed coastal solutions, a phase-by-phase approach is used to improve transparency and bridge these gaps between engineering consultants, scientists, municipalities and residents. Beyond preliminary discussions, subsequent phases maintain an open dialogue between all parties throughout design iterations. Information sheets highlighting the weaknesses and strengths of individual components of the design, as well as possible challenges in implementing them, facilitate communication and the selection of preferred alternatives in partnership with the involved parties. If the design or shoreline conditions are too complex, or if more visual aids are needed, a model is created not only to validate the alternatives, but also as another communication tool with municipalities and residents before confirming the final design. In Maisonnette, worries about winter storms have grown alongside a decrease in the ice cover, and the area being both vulnerable to erosion and flooding has garnered it special concern from locals.

A Robust Flood Construction Level Analysis for the Alders Beach Resort

Ms. Kate Lappan [1], ***Ms. Neville Berard*** [2], ***Dr. Phil Osborne*** [1], ***Ms. Pauline Martins*** [1]

1. *Northwest Hydraulic Consultants,* ***2.*** *Northwest Hydraulic Consultants Ltd.*

This study presents a robust flood construction level (FCL) analysis for the Alders Beach Resort, which is a small property located on the east coast of Vancouver Island, bordering the Strait of Georgia. The resort has been owned by a group of 15 families since 1973, who are looking to rebuild six of the property's summer rental cottages for maintenance. Due to the property's elevation, which makes it vulnerable to coastal flooding, the habitable spaces of the cottages must be built above an FCL. A site-specific assessment was conducted that considered unique topographic features to provide a representative value for the proposed redevelopment. This study was distinctive as it incorporated a joint probability analysis of extreme waves and water levels occurring simultaneously in the Strait of Georgia to minimize overly conservative inputs for wave run-up calculations and numerical modelling. Six combinations of water levels and significant wave heights were extracted from a 200-year equal probability curve, and a phase-averaging model (SWAN) was used to simulate the corresponding wave climates nearshore. Both empirical calculations and a phase-resolving model (SWASH) were used to simulate wave effects onto the shore. FCL values were calculated and ultimately it was recommended that one of the cottages be relocated. This study shows the importance of planning for the future of the coast (e.g. future sea level rise) and allowing room for nature, while aiming to preserve community and history. In the future, nature-based solutions may be designed and implemented to further strengthen the site's coastal resilience.

A Synthesis of Blue Carbon Stocks and Accumulation Rates in Eelgrass (Zostera marina) Meadows in Atlantic Canada

Ms. Rebecca Smart [1], ***Ms. Elli Cunningham*** [1], ***Ms. Karen Kohfeld*** [1], ***Mr. Adam Dewar*** [1], ***Mr. Marlow Pellatt*** [2]

1. *Simon Fraser University,* ***2.*** *Parks Canada*

Eelgrasses are among the most efficient carbon sinks globally, with substantial storage and accumulation potential. Despite covering only 0.2% of the ocean surface, these ecosystems store 20% of the ocean's carbon, leading to increasing international interest in their potential as nature-based solutions to climate change. Due to varying carbon dynamics based on biological, physical, and spatial factors, local data on species-specific stocks and sequestration rates are necessary for accurate carbon storage estimates. In Canada, there is limited knowledge of the extent of eelgrass and specific carbon dynamics, particularly for *Zostera marina* in Atlantic Canada, hindering the understanding of eelgrass in climate change mitigation. This research aims to fill this knowledge gap by quantifying carbon stocks and sediment carbon accumulation rates on a local scale, determining the relationship between eelgrass density and the extent of sediment organic carbon, and characterizing local and regional drivers of the variability in carbon sequestration for *Z. marina* meadows in New Brunswick. An enhanced understanding of carbon storage and factors influencing the variability will contribute to developing a framework for eelgrass as a nature-based solution. This framework is essential to ensure the efficacy of habitat protection and management strategies with the aim of mitigating climate change.

Acadian diaspora connections to Nova Scotia dykeland and tidal wetland landscapes

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French settlers first arrived in Mi'kma'ki in the early seventeenth century. To increase agricultural production, their descendants – the Acadians – drained the Bay of Fundy's tidal wetlands using dykes and aboiteaux. From 1755 to 1758, thousands of Acadians were deported to British colonies and Europe, forming the Acadian diaspora. Today, approximately 364 km of Acadian dykes remain in New Brunswick and Nova Scotia. The Nova Scotia Department of Agriculture does not currently possess the ability to maintain and raise all dykes to withstand the projected impacts of a changing climate. Several coastal adaptation options have been proposed, including managed dyke realignment, which combines coastal retreat and tidal wetland restoration. Decision-makers are thus in the awkward position where they must not only decide which lands to protect and which lands to restore, but also who is a stakeholder and who is not. The purpose of this research is to determine whether Acadian diasporans (1) remain culturally linked to the Bay of Fundy dykelands, (2) are beneficiaries of ecosystem services co-produced with the Bay of Fundy dykelands, and (3) are stakeholders in managed dyke realignment decisions in the Bay of Fundy dykelands. Acadian diasporans were interviewed and surveyed at Grand-Pré National Historic Site and at the *Congrès mondial acadien* in August 2024. Results indicate that Acadian identity is complex, Acadian diapsorans are beneficiaries of non-material ecosystem services, and that Acadian diasporans are heavily divided over whether they believe they are stakeholders in managed dyke realignment decisions in the Bay of Fundy.

Adapting to Sea-Level Change: New High-Resolution Coastal Projections for Canada

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1. *Environment and Climate Change Canada,* ***2.*** *ClimAtlantic*

Climate change is driving global sea-level rise, with projections suggesting an increase of over a meter by 2100, highlighting the growing challenges and risks for Canada's coastal regions. However, regional impacts vary considerably due to factors like post-glacial rebound and mantle displacement. While Atlantic Canada is projected to experience above-global average sea-level rise, intensifying extreme water-level events, areas such as Hudson Bay and Nunavik may see a decrease in relative sea level due to local land uplift. This variability highlights the importance of localized assessments of coastal flood risk.

To support adaptation efforts, two high-resolution gridded datasets are now available on ClimateData.ca. Natural Resources Canada's Relative Sea-Level Change (RSLC) projections incorporate sea-level rise and vertical land motion, while Fisheries and Oceans Canada's Vertical Allowance (VA) projections assess the infrastructure elevation required to reduce flooding risks, factoring in RSLC as well as historical storm tide data. Both datasets are based on the latest CMIP6 model ensemble from the Intergovernmental Panel on Climate Change's Sixth Assessment Report with decadal projections from 2020 to 2150. Data are accessible via an interactive map, providing detailed visualizations for much of Canada's coastline. Additionally, users can access guidance materials to assist in interpreting and applying the data.

Through ClimateData.ca, users will also be encouraged to access new Vertical Land Motion data from Natural Resources Canada and the Continuous Vertical Datum Mean Water Level 2010 data from the Canadian Hydrographic Service, hosted on external websites, to help them better interpret and use the RSLC and VA data.

Addressing environmental issues in the Bay of Fundy – An overview of BoFEP and its next steps

Dr. Peter Wells [1]***, Dr. Jon Percy*** [2]***, Dr. Graham Daborn*** [3]***, Mr. Michael Butler*** [1]

1. *Dalhousie University and International Ocean Institute,* ***2.*** *Bay of Fundy Ecosystem Partnership,* ***3.*** *Acadia Centre for Estuarine Research/Acadia Tidal Energy Institute*

This talk describes the early beginnings, accomplishments, recent activities, and new directions of BoFEP (Bay of Fundy Ecosystem Partnership), as it reflects on 30 years of work since 1995. BoFEP is both an on-line and in-person information and knowledge network for the Bay of Fundy's unique marine ecosystems. Its major activities have been its Fundy Tidings newsletter, website, biennial science workshop, and working groups. Its institutional challenges (e.g., volunteers and funding) are numerous, as its current participants bring attention to issues as wide ranging as climate change, coastal erosion, sustainable fisheries, and development pressures along the Bay's long and changing coastline. BoFEP's principal focus for the future will be on communication, outreach, education, conduct of working groups, and advocacy with its broad network of partners. It has begun to develop ways to enhance ocean and climate literacy in the schools and communities around the Bay. BoFEP welcomes, indeed it needs, participation of everyone concerned with the long term health of the Bay and its watersheds in a rapidly changing world.

Addressing the Plastic Pollution in Guyana Coastal Environment: A PROMAR Project

Prof. Temitope D. Timothy Oyedotun [1]

1. *University of Guyana*

Plastic pollution poses significant threats to Guyana's coastal and marine environments, exacerbating environmental degradation and impacting the health of aquatic ecosystems. The *Prevention of Marine Waste in the Caribbean Sea (PROMAR)* project, spearheaded and being implemented by the University of Guyana with funding from the German Federal Ministry for the Environment, Nature Conservation, Nuclear Safety, and Consumer Protection (BMUV) addresses these challenges through an integrated approach targeting the reduction of plastic waste flows into aquatic systems. This presentation outlines PROMAR's strategic framework, focusing on key objectives: establishing comprehensive monitoring systems, enhancing waste management practices, promoting circular economy principles, and fostering stakeholder awareness and capacity building. Leveraging participatory methodologies, the project implements pilot interventions at demonstration sites to quantify marine litter, identify sources, and develop targeted waste reduction strategies. It further promotes the adoption of biodegradable materials and responsible production practices through engagement with policymakers, industry players, and coastal communities. The PROMAR Project advances knowledge-sharing and strengthens institutional frameworks to address plastic pollution through behavioural surveys, clean-up initiatives, and policy dialogues. By integrating local and international best practices, this initiative aligns with the Sustainable Development Goals (SDGs), contributing to climate resilience and environmental sustainability. The implementation of this project underscores the importance of cross-sectoral collaboration and innovative policy solutions in reducing marine plastic pollution, offering scalable and replicable models for broader Caribbean contexts.

Keywords: Circular economy; Coastal ecosystems; Marine litter; Plastic pollution; Sustainable Development Goals (SDGs); Waste management.

Advanced numerical modeling using MIKE 21 to inform coastal resilience using nature-based and indigenous stewardship technologies in British Columbia

Mr. Jose Ribba [1]***, Ms. Jessica Wilson*** [1]***, Dr. Jonatan Margalit*** [1]***, Mr. Shubhneet Singh*** [1]***, Mr. Danker Kolijn*** [1]***, Ms. Sarah Dal Santo*** [2]***, Mr. Daniel Leonard*** [3]***, Ms. Becca Kordas*** [4]***, Ms. Katya YUSHMANOVA*** [5]

1. *DHI Water & Environment,* ***2.*** *Tsleil-Waututh Nation,* ***3.*** *Westmar Advisors Inc.,* ***4.*** *Hatfield Consultants,* ***5.*** *PWL Partnership Landscape Architects*

The səlilwətaɬ (Tsleil-Waututh) Nation has stewarded the lands and waters surrounding sə̓lilw̓ət (Burrard Inlet, BC) since time immemorial. However, shoreline modifications, vessel-induced wakes, sediment supply disruptions, and pollution have degraded the area, and projected sea-level rise and climate change further threaten the region. To address these risks, the Tsleil-Waututh Nation (TWN) initiated a series of consultation, planning, and design efforts to inform adaptive shoreline management. Most recently, TWN initiated a detailed study, supported by a multidisciplinary team, to design and implement nature-based solutions (NbS) and marine stewardship technologies across a 500-meter section of shoreline.

To better understand drivers of change, inform design, and support permitting efforts, an extensive coastal engineering and modeling study was undertaken. Key technical components included assessment of baseline and future-condition derived from field surveys, wake measurements, and advanced numerical modeling. Hydrodynamic (MIKE 21 HD), wave (MIKE 21 SW), and sediment transport (MIKE 21 MT) models were applied to characterize coastal processes and define governing design factors. This information supported the development of three conceptual design options, which were refined towards a single design concept through a multi-stage process of engagement, analysis, and numerical modeling. Further numerical modeling was undertaken for the preferred option to understand potential impacts to coastal processes following implementation.

This presentation will focus on the numerical modeling methodologies, simulation results, and their implications for the project design. It will emphasize technical insights into the application of modeling techniques to support coastal resilience and adaptation projects, and particularly nature-based solutions.

Advancing coastal adaptation planning in the Acadian peninsula

Ms. Nicky Hastings [1]***, Dr. André Robichaud*** [2]***, Dr. Marion Tétégan Simon*** [3]***, Ms. Jenna Miller*** [4]

1. *Natural Resources Canada-Geological Survey of Canada,* ***2.*** *University of Moncton - Shippagan,* ***3.*** *VALORES,* ***4.*** *Province of NB Environment & Local Govt.*

The Acadian Peninsula in northeastern New Brunswick, a predominantly Francophone region, is no stranger to coastal flooding and erosion. This low-lying area is home to seven towns and one rural district. The communities serve as critical hubs for the many residents in the area. The region has a strong connection to the ocean, which shapes the livelihoods and a way of life. Fishing and peat harvesting are vital industries here, while the region's beaches, dunes, and outdoor recreation attract tourists. More than 60% of the peninsula sits close to sea level, making it especially vulnerable to coastal hazards. For example, the decrease in the sea ice season that protects the coast from winter storms could increase the number of major erosion and flood events. Addressing challenges arising from present and future coastal hazards requires an approach that looks at adaptive strategies across various timeframes, requiring challenging decisions on where to start and how to support these actions.

The panel brings together speakers to discuss new research to better understand the coastal hazards and risks arising from coastal flooding and erosion. New numerical modelling and flood maps for the communities and the region as a whole highlight the effects of a range of storm surge probabilities under varying sea levels. Erosion rate measurements and new data point towards an acceleration of shoreline retreat in some areas, the potential loss of beaches and the weakening of dunes. Scenario planning and adaptive pathways offer ways to frame and address these issues.

Advancing Coastal Adaptation Through Collaboration: Adapting Nova Scotia's Shared Coastal Parks

Ms. Laura McCardle [1]

1. *Clean Foundation*

Collaborative efforts are integral to developing better approaches to coastal adaptation. Clean Foundation is a strong advocate for collaborative work, which is well showcased through its support of Nova Scotia's Shared Coastal Parks Sector. The Sector is comprised of diverse Rightsholder and stakeholder organizations, and is working to improve the resilience of federal, provincial, municipal parks and Indigenous Protected and Conserved Areas (IPCAs).

Through close partnership with the Sector, Clean Foundation is leading the *Adapting Nova Scotia's Shared Coastal Parks* project, funded by Natural Resources Canada's Climate-Resilient Coastal Communities Program. Spanning from 2024 to March 2027, this work will create conceptual site adaptation plans for three coastal parks across Nova Scotia: Caribou-Munroes Island Provincial Park, Thomas Raddall Provincial Park, and Battery Provincial Park. Through this work, park organizations and surrounding communities will be equipped with the skills they need to undertake climate change adaptation in coastal parks.

This initiative aligns closely with the goals of Coastal Zone Canada 2025, particularly the theme of *Strengthening Coastal Resilience and Relationships*. This project is grounded in best practices, integrating nature-based solutions, engagement with local organizations, and knowledge mobilization.

We will share insights into the project's design and progress, highlight lessons learned, and outline strategies for overcoming potential barriers to collaborative work. We welcome the opportunity to deliver this content as a presentation or, if deemed more suitable for an ongoing project, in a poster format.

Advancing coastal protection: comparative analysis of salt marsh stem dynamics in Canada and Germany

Ms. Inga Prueter [1], ***Dr. Oliver Lojek*** [2], ***Dr. Ioan Nistor*** [1], ***Dr. Nils Goseberg*** [2]

1. *University of Ottawa,* ***2.*** *Technische Universität Braunschweig*

Nature-based solutions for coastal protection, including the use of salt marshes, are gaining recognition worldwide as sustainable and effective strategies in coastal engineering, including the Canadian coastline (Baker et al. 2022, Markov et al. 2023). Salt marshes provide critical ecosystem services, such as wave attenuation, sediment stabilization, and biodiversity support, making accurate modeling of their submerged aquatic vegetation stems essential for understanding these benefits (Paul et al. 2012, Lo et al. 2017). This study validates a fluid-structure interaction solver in REEF3D::CFD against reference experiments and employs it to analyze vegetation motion and resulting forces under wave loads. The simulations capture a wide range of material properties representative of natural aquatic vegetation. The model demonstrates high agreement with experimental data, with deviations in forces and stem positions consistently below 10%, confirming its reliability.

The flow field in front of an individual stem was observed to have a large influence on the proposed fluid-structure interaction model. Sources of discrepancies are investigated by comparing simulated and experimental flow fields near the stem, revealing their critical role in driving vegetation motion. Additionally, field data on mechanical plant properties and vegetation density from Canadian and German studies are integrated and analyzed, broadening the model's applicability across varied conditions. Comparing these regional contexts highlights variations in vegetation dynamics and management approaches. Combining these findings with a critical literature review of salt marshes in coastal defense for both countries provides valuable lessons for tailoring nature-based coastal protection strategies to diverse environmental and ecological conditions worldwide.

Advancing Innovations in Coastal Spatial Planning by Exploring how Decision Support Tools Represent Place-Based Knowledge Systems in Nova Scotia, Canada

Ms. Jumanah Khan [1], ***Prof. Floris Goerlandt*** [1], ***Dr. Patricia Manuel*** [1]

1. *Dalhousie University*

Spatial planning is process that is essential for the transdisciplinary management of changing coastal environments. The process aims to influence the spatial distribution of activities in a way that balances environmental, economic and social needs. As community input becomes increasingly recognized for its vital role in decision-making, there is a growing need to explore how conventional decision support tools (DSTs) account for, and communicate place-based knowledge (e.g., Indigenous and Local Knowledge systems). Such knowledge systems enhance the contextual applicability of decisions that better reflect present and future uses of a place. This study explores the suitability of six Decision Support Tools (DST) used in spatial planning to collect and communicate place-based perspectives: Canada Marine Planning Atlas, participatory mapping, ArcGIS StoryMap, Marxan, the Marine Spatial Planning Board Game and virtual reality. Through a scoping review and semi-structured interviews with spatial planners, marine and coastal researchers, and users who reside and/or work in coastal environments in Nova Scotia, key characteristics that make DSTs suitable for communicating place-based knowledge as well as tool design limitations are identified. Also identified are the rightsholder and stakeholder engagement, data collection, and communication stages of the spatial planning process at which each of the selected DST are most effectively applied. The results are meant to inform the design and use of DSTs in a way that better account for and serve local coastal users throughout the stages of the spatial planning process, thereby supporting informed and sustainable decision-making in the context of coastal planning in the province.

An Emerging Civil Society in the Gulf of St. Lawrence?

Dr. Peter Clancy [1]

1. *St. Francis Xavier University*

Canada's Gulf of St. Lawrence is, by geo-political standards, a highly fragmented jurisdictional system. Since civic consciousness is in large part shaped within government boundaries, fragmentation can constrain environmental awareness and political engagement. Yet during the past thirty years, a series of political issues has emerged, ranging from seal hunting, groundfish decline and oil exploration to pulp mill effluent discharge and north Atlantic right whale mortality. Each case has stimulated networks of environmental actors and increased awareness by the Gulf regional public. What are the prospects for issue-engagement to build new participatory networks across marine jurisdictions? This paper considers the prospects for an emergent Gulf civil society.

An open-source and validated tsunami evacuation agent-based model for Ucluelet, BC

Mr. Joseph Kim [1], ***Dr. Ioan Nistor*** [2], ***Dr. Nils Goseberg*** [3], ***Dr. Andrew Cornett*** [2]

1. *University of ottawa,* ***2.*** *University of Ottawa,* ***3.*** *Technische Universität Braunschweig*

This study presents an open-source agent-based model (ABM) developed in the GAMA platform to simulate the tsunami evacuation process in Ucluelet, British Columbia. The model aims to improve understanding of community evacuation dynamics and inform disaster preparedness strategies. This is the first time an evacuation ABM is validated with field data (i.e., GPS tracks and questionnaire results), providing a unique approach to developing realistic evacuation ABMs to enhance community resilience to tsunamis and other extreme coastal hazards. Agents, representing individual evacuees, were assigned realistic demographic attributes and decision-making processes based on social, environmental, and situational factors. The ABM is validated using empirical data collected during a tsunami evacuation drill designed to observe tsunami evacuation behaviour. These experiments involved participants navigating evacuation routes with movement tracked via GPS devices. Questionnaire results that characterized the participants' level of tsunami hazard knowledge, demographics, and evacuation behaviour, were associated with the participants' GPS tracks. The validation process included calibrating the model against metrics such as recorded pedestrian speeds and evacuation times, and qualitative evacuation behaviours reported in the questionnaire.

This ABM serves as a decision-making tool for local emergency planners, enabling scenario testing to identify vulnerabilities and optimize evacuation protocols. Releasing this model as open-source, facilitates improvement by others and application to other coastal communities, fostering collaboration and innovation in disaster risk reduction.

Applying the Green Shores® Program in Mi'kma'ki: What We've Heard and Where We're Going

Mx. Kelly Umlah [1]

1. *Saint Mary's University*

The Green Shores® program, initiated in British Columbia (BC) by the Stewardship Centre for BC, has expanded delivery to the Atlantic coast through TransCoastal Adaptations Centre for Nature-Based Solutions (TCA) at Saint Mary's University (Kjipuktuk/Halifax). Municipalities throughout Nova Scotia without the resources or capacity to sufficiently address their coastal vulnerabilities were chosen for expansion of the Green Shores program to support their collective climate resilience. Over the last two years, TCA has engaged in relationship and capacity building by growing the Local Government Group (LGG) and providing subsidized Green Shores training to a wide audience throughout the province. Municipal staff, contractors, settler- and Mi'kmaw-led conservation groups, local non-governmental organizations, students, and shoreline property owners were among the champions in their communities for promoting and taking Level 1 training. In addition to knowledge of the Green Shores program itself, delivery of Level 1 training and the LGG strengthen our region's collective understanding of shoreline processes, climate change, and nature-based adaptation methods. These activities have also empowered participants to discuss barriers they experience in mitigating and adapting to current coastal changes in the region with those who can help to make their voices heard. This presentation will dive into how the Green Shores program has been delivered throughout Nova Scotia to date, the challenges and opportunities this region presents, and will explore how we intend to apply lessons learned in Nova Scotia to expansion of the program throughout Mi'kma'ki.

Applying well-developed vulnerability assessments in a Nova Scotian coastal wetland and beach context - Madison Hedges MSc

Ms. Madison Hedges [1]

1. *University of Galway Coastal and Marine Environments MSc*

My final dissertation project for my masters degree in Coastal and Marine Environments involved assessing the vulnerability of Nova Scotia beaches using QGIS maps and vulnerability scorecards. It is a technique I was lucky to experiment with during my masters program in Ireland, so I intended to investigate if it would be applicable to Atlantic Canada, particularly my home in Nova Scotia.

Multiple scorecards were taken into account for this study, with the goal of creating a balanced image of the environmental factors and the human factors that may lead to an increased beach vulnerability. Five scorecards were included in my study, each created to serve a particular purpose for their area of interest. They questioned the geomorphological condition, the storm susceptibility, the anthropogenic frequency and the overall rate of decline.

This process was applied to five local beaches in Nova Scotia, four of which had been previously assessed in 2014 for only the anthropogenic influence, and one that had very little research and coverage until 2019 during COVID-19. The comparison between the 2014 data and now, factoring in the heavy influence of a declining beach to a small town, has been extremely important to influence environmental decision making. Building on the 2014 study with further data was also a priority of mine during this study.

With the Irish influence in terms of their coastal protection initiatives and awareness, I wish to continue to expand in this field to hopefully develop a scorecard for beaches applicable specifically to Atlantic Canada.

Arctic delta evolution modelling of the Coppermine Delta using a reduced-complexity model

Mr. Nicolas Canham [1], ***Mr. Samuel Binette*** [2], ***Dr. Stéphanie Coulombe*** [3], ***Ms. Béatrice Noël*** [2], ***Mr. Richard Akana*** [4], ***Dr. David Didier*** [2], ***Dr. Jacob Stolle*** [1]

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Kugluktuk, Nunavut is an arctic community built at the Coppermine River's mouth which faces severely eroding coastlines, particularly along the deltaic islands. With a historical cemetery close to the bluff of the largest island and waterfront buildings on the mainland, coastal erosion presents an urgent and important risk to the community. This research project aims to better understand the evolution of the Coppermine Delta over the coming decades using a reduced-complexity model , ArcDelRCM. RCMs can allow for modelling at larger temporal and spatial scales than might otherwise be possible with hydrodynamic models, due to reduced computational complexity. RCMs often focus on large-scale processes, requiring substantial volumes of data to accurately reproduce phenomena as observed in the field. This research will provide the community with insight into the future morphological changes of the region, allowing for data-driven decision-making.

Over the last several years, hydrodynamic data, bathymetry, granulometric data and seasonal photographs have been collected in the region. ArcDelRCM will use these data to account for important processes such as sediment discharge, ice cover, spring ice melt, and bank erosion. Our preliminary results show that ArcDelRCM accurately represents the overall evolution of the Coppermine Delta. The next stage of research will include investigation of the smaller-scale changes to the deltaic island.

The validation of ArcDelRCM in the Canadian Arctic will help the community of Kugluktuk in its long-term resiliency planning against the impacts of global warming.

Assessing coastal development plans over the lifetime of the Nova Scotia Coastal Protection Act: A case study for Halifax Regional Municipality (HRM)

Ms. Athena Iraji [1], ***Dr. Kate Sherren*** [1]

1. *School for Resource and Environmental Studies, Dalhousie University*

Nova Scotia, with its extensive 13,000 km of coastline, is quite vulnerable to the significant challenges from sea-level rise, flooding, and storm hazards. In response, the government introduced the Coastal Protection Act (CPA) as a cornerstone policy to safeguard the province's coastlines, ecosystems, and communities. However, in 2024, after more than a decade of development, the CPA was unexpectedly shelved. It was replaced by a policy focusing on empowering landowners to decide where and how to develop their land, with the expectation of greater municipal oversight. Given that the majority of Nova Scotia's coastline is privately owned, this shift raises critical concerns about the potential for long-term degradation of coastal habitats, infrastructure, and community resilience. The long delays created uncertainty for coastal landowners, who may have sought to get work approved and perhaps completed before the Act took effect. By leveraging open data, the research examines how development patterns have evolved over the CPA's trajectory. Focusing on Halifax Regional Municipality (HRM) as a pilot site—chosen for its robust open data resources and existing by-law regulations—the study analyzes GIS-based Property Identification (PID) datasets and coastal development permits from 2003[AIA1] to 2024. The analysis evaluates whether the number and nature of permits shifted significantly at key CPA milestones (2009, 2019, and 2024), providing critical insights into the implications of this policy reversal.

Assessing Flood Mapping Needs for Coastal BC

Mr. Clayton Hiles [1]***, Mr. Eric Morris*** [1]***, Ms. Rachel Burns*** [2]***, Mrs. Jamie Sager*** [1]

1. *Kerr Wood Leidal Associates Ltd.,* ***2.*** *Kerr Wood Leidal Associates Ltd*

Flood maps provide an invaluable tool to help decision-makers and the public understand and mitigate flood risk. The availability and quality of flood maps varies widely across BC and there is no aggregated source for access. This creates challenges for needs-based allocation of flood mapping funding by senior government.

Kerr-Wood-Leidal Associates, under the direction of the Fraser Basin Council, the Province of BC, and the Government of Canada, endeavoured to assess and catalogue the riverine, coastal, and tsunami flood mapping needs of communities throughout coastal BC. This included understanding community perspectives on flood risk, the quality of available maps, and the magnitude of the flood risk to the community.

To gather perspectives and data, each community throughout the project area, including 69 First Nations, 16 First Nations groups, 47 incorporated communities, and 12 regional districts were engaged directly. Different methods of communication were used to encourage participation, with 88% responding in some way.

Available riverine, coastal, and tsunami flood mapping was assessed based on a standardized scoring system. The risk from flooding was assessed based on regional flood hazard layers combined with geo-located population data to estimate the number of people exposed to each type of flooding.

This presentation will summarize the challenges and successes of the engagement processes and discuss trends in community feedback. It will also provide an aggregate overview of the available flood mapping and the flood risk faced by communities in Coastal BC, with priority areas for flood map development discussed.

Assessing the Effectiveness of Machine Learning Compared to a Deep Learning Neural Network for Classifying a Restored Salt Marsh

Ms. Kailey Nichols [1]***, Dr. Danika Van Proosdij*** [1]***, Dr. Jeremy Lundholm*** [2]***, Dr. Koreen Millard*** [3]***, Mrs. Samantha Lewis*** [4]

1. *Saint Mary's University,* ***2.*** *TransCoastal Adaptations Centre for Nature-Based Solutions,* ***3.*** *Carleton University,* ***4.*** *CB Wetlands and Environmental Specialists*

Salt marshes comprise some of the most productive ecosystems in the world due to the wealth of ecosystem services they offer and the biodiversity they support. In Nova Scotia's Bay of Fundy, tidal wetlands have been devastated for centuries from variable natural and anthropogenic activities. These cascading effects put coastal communities at high risk, prompting restoration of tidal wetlands. However, intensive planning, design, and monitoring is required due to their complex and dynamic nature, stressing the need for quantitative assessments of the restoration trajectory.

Monitoring these systems has evolved over time, particularly with advancements in technology. Many researchers have taken advantage of remote sensing in salt marshes for documenting marsh processes and features as surveys have become more efficient, cost-effective, and allow for data collection with minimal damage to the marsh (DiGiacomo et al., 2020). This has been achieved through remotely piloted aircraft systems (RPAS), and Structure from Motion photogrammetry. This research will leverage photogrammetric techniques and high-resolution data to perform spatial analyses with GIS software, offering insight into the vegetation community structure of a restored tidal wetland. Specifically, this research aims to increase our collective knowledge surrounding: 1) the effectiveness of variable sensors, bands, and raster inputs for classifying restored tidal wetlands; and 2) machine learning compared to deep learning algorithms for landcover classification. These findings will then be integrated with previous years datasets to evaluate the technological and methodological advancements made to further our understanding about the evolution of a managed realignment site to help inform restoration trajectories.

Assessing the plant and macroinvertebrate communities of a sandy barrier spit in northern New Brunswick restored using nature-based solutions

Ms. Emily Baker [1], ***Dr. Danika Van Proosdij*** [1], ***Dr. Jeremy Lundholm*** [2], ***Dr. Jennifer Frail-Gauthier*** [3]

1. *Saint Mary's University,* ***2.*** *TransCoastal Adaptations Centre for Nature-Based Solutions,* ***3.*** *Dalhousie University*

As zones of ecological transition, coastal ecosystems are home to communities of organisms reflecting both marine and terrestrial environments. Among these communities are species of commercial and/or conservation value, along with those that influence the structural characteristics of their habitats. With climate change threatening coasts, there is growing interest in coastal habitat restoration – particularly through using nature-based solutions, which promote shoreline protection by harnessing coastal landscapes and processes to build and restore coastal habitats. While many of these techniques have been successful, the ecological integrity of the restored habitats (i.e. whether they are ecologically comparable to non-restored reference habitats) is not always well-studied. Two nature-based solutions (a sand engine and a constructed marsh with sill) have been used to restore degraded sandy beach, sand dune, and salt marsh habitats on a barrier spit near Shippagan, New Brunswick. As part of a larger evaluation of the restored barrier spit's ecological integrity, its community composition was compared to that of a nearby non-restored barrier system reference site. Species richness and relative abundance data were collected for plants and macroinvertebrates at both sites in August of 2023 and 2024, and used in association analyses. From these, dendrograms were generated to visualise the community composition (e.g. clustering of species into groups and the structure and characteristics of such groupings) at both sites and over both years. Findings will be discussed in terms of comparisons over time and between sites, and in the context of ecological integrity of the restoration site.

Assessment of coastal scenery in Nova Scotia: a guide for a pertinent beach management

Prof. Camilo Botero [1], ***Prof. Lorn Sheehan*** [2], ***Dr. Ruben Cordero*** [2]

1. *Sergio Arboleda University,* ***2.*** *Dalhousie University*

The Coastal Scenery Evaluation System (CSES) is a technique that measures the beauty of a defined coastal area, based on an assessment of 18 natural and 8 human parameters, which are integrated in a fuzzy logic model to obtain an overall decision value representing the scenic appeal in five classes. During summer 2023, 149 beaches were assessed with the CSES technique in the province of Nova Scotia, Canada. The results revealed a coastline dominated by rural (51%; n=76) and village beaches (24%; n=36), with very few urban (1%; n=2) and resort (1%; n=2) beaches. Almost half of the beaches were inside of recreational (40%; n=60) and natural (5%; n=7) parks. In terms of coastal scenery values, almost one third of beaches were categorized as high natural and natural (11% Class I and 19% Class II, respectively), 42% were categorized as light and intensive development beaches (32% Class IV and 11% Class V, respectively), and 28% were categorized as medium landscape value (Class III). Based on these results, an additional classification was conducted to identify those beaches that require an ecosystem management approach, those with recreational management requirements, and those with tourism potential. Special attention was devoted to Class III beaches, as they have equal possibilities to be either better preserved and be upgraded to Class II, or to be further developed and downgraded to Class IV. The research demonstrates the utility of the CSES technique as a coastal management tool to provide insightful information to the planning and decision-making process.

Balancing Infrastructure Resilience and Environmental Demands: Optimizing Slope Protection at the Port of Vancouver, WA, USA

Mr. Sebastiaan Woerlee [1], ***Mr. Keyvan Mahlujy*** [1]

1. *WSP (Ports, Marine and Coastal)*

The Berth 9 Apron & Extension project at Terminal 3, Port of Vancouver (Washington, USA), addresses critical challenges in shoreline structural stabilization and slope protection in a dynamic riverine environment. The project involves the design and permitting of a 250-ft wharf extension and apron structure to accommodate larger vessels, integrating innovative measures to mitigate scour and wave-induced erosion risks.

Environmental processes at the site include wind-generated waves, river currents, propeller wash, and vessel wakes, with dominant incident waves approaching the riverbank at an oblique ~80-degree angle to the slope normal. This wave obliquity significantly reduces wave-induced damage, allowing optimized armour stone sizing using a reduction factor. Additionally, a joint probability assessment of waves and water levels, combined with correlations between high-wave and high-water events, informed a design approach that minimized over-sizing of armour stone for upper slope sections exposed to normally incident waves.

The design also considered practical limitations in rock gradations and the challenges posed by restricted access for construction and future repair activities. These constraints necessitated careful planning and adjustments to ensure functionality, constructability, and durability of the slope protection measures.

This study demonstrates how wave dynamics, hydrodynamic forces, and access limitations can be managed to stabilize critical infrastructure while meeting environmental and operational demands. The project exemplifies innovative coastal engineering practices tailored to complex site conditions.

Balancing Shoreline Erosion Protection With Nearshore Restoration

Mrs. Natasha Gibson [1], ***Mr. Jet Taylor*** [1]

1. *Toronto and Region Conservation Authority*

The Ajax Nearshore Restoration and Shoreline Protection Project focuses on strengthening the resilience of the shoreline, understanding environmental processes, and ensuring good coastal management by using a nature-based approach to reduce erosion and restore historical conditions along the north shore of Lake Ontario.

The project builds upon an Environmental Assessment which considered integrated coastal zone management principles, technical and community opinion, and changes to shoreline protection as a result of climate change impacts. This resulted in the proposal of a scalable cobble boulder beach shoreline protection structure, which is a significantly softer shoreline protection than otherwise seen in the Greater Toronto Area (GTA). This solution also mimics the historic shoreline conditions of Lake Ontario within the GTA; replenishing the glacial drop stones that were removed during industrial stone-hooking practices. Using a mixture of cobbles and boulders in varying amounts will provide enhanced erosion protection where it is more critical (e.g. to protect infrastructure like outfalls), and will restore the shoreline to promote fish habitat and better nearshore vegetation growth.

In addition to the cobble boulder beach planned for 2026, a detailed Shoreline Erosion Monitoring Plan is proposed to document changes in condition and to monitor the efficacy of the restoration-based shoreline protection. The results of this project will also be shared locally with neighbouring Conservation Authorities and municipalities, research organizations, as well as federally through the Great Lakes Freshwater Ecosystem Initiative to showcase the efficacy of nature-based solution for nearshore erosion protection.

Beach Quality Assessment: Moving Beyond Aesthetics Towards a Comprehensive Framework for Beach Rankings

Dr. Camilo M. Botero [1], ***Dr. Elaine B. de Olivera*** [2]

1. *Coastal Systems Research Group,* ***2.*** *Universidade Federal do Rio Grande do Sul*

While beach quality is often evaluated through certification systems, classifications, or rankings, most existing web-based beach rankings rely heavily on subjective aesthetic criteria and lack scientific methodological rigor. This presentation introduces the Beach Prioritization Framework, a robust methodology that assesses beach quality through four key dimensions: recreation, protection, conservation, and sanitary conditions, providing a holistic evaluation of beaches as socio-natural systems. The framework employs 20 categories distributed across these dimensions, with specific weights assigned according to beach type (urban, village, or rural), and utilizes a credibility index to ensure evaluation reliability. Initial applications in 2023 included 59 beaches across 10 Latin American countries, while the 2024 assessment expanded to 123 beaches across 13 countries, including Canada, demonstrating the framework's growing adoption and scalability. Geographically, the framework has shown widespread applicability across different coastal environments, from the Caribbean to temperate zones, with strong representation in urban areas (48% of evaluated beaches), followed by village beaches (34%) and rural beaches (18%). The assessment revealed distinct patterns among beach types, with urban beaches showing stronger performance in recreational and sanitary aspects, while rural beaches excelled in conservation metrics. Moreover, the evaluation of all beaches can be accessed online, in a friendly-user interface. For Canadian coastal managers and stakeholders, this framework offers a standardized, science-based approach to beach evaluation that can complement existing management tools while providing valuable insights for sustainable coastal tourism development.

Between the breakwaters: a non-technical role in coastal resilience

Ms. Laura Eamon [1]

1. *CBCL*

Coastal environments are critical to the health and wellbeing of people and communities, providing a connection to nature and economic stability, among other important benefits. Coastal communities are experiencing the impacts of climate change with rising sea levels and increasing intensity and frequency of storm events. Researchers, scientists, and engineers must bring forward solutions that not only meet technical requirements but also reflect the interconnected needs of people, ecosystems, and infrastructure.

Coordination, collaboration, and communication are some of the skills required for the successful delivery of meaningful solutions that address coastal resilience. Between numerical modelling, concept design, and construction, there exists the coordination of resources, schedules, and deliverables; the collaboration among the project team, key stakeholders, and the broader public; and the communication connecting the people, the process, and the results.

This presentation introduces the role of project coordinators and tells the story of how multidisciplinary input is key to support coastal initiatives. Among the technical specialists, scientists, and engineers, project coordinators work to fill gaps and find efficiencies. This role underscores how non-technical professionals are pivotal in advancing coastal resilience, providing the structure needed to tackle complex challenges while maintaining a focus on collaboration and community. By working alongside a passionate and talented team, I contribute to creating sustainable solutions that strengthen the resilience of Atlantic Canada's coastal communities. Resilience is built not only by those designing breakwaters but also by those working behind the scenes, between the breakwaters, to bring these efforts to life.

Blue Carbon Stocks and Carbon Accumulation Rates for Salt Marshes on the Coast of Western Hudson and James Bays, Canada

Dr. Marlow Pellatt [1], ***Mr. Marcus Forbes-Green*** [1], ***Dr. Adam Collingwood*** [1], ***Mr. Samuel Hunter*** [2], ***Dr. Karen Richardson*** [1]

1. *Parks Canada,* ***2.*** *Weenusk First Nation*

Tidal salt marshes are blue carbon ecosystems that are very efficient carbon sinks. However, significant data gaps exist for carbon stocks, carbon accumulation rates (CAR), and areal extent of these ecosystems in northern Canada. Here we present the first in-situ saltmarsh blue carbon stock and CAR for the Hudson Bay Lowlands (HBL). Detailed carbon estimates for sites in northern Manitoba and northern Ontario were determined at La Perouse Bay in Wapusk National Park, the Hayes River estuary, the Winisk River estuary, and the Moosonee area of James Bay.

Saltmarsh vegetation type and extent were mapped using high-resolution satellite and UAV imagery. Vegetation and sediment depth were mapped at each study site. Detailed carbon stocks and CAR were calculated using Lead-210 dating on selected sediment cores. High-resolution carbon maps were generated. These data are providing the information to extrapolate upscaled coastal carbon estimates for the HBL. Organic matter depth in sediment cores was seen to increase with distance from shore, likely due to wetland succession driven by coastal uplift caused by isostatic rebound.

This project provides the first detailed estimates of saltmarsh blue carbon stocks and CAR for the HBL. Working with the Weenusk and Mushkegowuk First Nations, Parks Canada is seeking to understand carbon dynamics within ecosystems in the HBL and provide information on coastal carbon dynamics for community needs and the establishment of a National Marine Conservation Area. This information will support Canada's commitment to reducing greenhouse gas emissions through nature-based climate solutions and achieving net zero by 2050.

Blue Carbon Storage Dynamics in Prince Edward Island Eelgrass Meadows

Ms. Elli Cunningham [1], ***Ms. Rebecca Smart*** [1], ***Mr. Adam Dewar*** [1], ***Mr. Marlow Pellatt*** [2], ***Ms. Karen Kohfeld*** [1]

1. *Simon Fraser University,* ***2.*** *Parks Canada*

Within the last decade, coastal marine ecosystems and the vegetated habitats they support have received increasing interest for their ability to sequester and store large amounts of organic carbon, coined “blue carbon”. These natural carbon sinks exist globally and include mangroves, salt marshes, and seagrass meadows, all notable for their carbon storage efficiency, given a small global cover. Seagrasses are a group of marine angiosperms that form extensive meadows in shallow coastal waters, altering the environment through increased sediment accumulation. A species of seagrass, eelgrass or Zostera marina, is found throughout Canada, growing on soft sediments along the Pacific, Atlantic and Arctic coasts. Unlike many terrestrial environments, carbon in these meadows is primarily stored within soil underneath as sedimentary organic carbon, giving eelgrass habitats a strong capacity for long-term carbon accumulation given sediments remain undisturbed. Currently, there exists a limited number of Canadian eelgrass carbon studies, with results heavily concentrated on the Pacific coast. I present preliminary results from research conducted on two eelgrass meadows in Prince Edward Island - Walkers Cove and Tracadie Bay. The former is in a semi-exposed area, and the latter is a highly sheltered meadow. This is a part of the first eelgrass carbon study focused solely on Atlantic Canada and will provide key insight into carbon dynamics in a very understudied area. As blue carbon is increasingly recognized for its importance as a climate mitigation tool in domestic and international management, determining burial mechanisms and carbon storage quantity is paramount.

Building Collaborations for Coastal Resilience Engagement: Adapting to Coastal Hazards in the Great Lakes Region

Ms. Katie Franken [1], ***Ms. Zoe Lawrence*** [1], ***Ms. Bonnie Fox*** [1]

1. *Conservation Ontario*

The Great Lakes are recognized as a significant coastline in Canada requiring coastal resilience plans (CRPs) to help local communities eliminate and/or mitigate potential coastal hazards exacerbated by climate change. Coastal hazards can have severe impacts on local communities and the absence of CRPs can create socio-economic and environmental challenges that can undermine the quality of life. Three pilot areas led by Conservation Authorities on Lakes Superior, Huron and Ontario are developing regional-scale coastal resilience plans with adaptation actions to address climate change risks associated with coastal hazards.

Through extensive partnerships, Conservation Ontario is collecting, documenting and cataloging existing CA Coastal Network community engagement practices, as well as lessons learned from pilot project areas. This research will inform the development of community engagement best management practices, to support the pilot project's community engagement work plans and strategies. The collaborative research approach will enhance the capacity of the 26 coastal Conservation Authorities, as they navigate multiple voices and diverse perspectives within the Great Lakes Region through public engagement and multi-stakeholder committees including all levels of Government, Indigenous communities, businesses, and industry experts. Highlights of the research outcomes will be shared.

Building Resilient Coasts: AI-Powered Forecasting and Infrastructure Solutions

Mr. Logan Ashall [1], ***Mr. Bryce Bocking*** [1]

1. *MarineLabs*

MarineLabs is at the forefront of coastal resilience, offering innovative tools for real-time monitoring, hyper-localized forecasting, and AI-powered insights tailored to coastal engineering challenges. Our CoastAware™ platform combines a robust network of modular sensor buoys with advanced analytics to deliver actionable intelligence on metocean conditions, vessel activity, and environmental risks.

Hyper-localized AI metocean forecasting, a cornerstone of our platform, provides a step-change in decision-making accuracy for coastal infrastructure and operations. Unlike traditional global models constrained by coarse grids and limited local detail, MarineLabs' Forecast AI leverages strategically placed sensors and continuous machine learning to generate forecasts that capture the nuances of complex coastal systems. This capability has demonstrated up to 50% reductions in forecasting errors compared to publicly available models, improving operational efficiency and safety in ports and other critical coastal zones.

In addition, our Vessel Wake AI technology enables precise measurement and analysis of vessel-induced wake impacts, supporting shoreline erosion mitigation and the optimization of navigation practices. By providing detailed insights into wake dynamics, this tool empowers engineers and port authorities to design resilient infrastructure and manage marine traffic with reduced environmental impact.

This presentation will showcase MarineLabs' applications along Canadian coasts, demonstrating how hyper-localized forecasting and real-time data enable engineers and decision-makers to tackle the challenges of climate change and coastal development. By bridging data gaps with advanced tools, MarineLabs empowers stakeholders to safeguard coastal ecosystems, enhance infrastructure resilience, and ensure sustainable operations.

Canada-Wide Mapping of Coastal Change

Dr. Gavin Manson [1], ***Dr. Thomas James*** [1], ***Mr. Roger MacLeod*** [1], ***Mr. Dustin Whalen*** [1], ***Ms. Nicky Hastings*** [1], ***Dr. Ian Olthof*** [2]

1. *Natural Resources Canada-Geological Survey of Canada,* ***2.*** *Environment and Climate Change Canada - National Wildlife Research Centre*

With a length of approximately 340,000 km and a wide variety of types of shorelines, measuring coastal change Canada-wide is challenging but is required to understand the response of different coastal regions to climate change. Early measurements of coastal change were made directly in the field and later became possible remotely with the introduction of aerial photography. Past surveys and shoreline position change determined from historical aerial photography remain key components of coastal change research in the 21st century, but the advent of GPS, increased resolution of digital cameras, and miniaturisation of Light Detection and Ranging (LiDAR) sensors has allowed uncrewed aerial vehicles (UAVs) to become a revolutionary survey tool. At the same time, medium resolution satellite-based remote sensing technologies used in the Landsat missions have evolved to give levels of detail comparable to aerial photography. While the satellite imagery archive has grown, new analytical techniques have been developed to automate extraction of shorelines from multispectral imagery and measure coastal change. Though the Anthropocene is not formally recognised stratigraphically, it is widely held that a shift in global environmental systems is currently occurring due to human activities, though the impacts of these shifts are not being systematically tracked to understand the changing dynamics of Canada's coasts. We explore how existing databases of past surveys and coastal sensitivity and coastal change rates from historical aerial photography and the Landsat archive can be incorporated with new satellite data collections and UAV surveys to measure change of Canada's marine coasts into the Anthropocene.

Carbon balance changes in southern Gulf of St. Lawrence salt marshes

Mr. Angus Kennedy [1], ***Dr. David Garbary*** [1]

1. *St. Francis Xavier University*

In salt marshes of the southern Gulf of St. Lawrence, high rates of photosynthesis through the days of growing seasons and low rates of decomposition outside of growing seasons would have, historically, allowed for biomass accretion, i.e., a net carbon flux into the marsh. However, recent rapid climate change has manifested in increased average temperatures in Nova Scotia, notably in the autumn, allowing greater decomposition outside of the growing season. Using a portable sensor box with probes for CO2, CH4, and soil temperature, and both daytime and nighttime simulating soil gas chambers, soil gas flux measurements were made at five salt marshes in the southern Gulf of St. Lawrence. These soil gas flux measurements were made in dead zones, i.e. intact peat without emergent vegetation, and in *Sporobolus alterniflorus* zones. We found no significant difference between the senescing S. alterniflorus daytime fluxes of CO2 or CH4 and those of the dead zones over the entire summer. Also, all calculated daily net fluxes of CO2 shifted from uptake to emission between August and September. As *S. alterniflorus* had senesced by the end of summer, higher autumn temperatures likely allowed for greater rates decomposition without significant photosynthesis. This would shift yearly net carbon flux in these salt marshes toward net loss. It is possible that this changing dynamic has compromised the ability of regional salt marshes to replace the biomass they lose to decomposition each year. Along with sea level rise, this marsh physiology explains salt marsh retreat in Nova Scotia.

Charting the course: Monitoring collaborative governance and stakeholder engagement in coastal co-management

Ms. Taylor Mason [1], Mr. Emery Hartley [2], Mr. Philip Akins [3], Mr. zander chila [3], Ms. Jen Temple [3], Ms. Julien Braun [4], Ms. Mairead Norton [5], Ms. Danielle Denley [2], Ms. Nichole Prichard [2], Ms. Natalie Schell [2], Mr. Steve Diggon [6]

1. *Central Coast Indigenous Resource Alliance,* ***2.*** *BC Ministry of Waters Lands and Resource Stewardship,* ***3.*** *Marine Plan Partnership,* ***4.*** *Council of the Haida Nation,* ***5.*** *Nanwakolas Council,* ***6.*** *Coastal First Nations*

The Marine Plan Partnership (MaPP) for the North Pacific Coast is a partnership between 17 coastal First Nations and the Province of British Columbia. For over a decade, the partnership's enduring success has been founded on Ecosystem Based Management (EBM) – an adaptive approach to managing human activities that seeks to ensure the coexistence of healthy, fully functioning ecosystems and human communities. The intent is to maintain those spatial and temporal characteristics of ecosystems such that component species and ecological processes can be sustained, and human well-being supported and improved. MaPP monitors EBM indicators to provide critical insights that inform adaptive management and decision-making.

At the heart of MaPP's success is a commitment to collaborative governance and stakeholder engagement. To assess and enhance these core elements, MaPP developed two indicators to evaluate: 1) the strength of co-governance and 2) the quality of stakeholder and local government engagement. Drawing on data from surveys, interviews, and program–implementation, this evaluation presents quantitative and qualitative insights that can strengthen relationships between MaPP's governance partners and ensure that stakeholder feedback informs decision-making. In this session, the MaPP partners will share the results of this evaluation and highlight key lessons learned. This case study serves as a model for assessing complex indicators of human wellbeing, towards a more holistic and ecosystem-based understanding of coastal planning initiatives. By improving the quality of relationships and ensuring diverse voices are heard, MaPP provides a valuable blueprint for successful coastal co-management in an era of complex environmental and social challenges.

CITIZEN SCIENCE IN COASTAL AREAS: BUILDING CONSENSUS AND DEFINING THE NEXT STEPS

Dr. Camilo M. Botero [1], ***Prof. Luján Bustos*** [2], ***Prof. Federico Ferrelli*** [2], ***Dr. Line Bourdages*** [3]

1. *Dalhousie University,* ***2.*** *Universidad Nacional del Sur,* ***3.*** *Université Laval*

Citizen science has advanced significantly in recent years, particularly in its techniques and methodologies (e.g., CoastSnap and iNaturalist). Its rapid growth and impact can be largely attributed to community empowerment, which promotes bottom-up environmental management and integrates traditional knowledge into scientific coastal research. This approach is crucial, as it incorporates the perspectives of local, especially Indigenous and rural communities, enhancing the understanding of coastal dynamics. Moreover, citizen science enables academics to broaden the scope of their studies, efficiently cover larger coastal areas, optimize time, and diversify research topics. In this context, the workshop aimed at exchanging experiences in citizen science within coastal areas, discussing concepts and methodologies in citizen science, clarifying differences between ocean literacy and open science, and proposing future steps to strengthen citizen science in Canadian coastal zones. Participants will primarily include researchers working on citizen science projects, advocates for traditional knowledge inclusion and coastal community empowerment, and individuals with interest in citizen science. The agenda spans approximately 120 minutes: 1. Participants introduction; 2. Presentation of citizen science and its application to coastal areas; 3. Roundtable discussion on key concepts and methodologies for citizen science initiatives; 4. Group sessions on the future of citizen science in Canadian coastal areas; 5. Presentation of group results; Conclusion and summary. Dalhousie University will lead this workshop as a part of the TranSECT project. However, other interested institutions will be contacted in the months leading up to the event to ensure active participation from all attendees.

Citizen-Science in Action: Transforming Beach Cleanups in Panama

Ms. Angie P Diaz [1], ***Dr. Camilo M. Botero*** [2]

1. *Lipscomb University,* ***2.*** *Coastal Systems Research Group*

The project “Impact of Waste from the Textile and Beverage Industries on Beach Ecosystems in Latin America and the Caribbean” took place in Panama during the year 2024, with two clean-ups in September and October 2024. It transformed beach cleanups into citizen science efforts, focusing on data collection, volunteer training, and fostering environmental awareness in communities. Over 150 volunteers, participated, including 40 scouts. They were trained and certified by the International Training Center in Beach Management and Certification (CIFPLAYAS) in ten techniques, including the method BLAT QQ (Beach Litter Assessment Technique – Qualitative and Quantitative). Volunteers analyzed, classified, and quantified beach litter to evaluate the impact of textile and beverage industries on ecosystems. Cleanups took place at La Barqueta Beach (Chiriquí, Province) and Veracruz Beach (Panama City). At La Barqueta, 24% of waste was from the beverage industry and 4% from textiles, with recreational quality scores ranging from 81% to 99%. At Veracruz, urban areas scored 80% and rural areas 69% for recreational quality. The data was collected through the Kobo Collect app and it will contribute to peer-reviewed research, guiding effective coastal management strategies. This groundbreaking project highlights the importance of scientific approaches to address marine litter, as was. recognized at the National Symposium on Plastics II: Solutions for Marine-Coastal Biodiversity 2024. In sum, this project emphasizes the need for ongoing scientific cleanups, transforming symbolic efforts into impactful actions. CIFPLAYAS will continue training volunteers, empowering citizens to protect beaches and preserve ecosystems for future generations.

Coastal access workshop Part 2: Building relationships and strategies for connecting with the shore

Dr. Patricia Manuel [1]***, Dr. Hannah Harrison*** [1]***, Mr. Nicolas Winkler*** [2]***, Mr. Mike Kofahl*** [3]***, Mr. Bryson Guptill*** [4]

1. *Dalhousie University,* ***2.*** *Ecology Action Centre,* ***3.*** *East Coast Environmental Law,* ***4.*** *The Island Walk (PEI) Inc.*

In Part 2 of our workshop, we build from the presentations and discussions in Part 1 (previous session) to explore building relationships and strategies for connecting with the shore.

- Introductions and recap from Part 1
- Presentation - 'First steps: building an inventory of public coastal access in Nova Scotia' –by Patricia Manuel
- Presentation - 'Access to access: quality and (in)equality' – by Hannah Harrison and Nicolas Winker
- Workshop activities - Building relationships and strategies for connecting with the shore – Workshop participants in small groups and plenary discussion
- Wrap up

Coastal access workshop: building strategies and relationships for connecting with the shore

Dr. Patricia Manuel [1], ***Dr. Hannah Harrison*** [1], ***Mr. Nicolas Winkler*** [2], ***Mr. Mike Kofahl*** [3], ***Mr. Bryson Guptill*** [4]

1. *Dalhousie University,* ***2.*** *Ecology Action Centre,* ***3.*** *East Coast Environmental Law,* ***4.*** *The Island Walk (PEI) Inc.*

In this two-part workshop, we will use presentations and facilitated small group and plenary discussions to explore the characteristics, extent, and legal context of coastal access in Atlantic Canada, and hear stories from diverse perspectives. We'll identify local challenges and co-develop strategies for building relationships and improving access to the shore. Outputs will be consolidated into a report and feature article, with the goal of forming an Atlantic coalition on coastal access.

The coast is a public good—essential for work, provisioning, and recreation—and shapes the identity of coastal communities. Yet access is becoming more difficult. Over 85% of the coastline in Nova Scotia and Prince Edward Island is privately owned, and much of New Brunswick's coast is also private. A lack of public access often forces people to cross private land. Increasing development and subdivision threaten traditional access, while climate change damages the coast, access routes, and infrastructure.

Given these challenges, how can communities and the public maintain and enhance coastal access?

Coastal Access Workshop Part 1: Coastal Access Opportunities and Challenges

- Introduction
- Workshop Activity: *Your Coastal Access* – Interactive session
- Presentation: *The Island Walk Story: Addressing Challenges and Finding Opportunities for Coastal Access in PEI* – Bryson Guptil
- Presentation: *Coastal Access and the Law* – Mike Kofahl
- Workshop Activity: *Coastal Access Challenges and Opportunities* – Small group discussions
- Presentation: *Private Right vs Public Good: Coastal Access and Communities* – Hannah Harrison & Nicolas Winker
- **Conference Coffee Break** (Please join us again for Part 2!)

Coastal Flood Inundation Mapping of British Columbia's Coastline for Hazard Risk Assessment

Mrs. Elisa Scordo [1], ***Dr. Brett Eaton*** [1], ***Mr. Kris Holm*** [1]

1. *BGC Engineering*

Floods are a common occurrence along British Columbia's 26,000 kilometers of rugged coastline that stretches between Alaska and Washington. BC's coastline includes low-lying areas such as river deltas, estuaries, and coastal plains that are naturally more prone to flood inundation. Nearly three-quarters of the province's population lives in coastal areas, and critical infrastructure such as major ports, airports, and transportation corridors are often located in areas prone to coastal flooding.

Coastal floods occur when ocean water levels rise and inundate the land along coastlines in response to severe weather (e.g., storm surges), high tides, and rising sea levels from climate change. Although there is a history of damaging coastal flooding in BC, there are few detailed flood hazard maps available for communities located in flood-prone areas.

To provide much-needed flood information, BGC developed a screening-level (Tier 1) coastal flood inundation mapping layer along BC's coastline using publicly available terrain and oceanic data that includes a combination of storm surge, mean higher high water (MHHW), and sea level rise (SLR) data for current (2020) and climate change conditions (2100). The screening tool was compared to areas with detailed floodplain mapping and showed similar inundation extents for the 2100 coastal inundation scenario developed for the Lower Mainland of BC.

The objective of the mapping is to provide screening-level hazard information for BC's coastline to improve community resiliency to coastal flooding through application in disaster and climate risk assessments at a provincial scale.

Coastal geomorphological changes monitoring in Kugluktuk and the Coppermine River Delta, Nunavut

Mr. Samuel Binette [1], ***Mr. Richard Akana*** [2], ***Dr. David Didier*** [1], ***Dr. Stéphanie Coulombe*** [3], ***Mr. Charles Jourdain-Bonneau*** [1], ***Ms. Béatrice Noël*** [1], ***Ms. Beatrice Roberge*** [1], ***Mr. Nicolas Canham*** [4], ***Dr. Thomas Buffin-Bélanger*** [1], ***Dr. Jacob Stolle*** [4]

1. *Université du Québec à Rimouski (UQAR),* ***2.*** *Kugluktuk Hunters and Trappers Organization,* ***3.*** *Savoir polaire Canada-Polar Knowledge Canada (POLAIRE-POLAR),* ***4.*** *Institut national de la recherche scientifique (INRS)*

Coastal dynamics in the Canadian Arctic remain poorly understood due to a lack of observational data on key controlling factors. While Inuit Nunangat represents the majority of Canada's coastline, coastal changes noticed by Nunavummiut remain understudied. Kugluktuk residents in the Kitikmeot region report significant changes in the coastal area, with erosion threatening their old cemetery and making quad and boat travel hazardous. Through community-led fieldwork, recent (2021 to 2024) coastal response to morphogenic processes was documented using a combination of state-of-the-art instruments (high-frequency pressure sensor, UAV-SfM, time-lapse camera, thermistor string) to monitor key controlling factors (hydrodynamics, permafrost monitoring). With the addition of very-high-resolution (VHR) historical aerial and satellite imagery, we conducted a decadal analysis of coastal changes in the Coppermine River Estuary (1952 to 2024) and the coast around Kugluktuk (1965 to 2024), revealing contrasting patterns of change. In the estuary, we assessed close to 50-m of erosion, with rates increasing recently next to the cemetery. West of town, 90-m of erosion was quantified by the port, alongside the progradation of approximately 50-m of new coast. The analysis of recent VHR topographic and hydrodynamic data suggests heterogenous exposures and responses to changes to external forcing factors. These findings underline how permafrost coasts in western Nunavut are sensitive to changes, despite being in a fetch-limited and micro-tidal environment. . Community-led coastal monitoring projects are crucial in understanding coastal changes in the Canadian Arctic and to support local capacity building to address future changes.

Coastal Processes at McNabs Island

Ms. Sarah van den Heuvel [1], ***Dr. Steffanie Piché*** [1], ***Mr. Vincent Leys*** [1]

1. *CBCL*

McNabs Island Provincial Park is located at the entrance of the Halifax Harbour and is an important tourism and recreational site with many historical and natural features. The main public access point to the island is Garrison Pier in McNabs Cove, which is reaching the end of its service life. There are various coves around the island, some of which have been used as island access points in the past. CBCL was asked to provide coastal engineering input into the selection of a suitable site for a new access structure. The coastal processes study included an island visit, examination of shoreline change history, and an assessment of wave conditions (extreme and operational thresholds) and flood and erosion hazards, considering potential long-term changes from sea level rise and shoreline stability at four sites around the island. A 2D coupled wave-hydrodynamic model was utilized to evaluate the wave conditions and storm hydrodynamics at the sites. Bathymetry, extreme water levels, sea level rise, offshore winds and waves, and wave buoy data were analyzed and used in the numerical modelling framework as input and calibration datasets to the wave modelling and coastal flooding analyses. Findings from the coastal assessment will be combined with feedback from parallel stakeholder consultations to select the final access point option.

Coastline Classification and Delineation Using Machine Learning for Quantification of Coastal Erosion on Prince Edward Island

Ms. Genevieve Keefe [1], ***Dr. Xander Wang*** [1]

1. *University of Prince Edward Island*

Climate change is causing sea levels to rise and storm intensities to grow, and the resultant erosion is increasingly becoming a problem for coastal regions like Prince Edward Island. Climate projections indicate that the risk to coastal habitats and infrastructure will only increase over the coming century. Automated detection of coastal vegetation boundaries is a fast, inexpensive, and reproducible method of monitoring coastal erosion. Spatial and temporal advancements in erosion monitoring offer insight into local erosion risks and provide data for predictive modelling. Holistically nested edge detection is a methodology using convoluted neural networks to delineate coastlines from high-resolution remote sensing imagery and determine coastal erosion rates for a series of local sites. Comparative analysis of erosion rates elucidates differences associated with coastal feature type, vegetation, and other geomorphological factors. This enables the identification of vulnerable areas and illustrates the efficacy, or lack thereof, of coastal protection measures. Additionally, the improved temporal resolution offered by this analysis allows for the evaluation of critical short-term changes from high-energy erosive events.

Collaborative Ghost Gear Retrieval in Atlantic Canada (30-min)

Ms. Zora McGinnis [1], ***Ms. Kelly Mackarous*** [1]

1. *Coastal Action*

In 2024, Coastal Action led a large-scale ghost gear retrieval project in Nova Scotia, PEI, and Newfoundland as a response to the devastation brought by Hurricane Fiona. This work was funded by Fisheries and Oceans Canada (DFO), and expanded ghost gear retrievals into areas that had not seen this kind of restoration work before. Our work included both at-sea retrievals and shoreline cleanups and collected storm debris as well as fishing gear. Working in three provinces and the island of Cape Breton simultaneously was a unique challenge and required close collaboration with our project partners and the fishing communities in each of our retrieval zones. This panel discussion will feature members of the retrieval teams from Coastal Action, ACAP Humber Arm, Bedeque Bay Environmental Management Association, and one of our retrieval captains.

Ideally this panel discussion could be appended to the Collaborative Ghost Gear presentation we have also submitted. Our proposed format would be a 15-minute presentation followed by 30-45 minutes of panel discussion addressing questions on our joint work and to discuss the successes and challenges of retrieval work in our various provinces. It will highlight the importance of community-based responses to climate driven coastal disasters.

Combined risk of storm waves and storm surges in the Gulf of St. Lawrence

Prof. Urs Neumeier [1], ***Mr. Sylvain Joly*** [1]

1. *Institut des sciences de la mer, Université du Québec à Rimouski*

Storm waves are the major cause of coastal erosion. In addition, the erosive action of waves varies significantly depending on the water level during the storm peak (controlled by astronomical tides and storm surge), with the most severe erosion occurring during very high-water levels. However, the probabilities of extreme storm waves and extreme high-water levels are not independent, which can considerably affect calculated return periods.
We examined long records of waves and water level at different stations in the Estuary and Gulf of St. Lawrence in a context of partial ice cover during winter. Based on the observations, we calculated return periods of combined events of extreme waves and water levels. These return periods were compared with various statistical approaches of the problem. Joint probability methods using copula functions produced the most interesting return periods. These results improve our understanding of the probability of extreme storm events impacting shoreline stability and coastal ecosystems. They are also valuable tools for coastal engineers having to design coastal protections.

Combining Traditional Engineering and Nature-Based Techniques for the Restoration of the Hillman Marsh Barrier Beach and Wetland

Mr. Seth Logan [1], ***Mr. Danker Kolijn*** [2], ***Mr. Pete Zuzek*** [3], ***Ms. Jenny Gharib*** [4], ***Mr. Kevin Money*** [4], ***Mr. Greg Mayne*** [5]

1. *SJL Engineering Inc.,* ***2.*** *DHI Water & Environment,* ***3.*** *Zuzek Inc.,* ***4.*** *Essex Region Conservation Authority,* ***5.*** *Canadian Water Agency*

The Hillman Marsh is a designated Provincially Significant Wetland located on the east side of the Pelee Peninsula, on Lake Erie. The formerly barrier-protected marsh covers a total area of nearly 1,000 acres, and was once a thriving ecological system providing ecosystem services to the region and critical habitat to endangered species and numerous migratory bird populations. Due to cumulative stresses imposed on the Hillman Marsh from a combination of impaired coastal processes related to human development and climate-related impacts including high lake levels, the 1.5 km long barrier beach that once protected the Hillman Marsh has irreversibly breached. Not only has this resulted in the destruction of habitat, loss of wetland species and reduction in ecosystem services, but it has also left the perimeter dykes surrounding the marsh vulnerable to impacts from waves generated on Lake Erie. These dykes protect more than 2,000 hectares of low-lying agricultural and residential lands from catastrophic coastal flooding. With funding from ECCC through the GLFEI, the Essex Region Conservation Authority supported by a multi-discipline consulting team are undertaking an ambitious project to restore the Hillman Marsh barrier beach and wetland through a combination of traditional engineering and nature-based techniques. The presentation will explore the collection of field data, engineering analyses and extensive numerical modelling of marsh and nearshore hydrodynamics, surge, waves and sediment transport undertaken to investigate the complex physical processes that have shaped the Hillman Marsh historically, and the expected performance of restoration concepts under future conditions that account for climate change.

Community Stewardship, Climate Adaptation and Archaeology in Nova Scotia

Ms. Andrea Richardson [1]

1. *Cape Sable Historical Society*

Climate change is a significant threat to archaeology and heritage in Nova Scotia. We see the direct impacts of sea level rise, intense storms, flooding, erosion, and wildfires on archaeological sites across the province. Many of these impacts are felt even more keenly on the coast, where most archaeological sites are located. As these effects intensify, more and more archaeological sites—and the stories they hold–may be damaged or lost.

We can find hope in collaboration and action. Archaeologists are working together to respond to the impacts of climate change on archaeology in Nova Scotia. Between 2019 and 2022, the archaeology sector in Nova Scotia (including representatives from consulting archaeology, academia, government, community organizations, and Mi'kmaq rights holders) worked together to create a climate adaptation strategy for the sector. It's now being implemented through adaptation projects led by a dedicated team of volunteers from the archaeology sector, coordinated by Andrea Richardson (Climate Adaptation Coordinator for the archaeology sector) and supported by funding from Nova Scotia's Climate Change Plan for Clean Growth.

A key component of the strategy implementation is the development of an archaeological site stewardship program and Community Reporting Form, enabling citizen scientists to highlight changes to archaeological sites and building relationships so that communities are able to make decisions on the future of their cultural heritage.

Community-partnered monitoring of riverine and coastal ecosystems in the Hudson Bay and James Bay Lowlands

Ms. Alessia Guzzi [1], ***Prof. Tim Papakyriakou*** [2], ***Prof. Jens Ehn*** [2], ***Dr. LeeAnn Fishback*** [3], ***Dr. Karen Richardson*** [3], ***Dr. Alison Cassidy*** [3], ***Mr. Samuel Hunter*** [4], ***Dr. Alexandre Litvinov*** [5], ***Ms. Hope Hill*** [6], ***Mr. Keilan Ledger*** [1], ***Mr. Kaushik Gupta*** [1], ***Prof. Zou Zou Kuzyk*** [2]

1. *University of Manitoba, Centre for Earth Observation Science,* ***2.*** *University of Manitoba,* ***3.*** *Parks Canada,* ***4.*** *Weenusk First Nation,* ***5.*** *Moose Cree First Nation,* ***6.*** *Mushkegowuk Council, Lands and Resources*

The coastline of southwestern Hudson Bay and western James Bay (HBJB) provides crucial habitat for thousands of birds, fish and mammals, and is the homeland of the Omushkego Cree. With increasing development within the HBJB Lowlands, compounding the effects of climate change, Omushkego Cree are leading conservation initiatives in their traditional territory and the adjacent marine region. The main objective is to protect the peatlands of HBJB Lowlands and understand changes to the natural processes that contribute to carbon storage. Understanding the carbon system along the aquatic continuum from the land, to rivers, to sea, is crucial for understanding the full impacts of climate change and anthropogenic disturbance on the coastal ecosystems, and to better integrate knowledge on the region's carbon cycle into Canada's carbon accounting. The work being conducted seeks to quantify delivery of nutrients and terrestrial-derived carbon in its different forms via rivers to the coast and consider impacts on coastal ecosystems from factors such as warming, ocean acidification and sedimentation. In 2023, community-partnered river and coastal monitoring programs were initiated with Moose Cree First Nation and Weenusk First Nation to study the Moose River and Winisk River watersheds and associated coasts. In 2024, in partnership with Parks Canada, study sites were added in Wapusk National Park (Broad and Owl Rivers), at the northern boundary of the HBJB Lowlands. Here, we present preliminary results and discuss next steps in our partnered research, with the aim of addressing both global research questions and local monitoring objectives and research priorities.

Community-Scale Nature-Based Design for Habitat Enhancement on Vulnerable Coastlines in Parksville-Qualicum Beach

Ms. Alexandra Forsythe [1], ***Mr. Grant Lamont*** [1], ***Dr. Phil Osborne*** [1], ***Mr. Wil Hilsen*** [1]

1. *Northwest Hydraulic Consultants*

This study presents detailed designs for five community-level projects along the Strait of Georgia shoreline between Little Qualicum River and Craig Bay, within the Parksville-Qualicum Beach Wildlife Management Area, British Columbia. These sites were selected based on their vulnerability to coastal processes and their potential to support forage fish habitat. Priority was given to areas with existing anthropogenic modifications, such as homes in the backshore, sanitary sewer lines, or shoreline armouring, ensuring the focus remained on community-scale solutions. Coastal processes typically span larger areas than single properties, and projects designed at the scale of a coastal reach have higher chances of success. This approach facilitates better integration with physical processes and ecosystems. This project's collaboration with all levels of government and First Nations communities strengthened the community-scale focus and ensured inclusivity in planning. The five sites exhibit varying existing conditions, including hard armoured shorelines, localized erosion, and actively eroding coastal bluffs. The detailed designs emphasize nature-based solutions, such as beach nourishment strategies combined with minimal structural interventions, including cobble groynes for sediment retention or headland structures where wave energy exposure is high. These designs were selected to integrate seamlessly into the surrounding ecosystems while enhancing habitat variability in the upper intertidal zone. The overarching goal is to preserve and enhance shoreline ecological value by restoring and protecting habitat, mitigating erosion, and reducing additional shoreline armouring. The projects balance habitat restoration with sustainable shoreline protection for long-term community and environmental resilience.

Comprehensive Salmonid Habitat Restoration and Monitoring in Tsawout Territory for Ecological and Cultural Sustainability

Mr. Neil Fowler [1], ***Dr. Lais Chaves*** [2], ***Mr. Dion Joseph*** [2], ***Mr. Adrian Boskovic*** [1], ***Ms. Chrissy Chen*** [1], ***Ms. Jennifer Claxton*** [2]

1. *Tsawout First Nation,* ***2.*** *Tsawout First NAtion*

Salmonid habitat restoration in Tsawout Territory focuses on safeguarding and revitalizing critical ecosystems to support salmon populations, a cornerstone species for the region's ecological, cultural, and economic sustainability. This effort emphasizes comprehensive habitat monitoring and restoration activities across diverse aquatic environments.

A rotary screw trap deployed in Tetayut Creek during spring assessed fish utilization, offering key insights into salmonid presence, migration patterns, and species diversity. Monthly water quality sampling tracked key parameters, such as temperature, dissolved oxygen, and nutrient levels, ensuring a consistent understanding of habitat conditions for salmon and their prey. Creek walks provided in-depth habitat assessments, identifying barriers to fish passage and opportunities for restoration, while invertebrate surveys highlighted the abundance and diversity of critical food sources for juvenile salmon. Complementing this, salmon habitat mapping on Tsawout Reserves included eelgrass meadows, vital nurseries for juvenile salmon. Beach seining and saltmarsh habitat assessments extended the monitoring to intertidal zones, evaluating fish utilization in these dynamic environments.

These activities collectively built a robust dataset to guide effective management and restoration strategies moving forward.

Conservation Standards as a conservation planning framework for coastal management: A case study on the Inner Bay of Fundy Conservation Plan process

Ms. Georgia Cooney [1], ***Ms. Maxine Westhead*** [1], ***Dr. Patricia Manuel*** [1]

1. *Dalhousie University*

The Conservation Standards (CS) are a prescribed set of steps, practices and principles for conservation planning. The literature about using CS for global conservation planning is limited, however. A conservation planning initiative for the Inner Bay of Fundy (IBoF) region of Atlantic Canada has been underway since March 2020. This initiative, led by Environment and Climate Change Canada's Canadian Wildlife Service and facilitated by Global Conservation Solutions, is using the CS framework. Participants meet in online workshops and follow the steps of the CS. Since startup, over 100 participants from government, non-governmental organizations, industry, Indigenous organizations, and academia have participated in 42 workshops. The initiative is still ongoing. This paper reports on the challenges and successes of the CS as a conservation planning framework, using the IBoF Conservation Plan process as a case study. A survey of 16 workshop participants provided insights to the process. Successes of using the CS include knowledge-sharing, relationship-building, and enhanced understanding of the CS as a conservation planning tool. Challenges include engagement and inclusion of all relevant stakeholders and rights holders and a lack of clarity about a timeline for outputs. Recommendations to amplify successes include establishing smaller groups within workshops to help increase efficiency and comfort and maintain participation and interest among participants. Recommendations to address challenges include increased transparency and communication about desired outputs and timelines. The lessons learned from this case study can inform the final results of the IBoF Conservation Plan and the use of the CS framework in other initiatives.

Contribution of seagrass meadows and salt marshes in the Acadian Peninsula to combating climate change through blue carbon sequestration

Dr. Irina Randriantiana [1], ***Mr. Rajaonarimanana Nisa*** [1], ***Dr. Marion Tétégan Simon*** [2]

1. *VALORĒS, Coastal Zones Research Institute Inc., Nouveau-Brunswick, Canada,* ***2.*** *VALORES*

This project is part of efforts to inventory nature-based solutions to climate change.These two ecosystems are increasingly recognized as vital nature-based solutions to climate change due to their ability to provide multiple ecosystem services that mitigate its effects. They are among the most efficient natural carbon sinks, sequestering large amounts of CO2 in their soils for centuries. This process, known as blue carbon storage, helps mitigate greenhouse gas emissions. In addition, seagrass meadows and salt marshes act as natural support to biodiversity and natural buffers against extreme weather events, reducing the impact of storm surges, coastal erosion and, flooding. Their biodiversity, integrity, and ecological efficiency are currently threatened by climate change, which is further exacerbated by human activities. Over time, surface area losses have intensified due to their high sensitivity to changes such as sea level, as well as human activities such as infilling and drainage. These processes reduce the biological productivity of these valuable coastal ecosystems. An in-depth understanding of the latter, including the services they provide, is essential for proposing realistic solutions for climate change prevention and adaptation and for our coastal communities. Estimates of the sequestration and accumulation potential of blue carbon, one of the services provided by these ecosystems, have been carried out at several sites in the Acadian Peninsula. The ambition of this initiative is to determine the current surface area of these ecosystems, estimate blue carbon stock, and to inventory the characteristic flora and fauna found within them.

Costal aquifers as hidden conduits for water and contaminant exchanges in cold and warm seasons

Ms. Summer Montoya [1], ***Dr. Rob Jamieson*** [1], ***Dr. Barret Kurylyk*** [1]

1. *Centre for Water Resources Studies, Dalhousie University*

Coastal groundwater is often underrepresented in climate change related coastal zone research and policy initiatives despite being an important freshwater resource for the global coastal population. Coastal aquifers provide a pathway for bi-directional contamination, with both landward saltwater intrusion and seaward contaminant (e.g., nutrients, pathogens, metals) discharge occurring within these "subterranean estuaries." In northern latitudes, snowmelt-driven recharge, frozen ground hydraulic properties, and low ground temperatures interact to strongly influence contaminant transport and groundwater exchange between the aquifer and ocean. Given amplified warming rates, rising sea levels, and intensifying storms, cold coastal regions are particularly vulnerable to changes in these interactions with implications for altered contaminant movement. In Nova Scotia, access to safe coastal recreation is critical for the economy and community well-being, and at least 40% of the provincial population relies on private wells for their water supply. To contribute to the growing conversation around these threats, we have established a coastal groundwater and contaminant monitoring and modeling program at Rushton's Beach Provincial Park in Nova Scotia. This includes instrumented shallow wells and soil moisture sensors (upgradient, wetland, and beach positions), regular geophysical surveys, drone-based mapping, and frequent water quality sampling over the winter and snowmelt season. Preliminary results will be presented to highlight the potential for coastal aquifers to function as a hidden conduit for contaminant exchanges.

Crafting transformation through cultural arts and engagement in Conche, NL

Ms. Sara Langer [1]

1. *Memorial University of Newfoundland*

The proposed activity will have participants learning to crochet their own filleted cod. This is part of a larger collaborative art project with the French Shore Interpretation Centre in Conche, NL which will actualize the transformation of a discarded gill net into a tapestry using culturally significant handcrafts and motifs to the community. Conche is a small fishing community of approximately 150 people on the northeast tip of the Great Northern Peninsula that has 300 years of deep fishing culture which remains a significant part of their local economy. Recently is has become more tourist-based since the establishment of the Interpretation Centre which houses a 226-foot long, embroidered tapestry depicting the history of Conche from the 1500s to 2010. Handcrafts are also culturally significant and motivated through survival. Using a traditional design of a filleted cod, participants can learn a new skill and contribute physically to the transformation of an object of ecological destruction. The result will be a collage of different cods sewn into the mesh representing the community's long-lasting fishing culture. Physically threading between the nylon lines closing the mesh symbolizes the marine life that will escape suffocation and drowning if entangled in it. This activity will end with participants having created their own piece that they can either keep or leave to be incorporated into the new tapestry. Throughout the workshop there will be discussions and conversation around ghost gear, coastal and cultural revitalization, and art.

Creating coastal experiential learning best practices with a proposed CZCA education specialty group

Dr. Mike Bitton [1]

1. *Wilfred Laurier University*

A narrative synthesis examining experiential learning opportunities, and potential collaboration with Coastal Zone Canada to assemble a new working group within the Association is presented. Experiential learning in coastal environments offers invaluable educational benefits by immersing students in real-world experiences that deepen their understanding of coastal processes and sustainability challenges. Examples of field-based activities, such as studying coastal erosion, sediment transport, ecology, restoration, students gain firsthand knowledge of the dynamic and vulnerable nature of coastal ecosystems. Experiential learning provides opportunities to meet with professionals, academics, and First Nations communities, enhancing students' understanding of both the scientific and cultural dimensions of coastal management.

A crucial component of effective coastal education is the formation of a Coastal Zone Canada Association Education specialty group, which can help unify efforts across Canada, creating best practices and resources for coastal education. This presentation highlights past experiences and literature that highlights the value for the CZCA to form an Education Community of Practice or Specialty Group. This group could provide educators with tools and frameworks for teaching coastal geomorphology, ecology, sustainability, and community engagement while promoting cross-institutional collaboration. It would help ensure that diverse perspectives are integrated into the conservation and management of coastal areas. Ultimately, establishing experiential learning practices established by the CZCA could help prepare students for coastal careers in geography, environmental science, and coastal policy, equipping them with the interdisciplinary skills and knowledge necessary to tackle complex coastal challenges.

Decision-making under flood predictions: a risk perception study of coastal real estate

Dr. Avidesh Seenath [1]***, Dr. Scott Mahadeo*** [2]***, Dr. Matthew Blackett*** [3]

1. *Environmental Change Institute, University of Oxford,* ***2.*** *Portsmouth Business School, University of Portsmouth,* ***3.*** *School of Energy, Construction and Environment, Coventry University*

Flood models, while representing our best knowledge of a natural phenomenon, are continually evolving. Their predictions, albeit undeniably important for flood risk management, contain considerable uncertainties related to model structure, parameterisation, and input data. With multiple sources of flood predictions becoming increasingly available through online flood maps, the uncertainties in these predictions present considerable risks related to property devaluation. Such risks stem from real estate decisions, measured by location preferences and willingness-to-pay to buy and rent properties, based on access to various sources of flood predictions. Here, we evaluate the influence of coastal flood predictions on real estate decision-making in the UK by adopting an interdisciplinary approach, involving flood modelling, novel experimental willingness-to-pay real estate surveys of UK residents in response to flood predictions, statistical modelling, and geospatial analysis. Our main findings show that access to multiple sources of flood predictions dominates real estate decisions relative to preferences for location aesthetics, reflecting a shift in demand towards risk-averse locations. We also find that people do not consider flood prediction uncertainty in their real estate decisions, possibly due to an inability to perceive such uncertainty. These results are robust under a repeated experimental survey using an open access long-term flood risk map. We, therefore, recommend getting flood models 'right' but recognise that this is a contentious issue because it implies having an error-free model, which is practically impossible. Hence, to reduce real estate risks, we advocate for a greater emphasis on effectively communicating flood model predictions and their uncertainties to non-experts.

Design, Construction, and Monitoring of a Nature-based Nearshore Reef and Dune System at Gibraltar Point in Toronto, Ontario

Dr. Mohammad Dibajnia [1], ***Ms. Brynn Coey*** [2], ***Mr. Rick Portiss*** [2], ***Ms. Karen McDonald*** [2], ***Mr. Clifton Coppolino*** [2]

1. *W.F. Baird & Associates Coastal Engineers Ltd.,* ***2.*** *TRCA*

Gibraltar Point, located at the southwestern tip of the Toronto Islands, has experienced severe shoreline erosion of approximately 4 m/year, threatening natural habitats, coastal stability, recreational opportunities, and public infrastructure. To address this, Toronto and Region Conservation Authority (TRCA) implemented a sustainable, nature-based solution, combining a nearshore reef and a dune system to mitigate erosion while enhancing ecological and recreational value.

The nearshore reef was designed and constructed to dissipate wave energy from Lake Ontario storms, reduce erosion, maintain a dynamic beach, and protect and enhance aquatic habitat. In addition to the reef, a dune system was designed and constructed as part of the broader erosion control strategy, further stabilizing the shoreline, and enhancing natural habitats and recreational opportunities. Spanning approximately 5 ha total, the reef and dune system work together to balance shoreline protection with ecological restoration. The project's design was guided by advanced coastal modeling, which informed the strategic placement of 35,000 m³ of stone, riprap, and gravel for the nearshore reef.

A complementary adaptive sand management strategy involves replenishing 15,000 m³ of sand at the project site every five years, or as required. The ongoing long-term monitoring will play a critical role in assessing aquatic habitat enhancements and erosion rates, providing data to guide adaptive management strategies. Initial results indicate an increase in species diversity following construction.

Together, these efforts demonstrate an innovative and cost-effective approach to integrating erosion control with ecological enhancement, offering a scalable model for sustainable shoreline management.

Developing 3D Mapping Tools to Identify, Protect and Reconnect Communities with Submerged Mi'kmaw Heritage Sites

Ms. Lauren Douglas [1], ***Dr. Tim Webster*** [1], ***Dr. Heather MacLeod-Leslie*** [2], ***Mr. Keith Christmas*** [3]

1. *Applied Geomatics Research Group, NSCC,* ***2.*** *Kwilmu'kw Maw-Klusuaqn Negotiations Office,* ***3.*** *Unama'ki Institute of Natural Resources*

Researchers from the Applied Geomatics Research Group (AGRG) and archaeologists from Kwilmu'kw Maw-klusuaqn Negotiations Office (KMKNO) partnered to investigate possible submerged Mi'kmaq archeology sites around Pitu'poq. Application of an Etuaptmumk approach was achieved through consultations with local elders who aided in defining two study areas, near Malikewe'jk and near Tewitke'jk. The areas were surveyed with an airborne topo-bathymetric lidar (TB-lidar) sensor. The resulting lidar digital elevation models were visualized as colour shaded relief maps which allowed the submerged landscapes to be interpreted and potential archaeology sites to be identified by AGRG and KMKNO officials. The submerged features observed in the lidar DEM were prioritized to guide onsite investigations. Although no direct evidence of past Mi'kmaw settlements was found, a piece of wood was collected and radiocarbon dated to 2334 + 36 Cal BP; this find was a factor in the archeologists' determination that the lidar maps provided great insights into the submerged landscapes and narrowed the options down to favorable potential sites to groundtruth. Overall, this project successfully demonstrated the effectiveness of combining local traditional knowledge to choose target sites with the use of TB-lidar to reveal sunken landscapes that were interpreted based on the potential for Mi'kmaq occupation. This method allowed for a more tightly focused groundtruth campaign to be implemented by narrowing down the target sites and optimizing the more rigorous and expensive diving and underwater video portions of the campaign. Future work should explore the use of TB-lidar in more locations around Pitu'poq.

Developing a Comprehensive Coastal Strategy for Resilient Ecosystems and Communities in Maine

Ms. Helena Tatgenhorst [1], ***Mr. Jeremy Bell*** [1], ***Mrs. Jocelyn Runnebaum*** [1], ***Mr. Geoffrey Smith*** [1]

1. *The Nature Conservancy*

Stretching over 3,400 miles, Maine's coast harbors diverse ecosystems that support a wide array of plant and animal species as well as livelihoods in coastal communities. However, climate change and coastal development pose significant threats to coastal ecosystems, which also threaten lives, local economies, and property.

The Maine chapter of The Nature Conservancy embarked on a year-long process to develop strategies that tackle these threats by protecting and restoring coastal ecosystems and helping coastal communities overcome these challenges in a manner that provides benefits to both people and nature. This planning process included facilitated workshops and informational interviews with researchers, coastal restoration practitioners, and planners to identify gaps, needs, and opportunities for meaningful and lasting conservation along the coast. The result of this work is a comprehensive coastal strategy that provides a blueprint for how TNC's ongoing work with partners will advance healthy and resilient coastal ecosystems and communities across Maine's coast at a scale that meets the challenges they face.

The coastal strategy includes four key actions:

1. **Protect and restore coastal ecosystems:** Enhance coastal habitats' resilience to climate impacts.
2. **Advance community climate resilience:** Promote nature-based solutions for adapting to environmental changes.
3. **Support Indigenous lifeways:** Collaborate with Wabanaki communities for sustainable coastal conservation.
4. **Strengthen policy and finance:** Advocate for effective policies and sustainable funding for coastal protection.

This strategy aligns with The Nature Conservancy's goals of conserving lands and waters, mitigating climate change, and addressing biodiversity loss, highlighting the importance of integrating ecological, social, and cultural dimensions for lasting conservation.

Developing an Oceans Act Marine Environmental Quality Guideline to Support Efforts to Address Eutrophication in Southern Gulf of St. Lawrence Estuaries

Ms. Jackie Walker [1], ***Mrs. Monica Boudreau*** [1]

1. *Fisheries and Oceans Canada*

The *Oceans Act* provides management options to attain one of Fisheries and Oceans Canada's (DFO) key priorities of conserving and protecting Canada's oceans, by addressing human-induced stressors on marine ecosystems. In the southern Gulf of St Lawrence (sGSL), nutrients are one of the most important stressors in estuaries, resulting in changes or loss to fish habitat, reduced biodiversity and extreme changes in dissolved oxygen, including anoxic conditions. Eutrophic conditions are also the leading cause of declines in estuarine eelgrass. Consequently, DFO is developing a Marine Environmental Quality (MEQ) guideline to support efforts to address eutrophication in sGSL estuaries.

The guideline recommends the use of dissolved oxygen as an indicator of estuarine trophic status. In collaboration with the University of Prince Edward Island and the Government of Prince Edward Island, DFO researchers developed an oxygen metric reflecting oxygen production and consumption, termed "eutrophic time". A high correlation was observed between Eutrophic Time, nitrate loading and water residence time, which can be used to support management efforts to maintain healthy ecosystems or to calculate nutrient loading reductions required to restore eutrophic ecosystems. Because of the ecological significance of eelgrass, the Eutrophic Time target was defined to prioritize the protection of eelgrass. The guideline recommends a monitoring regime and procedures which should be implemented within the region for the ongoing monitoring of estuarine trophic status.

The guideline development process, significant body of research, and collaborations that contributed to the development of the first *Oceans Act* MEQ measure will also be discussed.

Developing Empirical Equations for Oyster Shell Berm Performance Using Full-Scale Experiments

Mr. Mitchel Provan [1], ***Mr. Amanj Rahman*** [1], ***Dr. Enda Murphy*** [2]

1. *National Research Council Canada,* ***2.*** *University of British Columbia*

There has been growing worldwide interest in exploring nature-based solutions that can augment or provide alternatives to traditional hard coastal infrastructure. Among these, engineered oyster reefs have gained attention for their potential to replicate the benefits of natural reefs, such as wave attenuation and ecosystem enhancement. Engineered reefs provide the opportunity to reduce shoreline erosion while simultaneously fostering new oyster growth. Though these reefs have been implemented at a number of sites throughout North America, there is still a limited understanding on predicting their performance in terms of wave attenuation and stability. Steps towards addressing this knowledge gap involved conducting full scale (1:1) wave flume experiments with two types of berms: berms formed out of bags filled with empty oyster shells and berms formed out of loose, unconsolidated empty shells (including sand-shell mixtures). Various berm configurations were subjected to a wide range of water level and wave conditions and the experimental results indicated that existing equations for wave transmission over low-crested structures poorly predict wave transmission over oyster shell berms. Therefore, new empirical equations for both wave transmission and stability/reshaping of the berms were developed based on the large experimental dataset. These equations can assist practitioners in estimating the performance of these engineered reefs and support more successful implementation.

Development of Asset Management, Relocation and Decommissioning Plans for Coastal Infrastructure Across PEI

Mr. Brian Thompson [1], ***Ms. Brianna Lunardi*** [2], ***Mr. Vincent Leys*** [2], ***Ms. Candace MacDonald*** [2], ***Mr. Jordan Doiron*** [2]

1. *PEDTI,* ***2.*** *CBCL*

Coastal flooding and erosion risks in Prince Edward Island (PEI) are increasing due to climate change, and stress from both natural and societal sources. Managing the coastline is complex due to conflicting environmental, social, and economic needs and their implications on the sustainability of the coast. Recommendation 13 of UPEI's 2023 Interim Coastal Policy Recommendation Report advocates for the development of asset management relocation and decommissioning plans for coastal public property and infrastructure within high-risk coastal areas.

The PEI Department of Transportation and Infrastructure (PEIDTI) commissioned CBCL to initiate the development of such asset management plans. This study involves the mapping and prioritizing of assets in vulnerable areas, then identifying adaptation options and pathways for various infrastructure types. It develops initial guidance on appropriate thresholds, suitability, timing, and best practices related to extending the functional life, relocation, and decommissioning of at-risk public infrastructure.

With this work, PEIDTI is further building capacity to make informed decisions about infrastructure adaptation now and in the future.

Development of Shoreline Mangement Plans to increase climate resilience in PEI

Mr. Bryan Martin [1]

1. *Government of Prince Edward Island*

Prince Edward Island faces significant challenges from coastal erosion and flooding, exacerbated by climate change and human activities. To tackle these issues, Shoreline Management Plans (SMPs) are essential tools that provide sustainable approaches for managing coastal risks in the short, medium, and long term. With financial assistance from Natural Resources Canada, the Government of PEI is piloting the development of SMPs along a quarter of its coastline. The pilot project will establish a framework for the development of SMPs in PEI's remaining coastal areas. The SMPs aim to balance the protection of natural shoreline functions with the need for development and recreational use. The project will include a partnership with Lennox Island First Nation to develop a separate SMP tailored to the community's specific coastal needs and values. All of the SMPs will be grounded in the scientific understanding of local coastal processes and will be refined through the integration of municipal land use plans, where available, as well as Indigenous, stakeholder, and community engagement. By adopting this novel approach, PEI seeks to enhance coastal resilience, protect habitats, and ensure the long-term sustainability of its unique coastline. This presentation will focus on the initial process from a provincial perspective, highlighting the creation of an engagement framework, relationship building, and lessons learned.

Development of the Canadian Coastal Zone Information System (CCZIS)

Mr. Amaury Camarena [1], ***Mr. Tom Kozlowski*** [1], ***Ms. Jessica Wilson*** [2], ***Ms. Lea Braschi*** [1]

1. *CBCL,* ***2.*** *DHI Water & Environment*

The Canadian Coastal Zone Information System (CCZIS) is an innovative web-based decision-support platform designed to enhance coastal infrastructure planning and risk assessment in Canada. Developed by CBCL Limited and DHI Water & Environment Inc., the CCZIS consolidates numerous datasets and advanced numerical modelling into a centralized online system for informed decision-making.

The CCZIS integrates over 20 datasets, including offshore wave and wind hindcasts (ECMWF-ERA5, MSC50), sea-level rise projections (CCCS, NASA), tide gauge data, ice characteristics, and topo-bathymetric information. These datasets underwent rigorous quality control to ensure consistency and reliability. Post-processing includes statistical analyses and extreme value analyses, providing an overview into waves, winds, water levels, and other critical coastal variables across Canada.

A key feature is the high-resolution wave modeling framework, developed specifically for this project, which simulates extreme synthetic events and relevant historical storms, initially for Atlantic Canada and expanding to other coastlines. This multi-domain approach achieves nearshore resolutions of 300 meters, introducing a coastal dataset that is the first of its kind in Canada. The system enables users to upload datasets for project-specific integration, facilitating comprehensive analysis within a single, unified tool.

The CCZIS advances coastal engineering with tools for bathymetric interpolation, seasonal statistics, and preliminary wave propagation modeling for data-scarce regions like the Arctic. It provides reliable nearshore and offshore data visualized alongside coastal features such as ports and harbours, supporting comprehensive site assessments. This system represents a significant milestone in consolidating and standardizing coastal data, enabling robust, science-driven solutions for Canada's coastal resilience and infrastructure planning.

Drones for Community-Driven Environmental Stewardship and Collaboration

Mr. Ludwig Paul Cabling [1]

1. *University of Victoria*

The use of unmanned aerial vehicles, commonly known as drones, has recently been commercialized for everyday consumers, offering attractive aerial shots and the ability to capture media remotely. In this context, we propose a framework and collaborative program to use drones with coastal community partners for a variety of purposes. Our goal is to create accessible and valuable digital assets using drones, particularly for environmental stewardship groups focused on education, historical preservation, advocacy, promotion, baseline and performance monitoring, and ideation for solutions to societal challenges. We explore whether there are cases of community-drone use available via web search and through research databases to gather current insights and best practices. We then describe the process of training community partners on the use of the DJI Mini 4 Pro and AerialModel.com, which is a web-based application to create 3D models from aerial photographs. This approach streamlines data gathering and processing, allowing communities to create more models (e.g., numerous areas of interest) or focus efforts on the specific uses, such as feature identification or ideation for nature-based solutions. We highlight successful cases of drone use with partner communities on Vancouver Island and suggest future research opportunities, such as identification of cultural heritage features, remote environmental protection investigations, and rapid response data collection. We then share considerations for working with diverse partners, with the aim of fostering stronger academic-community relationships and supporting future growth in collaborative projects.

EASTERN SHORE COASTAL MONITORING NETWORK: INTEGRATING CITIZEN SCIENCE AS A TOOL FOR RISK GOVERNANCE

Dr. Camilo M. Botero [1], ***Mrs. Marian Lucas-Jefferies*** [2], ***Prof. Ronald Pelot*** [1], ***Prof. Floris Goerlandt*** [1]

1. *Dalhousie University,* ***2.*** *Anglican Diocese of Nova Scotia and Prince Edward Island*

Nova Scotia boasts numerous coastal areas requiring monitoring to ensure conservation and management, but adequate economic and human resources are only sometimes available for such monitoring. The engagement of volunteers interested in becoming citizen scientists could be an alternative to overcome these barriers. This work describes how citizen science could be used as a tool to improve risk governance in coastal communities, with emphasis on climate change hazards and based on the experience on the Eastern Shore during the year 2024. This project was funded by five different grants and led by the Anglican Diocesan Environment Network and Dalhousie University. The activities started in the first semester when four academic events were organized to showcase citizen-based coastal monitoring experiences in Canada and worldwide. The monitoring was implemented in four coastal sections in Sheet Harbour and two more coastal sites in Guysborough County. Volunteer training focused on low-cost parameters such as beach profiles, meteorological data, and beach flora. The data from the citizen monitoring is being uploaded to a cloud service for further analysis by Dalhousie University's researchers within the Transforming Climate Action program. The data analysis is focused on producing local descriptions of each coastal site, comparisons among these, and developing regional reports to engage new community members. In the mid-term, these data will serve as a baseline for formulating a climate change risk governance framework building on citizen science and collaboration with governmental agencies. The long-term aim includes expanding the monitoring network to other communities along the Atlantic provinces.

Eco-cultural marsh restoration for coastal resilience in Salish Sea estuaries

Mr. Dominic Janus [1], ***Mr. Tim Clermont*** [1], ***Ms. Jacklyn Barrs*** [2], ***Mr. Danny Hurry*** [3]

1. *Guardians of our Salish Estuaries,* ***2.*** *WWF-Canada,* ***3.*** *Wei Wai Kum Guardians*

Estuarine marshes provide critical fish and wildlife habitat, sequester carbon, and support shoreline resiliency to climate change impacts such as coastal flooding. The protection, restoration, and stewardship of these habitats support various ecological, socioeconomic, and cultural values. Introduced Canada Geese (*Branta canadensis*, 'CAGO') in the Salish Sea Basin of British Columbia have become hyperabundant and are degrading estuaries. CAGO herbivory of marsh vegetation removes plant components, resulting in reduced productivity and resiliency, erosion, soil compaction, and a loss of habitat and ecosystem services. Lyngbye's sedge (*Carex lyngbyei)* marsh communities are among the highest impacted by CAGO. These marshes form critical habitat for juvenile salmonids while also supporting coastal productivity and resiliency among many other values. Since 2010, Guardians of our Salish Estuaries (GooSE) has been restoring estuaries from CAGO impacts. Our eco-cultural restoration method involves installing sustainably sourced wood fencing (exclosures) to prevent CAGO herbivory and facilitate improved plant growth in degraded areas, and planting Lyngbye's sedge within exclosures to accelerate restoration. Eco-cultural fencing is based on Indigenous fish traps and was co-developed with our First Nation partners; it acts in service to a longstanding legacy of coastal stewardship and is grounded in strong collaborative partnerships. The effectiveness of eco-cultural restoration depends on environmental conditions, planting designs, fence design, and requires adaptive management. We map plant growth, environmental conditions, and carbon stocks and accumulation rates at restoration sites to monitor effectiveness and inform future efforts to increase coastal resiliency and restore estuaries in the Salish Sea.

Eelgrass monitoring across the St. Lawrence Maritime Estuary : how to harmonize and develop salient tools to empower stakeholders assessing coastal meadows ecological status

Mx. Marie-Pomme Poissant [1], ***Mrs. Eve Tremblay Morel*** [1], ***Mr. Félix Lauzon*** [2], ***Mrs. Éléonore Dansereau-Macias*** [2], ***Mr. Jonathan Pothier*** [2], ***Mrs. Marie-Soleil Pétrin*** [3], ***Mrs. Lysandre Bourgouin*** [3], ***Mrs. Cynthia Thibault*** [4], ***Mr. Manfred Desire Bonga Nyetem*** [4], ***Prof. Fanny Noisette*** [1]

1. *Institut des sciences de la mer,* ***2.*** *Comité ZIP du Sud-de-l'Estuaire,* ***3.*** *Comité ZIP de la Gaspésie,* ***4.*** *Comité ZIP Côte-Nord du Golfe*

In the last decades. interest in eelgrass meadows has grown in academic research but also in the nature protection and management sector in Canada because of (1) their drastic declines in the 1990s- 2000s, (2) their blue carbon potential and (3) their recognized roles in maintaining high biodiversity in coastal zones. In the St. Lawrence maritime Estuary (Québec, Canada) eelgrass decline is not a common trend. Eelgrass meadows temporal trajectory is primarily influenced by local-scale environmental factors (fresh water affluent, coastal delineation, etc.) and superimposed by climate change influence. Understanding their temporal and spatial dynamics is crucial to better protect, manage and restore these ecosystems. Various entities, including NGOs, national parks, First Nations, and academic institutions acquire data and/or apply management measures on eelgrass meadows. Considering the immense territory that represents the St. Lawrence Maritime Estuary and the diversity of stakeholders, there was a high need for developing a harmonized and salient set of indicators to monitor eelgrass meadows accounting for differences in resources (time, equipment, humanpower). We developed a comprehensive yet user-friendly monitoring protocol through collaboration with all stakeholders, ensuring a standardized method for evaluating essential eelgrass traits and environmental parameters. We identified key indicators at the intersection of their ecological relevance and practical applicability. These tools should enable local and regional decision-makers to support fair and effective land-use management and autonomy for effective management strategies of coastal meadows. Furthermore, this initiative nurture relationships among stakeholders, facilitates collaboration across regions and enhance the sharing of different knowledges.

Embedding climate change action in decision making by coastal municipalities

Mr. Alexandre Legault [1], ***Dr. Sandra Toze*** [2], ***Dr. Isabelle Caron*** [3]

1. *School for Resource and Environmental Studies, Dalhousie University,* ***2.*** *Department of Information Science, Dalhousie University,* ***3.*** *Department of Policy and International Relations, Dalhousie University*

As climate continues to change, extreme weather events are becoming commonplace. Although all levels of government in Canada have begun to introduce and implement policies to address climate change mitigation, so far these policies remain inadequate. Policy makers face substantial challenges in designing and implementing comprehensive policies. Often confronted by large volumes of information on climate subjects, they may have difficulty in evaluating the quality and deciding what counts as evidence to be presented to decision-makers. The uptake of relevant, credible evidence in policy processes to inform decisions about climate change adaptation remains limited in many jurisdictions. Municipal governments are directly impacted and must consider the impacts of climate change. In 2019, for example, the Halifax Regional Council unanimously declared a climate emergency. Few studies have investigated the ways in which information, evidence, and knowledge flow at science-policy interfaces in municipal government contexts. This research is identifying factors that enable or impede the uptake of evidence at the municipal level by focusing on the development and implementation of coastal climate adaptation policies. It aims to build a bridge between the policy makers who develop and implement policies and the researchers who produce knowledge on coastal climate adaptation. Four Canadian coastal municipalities will be the focus of case studies beginning with Halifax Regional Municipality. Using a transdisciplinary approach, our research questions are being co-constructed alongside the professional municipal staff. This presentation will describe the collaborative research design process and include preliminary results of a systematic literature review.

Encouraging Ocean and Climate Literacy within the Nova Scotia School System.

Mr. Michael Butler [1]***, Ms. Kerri McPherson*** [2]***, Dr. Peter Wells*** [1]

1. *Dalhousie University and International Ocean Institute,* ***2.*** *NS Dept. of Education and Early Childhood Development*

The “Ocean-climate nexus” explains the connection between the ocean and the atmosphere, and together the implications for climate change and associated weather phenomena. Climate change, an existential threat, is exemplified in the Atlantic Provinces by sea-level rise, increased coastal erosion, changing ocean ecosystems and extreme weather patterns. Only an ocean/climate literate society will understand and mitigate these stressors. Hence, the need exists for teachers and their students to be appropriately informed. To respond to this need, the International Ocean Institute-Canada, in collaboration with the Nova Scotia Department of Education and the Ocean Literacy Working Group of the Bay of Fundy Ecosystem Partnership, adopted the well established “Professional Development Day” format as the best option to introduce such a program locally. To date, two P.D. Days were delivered, the first on March 23, 2024, to 35 experienced teachers, primarily from the Halifax area; the second on Oct.19, 2024 to 35 teachers-in-training at Mount Saint Vincent University, one of five Nova Scotia universities with a Faculty of Education. The goal of each P.D. Day was to present ocean/climate information in a manner clearly understood by the non-specialist. An Educators Toolkit, designed by experienced teachers, provided ready-to-use and age-appropriate learning experiences. This was supplemented by hands-on demonstrations of classroom experiments and the provision of accessible resource material. This presentation describes the format of the P.D. Days delivered to date, the topics and speakers, resource material, and future objectives. Through this initiative, teachers and students are encouraged to become “change makers” in their communities.

Enhanced Shoreline Classification for Prince Edward Island

Ms. Esther Gomes [1], ***Mr. Danker Kolijn*** [2], ***Mr. Mads Christensen*** [2], ***Dr. Andrew Clark*** [3], ***Mr. Peter Nishimura*** [3], ***Mr. Matthew McNeill*** [3]

1. *DHI Water & Environment Inc.,* ***2.*** *DHI Water & Environment,* ***3.*** *Government of Prince Edward Island*

In the context of climate change and rising sea levels, accurate and up-to-date coastal information is crucial for effective shoreline management and hazard mitigation. Prince Edward Island (PEI), with its 3000km of dynamic coastline, is particularly vulnerable to coastal flooding, erosion, and other climate-related impacts. Updated shoreline classification is essential for informed decision-making in coastal management, planning, and environmental protection.

This presentation will detail the methodologies and applications of an enhanced shoreline classification project for PEI. The project aims to update the existing 2012 dataset, incorporating five key categories: Physical, Geological, Ecological, Coastal Water Levels, and Anthropogenic. The categories and classification system have been developed to incorporate information beneficial for shoreline management purposes and with detailed attention to PEI's unique coastal environments. By leveraging innovative Earth Observation (EO) technology, AI and numerical models, the project aims to provide a comprehensive and accurate classification of PEI's shoreline.

The updated shoreline classification datasets will support several key strategic objectives including coastal management, planning, development, hazard mitigate, environmental protection, regulatory decisions, and further research, education, and public understanding.

In this presentation, you will discover the innovative methodologies employed, the challenges overcome, and the transformative potential of the enhanced shoreline classification for coastal management and planning in PEI. Attendees will learn how this project addresses critical issues related to climate change and sea level rise, offering practical solutions and insights.

Enhancing Coastal Resilience: Marsh elder (Iva frutescens) as a Nature-based Solution

Ms. Allison MacNeil [1]

1. *Saint Mary's University*

Salt marshes provide many ecosystem services such as wave and storm surge buffering, erosion prevention, carbon sequestration, and essential habitats for many species. In the Maritimes, a large portion of salt marshes have been lost due to agricultural and development pressures. To combat shoreline erosion, structures such as rock seawalls are often used, however, these structures cause unwanted consequences, including increased erosion, habitat loss, and expensive upkeep. Living shorelines use natural materials and vegetation to restore coastal processes and create a more sustainable shoreline. Marsh Elder (*Iva frutescens*) is a salt marsh shrub native to the Eastern coast of North America. Within Nova Scotia, it is the only shrub that occurs in salt marshes and is exclusively found in the Minas Basin and Yarmouth areas. Marsh Elder has a greater salinity tolerance than other shrubs, allowing it to grow lower in the tidal frame. This shrub is potentially valuable to living shoreline projects, as studies have shown that combining shrubs and grasses can prevent erosion, decrease overland flow velocities, and prevent agricultural runoff better than solitary grasses or shrubs. Despite its potential importance, little research has been conducted on Marsh Elder. This paper aims to determine Marsh Elder's ecological niche (elevation, inundation frequency, soil nutrients and characteristics, and plant associations), assess fitness differences between populations using a common garden experiment, and identify planting techniques to aid in successful integration into living shorelines. This study will provide the first ecological assessment and planting experiment of Marsh Elder in Canada.

Erosion on a Nourished Beach with Complex Bathymetry

Dr. Laura Szczyrba [1]***, Dr. Ryan Mulligan*** [2]***, Dr. Peir Pufahl*** [3]

1. *BGC Engineering,* ***2.*** *Department of Civil Engineering, Queen's University,* ***3.*** *Department of Geological Sciences and Geological Engineering, Queen's University*

Many coastal communities nourish their beaches to maintain or increase beach width, providing critical recreational and protective benefits. Sandy beaches are often characterized by a highly dynamic nearshore environment, which often includes a mobile linear sandbar. However, in many regions around the world, antecedent geologic processes have created complex bathymetric ridge and trough systems. These features have been correlated with higher rates of beach erosion and accelerated shoreline retreat. The impact of complex nearshore bathymetry on beach nourishment performance remains unclear. In this study, the morphodynamic model XBeach is applied to simulate two-dimensional coastal processes at two sandy sites in North Carolina: Duck, where the model was calibrated with field data, and Kitty Hawk, where it was validated to analyze morphology changes influenced by shore-oblique bathymetric features. At Kitty Hawk, 10 representative historical storms were simulated for pre- and post-nourishment scenarios. The simulations revealed that shore-oblique features consistently generate alongshore-variable patterns of erosion and deposition, persisting before and after nourishment. Findings indicate that storm wave conditions drive the magnitude of sediment transported. However, the shore-oblique bathymetric features exert greater influence on sediment transport pathways than storm wave conditions, driving substantial alongshore variability. Understanding these dynamics can improve the design and performance of future beach nourishment projects.

Evaluating the Accuracy of Loss on Ignition for Blue Carbon Quantification in North Atlantic Salt Marshes

Dr. Holly Abbandonato [1], ***Prof. Jeff Ollerhead*** [2], ***Dr. Amanda Loder*** [3], ***Mr. Nic McLellan*** [1]

1. *Ducks Unlimited Canada,* ***2.*** *Mount Allison University, Department of Geography and Environment,* ***3.*** *Environment and Climate Change Canada*

Interest in protecting and restoring salt marshes as nature-based climate solutions has grown due to their rapid carbon burial potential and their ability to sequester carbon at some of the fastest rates globally. Salt marshes accumulate carbon through both plant and algal CO2 fixation and tidal deposition of dissolved carbon. To estimate soil organic carbon in these ecosystems, the Loss on Ignition (LOI) method is commonly used for its cost-effectiveness and simplicity. However, LOI has been criticized for decades due to inaccuracies, particularly in clay-based or mixed sediments, where overestimations of organic carbon can range from 30-300%. Factors such as sample size, exposure time, temperature, inorganic carbon, and the structural water in clay can introduce error. This study aims to evaluate the accuracy of using Loss on Ignition (LOI) to measure blue carbon in salt marsh sediments along the north Atlantic coast, including the Bay of Fundy and Northumberland Strait. It compares organic carbon measurements from LOI with elemental analysis in comparison to the widely used Craft et al. (1999) quadratic equation across different tidal regimes, marsh zones, depths, clay contents, and sites. Our results show that conversion factors for LOI are not always an accurate method for estimating the organic carbon content in salt marsh sediment. This study highlights the importance of considering methodologies to accurately quantify blue carbon stocks, especially as stakeholders increasingly prioritize these ecosystems for climate solutions.

Experimental and Numerical Modeling of Climate Change-Adaptive Coastal Structures, Phase II: Vertical Seawalls

Mr. Stefano Kerr [1]***, Mr. Scott Baker*** [2]***, Dr. Ioan Nistor*** [1]

1. *University of Ottawa,* ***2.*** *National Research Council Canada*

Coastal flooding risks are expected to increase due to increasing urbanization, rising sea levels, declining sea ice cover, and shifting weather patterns associated with climate change (CC). Much of Canada's existing coastal infrastructure is ill-equipped to survive, let alone provide continuing service when subjected to increasing water levels and larger waves. At present, there is limited research and design guidance addressing CC-proofing and adaptation. The current study is a novel two-phase project and a joint applicative research collaboration by NRC-OCRE and the University of Ottawa, aiming to understand how different adaptations to conventional coastal protection structures improve their hydrodynamic resilience to CC. **Phase I** investigated traditional coastal revetments while **Phase II** (the topic of this presentation) examines traditional vertical seawalls. **Phase II** physical modeling is ongoing in the Large Wave Flume at the NRC-OCRE facility in Ottawa and will consider how several different adaptations to a baseline vertical seawall (vertical crest extension; lakeward breakwater, revetment, perched beach; landward drainage swale, secondary walls) affect wave overtopping over the structure. The study will also incorporate nature-based solutions, namely ECOncrete ® Coastalock armour units. Numerical modeling is to be completed following the end of physical modeling in January 2025 and the model(s) employed will be calibrated and validated using experimental results. The project aims to develop design guidelines based on both Phases' results, ensuring coastal infrastructure and communities alike maintain resilience to the changing climate.

Exploring Beach Nourishment as a Solution to Coastal Erosion in Atlantic Canada

Ms. Julia Durocher [1]

1. *Dalhousie University*

Environment & Climate Change Canada's (ECCC) Disposal at Sea (DAS) program issues permits to dispose of certain materials in the intertidal zone and beyond. Most of this is dredged material from the many harbours across Atlantic Canada, excavated for safe navigation. To be safely disposed of at sea, the material must not contain contaminants over their prescribed limits in the *Disposal at Sea Regulations*. Disposing of dredged sediment can be destructive to benthic communities, however, and permits are only granted in cases where it cannot be demonstrated that viable alternatives are available. The re-use of dredged material on beaches to combat coastal erosion, or beach nourishment, is one such alternative which is currently underdeveloped in Atlantic Canada. As sea-level rise continues to erode coastlines at accelerating rates, the need for action such as beach nourishment is made abundantly clear.

As ECCC's DAS program's authority falls in potential beach nourishment areas, opportunities for incorporating beach nourishment within the program's framework were explored. Comparisons were drawn with frameworks in California and the Netherlands to identify a potential path forward for Atlantic Canada.

The presentation covers an overview of the DAS program and the frameworks for managing dredged material in California and the Netherlands, as they relate to beach nourishment. Barriers including stringent concentration limits when screening for contaminants, species-at-risk, cost, and socio-cultural perceptions of beach nourishment are identified and discussed. In response to these barriers, recommendations are drawn, such that the DAS program can be effectively utilized to facilitate beach nourishment.

Flood Hazard Identification and Mapping Program (FHIMP): Research Update

Ms. Amy Jackson [1]

1. *Environment and Climate Change Canada*

The Government of Canada's Flood Hazard Identification and Mapping Program (FHIMP) was established in 2021 to help Canadians better plan and prepare for future flood risks. In addition to producing flood hazard maps for high-risk areas across the country, this program aims to advance the science and engineering of flood modelling and mapping in Canada. To do so, the program is investing approximately $1M per year at Canadian universities and research organizations to develop new knowledge and train the next generation of flood experts in Canada. In this presentation, Environment and Climate Change Canada (ECCC) will provide a summary of research projects carried out by partner universities and research organizations as well as flood mapping research at ECCC.

Flood Hazard Identification and Mapping Program (FHIMP): Technical Bulletins

Ms. Marta Lopez Egea [1], ***Ms. Mouna Doghri*** [1], ***Mr. Apurba Das*** [1]

1. *Environment and Climate Change Canada*

The Government of Canada's Flood Hazard Identification and Mapping Program (FHIMP) was established in 2021 to help Canadians better plan and prepare for future flood risks. One of the key activities of the program is the development of technical guidance to promote best practices and approaches to flood mapping in Canada.

In this presentation, Environment and Climate Change Canada (ECCC) will discuss technical bulletins that have been recently published or are in development on the themes of geomorphology, uncertainty, and triggers for when flood maps should be updated.

Following the Flow of Water: An Atlas for Mi'kmaq Marine Knowledge

Ms. Kelsey White [1], ***Ms. Alanna Syliboy*** [1], ***Mr. Lucas Amiro*** [1], ***Ms. Leah Fulton*** [2], ***Ms. Jumanah Khan*** [3], ***Dr. Patricia Manuel*** [3], ***Dr. Claudio Aporta*** [4]

1. *The Confederacy of Mainland Mi'kmaq,* ***2.*** *University of Victoria,* ***3.*** *Dalhousie University,* ***4.*** *World Maritime University*

This presentation explores the collaboration between The Confederacy of Mainland Mi'kmaq (CMM) Department of Aquatic Resources & Fisheries Management and the Ocean Frontier Institute's Benthic Ecosystem Mapping and Engagement (BEcoME) project, to develop the Mi'kmaw Marine Atlas. Using ESRI ArcGIS StoryMap, the Atlas combines spatial mapping and narrative storytelling from the uplands to the seafloor of the inner Bay of Fundy. We sought to sought to provide a revisionist illustration of knowledge, information, and data to reflect the holistic understanding of the waterways flowing in and out of the inner Bay of Fundy and the relationships with the Mi'kmaq, who have communal knowledge spanning over 12,000 years as stewards of the land and water. It incorporates past and current environmental work in the area while weaving Mi'kmaw Knowledge and scientific understanding throughout. The Mi'kmaw Marine Atlas aims to serve as a resource for Mainland Mi'kmaw communities in supporting their planning, education, and knowledge-sharing. This project emphasizes collaboration, the prioritization of cultural knowledge, and ethical data-sharing, ensuring that Indigenous perspectives are central to the interpretation and dissemination of environmental information. The presentation highlights the shared efforts of The CMM and BEcoME in documenting community engagement and fostering a culturally informed approach to data sharing. Through this partnership, our understanding of the inner Bay of Fundy's marine environments has deepened in a manner that honors Mi'kmaq traditions and contributes to the next seven generations.

Hurricane Fiona 2D wave runup and compound coastal flood mapping in Port aux Basques, Newfoundland and Labrador: An innovative approach to strengthen coastal climate resilience & preparedness

Mr. Patrick Joynt [1], ***Mr. Danker Kolijn*** [2], ***Mr. Gabriel Carvalho*** [1], ***Ms. Aline Kaji*** [1], ***Mr. Jose Ribba*** [2], ***Mr. Meven Huiban*** [1], ***Mr. Andrew Weiss*** [3], ***Ms. Paula Dawe*** [4]

1. *DHI Water & Environment Inc.,* ***2.*** *DHI Water & Environment,* ***3.*** *KGS Group,* ***4.*** *Government of Newfoundland and Labrador*

Hurricane Fiona caused unprecedented devastation to the community of Port aux Basques, Newfoundland and Labrador, highlighting critical vulnerabilities from compound coastal flooding due to combined impacts from tides, surge and wave effects. Traditional wave runup assessments often rely on 1D transects, which oversimplify complex shorelines and coastal processes, thereby potentially underestimating compound flood risk. To address this shortcoming, DHI has developed a novel 2D mapping approach using a phase-resolving wave model (MIKE3 Wave Flexible Mesh) to seamlessly map compound flood risk, including wave effects (using R2%), along extended reaches of shoreline. This provides planners, decision makers and engineers with a quantitative tool to illustrate coastal land and infrastructure which are vulnerable and impacted by compound flood effects, including climate change.
The 2D approach was proven successful to depict the wave effects in Port aux Basques where multiple barrier islands and a complex shoreline poses challenges to the traditional 1D-transect approach. Results reveal critical hotspots of vulnerability within the community and highlight the compounded effects of Fiona's meteorological conditions. Furthermore the study examines the factors that made Fiona particularly destructive, comparing observed impacts to return period events to contextualize the severity.
This presentation will explore the technical implementation of the 2D wave runup mapping and its implications for coastal management. By advancing our understanding of wave runup, this work underscores the need for innovative modeling techniques to support rural communities like Port aux Basques in building resilience to future extreme weather events in an era of climate change.

Hydrodynamic Analysis of a Cylindrical Wave Energy Converter in Irregular Waves Using WEC-Sim

Mr. Yi Man [1], ***Dr. Ioan Nistor*** [1], ***Dr. Colin Rennie*** [1]

1. *University of Ottawa*

Wave energy converters (WECs) present significant potential for renewable energy generation. Utilizing numerical tools is a key step in creating such harvesting devices. This study proposed a structured comparison method to evaluate and compare the hydrodynamic forces and motion responses of different WEC geometries under both regular and irregular wave conditions. The workflow of integrating SolidWorks for geometry creation, NEMOH for frequency-domain hydrodynamic calculations, and WEC-Sim for time-domain wave-structure interaction analysis is demonstrated. A regular cylindrical buoy (10 m diameter, 7.5 m height, and 5.45 m draft depth) is analyzed under irregular Pierson–Moskowitz wave spectrum with a significant wave height of 2.45 m and a peak period of 9.5 s. Key dynamic responses, including position, velocity, acceleration, and hydrodynamic forces including excitation, damping, added mass, and restoring forces, are evaluated. Results show dominant contributions of restoring force in the heave direction, with time-series analysis revealing substantial coupling between wave input and cylinder response. In the surge direction, the dynamic behavior is consistent with the irregular wave inputs and excitation forces. This case study demonstrates the application of WEC-Sim in capturing wave-structure interactions and the proposed approach provides insights into how the geometry shape responds to different wave scenarios, potentially informing the optimization of wave energy converter designs.

Identifying the principal coastal flooding threats to parts of the Lower Mainland of British Columbia: Tsunamis, storm surges, and rising sea levels.

Ms. Nicky Hastings [1], ***Mr. Joseph Kim*** [2]

1. *Natural Resources Canada-Geological Survey of Canada,* ***2.*** *University of ottawa*

The Lower Mainland region of British Columbia faces several significant coastal hazards, including tsunamis and storm surges. Much of the Fraser Delta coastline is low-lying and protected by an extensive diking system. However, these dikes are vulnerable to breaching and may not be adequately designed to withstand rising sea levels. This is made more challenging as projected growth in Metro Vancouver is set to reach 4.2 million by 2050, according to the Metro 2050: Regional Growth Strategy, leading to increased urbanization by the coastline.

Tsunamis from subduction zone earthquakes, such as those originating in the Cascadia Subduction Zone and the Alaska Panhandle, can have significant impacts on the outer coast of Vancouver Island. Vancouver Island's role in protecting the inner coast from the effects of megathrust tsunamis is investigated. In addition, new research has identified crustal faults near Boundary Bay. Although these faults have longer recurrence intervals, they could generate localized tsunamis by displacing the seafloor or triggering submarine landslides. These localized tsunamis would have minimal warning time due to their proximity to nearby communities. Storm surges develop on the west coast of Canada regularly. Rising sea levels amplify the impact of storm surges, particularly in low-lying regions like Boundary Bay.

New floodplain maps were developed to identify the most critical pathways in the Lower Mainland of British Columbia. These maps highlight coastal flooding impacts from tsunamis, storm surges, and sea level rise to critical infrastructure such as rail lines, roads, and assets like farms, homes, dikes, and bridges.

Impact of Climate Change on Sedimentation of Small Craft Harbours, Prince Edward Island

Mr. Brian Bylhouwer [1], ***Mr. Arturo Jimenez*** [1], ***Dr. Babak Tehranirad*** [1]

1. *Stantec Consulting Ltd.*

Small craft harbours in Prince Edward Island (PEI) provide essential infrastructure for fishers, particularly in support of the seasonal lobster fishery. Fishers rely on safe and timely navigation of the harbours, given the relatively short, 8-week period of the lobster fishing seasons. Sedimentation has been increasingly leading to costly maintenance delays and hazardous sailing conditions for fishers.

Climate projections show substantial decreases in ice cover near the coast, or in some cases a nearly ice-free environment, by the 2nd half of the century in the Gulf of St. Lawrence. Reduction in ice cover could increase sedimentation in small craft harbours in PEI as the coastal ice cover protects the coastline from waves and inhibits sediment transport.

A case study of potential impacts of reduced ice cover was completed using Deflt3D software to model waves, sand transport and morphology at the North Lake and Skinner's Pond small craft harbours. Three ice cover scenarios were reviewed to study changes in sedimentation, including a baseline condition of the current average season with 2 months of ice cover, a reduced ice-cover season of 1 month, and a season with no ice formation. Sedimentation was estimated to increase by 10 to 20% with reduced ice cover and by 15 to 30% during ice-free conditions, indicating future increases in navigation disruptions and/or maintenance costs without mitigation measures. The results of this study could help inform sediment management strategies and future harbour designs in PEI under changing climate conditions.

Impact of the October 2nd, 1923 Storm on sandy beach and dune systems on the North Coast of Prince Edward Island and comparison with that of Hurricane Fiona in September 2022.

Prof. Irene Delgado-Fernandez [1], ***Prof. Robin Davidson-Arnott*** [2], ***Prof. Jeff Ollerhead*** [3], ***Prof. Bernard Bauer*** [4]

1. *University of Cadiz, Faculty of Marine and Environmental Sciences,* ***2.*** *University of Guelph, Department of Geography, Environment and Geomatics,* ***3.*** *Mount Allison University, Department of Geography and Environment,* ***4.*** *University of British Columbia - Kelowna, Department of Earth, Environmental and Geographic Sciences*

Aerial photography carried out in 1935 for all of Prince Edward Island showed extensive overwash along the north shore of the province. Previous work has detailed the extent of this overwash at Greenwich Dunes, Prince Edward Island National Park, and the subsequent recovery up to 2005. This work suggested that the overwash was related to the passage of a hurricane offshore of Halifax and Cape Breton on October 2, 1923, that produced very large storm surge along the north coast. Here we use a digital photo mosaic constructed by The PEI Department of Environment, Energy and Climate Action, Forests, Fish & Wildlife Division from the original aerial photography to measure the alongshore extent of overwash of barriers and mainland coastal dune systems along approximately 68 km of shoreline between Cable Head West in the east to Cavendish Spit in the west. In addition, the landward extent of overwash on barriers and mainland shores is documented as are the inland relic dune systems that developed during recovery from this storm. Finally, we compare overwash data from the 1923 storm event to that associated with Hurricane Fiona along the same stretch of coast based on recent satellite imagery. The results feed into other work being carried out by our research group on the controls on storm and storm sequencing impacts on the sandy beach and dune systems on the north shore, dune resilience and dune recovery, and potential impacts of Global Climate Change and Relative Sea-level Rise.

In and ex vitro germination and propagation of Iva frutescens L.

Ms. Kendra Sampson [1]***, Dr. Allison Walker*** [1]***, Dr. Danika Van Proosdij*** [2]***, Dr. Robin Browne*** [1]***, Ms. Kirsten Ellis*** [3]

1. *Acadia University,* ***2.*** *Saint Mary's University,* ***3.*** *CB Wetlands & Environmental Specialists*

Iva frutescens L., commonly known as marsh elder, is a shrub native to Nova Scotia salt marshes. Dense stands provide numerous ecosystem services, including wave energy attenuation, sediment stabilization, erosion control, habitat protection, pollinator support, and carbon storage. This species tolerates a range of salinities but is intolerant to flooding, restricting its distribution to narrow belts at higher elevations. This study explored *in* and *ex vitro* germination and propagation of *I. frutescens* to develop protocols for *ex situ* conservation and site recovery strategies. Seeds were collected in Fall 2024 from Atlantic coast (Surettes Island, Johnson Cove) and Bay of Fundy (Port Williams) salt marshes. Multiple variables were tested for *ex vitro* growth, including seed coat removal, cold stratification, and growth hormone application. For *in vitro* growth, seeds were placed onto four nutrient media types using plant tissue culture to assess germination and propagation response. *In vitro* trials revealed Johnson Cove seeds had high germination rates (85%) over 21 days when cold stratified on saline and placed on growth hormone media with no seed coat. *In vitro* germination varied significantly for cold stratified seeds, presence/absence of seed coats, and media type. *Ex vitro* germination varied significantly by collection site and seed coat presence. This is the first study to assess and successfully use *in vitro* micropropagation on *I. frutescens*. *In* and *ex vitro* derived plantlets remain under observation. These protocols are expected to assist with vegetative recovery of restored salt marshes and nature-based coastal management projects.

Indigenous Coastal Climate Coalition British Columbia is our Coast

Ms. Debbie Miller [1]***, Mr. Dave Johnston*** [2]***, Ms. Lexi Kosmides*** [3]***, Ms. Angela Davidson*** [4]***, Ms. Linus Shaw*** [5]***, Ms. Paula Lash*** [6]

1. *Indigenous Coastal Climate Coalition,* ***2.*** *Haisla First Nation,* ***3.*** *Songhees First Nation,* ***4.*** *Da'naxda'xw First Nation,* ***5.*** *Malahat First Nation,* ***6.*** *Cowichan Tribes*

The Indigenous Coastal Climate Coalition (ICCC) presents this abstract for the Coastal Zone Canada Conference "Strengthening Coastal Resilience and Relationships." We will present on coastal care and management.

The ICCC comprises Indigenous Nations with territories on the coast of British Columbia. These Nations recognize similar impacts from the changing climate and similar challenges to adapting to those impacts using historical and contemporary Indigenous practices and knowledge. The coalition Nations, Cowichan Tribes, Malahat Nation, Haisla, Da'naxda'xw, and Songhees, will share their projects, which include returning diked farmland to its natural state, shoreline restoration, protecting forests for an Indigenous protected area, and coastal erosion protection to protect cultural areas.

Paula Lash, Cowichan Tribes—estuary returning the diked farmland to its natural state with its partners Ducks Unlimited and Nature Trust.

Linus Shaw, Malahat Nation shoreline restoration project at Malahat beach.

Angela Davidson, Da'naxda'xw – Working with a practicing forester to protect forests with the goal of an Indigenous protected area – understanding the connection to the headlands and the coastline

Lexi Kosmides, Songhees – a plan to address coastal erosion for the protection of a Songhees territorial coastline

Dave Johnston will present on Haisla's shoreline protection project, detailing the process and barriers to date as the community actively works towards their goal of community protection due to shoreline erosion, storm surge, and rising sea levels. The project will focus on nature-based solutions driven by community engagement.

Indigenous Perspectives from Our Coasts: How Relationships with the Land and Each Other Strengthen Coastal Resilience Through Stewardship

Ms. Chelsea Boaler [1], ***Ms. Erin Keenan*** [1], ***Ms. Marianne Fish*** [1]

1. *WWF-Canada*

World Wildlife Fund Canada (WWF-Canada) supports Indigenous-led stewardship, restoration, and protection of coastal lands and waters from coast to coast to coast, across diverse bioregions and ecosystems. This workshop will provide space for Indigenous voices to share coastal stewardship experiences. Through these conversations, we will explore how stewardship can enhance connections to the land and each other, and how fostering these relationships can drive common priorities and strengthen resiliency. Case studies and stories from each of Canada's coasts will be shared. In Nunavut, WWF-Canada supports Guardian programs whose primary goal is to conserve wildlife and habitat to ensure the well-being of future generations. We further support Miawpukek First Nation Marine Guardians along the south coast of Newfoundland with stewardship efforts as it relates to blue carbon, aquatic cultural species at risk, and Indigenous Conserved and Protected Areas (IPCAs). On the Pacific Coast, we are facilitating training opportunities for First Nations and other partner organizations to build capacity for mapping and monitoring of coastal ecosystems and supporting Indigenous-led work to restore and protect coastal wetlands. Conversations will be led by Indigenous partners from these Guardian programs supported by our organization, and other Indigenous governments and organizations working to build coastal resilience. The aim of the workshop is to connect, foster relationships, and provide an opportunity for knowledge sharing among Indigenous people, communities, and organizations engaging in coastal stewardship.

Insights and outcomes from a collaborative assessment of the cumulative effects of marine vessel traffic at regional scales on the South Coast of British Columbia

Dr. Natascia Tamburello [1], ***Mr. Hugh Stimson*** [1], ***Dr. Ibrahim Alameddine*** [1], ***Ms. Shreya Nemani*** [1], ***Mr. Alex Crew*** [1], ***Dr. Annie Chalifour*** [2], ***Mx. Ship Movement and Vessel Management Coordinating Committee VMCC*** [3]

1. *ESSA Technologies Ltd.,* ***2.*** *LGL Environmental Ltd.,* ***3.*** *First Nations Fisheries Council*

Cumulative effects in Canada have historically been addressed on a project-by-project basis, including those creating additional vessel traffic in the marine and coastal environment. However, cumulative effects often exceed the temporal and regional scope of project-level impact assessments and have generally not been well captured to date. Under the Oceans Protection Plan, Transport Canada has partnered with the First Nations Fisheries Council of BC, ESSA Technologies Ltd., and LGL Ltd. to jointly conduct a regional Cumulative Effects of Marine Shipping (CEMS) assessment in South Coast BC over the last 2 years, guided and co-developed by a steering committee of delegates from at least 17 interested South Coast BC First Nations. This work has produced a comprehensive and detailed picture of the footprint all forms of vessel traffic on the South Coast of BC, from large cargo ships to small recreational boats, and estimated the potential impacts of their associated stressors (e.g., wake pressure, bottom disturbance, anchor damage, discharges, etc.) on benthic marine species and ecosystems at fine spatial and temporal scales across a calendar year. The results are anticipated to inform the development of targeted management strategies to reduce cumulative impacts on impacted marine ecosystems in this region. Our talk will provide an overview of our technical approach, results, and public data products of broad interest to coastal Indigenous communities. We will also offer lessons learned throughout the partnership on weaving Western and Indigenous ways of knowing to inform cumulative effects assessment that serves the needs of affected Indigenous communities.

LABORATORY INVESTIGATION OF WAVE-PERMAFROST INTERACTIONS IN ARCTIC COASTAL ENVIRONMENTS

Mr. Olorunfemi Omonigbehin [1], ***Mr. Hatim Ben Said*** [1], ***Dr. Jacob Stolle*** [1], ***Prof. Pierre Francus*** [1]

1. *Institut national de la recherche scientifique (INRS)*

Arctic coastal communities are witnessing rapid coastal erosion rates due to climate change. To build resilience in these communities, we must understand the thermomechanical processes at play when warming Arctic waters increasingly and extensively encounter Arctic coastal bluffs. In a controlled laboratory experiment, we subjected artificial permafrost blocks to varying wave conditions in a 9 m wave flume. We simulated natural coastal environments with wave heights of 2-4 cm and periods of 0.8-1.2 s, as well as still water and ambient air. We tracked the temperature evolution in the blocks with an array of six temperature sensors placed at 2 cm intervals along a transect parallel to the wave direction and morphological changes to the specimens using a video camera. This setup showed a link between wave energies of varying magnitudes and permafrost degradation. Our results revealed that higher wave forcing significantly accelerated thermal denudation and erosion of coastal permafrost. The laboratory findings, combined with field observations, will help in developing comprehensive, process-based numerical models for coastal permafrost erosion. This addresses the logistical challenge to the in-situ monitoring of the process and offer predictive tools that help planners, communities, and policymakers anticipate and adapt to changing Arctic conditions. A key novelty of our study is the provision of experimental data, such as the heat transfer coefficient at the water-permafrost boundary, which are essential initial and boundary conditions when developing, validating, and calibrating the numerical models.

Lessons for managed retreat: The role of place attachment on health and well-being

Ms. Robin Willcocks Musselman [1], ***Dr. Kate Sherren*** [1]

1. *School for Resource and Environmental Studies, Dalhousie University*

Climate change is predicted to increase overland and coastal flooding, putting millions of people living in floodplains and coastal area at risk. Individuals and communities will need to choose among various adaptation strategies including retreat; the strategic location of people, assets, and activities to avoid natural hazard risks and adapt to climate change impacts. Despite the logic and increasing urgency of relocating people and structures away from high-risk areas, complex economic, cultural, and social-psychological factors affect individual responses and create significant challenges. Recently, there has been more interest in understanding the influence of factors related to how people think about and respond to relocation, such as the emotional and social connections people have to the places where they live. Place attachment is seen as a valuable social dimension to understand because relocation will disrupt the bonds and identities people have wrapped up in that place. Although understanding of place attachments and how they respond under relocation is limited, there is a growing acceptance that disruption to place attachments can have negative consequences on people's physical and mental health, and well-being. Less understood however, is the stability and ontological security that place attachments provide can have positive effects. The possibility that place attachments offer in reinforcing self-continuity could help promote recovery and support the mental health and well-being of individuals by easing stress and the sense of loss caused by living through relocation. This knowledge could also provide informed guidance for intervention in managed retreat policy and planning initiatives.

Living Shorelines in Cool-Temperate Climates: Insights from a Freeze-Up Event at the Living Dike Pilot Project Site, British Columbia

Dr. Enda Murphy [1], ***Mr. Matt Osler*** [2], ***Dr. D. Gwyn Lintern*** [3], ***Ms. Michelle Côté*** [3]

1. *University of British Columbia,* ***2.*** *City of Surrey,* ***3.*** *Natural Resources Canada-Geological Survey of Canada*

The Living Dike is a pilot sea-level rise adaptation project in Boundary Bay, British Columbia, which was implemented through a partnership between the City of Surrey, City of Delta and Semiahmoo First Nation. The nature-based pilot was completed in Summer 2023, and included placement of sediment, planting of native salt-marsh vegetation, and construction of a variety of sediment-stabilizing features in plots extending up to 70 m seaward of existing dikes. There are few examples of such living shorelines projects in cool-temperate climate regions where snow and ice are sometimes present for extended periods. If successful, the Living Dike concept will be implemented over a wider area, helping to offset the effects of sea-level rise on coastal flood risk in the hinterland.

In January 2023, southern BC experienced a pronounced cold snap, with daily-minimum air temperatures falling below freezing for ten days. Monitoring revealed the formation of shorefast ice, and following the event, varying patterns of ice break-up within the different plots. Ice plucking of sediment, oyster shells, and transplanted vegetation plugs was observed. Here, we present observations of the short-term effects of this freeze-up event on the integrity of the Living Dike pilot, and an analysis of long-term meteorological records and regional climate model projections to estimate the changing likelihood of such events within the first few years of marsh creation or restoration projects. The results provide insight to considerations for scale when implementing living shorelines projects in cool-temperate regions, and triggers for parametric insurance covering ice hazards.

Living with the Seafloor: Exploring Place-Based Knowledge of Benthic Spaces in the Minas Basin, Nova Scotia

Ms. Alison Webster [1], ***Dr. Patricia Manuel*** [1]

1. *Dalhousie University*

People who live at the coast, and who work in and use coastal and marine spaces for recreation have unique knowledge of the ocean, including the seafloor. Usually not visible from the surface or easy to reach, exploring, understanding, and using the seafloor requires well-honed skills, frequently used by residents of coastal communities. However, local, place-based understanding of benthic spaces are often overlooked in benthic mapping, despite its importance for informing decision-making about the use and protection of the coastal and marine environment. Exploring and documenting the place-based knowledge accumulated by residents of coastal communities can contribute to a holistic understanding of benthic spaces and the connection of coastal communities with the seafloor. Using participatory mapping and semi-structured interviews with recreational and commercial users, this research explores local uses, perspectives, and interpretations of coastal and marine spaces, particularly the benthic environment of the Southern Bight of the Minas Basin. The mapping sessions and interviews provided insight into the geography of the Minas Basin seafloor, and the social, cultural, ecological, and economic significance of benthic spaces in the Minas Basin. Mapping tied activities, observations, and experiences to places, as well as documented observed changes. The results from this study can contribute to a holistic understanding of the seafloor, as well as provide insights to understand attachment to place in a changing coastal landscape. This knowledge can be used to support resilient coastal culture and livelihoods, enhance local decision-making, and inform protection strategies for benthic habitats in the Minas Basin.

Local voices, marine choices: Reimagining participation of coastal communities in Marine Spatial Planning

Mr. Daniel Martinez Calderon [1], ***Dr. Bertrum H. MacDonald*** [1], ***Dr. Patricia Manuel*** [1]

1. *Dalhousie University*

Public participation is essential for the successful management of coastal-marine environments. In this context, Marine Spatial Planning (MSP) has emerged as an influential approach to promote sustainable marine governance. By 2023 about 126 countries had embraced MSP in some form, including Canada. However, social science scholars criticize stakeholder engagement in MSP for often being tokenistic, especially of community-level stakeholders. To address this critique, we conducted research to develop a place-based decision-making framework to foster meaningful local stakeholder participation in MSP, using the Scotian Shelf-Bay of Fundy planning area as a case study. Through a mixed-methods approach combining a literature review, expert interviews (local and global), and community focus groups, this study explores three key dimensions: (1) theoretical foundations for reimagining community-oriented MSP, (2) practical elements that facilitate meaningful local engagement, and (3) contextual factors that influence public participation in the study area. The study examines how to integrate the local component into MSP to develop more inclusive processes that reflect the perspectives, interests, and needs of coastal communities. The result is a framework with three key components: (1) stakeholder engagement and community planning principles, (2) locally sensitive practices for effective engagement about who should participate, how, when, and at what level, and (3) context-appropriate factors that shape public participation in the Scotian Shelf-Bay of Fundy planning area, including cultural, institutional, political, and socioeconomic factors. This presentation will demonstrate that application of the framework will strengthen coastal-marine management by offering an evidence-based approach to enhance participation of coastal communities in MSP.

Mahone Bay Living Shoreline: Flood Protection and Shoreline Stabilization.

Ms. Jordan Veinot [1]

1. *Coastal Action*

The Town of Mahone Bay, Nova Scotia is extremely vulnerable to the effects of climate change, including sea level rise, storm surge, and increased precipitation. These effects result in flooding, coastal erosion, and an increase in contaminated stormwater runoff entering the harbour. To help protect Mahone Bay from flooding and mitigate coastal erosion, Coastal Action proposed the 'Flood Protection and Shoreline Stabilization Project'. This project involves the construction of a natural infrastructure site; a combination of a living shoreline, nearshore breakwater (rock sills), and tidal wetland, along Edgewater Street in Mahone Bay. These multiple pieces of infrastructure will work collaboratively to reduce wave energy and storm surge, filter stormwater runoff, and stabilize the shoreline. Driven by a partnership that includes partners in local government, academia, and industry working together, we have been able to see this project come to life in a community that needs it. Research is being conducted at the site to test the applicability and success of natural infrastructure techniques in buffering climate change impacts under variable winter conditions. The project also involves educating the public on site-specific coastal climate change risks and the significance of coastal nature-based solutions through educational signs, workshop events, and community planting days hosted at the site.

Making Adaptation Count: Implementing Adaptation Pathways in the Aquaculture Sector

Mr. Adrian Prado [1], ***Mx. Stephanie Arnold*** [1], ***Ms. Anna Jamieson-Garf*** [1], ***Ms. Jenna Miller*** [2], ***Mr. Sepehr Khosravi*** [1], ***Ms. Willa Neilsen*** [1]

1. *CLIMAtlantic,* ***2.*** *Province of NB Environment & Local Govt.*

As the threats of climate change in the Atlantic coastal zone increase in magnitude, scope and complexity, finding the adaptation approaches that avoid causing unintended harm (i.e. maladaptation) is becoming more and more challenging. How do we know which option(s) are the right fit? How may each open or close the door to more comprehensive, impactful and/or long-term options somewhere down the road? CLIMAtlantic and its partners are applying future visioning and collaborative co-creation with stakeholders and rightsholders through the use of an adaptation pathways approach to map out the different options, threats, pressures and considerations that should play a role in collective adaptation planning and action.

This presentation will showcase CLIMAtlantic's exploration of applying a first iteration of a holistic adaptation pathways framework to the oyster and salmon aquaculture sectors of New Brunswick. It will emphasize how mapping adaptation pathways can offer the opportunity to explore the deeper relationships among different actors, adaptation options, multiple hazards, and the complex and interrelated systems that they act on (e.g. social, economic, ecological, etc.). This work will explore coastal adaptation across various scales (e.g. local, watershed, regional, etc.), jurisdictions (e.g. municipal, provincial), and time horizons.

Making Room for Wetlands: Managed dyke realignment and tidal wetland restoration in Nova Scotia's dykelands

Ms. Nancy Anningson [1], ***Ms. Morganne Robben*** [1], ***Dr. Danika Van Proosdij*** [2], ***Mr. Tony Bowron*** [3]

1. *TransCoastal Adaptations Centre for Nature-Based Solutions,* ***2.*** *Saint Mary's University,* ***3.*** *CB Wetlands and Environmental Specialists*

The practice of re-introducing, where feasible, tidal flow to former agricultural dykelands and the restoration of tidal wetland habitat has been identified as a viable adaptation method to current and future hazards associated with climate change. With limited resources available, guidance is required to determine where and how our dykeland systems can be managed to optimize ecosystem services, maximize adaptation benefits, and minimize economic costs while maintaining fertile agricultural land and social, cultural, and historic activities. Building upon the successful implementation of managed dyke realignment and restoration of tidal wetland habitat in the first iteration of the *Making Room for Wetlands* (*MRFW*) project (2017-2022), *MRFW* 2.0 is being implemented in multiple dykeland communities in the Bay of Fundy, Nova Scotia, Canada. Sites are selected in collaboration with the Provincial body responsible for dyke maintenance after a comprehensive dyke vulnerability assessment. This project builds upon over two decades of collaboration and experience in tidal wetland restoration. Many of these sites have historical and cultural significance to both the Mi'kmaq and Acadian peoples and are known to support culturally important species to the Mi'kmaq, including plamu (Atlantic Salmon), punamu (Atlantic Tomcod) and ka't (American Eel). The project will improve the resilience of the surrounding communities, infrastructure, and agricultural lands to climate change by allowing room for the natural migration of wetlands in response to sea-level rise, reducing flood and erosion risks. This presentation will provide an overview of the *MRFW* project framework and current and past sites and successes.

Making Waves: The Social Ripple of Marine Conservation

Ms. Payton Truyens [1], ***Ms. Vanessa Mitchell*** [1], ***Mr. Joshua Barucha*** [1]

1. *Maritime Aboriginal Peoples Council*

Humans are social beings that develop strong connections to their physical environments. Marine environments are no different, and provide significant value to one's health, wellbeing, lifestyle, livelihood, culture, and spirituality. When conservation areas are established to protect marine environments, it can lead to a variety of positive and negative environmental, economic, and social impacts. While the environmental and economic impacts receive substantial attention in science and policy, less significance is placed on the social impacts of conservation efforts, despite them carrying equal importance.

The Social Impacts of Marine Conservation Project recognizes the value of peoples' ties to marine environments and is looking to identify what social impacts are associated with marine conservation. Additionally, this project is developing a Social Impact Assessment Framework that can be used to ensure proposed marine conservation areas have a net-positive impact on individuals and communities. This can be done through mitigating negative impacts while reinforcing positive impacts. Marine conservation areas are a critical tool for restoring and maintaining the health of our oceans and, through this project, we want to ensure that the social wellbeing of the communities in these conservation areas is also maintained, if not improved.

This project and the subsequent framework focus on the off-Reserve Indigenous Community in the Maritimes Region and has the overarching goal of increasing the role of the off-Reserve Community as Rightsholders in marine conservation.

Managing Long-term Coastal Uncertainty with Adaptation Pathways – Case Study of The Links at Crowbush, PEI

Ms. Brianna Lunardi [1], ***Mr. Vincent Leys*** [1], ***Dr. Laura Swatridge*** [1]

1. *CBCL*

The Links at Crowbush (Crowbush) is an iconic provincially owned golf course on the north shore of Prince Edward Island (PEI). The coastline at Crowbush is characterized by a natural and artificial dune system at varying levels of stability, a sandy beach, and a bluff headland to the west. The beach-dune system and subsequently course assets are increasingly vulnerable to coastal flooding from storm surge and wave attack, and erosion, which is mostly dominated by large storm events. The coastal impacts of these events are expected to be accelerated by loss of sea ice and sea level rise.

Multiple adaptation solutions can be implemented to minimize coastal risk, erosion and flooding, at the site. A sustainable approach to mitigate coastal risk requires the intentional alignment of intervention approaches with dynamic processes and increasing hazards. The challenge with achieving this is understanding which adaptation solutions to implement and when. Adaptation pathways are a decision-making framework used to manage long-term challenges and uncertainties in the context of climate change. The decision to move from one pathway to the next is based on trigger points which indicate when a solution is anticipated to fail or loose function. Allowing for adaptation to occur before a trigger is met, reducing reactive decisions and promoting adaptive ones.

This presentation will share how adaptation pathways were used to help decision-makers plan which interventions to implement and when at The Links at Crowbush Golf Course.

Mapping Social Metabolism in the Gulf of St. Lawrence, 1850-2025

Dr. Joshua MacFadyen [1], ***Dr. Erin Spinney*** [2]

1. *University of Prince Edward Island,* ***2.*** *University of New Brunswick, Saint John*

This paper attempts to answer a seemingly simple question: how many people lived on the shores of the Gulf of St. Lawrence at various points in its long history of European settlement? The answer is surprisingly difficult given the fragmented nature of this multi-jurisdictional and fundamentally coastal space. However, it is essential to define these terms in order to understand the Gulf's social and ecological metabolism, a critical approach to addressing sustainability problems in the region. This is one of the goals of a new SSHRC Partnership Development project: Ecologies, Knowledge, and Power in the Gulf of St. Lawrence Region, c.1500-Present. This interdisciplinary team considers the Gulf as littoral space, where internal flows of energy, materials, and knowledge across land and sea were often as significant as resource extraction. The paper draws on a wide variety of detailed historical records to offer a more precise accounting of social, economic, and environmental changes in the region. Using digital tools such as historical Geographic Information Systems the paper considers population growth as well as the historical acquisition and distribution of food and energy across the Gulf, particularly in the last 175 years.

MESH OPTIMISATION FOR MODELLING MICRO AND MESO TIMESCALE SHORELINE EVOLUTION ALONG SANDY COASTS

Ms. Kristen Goseine [1], ***Dr. Avidesh Seenath*** [2], ***Prof. Nigel Williams*** [1], ***Dr. Scott Mahadeo*** [1]

1. *Portsmouth Business School, University of Portsmouth,* **2.** *Environmental Change Institute, University of Oxford*

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

Modelling Fate and Transport of Dredged Sediment Pumped onto Sturgeon Bank, Fraser Estuary

Mr. Jeremy Karkanis [1], ***Mrs. Jamie Morris*** [2], ***Mr. Mitchel Provan*** [2], ***Ms. Jamie Gauk*** [3], ***Mr. Eric Balke*** [3], ***Mr. Julien Cousineau*** [2], ***Dr. Enda Murphy*** [1]

1. *University of British Columbia,* ***2.*** *National Research Council Canada,* ***3.*** *Ducks Unlimited Canada*

Sturgeon Bank is a provincially-designated Wildlife Management Area comprised primarily of intertidal marsh, mud flats and open water within the unceded traditional territories of the Coast Salish peoples, including the xʷməθkʷəy̓əm (Musqueam) and sc̓əwaθən məsteyəxʷ (Tsawwassen) First Nations, and west of the City of Richmond, British Columbia. Sturgeon Bank provides critical habitat for fish and migratory birds, and is the first line of defence in protecting the City of Richmond from exposure to coastal hazards. However, monitoring indicates that the salt marsh areas at Sturgeon Bank have receded by more than 30% since 1986. The Sturgeon Bank Sediment Enhancement Pilot Project involves placement of mounds of dredged, fine sediments on the intertidal mudflats, with the premise that the sediments will be transported onshore by waves and tidal circulation, supporting marsh restoration. Beginning in 2021, three sediment depositions have been completed at Sturgeon Bank, with plans to continue placing sediment annually. However, monitoring and observing transport pathways and quantities is challenging, owing to the relatively small quantities of placed sediments, and difficulties in distinguishing them from native sediments. Our research aims to provide insight to sediment source-receptor pathways, and inform the pilot project methodology, using field observations and numerical models to replicate the driving hydrodynamic and sediment transport processes. This presentation will provide a summary of model development, calibration, preliminary findings and lessons learned. Next steps will be discussed, including opportunities for model expansion to support marsh restoration, and nature-based solutions for managing coastal hazards throughout the Fraser River Delta.

Modelling of storm surge and surface wave contributions to coastal flooding in the Northumberland Shore Region

Dr. Laura Swatridge [1], ***Mr. Amaury Camarena*** [1], ***Mr. Tom Kozlowski*** [1], ***Mr. Clenmar Rowe*** [1]

1. *CBCL*

The dynamic combination of tides, storm surge, and surface waves can lead to extreme water levels, which are intensified the predicted effects of climate change. This study applies numerical modeling and data analysis techniques in the Northumberland Shore Region of Nova Scotia to assess coastal conditions that contribute to coastal flood risk. A dynamically-coupled hydrodynamic and spectral wave model was applied to the region to provide up to 100 m resolution predictions of circulation and waves, driven by observed water levels and meteorological forcing from regional atmospheric models. The model was calibrated to available water level observations to ensure accurate prediction of water levels across the domain and validated under extreme storm conditions (Hurricane Fiona, 2022).

Statistical analysis of long-term metocean datasets was completed to develop an understanding of extreme conditions, which are used as model inputs to simulate water levels and waves corresponding to 2-, 20-, and 100-year storm events. Model results were used to develop flood lines for the region for static water level, capturing the combined effects of high tide, storm surge, and wave setup by superimposing peak water levels on provincial LiDAR. Further investigation was completed to assess dynamic flood limits. A 1-dimensional wave model, XBeach, was applied to predict wave run-up for regions of interest. Additionally, a 2-dimensional overland flood model, SFINCS, was applied to simulate dynamic flood limits, utilizing wind and precipitation from tropical cyclones as the primary drivers.

MODELLING THE EFFECTIVENESS OF NATURE-BASED INFRASTRUCTURE IN REDUCING FLOOD HAZARDS AT THE LIVING DYKE IN BOUNDARY BAY, BC

Ms. Marina St. Marseille [1], ***Dr. Ryan Mulligan*** [1], ***Ms. Jamie Gauk*** [2], ***Mr. Aerls De La Rosa Toro Rivera*** [3], ***Dr. Enda Murphy*** [3], ***Mr. Mitchel Provan*** [4]

1. *Department of Civil Engineering, Queen's U,* ***2.*** *Ducks Unlimited Canada,* ***3.*** *University of British Columbia,* ***4.*** *National Research Council Canada*

Climate change will continue to affect coastal regions, as global sea levels rise, and as areas are increasingly exposed to erosion and flooding hazards arising from the combined effects of waves and high-water levels. Here, a low-lying region along the coast of Boundary Bay in British Columbia exposed to waves and storm surge is studied. Communities, farmlands and critical infrastructure in this region are protected from flooding by an existing 100-year-old dyke, which is coming under increasing pressure from sea-level rise. The "Mud Bay Nature-based Foreshore Enhancements" is a pilot project that has been launched to assess and demonstrate the viability of using a 'Living Dyke', a nature-based infrastructure to enhance coastal flood protection in the region. The project involves placing sediment, planting native salt marsh vegetation, and testing four stabilization techniques including brushwood dams, sand berms, rock berms, and oyster-shell bags in the intertidal zone to attenuate waves and reduce wave overtopping of the dyke. A series of in-situ pressure sensors have been deployed to monitor wave and water level conditions at the field site. Using the observations, a high-resolution coupled wave-flow numerical model (Delft3D-SWAN) is validated and applied to simulate wave dissipation and flooding scenarios. Modelling of extreme wave events and sea-level rise scenarios is conducted to evaluate the performance of the Living Dyke stabilization techniques. The results will provide insight to the potential benefits of the Living Dyke as a nature-based protection measure to mitigate coastal squeeze and reduce risks from waves, storm surge, and sea-level rise.

Monitoring vegetation height to track environmental change and restoration trajectory in tidal wetlands

Dr. Jeremy Lundholm [1], ***Ms. Kayla Williams*** [2], ***Ms. Emily Hodgson*** [3], ***Ms. Jennie Graham*** [2], ***Mr. Tony Bowron*** [2], ***Dr. Danika Van Proosdij*** [3]

1. *TransCoastal Adaptations Centre for Nature-Based Solutions,* ***2.*** *CB Wetlands and Environmental Specialists,* ***3.*** *Saint Mary's University*

Monitoring coastal processes can involve complicated and expensive instrumentation. This creates challenges for community groups and landowners who need simple but reliable ways to assess changes to local shorelines. This study evaluates whether the height of dominant tidal wetland plants can be used to indicate changes in wetland health. We used >4700 records of dominant species height measured from vegetation plots in reference and restoring tidal wetlands in mainland Nova Scotia. Twelve species had sufficient records for statistical analyses; 11 of 33 reference sites had at least five years of repeated samples. Reference sites showed showed both declines and increases in heights over time depending on species and site. Average heights of several species were significantly greater for Upper Bay of Fundy minerogenic wetlands compared with Atlantic and Northumberland Strait coastlines. Reference heights for dominant low marsh and high marsh grasses were negatively correlated with elevation and positively correlated with soil nitrogen. At restoration sites, heights of dominant salt and brackish marsh species showed consistent trends only at the Upper BoF sites, with heights peaking 4-7 years post-restoration, followed by declines >10 years onward. This height response may result from increased nutrient availability following sediment accretion in early post-restoration followed by declines as accretion slows down. Plant height may represent an effective metric for assessing changes to tidal wetlands and other coastal ecosystems, and evaluation of restoration trajectories. Future work will assess the role of changes in tidal hydrology on vegetation height and establish regional baseline values for each species.

Municipality Scale Assessment of Wave Run-up Risk to Coastal Infrastructure

Mr. Tom Kozlowski [1], ***Mr. Amaury Camarena*** [1]

1. *CBCL*

Coastal flooding is a growing concern for municipal infrastructure, such as roads or buildings, along the shoreline. Coastal infrastructure vulnerability assessments at the regional or municipality-scale require spatially varying estimates of extreme water levels and wave effects. Assessments of this scale may neglect the complex and significant coastal processes of wave set-up and particularly wave run-up. The presented work shows the methodology and results of a large-scale application of EurOtop guidelines for the regional-scale estimation of wave run-up, and their use in scoping-level infrastructure assessment.

Wave run-up calculations were applied to profiles at a spacing of 1 m along the shoreline using regionally modelled input conditions (extreme water levels, significant wave height, wave period), as well as elevation data derived from LiDAR. Extreme coastal conditions were considered for four return periods (2-, 20-, 100-, 1,000-year) and two climate conditions (present day, year-2100).

In total, 1.9 million calculation nodes along the coast of Halifax Regional Municipality were used to assess 16,689 road assets and 9,727 vertical assets (e.g. buildings, facilities, or properties) for estimated wave run-up risk. The resulting likelihood, consequence and risk scores were calculated for the purposes of high-level identification of high-risk assets where site-specific detailed assessment would be recommended.

The presented methodology can inform high-level planning and decision-making where knowledge of coastal flood risk and climate change is important, such as infrastructure maintenance, asset management, development, recreation planning and emergency management.

Native or Invasive? How shoreline plant communities are recovering from Hurricane Fiona in Nova Scotia

Dr. Sarah Stewart-Clark [1]

1. *Dalhousie University*

As climate change increases the frequency of storm events, hurricanes will play an increasing role in species invasions by acting as both a vector for invasive species and by destabilizing habitat making it more susceptible to invasion. In September 2022, Hurricane Fiona landed in Atlantic Canada as a Post Tropical Storm causing storm surges and wave activity that significantly damaged sandy beaches in Nova Scotia. In some locations all vegetation along the sandy shore, including entire sand dunes were completely removed. When a disturbance, like a hurricane opens up space, non-native weedy or invasive species are often the first to establish populations. The very characteristics that make them invasive often assists in this rapid establishment. As severe storm events increase due to climate change, will invasive species displace native species, or as habitat succession occurs, will native species re-establish and replace the invasive species over time? This study examined two sites along the North Shore of Nova Scotia from intertidal zone through dune systems to low marsh, tracking whether the plants that grew back were native or non-native species. Preliminary data analysis demonstrates that native plants primarily dominate in high intertidal habitat, while invasive species now dominate the dune and low marsh habitats. Following these ecosystems over time will allow us to understand whether native plant communities will recover, or if severe storm events, like Hurricane Fiona will benefit invasive plants over native ones.

Nature-based sandy interventions: finding synergies between flood safety, beach recreation and nature

Prof. Kathelijne Wijnberg [1], ***Ms. Elham Bakhshianlamouki*** [1], ***Ms. Sasja van Rosmalen*** [2], ***Mr. Manuel Teixeira-Manion*** [1], ***Dr. Ellen-Wien Augustijn*** [1], ***Prof. Marcela Brugnach*** [3], ***Dr. Erik Horstman*** [1], ***Dr. Juul Limpens*** [2], ***Dr. Jan Mulder*** [1], ***Dr. Michel Riksen*** [2], ***Prof. Alexey Voinov*** [1]

1. *University of Twente,* ***2.*** *Wageningen University,* ***3.*** *Basque Centre for Climate Change*

Socio-economic pressures in coastal zones are rising worldwide, leaving increasingly less room for natural coastal dynamics. Identifying synergies between social and natural systems seems crucial for fostering sustainable coexistence and co-development. Recent multi-functional, nature-based interventions on the Dutch coast offer great potential in that respect. Constructed by mega-nourishment, these interventions aim at improving flood safety on a decadal scale by increased dune growth, while enhancing ecological and recreational value. Surprisingly, studies evaluating these innovative solutions paid little attention to how the social and natural systems interact in these human-made coastal landscapes (which we refer to as sandy anthropogenic shores, or SAS). We do not know whether these interactions strengthen or weaken the primary safety function of the nature-based interventions throughout its lifetime.

Using the Hondsbossche Dunes and the Sand Motor SAS as Living Labs, we investigated how recreation, embryo dunes and flood safety co-evolve over time and across space. Based on field studies and a participatory modelling process we have integrated beach visitors' behaviour with novel biomorphological models to evaluate the evolving functionality of the interventions.

Simulations over 20–50 years showed that on wide, elevated SAS beaches, high recreation pressure constrained embryo dune formation, allowing for continued growth of the original foredune thus enhancing long-term flood safety. However, this synergy between recreation and flood safety came at the cost of ecological value. Further exploration of SAS design and recreation scenarios could reveal whether ways exist to achieve synergies among all three functions: recreation, flood safety, and ecological value.

Navigating Challenges and Unlocking Opportunities: A Panel Discussion on Implementing Nature-based Solutions for Coastal Resilience

Ms. Brianna Lunardi [1], ***Ms. Rachael Franks Taylor*** [2], ***Ms. Negin Ficzkowski*** [3], ***Mr. Mitchel Provan*** [4], ***Ms. Kate Hayes*** [5], ***Ms. Jenny Gharib*** [6], ***Ms. Jennifer Crilly*** [7]

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The implementation of nature-based solutions (NBS) is critical for enhancing coastal resilience to climate change, biodiversity loss, and increasing human pressures. Decision-makers often encounter challenges and barriers, including policy and knowledge gaps, limited resources, guidance, and community engagement. This panel discussion hosted by the Great Lakes Nature-based Coastal Solutions community of practice will bring together a diverse group of experts to explore these challenges and identify pathways to overcoming them.

The session will begin with a brief presentation highlighting the gaps and opportunities in NBS implementation, summarizing key insights from recent research on the experiences of shoreline municipalities, focusing on four categories - governance, socio-scientific, technical, and socio-economic barriers. These insights will provide a foundation for the panel discussion.

The panel discussion will feature five confirmed practitioners who will participate in a moderated question-and-answer session focused on the challenges and barriers to implementing NBS. The moderator will guide the panelists through a series of thought-provoking questions designed to introduce key themes, encourage the sharing of diverse perspectives, and explore specific case studies or experiences. The session will then shift to an interactive format, providing the audience an opportunity to pose questions directly to the panelists.

The session aims to mobilize the existing knowledge on NBS and guide strategies for policymakers, practitioners, and researchers seeking to increase the adoption of successful NBS. Through advancing dialogue and building relationships, the panel aspires to contribute to the advancement of sustainable, inclusive, and resilient coastal communities.

Numerical Modelling of Morphodynamic Processes around Shipping Channels and Shallow Bays

Ms. Chiara Manchia [1], ***Ms. Zoe Zimmerman*** [1]

1. *WSP (Ports, Marine and Coastal)*

Sediment transport dynamics in a complex coastal environment characterized by strong tidal flows, shipping channels, and shallow bays was studied using numerical models. This study supported the California State University's Maritime Academy's (Cal Maritime) pier and boat basin redevelopment in Vallejo, California. Due to the facility's exposed location, in proximity to a shipping channel passing through a shallow bay, and local fluvial influence, it was important to understand the effects of a redesigned pier and breakwater extension on the local hydrodynamics and seabed morphology.

A coupled hydro-morphodynamic model (Delft3D-FM) was used to simulate flow, wind, and wave forcing for typical and extreme conditions, including wave-current interactions and associated sediment processes. Impacts of climate change were incorporated in the form of sea level change when estimating the extreme wave conditions. Wave forces on pier structure elements were calculated to ensure the integrity of the redevelopment to climate change induced stresses. The Delft3D-FM model also simulated sediment dynamics throughout the model domain from the Pacific ocean to areas of interest inside San Pablo Bay. Model results were validated using measured bathymetry. Flow restrictions near the proposed pier extension were identified, with minor changes in nearby areas. Sediment transport modeling indicated that the seabed reached an equilibrium state in response to the modification in flow conditions from the redevelopment, with finer sediments redistributing uniformly within the larger dredged basin of the proposed design. The findings highlight the effectiveness of numerical models in evaluating sediment processes in macro- and micro-spatial and temporal scales.

Numerical study of wave overtopping at coastal revetments

Dr. Mojtaba Jandaghian [1], ***Dr. Abolghasem Pilechi*** [1], ***Mr. Scott Baker*** [1]

1. *National Research Council Canada*

Canadian coastal infrastructure and communities are increasingly threatened by the impacts of climate change. Severe storms, leading to coastal flooding and increased wave heights, pose significant risks, endangering shorelines and critical infrastructure. Coastal revetments are essential protective structures against such hazards. Yet, their design, configuration, and material properties require further evaluation to effectively address the evolving challenges of climate change.

Physical modelling is a well-established approach historically used for evaluating the design performance of coastal structures. However, its high costs and limitations in simulating extreme wave conditions restricts its application in complex design scenarios. Advances in computational methods provide cost-effective alternatives capable of capturing wave-breaking events and wave-structure interactions. Nevertheless, further development and validation are required to accurately simulate severe wave overtopping at revetments, considering their different configurations.

This study examines the capability of a Computational Fluid Dynamics approach, based on an enhanced mesh-free particle method, to assess the resilience of coastal revetments under wave action. The numerical model incorporates irregular wave boundary conditions and simulates the coastal revetment as a porous medium. We validate the numerical results, including simulated wave data and overtopping discharge, against experimental measurements conducted in the Large Wave Flume facility at the National Research Council Canada, Ottawa. We analyze the effect of different parameters and numerical configurations on the model's performance. The findings provide valuable insights into the strengths and limitations of the adopted approach for such applications, contributing to advancements in coastal structure modelling.

PEI Climate Hazard Tools & Resources

Ms. Emily VanIderstine [1], ***Mr. Matthew McNeill*** [1]

1. *Government of Prince Edward Island*

Prince Edward Island (PEI) is at the forefront of addressing coastal hazards through a comprehensive suite of tools and resources designed to help residents, property owners, and planners understand and mitigate risks associated with coastal flooding, erosion, and sea-level rise. This presentation will explore the available tools and resources including the Climate Hazard & Risk Information System (CHRIS), Coastal hazards Assessments (CHA) along with several guidance documents.

Coastal Hazard Assessments (CHA) offer in-depth evaluations of potential erosion and flood hazards for individual properties. These assessments are valuable for landowners and developers seeking to implement risk reduction measures and ensure sustainable land use in vulnerable coastal areas.

The Climate Hazard & Risk Information System (CHRIS) provides comprehensive climate hazard and risk information. CHRIS integrates data on historical weather events, climate projections, and potential impacts of climate change to offer a robust understanding of future risks. This system supports strategic planning and resilience-building efforts by highlighting areas most at risk from climate hazards.

These tools along with the accompanying guides help residents and property owners understand and reduce risks associated with coastal flooding, erosion, and sea-level rise. Together, these tools represent a coordinated effort by PEI to promote resilience against coastal hazards, protect communities, and support sustainable development in the face of a changing climate.

Pelee Coastal Resilience Action Plan

Mr. Pete Zuzek [1], ***Mrs. Linda Mortsch*** [2], ***Mrs. Janice Forsyth*** [3], ***Dr. Larry Hildebrand*** [4]

1. *Zuzek Inc.,* ***2.*** *University of Waterloo,* ***3.*** *Foresight Consulting,* ***4.*** *World Maritime University*

The Pelee Coastal Committee is leading the development of a Resilience Action Plan for the two littoral cells that converge on Point Pelee National Park. The funding for the project was received from Natural Resources Canada's Climate Resilience Coastal Communities fund and local matching resources from counties, municipalities, and conservation authorities. Baseline conditions in the coastal area of the two littoral cells was documented along with coastal risks to infrastructure and natural capital using recently updated hazard mapping. A draft list of adaptation concepts was co-developed with the community to increase resilience to the social, economic, ecological, and physical dimensions of the coast. Following extensive community engagement on the draft concepts, the Pelee Coastal Committee selected six adaptation concepts that will be advanced in Year 2 of the project which commenced in April 2025. The adaptation planning and design will assess at-risk municipal infrastructure and natural capital, generate fact sheets for stakeholders, create a nursery to propagate genetically appropriate native plants for restoration, consider alternatives to de-risk coastal communities with nature-based restoration, design rock shoals and beach nourishment to protect Point Pelee National Park from further erosion, and development concepts to enhance bypassing of sediment at harbours and ensure the beneficial re-use of dredged sediment for beach building.

Pilot Testing a Living Dike in Boundary Bay, British Columbia

Mr. Eric Morris [1], ***Mr. Evan Elder*** [1], ***Ms. Allison Matfin*** [1], ***Ms. Rachel Burns*** [1], ***Mr. Matt Osler*** [2], ***Mr. Daniel Stewart*** [3]

1. *Kerr Wood Leidal Associates Ltd.,* ***2.*** *City of Surrey,* ***3.*** *Asarum Ecological Consulting*

Salt marsh serves as critical wetland habitat and offers natural flood protection for surrounding areas. However, salt marsh habitat is under threat as sea level rise threatens its survival through coastal squeeze. To address this, the City of Surrey is undertaking the Living Dike project in Boundary Bay, BC which experiments with nature-based methods to protect salt marsh habitat and maintain flood protection value as sea levels rise under a changing climate.

The project's first phase, the salt marsh pilots, was implemented in 2023 to explore methods for creating, elevating, and preserving marsh habitats. Techniques tested included thin-layer sediment placement, edge stabilization, and marsh planting. These pilot sites have already endured multiple coastal storms, providing insights into the effectiveness of various stabilization and planting methods.

The project's second phase, slated for construction in spring 2025, will trial a "wide green dike" design, an adaptation from Northern Europe. This dike consists of erosion-resistant clay and sandy clay planted with grasses and herbaceous plants. In fall 2024, the National Research Council of Canada conducted physical modelling of this design to gauge its resilience to wave action under Boundary Bay's storm conditions. Future phases aim to combine the salt marsh and wide green dike approaches across Boundary Bay, leveraging findings from these pilots to construct an integrated living dike that enhances both habitat and flood protection as sea levels rise.

The findings from the physical modelling, the pilot construction, and the application of the European design to a BC setting are discussed.

Planning in advance of an expanding industry: What a successful kelp economy means for BC

Mrs. Sarah Gutzmann [1]

1. *Simon Fraser University*

Seaweed industries are rapidly expanding worldwide and are heralded as being environmentally low impact and able to enhance habitat, fisheries productivity, and the livelihoods of coastal communities. Ocean industries have reciprocal relationships with social and environmental health; however, 'business as usual' industries tend to be poorly equipped to navigate pivotal social-ecological challenges like climate change, (a lack of) social equity, and biodiversity loss. On the contrary, the "blue economy" as well as "regenerative economics" are development frameworks better suited to the ocean's polycrisis as they prioritize social-ecological wellbeing.

Canada is in the process of developing a blue economic strategy with an expressed interest in a seaweed sector. Likewise, a blue economy is a priority for British Columbia (BC) where seaweed industries (focused on kelp harvest, cultivation, and restoration) have been expanding. However, the sector is still relatively new in BC, with some of the largest producers only having started operations in past 7 years. Hence, this developing sector provides an opportunity to be transformative, planning beyond what is sustainable and into what can be regenerative and reconciliatory, in order to meet synergistic social, economic, and environmental goals and be resilient to climate change. Highlighting part of the author's PhD research project, this presentation will 1) synthesize factors needed for a "successful" kelp sector in the context of regenerative and blue-economic development theory, 2) critically apply the planetary boundary concept to depict BC's kelp social-ecological system, and 3) share preliminary results from a sector social network analysis.

Polycentric Governance in the Gulf of St. Lawrence

Dr. Mario Levesque [1]

1. *Mount*

Environmental governance in the Gulf of St. Lawrence is a complex endeavour with multiple interdependent actors involved in decision making at multiple levels within a general system of rules that governs environmental subsectors. This suggests a potentially fragmented governance system at play with suboptimal environmental outcomes. This paper challenges this view by drawing on public choice theory to probe the attributes that affect management options in relation to eight case studies (fisheries, Gulf infrastructure, offshore oil and gas, coastal and shoreline protection, ship ballast water, aquaculture, large ocean management, marine protected areas) to offer valuable insights into natural resource and environmental policy formation. The key questions are: How has institutional design impacted environmental outcomes in cases? Can we detect the emergence of a polycentric system of governance in the Gulf of St. Lawrence?

Post-tropical storm Fiona – impacts and recovery at Waterside Beach Provincial Park and Big Island beach on the Northumberland Strait of Nova Scotia

Ms. Alexis Trevors [1], ***Dr. David Garbary*** [1]

1. *St. Francis Xavier University*

Coastal dune systems are dynamic and experience seasonal fluctuations in erosion and accretion, but extreme weather events can cause extensive short-term erosion and other impacts. Extreme weather events are expected to increase in frequency and intensity as a byproduct of climate change. Understanding the impact of these events is integral in approaches to coastal management and development. While conducting a long-term study tracking the erosion of vegetated coastal dunes along the Northumberland Strait, we experienced post-tropical storm Fiona in September 2022. Two field sites: Waterside Beach Provincial Park and Big Island, were surveyed before and after this extreme weather event and were dramatically impacted. Quantitative data on the erosion was tracked using a handheld GPS to record the margin of established dune vegetation. We found comparable losses of the dune between both systems of up to ~18 m. Subsequent surveys in 2023 and 2024 showed slight further erosion at Big Island and no change at Waterside. Photos of Waterside show a rapid recovery of the foredune vegetation in recolonizing bare sand and re-establishing colonies on previously eroded dune ramps. The varying ability of coastal systems to recover from extreme weather events is a result of complex factors. Waterside and Big Island have many commonalities, but Waterside has historically been a prograding system. The factors that have allowed it to grow may also help it recover, while a previously eroding system, such as Big Island, does not have the appropriate conditions for recovery.

PRINCE EDWARD ISLAND'S TOURISTS' KNOWLEDGE, ATTITUDES, AND PERCEPTIONS OF SUSTAINABILITY AND BEACH TOURISM IN THE FACE OF CLIMATE CHANGE

Mrs. Taiwo Ogunsanya [1]

1. *University of Prince Edward Island*

The study examines the effects of climate change on tourism in Prince Edward Island (PEI), Canada, focusing on visitors' awareness, attitudes, and perceptions related to tourism sustainability. Climate change, propelled by escalating greenhouse gas emissions, has resulted in substantial environmental transformations, encompassing elevated temperatures, modified precipitation patterns, and intensified coastal erosion. PEI, a province dependent on coastal tourism, faces substantial threats such as rising sea levels, coastline erosion, and severe weather phenomena. These challenges jeopardize its tourism infrastructure and natural assets, which are essential to its economy. The study examines the relationship between tourists' awareness of climate change and their endorsement of sustainable tourism activities. The research will employ a mixed-methods approach to delineate alterations in tourist attractions during the previous twenty years due to the impacts of climate change, gauge tourists' awareness of climate change, and analyze the effects of tourism activities on the sustainability of PEI's tourism sector using GIS mapping, surveys, and interviews with tourists and main stakeholders resulting in policy recommendations for PEI's tourism stakeholders.

Projet Adaptation Péninsule acadienne : a project to build resilience to climate change impacts

Dr. Marion Tétégan Simon [1], ***Dr. Thibaut Peterlini*** [1]

1. *VALORES*

Projet Adaptation PA is a regional project aimed at identifying and implementing measures to reduce current and future impacts of coastal erosion and flooding in communities at risk along the Acadian Peninsula. The effects of climate change have already been observed in the Acadian Peninsula, as is the case elsewhere across the country. Flooding has occurred in some communities during major storms, particularly in 2000 and in 2010, whereas in other communities, erosion has forced people to move or is currently posing a threat to homes or roads.

Some examples here after. On Miscou Island, the road leading to the famous lighthouse has been damaged several in recent years. On Lamèque Island, erosion has been worrying the residents of Sainte-Marie-Saint-Raphael, Cap-Bateau and Pigeon Hill for several years now. Some residents have resigned themselves to moving. Other residents would like to do so but can't afford to and therefore experience stress every time a storm hits. In Maisonnette, the 'Chemin des chalets' was threatened by erosion and the wooden boardwalk on the Maisonnette dune was damaged. In Grande-Anse, cliff erosion is a source of concern.

Since 2011, Valores, works alongside communities in their efforts to adapt to climate change. Its role is to couch scientific information in layperson's terms for communities, and to help communities on strategic planning exercises, cost-benefit analyses of strategies, technical studies, evaluation of strategy feasibility, public consultations, communication and awareness, and implementing adaptation solutions.

Protecting Coastal Wetlands in Nova Scotia Through Stewardship and Collaboration

Ms. Abbey Duinker [1], ***Mr. Amos Creaser*** [1], ***Ms. Kelly Mackarous*** [1]

1. *Coastal Action*

Protecting Coastal Wetlands in Nova Scotia through Stewardship and Collaboration is a capacity-building and baseline data collection project supporting coastal wetland research across the province. Funded by Fisheries and Oceans Canada (DFO), this initiative aims to enhance ocean conservation efforts by assessing the health of coastal wetlands. This project focuses on key areas of interest throughout Nova Scotia, contributing valuable data on these important ecosystems. The overarching goal is to deepen the understanding of environmental and ecological processes and the cultural significance of coastal marsh ecosystems in Nova Scotia.

In partnership with technical experts and local nonprofit organizations, we established an equipment bank to share specialized tools among teams, enhancing data collection efforts and optimizing budget efficiency. The data collected focused on water quality, hydrology, geomorphology, and vegetation, creating a baseline for salt marsh health and functionality that can be used to monitor changes over time. This project is building capacity within local organizations, and strengthening resilience by supporting long-term, sustainable monitoring efforts for years to come.

This presentation will outline the results of our work, the methods employed for data collection, and our collaborative approach to equipment sharing.

Public perceptions of nature-based coastal solutions in the UK

Dr. Avidesh Seenath [1]***, Dr. Scott Mahadeo*** [2]***, Dr. Jade Catterson*** [3]

1. *Environmental Change Institute, University of Oxford,* ***2.*** *Portsmouth Business School, University of Portsmouth,* ***3.*** *School of Energy, Construction and Environment, Coventry University*

Coastal scientists are increasingly advocating for nature-based coastal solutions (NBCS) to ensure long-term coastal sustainability. Implementing NBCS will change coastal landscapes, necessitating consultation with the wider public as such changes directly affect the socio-cultural values of coastal zone residents and users. We, therefore, investigate public willingness to support, preferences, and perceived effectiveness of coastal management solutions, nature-based and otherwise, focusing on the UK as a case study. We do this through an online survey of >500 UK residents, capturing their demographics, place of residence, and coastal management perceptions. We apply inductive coding, statistical, and geospatial techniques to analyse our survey data. While we find consensus on the need for coastal management, there are divergent coastal management preferences and perceptions: NBCS are most preferred while hard defences are considered most effective. We find that people with coastal management and/or engineering experience are more convinced by NBCS effectiveness, while coastal residents believe in hard defences. Although NBCS may have several environmental benefits (e.g., coastal protection, carbon sequestration, greater biodiversity), we find that public knowledge on their likely effectiveness is limited. Therefore, if NBCS is deemed to be the way forward for coastal sustainability, more local stakeholder engagement on NBCS will be needed, potentially through systems mapping, in order to facilitate more robust and inclusive coastal management policies.

Quantifying the cumulative effects of vessel wakes on coastal erosion risk at regional scales: A case study from the South Coast of British Columbia

Dr. Ibrahim Alameddine [1], ***Dr. Natascia Tamburello*** [1], ***Mr. Hugh Stimson*** [1], ***Ms. Shreya Nemani*** [1]

1. *ESSA Technologies Ltd.*

Maritime traffic is a source of shoreline erosion in many ecologically sensitive areas, negatively affecting coastal and marine species, ecosystems, and the human communities that rely on them. In this study, we quantify the cumulative primary and secondary wakes generated by vessels operating in the South Coast region of British Columbia and their potential to contribute to coastal erosion, as part of a broader regional Cumulative Effects of Marine Shipping (CEMS) assessment in South Coast BC in partnership with Transport Canada, the First Nations Fisheries Council of BC, and delegates from First Nations across the region. The analysis accounts for wakes generated from vessels equipped with an Automatic Identification System (AIS) as well as non-AIS vessels at fine spatial and temporal scales for the year 2019 using a wide range of regional and global datasets. Predicted shoreline wake heights as well as their corresponding power fluxes were calculated along the entire coastline of the study area, using a series of well-established empirical models, and overlaid with information on the sensitivity of coastline segments from Parks Canada coastal sensitivity indices. This work has identified highly vulnerable sites as well as the vessel types and routes that contribute the most wakes to these sites, which can in turn inform targeted mitigation measures to reduce wakes as well as improve shoreline resilience to their impacts. Importantly, the methods developed as part of this work are reproducible and generalizable to other regions given the global availability of AIS and coastal sensitivity data.

Rates of carbon accumulation and implications of sea-level rise in upper Bay of Fundy and Northumberland Strait salt marshes

Dr. Amanda Loder [1], ***Dr. Holly Abbandonato*** [2], ***Mr. Nic McLellan*** [2], ***Prof. Jeff Ollerhead*** [3]

1. *Environment and Climate Change Canada,* ***2.*** *Ducks Unlimited Canada,* ***3.*** *Mount Allison University, Department of Geography and Environment*

Relative sea-level rise (RSLR), and storm frequency and intensity are increasing under a changing climate, and threaten coastal ecosystems in the Maritime provinces. Salt marshes are extensive along these coastlines, sustain some of the highest rates of carbon accumulation of all ecosystems, and preserve large soil carbon stocks over long periods of time. Yet, quantification of decadal rates of sediment accretion and carbon accumulation in these salt marshes is lacking, and their capacity to build vertically and sequester carbon in response to RSLR is not well understood. In this study, we measured rates of accretion and carbon accumulation over the last 100 years in a segmented salt marsh complex on the Northumberland Strait in the Cape Jourimain National Wildlife Area (NWA), and in the largest salt marsh on the Bay of Fundy in the John Lusby NWA. We collected sediment cores for radiometric dating (lead-210 and cesium-137) and soil carbon analyses, and described vegetation in 1 m × 1 m plots along representative transects. Our results suggest that the average accretion rate has been 0.6 cm yr^{-1} in Cape Jourimain NWA and 1.4 cm yr^{-1} in John Lusby NWA. Rates of organic carbon accumulation in John Lusby NWA have ranged between 78-540 g m^{-2} yr^{-1} since 1951. This poster will show how land use and geomorphologies have influenced carbon accumulation and soil composition in these salt marshes, and whether RSLR will hinder these salt marshes from self-sustaining and providing climate mitigation in the future.

Recovery of the foredune system at Greenwich, PEI after Hurricane Fiona: What does “recovery” really mean?

Prof. Jeff Ollerhead [1]***, Prof. Irene Delgado-Fernandez*** [2]***, Prof. Bernard Bauer*** [3]***, Prof. Robin Davidson-Arnott*** [4]

1. *Mount Allison University, Department of Geography and Environment,* ***2.*** *University of Cadiz, Faculty of Marine and Environmental Sciences,* ***3.*** *University of British Columbia - Kelowna, Department of Earth, Environmental and Geographic Sciences,* ***4.*** *University of Guelph, Department of Geography, Environment and Geomatics*

Hurricane Fiona battered the north coast of Prince Edward Island (PEI) on 23-24 September 2022, causing extensive wind and water damage to infrastructure as well as uprooting thousands of trees. Erosion of the foredune system along the Greenwich coast was severe in many locations, with complete removal of low-lying sections in some locations. Post-storm, the system has been recovering – but what does “recovery” mean in terms of shoreline resilience and criteria to be considered in determining progress toward complete “recovery”? The purpose of this presentation is to explore this question. First, we consider ***positional recovery***, which can be thought of in three dimensions: the x-y (horizontal) position of the foredune relative to the shoreline and the z (elevation) position relative to mean sea level. Second, we consider ***morphologic recovery***, in which the shape, size (volume), and geometric features of the foredune recover. At this stage, natural protection offered by the foredune system to the inland environment is largely reestablished. Third, we consider ***functional recovery***, in which vegetation communities are reestablished, habitat is restored, and the utility and aesthetic value of the foredune system to society are returned to prior conditions. Finally, using 22 years of profile data from Greenwich, PEI, we contemplate the temporal dimension of recovery by considering factors like storm magnitude and sediment budget, and the challenge of answering the question “How long will recovery take?”.

Reimagining Shoreline Management: Exploring Commoning Strategies for Riparian Zones

Mr. Manuel Spiller [1], ***Dr. Brennan Vogel*** [2]

1. *Western University,* ***2.*** *Huron University College*

The research presented explores the barriers and opportunities for improved governance of riparian zones as cohesive ecological systems. From a Lake Huron perspective, climate change effects such as storm events and a reduction in seasonal ice coverage contribute to an increase of wave energy impacts on lake shoreline environments. Hardened shorelines such as groynes, sea walls, and armor stone used as mitigation strategies have a limited life span, significant ecological impacts, and high costs in part due to the loss of ecosystem services. Their effect on the littoral flow further increases erosion elsewhere, while simultaneously limiting sediment flow. Deconstructing hardened shorelines where sensible, and a focus on nature-based solutions is therefor vital for sustainable climate adaptation. A commons approach is proposed as essential for meaningful ecological rehabilitation and enhancement of riparian habitats by connecting individual actors, allowing for local power retention and regional strategy implementation. Using case studies and commons literature, this research informs about the potential of, and implementation strategies for commoning inspired co-management of shorelines. This approach encourages shoreline owners to co-create management strategies that generate citizen power, and align with personal as well as regional values through financially considerate approaches that can lead to long-term improvements for shoreline health. Further, findings for cross-boundary commoning are not limited to a specific case, but can be implemented for ecological corridors in general, offering new approaches to manage and limit erosion, habitat fragmentation, and increase biodiversity and ecological connectivity across varying types of property ownership.

Reimagining the shore: 5Rs for a good coastal life

Dr. Kate Sherren [1], Dr. Patricia Manuel [2], Dr. H.M. Tuihedur Rahman [3], Ms. Wells Emily [1], Dr. Eric Rapaport [2], Dr. Danika Van Proosdij [3]

1. *School for Resource and Environmental Studies, Dalhousie University,* ***2.*** *Dalhousie University,* ***3.*** *Saint Mary's University*

Nature-based coastal adaptation is a subset of nature-based approaches to environmental planning and management that has, to this point, focused on the physical aspects of managing coastal risks: what our coastal protections are made of or where we put things that are in the way of harm. In our collaborative interdisciplinary work we have been reimagining nature-based coastal adaptation to start with first principles: how we think about the coast and what makes a good coastal life. In a nature-based approach our shared sense of what is good and possible, also known as the social imaginary, needs shifting before any physical material, or plans, or rules. We present a new nested framework for thinking about nature-based coastal adaptation that proposes a new relationship with the shore using five words starting with R: Reimagine, Reserve, Relocate, Restore, Reinforce. We use the nature-based adaptation option of managed dyke realignment in Bay of Fundy agricultural dykelands to illustrate the utility of the framework in practice.

Relational Approaches to Coastal Stewardship and Management: A Perusal of Canada's Blue Economy Strategy

Ms. Devdatta Mukherjee [1]

1. *PhD Candidiate, Dalhousie University*

Canada's Blue Economy Strategy (Strategy) is a comprehensive initiative that aspires to promote sustainability, foster innovation and ensure inclusivity in the management of marine resources, in a way that balances economic growth with environmental stewardship and community resilience. This paper appraises the Strategy through the lens of relational approaches to legal analysis.

Drawing upon the insight of material feminists to move beyond the common conceptualization of the individual as standing "outside of, and separate from, the environment", arguments have been made in the favour of embracing the concept of corporeal citizenship, of a 'differentially situated ecologically embedded individual'. 'Moving beyond boundary' metaphors reinforce the idea of reciprocal kinship between human and nature, and is capable of invoking simultaneous ethical and political responsibilities. Furthermore, Indigenous relationality posits that reconciliation must be mobilized as a relational practice beyond political economies and political ecologies in conservation practice. Relationality, and structures of power in the larger historical context, is linked to the analytic tool of intersectionality. Coastal stewardship and management would benefit from infusion with insights from relational approaches.

Having relational underpinnings would not only render the Strategy more effective, but also promote Canada's leadership in global ocean stewardship. The paper, therefore, offers suggestions towards incorporating relational perceptions from coastal communities, particularly Indigenous perspectives as gleaned from Indigenous scholars' works, across the thematic areas of the Blue Economy Regulatory Roadmap, namely, marine renewable energy and environmental protection, marine spatial planning, maritime autonomous surface ships, ocean technology, and sustainable fishing gear and practices.

Resilient Coasts for Salmon: Supporting Coastal Adaptation Through Shoreline Mapping

Ms. Kyla Sheehan [1], ***Ms. Maria Catanzaro*** [1], ***Dr. Nicole Christiansen*** [1], ***Dr. Isobel Pearsall*** [1]

1. *Pacific Salmon Foundation*

Through the Resilient Coasts for Salmon project (resilientcoasts.ca), the Pacific Salmon Foundation (PSF) is empowering the communities of eastern Vancouver Island with the data to make informed management and planning decisions related to coastal climate change adaptation. The Resilient Coasts team has been creating a spatial coastal modification dataset, which shows the extent of hardened infrastructure such as seawalls, overwater structures like personal docks and marinas, and areas of log accumulations from forestry waste on the shore. We are interested in tracking these features as they all have impacts to Pacific salmon migration and feeding patterns, as well as to habitats that salmon and other creatures of the coastal food web rely upon. To support local governments of coastal communities in moving towards nature-forward adaptation to sea level rise, these data will be made publicly available through the Marine Ecosystem Map (marinedata.psf.ca/sogmrg). Summary reports will also be made for communities to share our findings and key take-aways, as well as analyses related to important coastal factors such as sensitivity to sea level rise, wave exposure, projected floodplains, and forage fish habitat. These data and analyses can be used to identify potential locations for potential restoration. Join us to learn more about the creation of these data, and how they can help communities understand the interactions between coastal modification and impacts of climate change, and better tackle cascading impacts to Pacific salmon and the coastal food web.

Restoration Trajectories and Carbon Storage Capabilities of Restored Coastal Wetlands: A Nova Scotia Case Study

Mr. Evan Rundle [1], ***Ms. Morganne Robben*** [1], ***Mrs. Brittney Roughan*** [1], ***Dr. Jeremy Lundholm*** [1], ***Dr. Danika Van Proosdij*** [2]

1. *TransCoastal Adaptations Centre for Nature-Based Solutions,* ***2.*** *Saint Mary's University*

Across Nova Scotia on the coast of the Bay of Fundy, dykelands have historically converted tidal wetland habitat into arable farmland through the construction of dykes to restrict tidal flow. In certain cases, the managed realignment or breaching of dykes offers a pathway to restoring natural tidal flow and restoring coastal habitat. These restored habitats can improve coastal resilience by re-establishing a natural balance of sediment accretion and erosion allowing wetlands to change and grow with sea level rise, as well as mitigating flood risk by providing a natural alluvial plain to hold excess water during extreme events. The *Making Room for Wetlands* (*MRFW*) project has been working to identify and restore at risk dykelands to natural wetlands across Nova Scotia through managed dyke realignment and tidal wetland restoration. The Coastal Carbon Edition expands on the existing *MRF*W project by investigating the potential for restored wetlands to store and sequester carbon within their soils, contributing to future climate resilience. This presentation will outline the restoration trajectories as well as the carbon accretion rates and carbon stocks of six previously restored tidal wetlands in the Bay of Fundy; key methods and considerations including greenhouse gas sampling and volumetric estimation of accretion will also be discussed.

Restoring a resilient coastal ecosystem to Green Shores Gold Standard at Dyke Road Park

Ms. Kylie Knox [1], ***Ms. Sarah Primeau*** [2], ***Ms. Kelly Loch*** [2]

1. *Northwest Hydraulic Consultants,* ***2.*** *Stewardship Centre for BC*

The Courtenay River serves as a critical salmon migration corridor, supporting the recently listed East Vancouver Island Chinook salmon runs. The K'ómoks Estuary, where the river meets tidewater, is highly productive and ecologically significant, ranking among the top ten Southwestern BC estuaries.

The Dyke Road Park Project is a joint-venture between Comox Valley Regional District (CVRD), Stewardship Centre for BC, the K'ómoks First Nation, and others to naturalize a public park while restoring the ecosystem and building in coastal resilience. Located in the heart of the K'ómoks Estuary, the project's objectives are ecological and cultural restoration; attainment of Green Shores Gold standard to provide a reference for future projects; and climate change mitigation and adaptation.

In March 2022, the joint-venture group assembled a multidisciplinary project team to present ideas for project concepts. The environmental restoration plan developed for the site focused on intertidal wetland restoration, off-channel habitat creation, tidal marsh zones, riparian tidal forest restoration, and green design of the park infrastructure. Additionally, it addresses climate change impacts through designing infrastructure to the designated flood construction level and sea level rise adaptation. Construction began in August 2024.

This presentation explores the challenges of fitting a small project site into the Green Shores template and lessons learned for other nature-based projects. Green Shores projects are an excellent standard to aim for however the prerequisites can be unintentionally restrictive. Dyke Road Park stands as a testament to collaborative efforts in restoring coastal ecosystems and building resilience in the face of climate change.

Role of Community Capacity in MSP in Hare Bay, Great Northern Peninsula

Ms. Jackie Bauman [1]

1. *Memorial University of Newfoundland*

Coastal communities of the Great Northern Peninsula of Newfoundland (GNP), Hare Bay in particular, are constantly responding to social and ecological changes, to maintain their livelihoods as hunting, fishing, and wildlife watching remain important to the culture here. Enhancing local governance can build adaptive capacity to remain resilient in a changing social ecological system. MSP is a governance process that, when effectively developed, has the potential to conserve marine ecosystems while achieving social development goals, and providing more benefits to local communities. This research uses a governance analysis to determine the structures, institutions, processes, and procedures related to MSP, and the role that actors have at different scales. Furthermore, this analysis uncovers the elements of capacity development that can lead to collective action for marine conservation. Through this analysis, a framework for assessing local governance capacity was developed and used to determine gaps and opportunities within the coastal and marine governance systems that support Hare Bay. This framework was used to guide interviews conducted with local stakeholders. In addition, mapping workshops and observations took place to identify cultural and ecological values throughout Hare Bay. Findings demonstrated that focusing on local capacity development and incorporating spatial and non-spatial conservation tools into existing conservation measures (e.g. existing ecological reserve), can bring ecological and social benefits. It is recommended that appointing local people to take on roles in conservation, embracing partnerships, expanding research and education, initiating a community-based monitoring program, learning from other jurisdictions, and zoning, are all mechanisms that could enhance coastal

Root System Installation

Mrs. Rosmarie Lohnes [1], ***Ms. Emillie Rose*** [1]

1. *Helping Nature Heal Inc.*

For over 20 years Helping Nature Heal Inc. has been dedicated to ecological restoration and the use of nature-based solutions for public space design. Our work emphasizes community well-being, environmental sustainability, and the integration of spaces that are accessible and supportive for all individuals.

We specialize in building and maintaining Living Shorelines, through the use of natural materials, native species, and the strength of root systems. We're also experienced in educating community members on how to build resilience in their own ecosystem, as well as in themselves.

We are proposing a hands-on art installation, showcasing what different root systems look like, and how they interact with one another. By using only native species, we can show how much stronger these systems are, as they evolved to grow together. This is achieved through suspending a variety of bare-root native trees, shrubs, and perennials against a backdrop, and showing the continuation and intertwining of these roots through the use of coloured strings.

Passers-by can participate in this by joining in building the extensions of these root systems, during which they gain a greater understanding of how plants interact. Through the use of healthy root systems, we can create greater resilience on our coasts.

This installation has been successfully erected previously at a local Upskiller's Event.

We are applying under the sub-themes of Environmental Processes, Strengthening Resilience of the Coasts, and Relationships and Relations.

SALTGARDEN - enabling resilient salt marshes in the Wadden Sea

Dr. Erik Horstman [1], ***Dr. M. Paul*** [2], ***Dr. D. Bunzel*** [2], ***Dr. B.W. Borsje*** [1], ***Dr. V. Kitsikoudis*** [1], ***Dr. J.M. van Loon-Steensma*** [3], ***Prof. Dr. K. Rehdanz*** [4], ***Dr. M-C. Riekhof*** [4], ***Dr. L. Sander*** [5], ***Dr. H. Schwermer*** [4], ***Prof. Dr. D. van der Wal*** [6], ***Prof. Kathelijne Wijnberg*** [1]

1. *University of Twente,* ***2.*** *Leibniz University Hannover,* ***3.*** *Van Hall Larenstein,* ***4.*** *Kiel University,* ***5.*** *Alfred-Wegener-Institute,* ***6.*** *NIOZ*

The Wadden Sea is the world's largest continuous natural habitat shaped by tidal forces. This unique configuration of coastal and marine ecosystems is of Outstanding Universal Value and was recognised as a UNESCO World Heritage Site in 2009. However, this valuable yet vulnerable ecosystem is increasingly threatened by the impacts of the triple ecological crisis: climate change, biodiversity loss, and pollution. In principle, the natural dynamics of the salt marshes in the Wadden Sea can contribute to the mitigation of and adaptation to the impacts of the triple ecological crisis. Their ability to trap suspended sediments and stabilise soils strengthens their role as natural coastal protection and facilitates adaptation to sea level rise due to climate change. At the same time, salt marshes can serve as important pollutant and carbon sinks, whilst delivering outstanding biodiversity. However, most Wadden Sea salt marshes have undergone anthropogenic use for centuries, with a strong focus on coastal protection and agriculture.

The SALTGARDEN project explores new restoration concepts that aim to maintain the ecological integrity of salt marsh systems and strengthen their associated ecosystem services. Our desired societal impact is a paradigm shift in the management of salt marshes towards new ecological guiding principles that we name **Nature-based Gardening** (NbG). This shift requires social and political acceptance. SALTGARDEN therefore aims to co-create socially and politically accepted NbG strategies in order to improve the functioning and resilience of the vegetated coastal ecosystems in the Wadden Sea.

Sedimentary dynamics of beach and dunes to assess a coastal restoration

Dr. Marion Tétégan Simon [1], ***Dr. Thibaut Peterlini*** [2]

1. *VALORĒS, Coastal Zones Research Institute Inc., Nouveau-Brunswick, Canada,* ***2.*** *VALORES*

The village of Le Goulet (New Brunswick) is threatened by coastal flooding due to the degradation of its sand dunes. The impact of climate change in this Atlantic region is increasingly visible and marked; and the communities living in this region are more and more aware of the need of coastal restoration, especially in recent years. In order to restore its dunes, (1) *Ammophila breviligulata* was planted; (2) from 2013, the village build structures from fir trees and lobster cages to capture the sand transported by the wind; (3) and the village made siltings from sediments extracted from dredging works. The village plans to continue silting up with additional sediment from major work planned in its harbor.

In 2014, Valorēs, has developed a protocol to monitor the sedimentary dynamics of the beach and dunes of Le Goulet with the objective to assess the effectiveness of restorative structures by carrying out topographic surveys. Another objective of the study is to identify the sectors to prioritize for potential future silting up interventions.

On 10 years monitoring, the majority of transects have experienced seasonal (spring-fall) accumulations of sediment. In addition, it has been observed that some structures seem to contribute to the accumulation of sediment, especially towards the top of the beach. Net gains in sediment volume are measured in areas where it has structures and silting up, while net losses in sediment are measured in areas where it has no structures.

Sedimentological survey of bluff debris along the north shore of Lake Erie

Ms. Jacqueline Voisin [1], ***Mr. Cooper O'Rourke*** [1], ***Dr. Chris Houser*** [1]

1. *University of Waterloo*

Recent studies suggest that the bluffs along the north shore of Lake Erie are eroding at several meters per year and consequently, property owners have lost their homes and livelihood, roads have been closed due to bluff failure and gully development, and infrastructure are threatened (e.g., wind turbines, oil and gas pumps). Interest and urgency related to coastal erosion in the Great Lakes has largely been driven by higher-than-average water levels in the 1980-90s and since 2010. While there have been many studies along the American Lake Erie coastline, less is known about the northern, Canadian shoreline. To inform management decisions, more effort is needed to understand the processes, mechanisms, and rates of erosion to accurately model bluff retreat. In response, the objectives of this thesis are to 1) characterize the erosional and depositional sediment within a 100 km long littoral cell extending from Port Stanley to Long Point, and 2) identify potential sediment transport pathways based on the spatial variability in sediment texture and mineralogy. This is achieved through collection and analysis of sediments from onshore and nearshore locations by their mineralogy and particle size distributions using sieves and laser particle diffraction. Additionally, bathymetry data of the nearshore lake floor is processed and used in sediment flux calculation. The results contribute to the development of a sediment budget for the entire 186 km section of the northern shore of Lake Erie.

Setting up the conditions for implementing a coastal nature-based approach from a municipal point of view: example of Shore Rd project

Ms. Emma Poirier [1], ***Ms. Victoria Fernandez*** [1], ***Mr. Wisdom Akpokighe*** [1], ***Mr. Amaury Camarena*** [2], ***Ms. Gabriella Mauti*** [2]

1. *Halifax Regional Municipality,* ***2.*** *CBCL*

Shore Road in Eastern Passage, Nova Scotia, is a road that often gets damaged, flooded, and closed during major storms. As it is a key transportation route, addressing the impacts of climate change on safety and access is vital. Halifax Regional Municipality is implementing a nature-based approach including a cobble beach, native vegetation and a submerged sill to dissipate wave energy and reduce erosion risks. This presentation will focus on the processes and lessons learned during this ongoing project from a municipal point of view. This project highlighted that collaboration within and outside organizations is critical for success, and time for that must be considered, as both municipalities and regulatory agencies are still learning to adopt new approaches to efficiently implement this type of project.

Sourcing funding for this project included securing resources from the Natural Infrastructure Fund, and requiring this funding to be extended. Consultation with Indigenous groups was an important piece of this process, and recommendations received were incorporated into the updated plans. The permit approval process presents many lessons learned as the Fisheries Act authorization required the project to have a habitat offsetting plan to restore fish habitat elsewhere, which extended the timeline of the project. Various projects considered for offsetting were explored including fish passage as well as eelgrass restoration, which opened potential new avenues for future restorations. These lessons learned have all contributed to an improved understanding of the mechanisms required for municipalities to implement coastal nature-based approaches for climate change adaptation.

Shaping CoastAdapt: A User Friendly Adaptation Platform for Canada's Coastal Communities

Ms. Joanna Eyquem [1], ***Mr. Mujtaba Ali*** [2], ***Ms. Kelsea Walker*** [3]

1. *Climate Risk Institute,* ***2.*** *Natural Resources Canada,* ***3.*** *Nrcan*

Coastal communities across Canada are on the front lines of climate change, facing mounting risks from flooding, erosion, sea level rise and infrastructure vulnerabilities. While a wide range of tools and resources exist to support adaptation, they are often fragmented, hard to navigate, do not meet unique needs in a coastal context, or are inaccessible to people who need them most.

This collaborative workshop will support the development of CoastAdapt – a new national platform being designed to equip practitioners and decision-makers with easier access to practical, regionally relevant adaptation resources. Funded by Natural Resources Canada through the Climate-Resilient Coastal Communities (CRCC) program, this initiative is led by the Climate Risk Institute, in partnership with CLIMAtlantic and DHI. The platform will support coastal communities across Atlantic, Pacific, Northern, and Great Lakes-St. Lawrence regions, including those with limited specialist coastal knowledge and resources, remote and Indigenous communities.

The session will include a brief overview of what's been heard through prior national engagement efforts, followed by interactive roundtable discussions. Participants will help refine priorities related to accessibility, functionality, and content — ensuring the platform reflects regional needs, supports implementation, and complements (rather than duplicates) existing resources.

Rather than introducing new tools, CoastAdapt will serve as a curated and evolving access point — helping practitioners quickly find and apply the best available information. Insights from this session will shape the platform's design and delivery as it moves toward public release by 2028.

Shoreline Impact Evaluation of a New Ferry Route - Wake and Morphology Analysis

Mrs. Gabriela Maciel-Jobb [1], ***Mr. Aravinda Bharathi*** [1]

1. *COWI*

This case study outlines the methodology used to assess the shoreline impacts of a new ferry route in a bay area. The study focuses on the analysis of wake-induced effects and morphological changes along the ferry route, utilizing numerical modeling to predict and evaluate potential alterations to the shoreline.

The primary objective of the analysis was to identify areas at risk of shoreline change due to the passing ferries and to qualify the extent of these impacts. A detailed numerical hydrodynamic model was developed to simulate the wake waves generated by the vessels. These wake waves were then used to estimate their influence on the morphology of the shoreline at various locations along the ferry route.

The morphological analysis involved simulating the profile changes along the shoreline at different speeds of ferry transit. The results of these simulations highlighted how varying ferry speeds and frequencies can influence shoreline erosion and sediment redistribution. The study also identified specific areas along the route where notable changes to the shoreline profile were most likely to occur.

This case study provides valuable insights into how ferry operations can influence coastal dynamics, supporting decisions regarding ferry speed regulations and informing shoreline management practices to address the long-term effects of ferry-induced disturbances.

Spaceborne SAR for Management and Sustainable Development of Coastal Zones

Mr. Robert Quinn [1], ***Mr. Gord Staples*** [1]

1. *MDA Space*

Coastal marine environments, being invaluable ecosystems and host to many species, are under increasing pressure caused by, among others, increasing economic use, coastline changes, and offshore development. A continuous monitoring of coastal environments is of key importance for the identification of both natural and anthropogenic impacts and for an understanding of oceanic and atmospheric coastal processes. Spaceborne Synthetic Aperture Radar (SAR), because of its high spatial resolution, along with its independence of day and night, and its all-weather capabilities, is a key information source for monitoring of coastal zones.

This presentation will focus on the way, in which SAR sensors can be used for the surveillance of marine coastal environments, and how these sensors can detect and quantify processes and phenomena that are of high relevance for coastal residents and local authorities, leading to sustainable use and development of coastal zones. Use cases and examples for the following are presented:

- SAR, AIS, RF, optical, and IR data for illegal, unreported, and unregulated fishing;
- Marine pollution: SAR for spill detection and AIS for vessel identification and tracking;
- Coastal flood detection and near-real time delivery of flood extent maps;
- Integration of Aboriginal Peoples' knowledge and spaceborne assets to mitigate the impact of coastal zone changes on biophysically and culturally sensitive areas.

Spatial Parameterization of Sandy Beach Profiles for Meta-Modelling: A Case Study at Narrabeen-Collaroy

Mr. Matthew Julseth [1]

1. *CBCL*

The social, economic, and environmental functions served by diverse coastal environments makes understanding and unifying their morphological behaviour extremely valuable. Parametric shape functions have historically been used to represent cross shore profiles of specific coastal environments and have relevance in the development of cross shore behaviour models. Despite this, the ability to represent diverse coastal environments while maintaining parametric meaning, and the ability to use parametric models for the identification of common profile states presents a challenge to their application in diverse settings. The aim of this study is to evaluate the ability for parametric expressions to effectively characterize diverse coastal profile geometries. Here, a new parametric function is presented that can effectively represent key geometric attributes of diverse cross shore profiles. This function demonstrates high performance in the representation of both theoretical profile states (SSE = 0.04) and measured profile data (RMSE = 0.05 m) compared to several existing parametric functions. Fitted parametric values were applied for morphotype identification using K-means clustering and were validated through comparison of clustering performance using parameter values versus empirical data. Parametric clustering demonstrates a comparable ability to reduce data variance compared to empirical clustering (RMSE = 0.24 and 0.23, respectively) and visually demonstrates improved grouping of profiles with similar geometric characteristics. These results suggest that a parametric representation of the coastal profile can characterize and group diverse profile geometries, and could therefore be used in the development of a cross shore profile behaviour model.

Squeezed from both sides: An analysis of legal mechanisms, judicial trends, and limitations in maintaining coastal access in Nova Scotia, Canada, with implications for future coastal management.

Mr. Samuel Eisner [1], ***Dr. Hannah Harrison*** [1], ***Dr. Patricia Manuel*** [1], ***Mr. Mike Kofahl*** [2], ***Dr. James Baxter*** [1]

1. *Dalhousie University,* ***2.*** *East Coast Environmental Law*

Nova Scotia's coastline is valued by the public for a multitude of purposes, yet increasingly, public access to Nova Scotia's coast is constrained by its continued reliance on informal arrangements for private land crossings, which are jeopardized by the impacts of climate change and changing land ownership patterns. Known as "Canada's Ocean Playground," Nova Scotia promotes itself as a place where coastal spaces exist for the benefit of present and future Nova Scotians. We argue that the shore is thus a public good, access to which is integral for the public to benefit. This paper lays out this argument by drawing on legal, planning, coastal zone management, and human ecology perspectives to explore the coastline, and by extension access, as a public good. Using two recent court cases, we demonstrate how Nova Scotia's approach to managing coastal access is one of "governance through ownership." In this model, primary responsibility for managing coastal access is vested in private coastal property owners. Governance through ownership is shown to promote social conflict, as private property owners become de facto gatekeepers to a public good in the public eye. The result is eroding coastal access as existing property rights are prioritized in civil courts over novel conceptions of collective rights of access. As such, Nova Scotia's approach fails to manage coastal access as a public good. We conclude with a discussion of potential proactive provincial policies that would recognize access to the coast as an inherent extension of the coast as a public good.

State of the Coast: Leveraging global datasets to advance local scale coastal risk assessments

Mr. Clenmar Rowe [1], ***Mr. Etiënne Kras*** [2], ***Prof. Roshanka Ranasinghe*** [3], ***Dr. Arjen Luijendijk*** [2], ***Dr. Panos Athanasiou*** [2]

1. *CBCL,* ***2.*** *Deltares,* ***3.*** *IHE Delft*

The low-elevation coastal zone (LECZ) is one of the world's most rapidly developing areas but also among the most hazardous and exposed. However, development patterns and disaster risk reduction measures vary globally and locally, often leaving marginalized communities at a disadvantage due to limited data availability. Local-scale data collection faces challenges, including high costs, technical expertise deficits, and inaccessibility of remote areas. While high-resolution local data is ideal for accurate risk assessment, its unavailability necessitates alternative approaches using global-scale datasets. This study leverages advanced global datasets to evaluate coastal risk levels along the Caribbean coastlines.

The research strategically classifies and integrates global datasets, validated through an expert feedback survey, to optimize coastal risk level assessments. Five machine learning models were trained to evaluate the integration of risk indicators, enabling the projection of coastal risk levels under varying emission scenarios. Key findings reveal that regions such as Les Cayes (Haiti), La Romana (Dominican Republic), Palmas and Cataño (Puerto Rico) face the highest coastal risks under current conditions, including hurricanes, sea levels, wave heights, land subsidence, and erosion. Projections indicate that by 2050, under a high-emission scenario (SSP5-RCP8.5), 65% of the Caribbean's LECZ will experience increased hurricane risks, while by 2100, 44% will face intensified coastal erosion, and 75% higher sea levels.

To aid stakeholders, a "State of the Coast" tool was developed, providing accessible, cloud-based risk datasets and printable summaries for defined areas of interest. This pilot study supports data-scarce and vulnerable regions, advancing disaster preparedness and adaptation efforts.

Stewardship and Conservation Efforts within the Tsawout Indigenous Protected and Conserved Area (QEN, T MPA)

Mr. Neil Fowler [1], Dr. Lais Chaves [2], Mr. Dion Joseph [2], Ms. Jennifer Claxton [2], Ms. Chrissy Chen [1], Mr. Adrian Boskovic [1]

1. *Tsawout First Nation,* ***2.*** *Tsawout First NAtion*

The Tsawout First Nation has established the QENT Indigenous Protected and Conserved Area (IPCA) to safeguard vital marine and coastal ecosystems while honoring traditional stewardship practices. Through a range of activities, Tsawout Fisheries and community members actively monitor and restore habitats essential for ecological and cultural sustainability. Key initiatives include biotoxin sampling to ensure shellfish safety, Dungeness crab surveys and light trap monitoring to track population and larval dynamics, and European green crab monitoring to mitigate invasive species impacts. Clam surveys and habitat assessments in Tetayut Creek and saltmarsh areas identify restoration opportunities critical for salmon and shellfish.

Monitoring in Rockfish Conservation Areas (RCAs) and kelp farming activities contribute to marine biodiversity and habitat enhancement. Vessel traffic and anchoring monitoring, beach cleanups, and derelict vessel removal address anthropogenic impacts on sensitive habitats. Additionally, the Goldstream Salmon Hatchery supports salmonid population recovery efforts, fostering community involvement in salmon enhancement. Together, these initiatives reflect a holistic approach to conservation, blending traditional knowledge and scientific methods to ensure the long-term health of marine and terrestrial ecosystems within Tsawout territory. This ongoing stewardship reaffirms Tsawout's leadership in protecting culturally significant species and fostering sustainable co-management of resources.

Strategic Coastal Governance – Towards a Made-in-Canada Approach

Ms. Joanna Eyquem [1]

1. *Climate Risk Institute*

Effective governance is key to managing coastal flood and erosion risk. This involves working at spatial scales that reflect natural processes operating within littoral (coastal or shoreline) cells. Governance also describes how different Indigenous and non-Indigenous communities, governments, industry and resource users, non-governmental organisations, and researchers come together to make decisions about shoreline management.

There is currently a mismatch between the spatial and temporal scales required for effective coastal governance and those typically considered in coastal management projects in Canadian communities.

Ideally, coastal risk management measures should be designed as part of long-term integrated coastal zone management (ICZM) or a comprehensive flood and erosion risk management strategy. However, Canadian provinces and territories do not yet have a consistent approach to ICZM or strategic management of flood and erosion risks in shoreline areas.

This presentation draws on research completed to support the National Research Council's publication *Nature-based infrastructure for coastal flood and erosion risk management: a Canadian design guide*. Participants will gain insight into current shoreline management planning roles and approaches across Canadian provinces and territories. An overview of case studies from Canada and abroad will demonstrate the application of strategic coastal management planning and, importantly, lessons learned.

The presentation will support those contributing to decision-making to reduce flood and erosion risk in shoreline communities. A summary of key ongoing initiatives and helpful resources will also be provided, so attendees can apply these approaches to their own coastal management efforts after the conference.

Strengthening coastal resilience through values-based adaptation

Mrs. Thy Huynh [1]

1. *Living with Water*

In the face of escalating climate impacts, coastal communities across Canada face growing challenges in building long-term resilience. Achieving this resilience requires not only systems-based thinking but also a foundation of strong relationships among Indigenous and equity-denied communities. Such relationships are essential for amplifying diverse knowledge systems and lived experiences, such as the deep interconnections between human well-being and the health of the land, water, and ecosystems. These diverse knowledge systems and lived experiences serve as a foundation for exploring inclusive and socially accepted adaptation solutions.

A values-based approach (VBA) emphasizes the need to explore and integrate the different values held by individuals and communities, recognizing that these values influence how people perceive risks, prioritize actions, and make decisions. Furthermore, VBAs should guide behaviours and decision-making processes that prioritize the health and sustainability of ecosystems, recognizing that healthy ecosystems are vital for long-term human well-being.

This presentation shares lessons learned from the Living with Water project on the importance of adopting a values-based approach and how coastal practitioners can weave values into their projects. By leveraging social, cultural, and ecological values, this approach builds trust, co-creates innovative solutions, and lays a foundation for enduring coastal resilience. Ultimately, this work demonstrates the transformative potential of leveraging shared values to foster stronger relationships and more adaptive coastal communities in a changing climate.

Supporting Inuit self-determination in Nunavut's fisheries

Mr. Richard Paton [1], ***Mr. Kamikee Akavak*** [2], ***Mr. Jakob Anilniliak*** [2], ***Ms. Jade Owen*** [3], ***Ms. Sylvia Pewatoalook*** [2]

1. *Qikiqtani Inuit Association,* ***2.*** *Nunavut Arctic College,* ***3.*** *Nunavut Tunngavik Incorporated*

Qikiqtani Inuit continue to advocate and negotiate for increased (and rights-based) access to marine living resources in the offshore and increased federal investments to develop the inshore. To support Inuit self-determination in commercial fisheries, this three-year project (2024-2027) will document how marine-capture fisheries have evolved in Nunavut, and how Inuit rights, knowledge and governance were prioritized (or displaced) in the various stages of this evolution. The project is led by the Qikiqtani Inuit Association (QIA) in partnership with students and researchers from Nunavut Arctic College and Nunavut Tunngavik Incorporated.

Increasing Inuit institutional knowledge on marine-capture fisheries is a research priority identified by the QIA. Drawing on archival research and interviews with rights holders, policymakers and industry, the project team will explore the history of commercial and emerging fisheries in the Qikiqtani region, with a comparative analysis of fisheries policy, government investments and quota allocations in the Atlantic provinces and Greenland. This presentation will share results from interviews with rights holders in Pond Inlet, Clyde River, Qikiqtarjuaq and Pangnirtung, the four Nunavut communities historically involved in turbot fishing since the 1980s.

Surface wave dynamics over Scotian Shelf revealed through Hurricane Fiona

Ms. Sarah Hall [1], ***Dr. Ryan Mulligan*** [1], ***Dr. Barret Kurylyk*** [2]

1. *Department of Civil Engineering, Queen's U,* ***2.*** *Centre for Water Resources Studies, Dalhousie University*

Coastal zones are often highly populated, support diverse ecosystems and lie at the forefront of climate change, given the impacts of rising sea levels and more frequent and intense coastal storms. Recently, Atlantic Canada has been impacted by intense cyclonic storms that cause extreme winds, storm surges and high waves that flood low-lying areas and erode barriers that protect critical infrastructure. In September 2022, Hurricane Fiona made landfall and tracked northward over eastern Nova Scotia, causing vast destruction across the region. Fiona provides a unique "study storm" to better understand storms that traverse the Scotian Shelf and impact coastal regions. We use wind and wave observations, and the ECCC atmospheric model (High-Resolution Deterministic Prediction System, HRDPS) past forecasts for the period of Fiona to demonstrate the accuracy of the Holland wind model to predict wind and pressure conditions across the Scotian Self and Eastern Nova Scotia. To gain understanding of the surface waves for other events, we alter the hurricane track and storm intensity in the Holland model and generate wind and pressure fields to use as input to a coupled hydrodynamic-wave model. Delft3D-SWAN was applied over the region and validated with data from Hurricane Fiona, and the fields generated from the Holland model was then used to force the model. Results show the large variance in significant wave heights and storm surges that could result from altered hurricane tracks that are possible in the future.

Sustaining Dungeness Crab Populations: Tsawout First Nation's Path to Rights-Based Marine Stewardship

Dr. Lais Chaves [1], ***Ms. Nicole Jung*** [2], ***Mr. Adrian Boskovic*** [3], ***Ms. Chrissy Chen*** [3], ***Mr. Neil Fowler*** [3]

1. *Tsawout First NAtion,* ***2.*** *University of British Columbia,* ***3.*** *Tsawout First Nation*

Tsawout First Nation conducts ongoing crab surveys to monitor the health and sustainability of Dungeness crab populations within Tsawout's QEN,T Indigenous Protected and Conserved Area (IPCA). These surveys work to address data gaps in Fisheries and Oceans Canada's approaches to crab fisheries management, which rely heavily on extrapolating crab landings from select areas to infer coast-wide abundance. The data from these surveys provide critical insight into crab population trends, site-specific abundance, and fisheries pressure within Tsawout waters. Increased restrictions and reduced access for Indigenous fishers, stemming from the prioritization of commercial and recreational activities, have disrupted Indigenous livelihoods and cultures. Other First Nations have spearheaded re/asserting Indigenous laws and jurisdiction over crab harvesting, taking into their own hands Indigenous Peoples' constitutionally-protected, priority right to fish for food, social, and ceremonial purposes. Here, Tsawout has similar aims: This study will weave together traditional ecological knowledge and contemporary scientific methods to produce robust, place-based data essential for adaptive management. It will specifically inform the development of a sustainable management plan for the QEN,T IPCA where the health of marine ecosystems and the well-being of the Tsawout Nation *will* be prioritized. This initiative highlights the intersections of Indigenous rights, ecological stewardship, and the challenges posed by competing interests in protected marine environments.

The Double-Barreled Case of Coastal Erosion in the Canadian Arctic

Mr. Mark Biagi [1]

1. *Vision Marine Consulting Ltd.*

Climate change is rapidly changing the way the ecological game is played. In a way, we are witnessing ecosystem evolution in quick-time. Nowhere is this more evident than in the Canadian Arctic. With the rapidly changing climate melting the permafrost, there is literally nothing that can be done about it. This melting is increasing coastal erosion, threatening the integrity of coastal communities, and creating barriers to established transportation routes, including access to hunting grounds. As a small community on the southwestern side of Banks Island in the western Canadian Arctic, Sachs Harbour is on the verge of falling into Amundson Gulf. Sachs Harbour Hunters and Trappers Committee is working with Vision Marine Consulting to mitigate and adapt to the coastal erosion threatening their community. Together, we are taking an out-of-the-box approach to address this issue by introducing the use of Geotubes as a way of preventing the ongoing erosion of the community coastline as well as reclaiming land lost to the community after many years of relentless erosion.

The Dune Toe: What's the Point

Dr. Chris Houser [1]

1. *University of Waterloo*

The dune toe is the boundary between the beach and dune. This study highlights the lack of consensus on an operational definition of the dune toe and the uncertainty that commonly used morphometrics match field observations. Using examples from Prince Edward Island (PEI), the Gulf of Mexico and the Netherlands, it is shown how our inability to accurately and consistently define the dune toe and other landform boundaries in coastal geomorphology has implications for understanding of foredune development, storm-impact assessments, and management decisions. Given the availability of remotely sensed data and the increasing use of machine learning to analyze these spatially and temporally rich data sets, it is argued that the development of models that are scalable and can be translated between sites is dependent on experience in the field. It is through this field experience that an understanding of process-form relationships and landform boundaries can be developed.

The effects of coastal erosion on the PEI archaeological record

Mr. Christian Theriault [1]

1. *Government of Prince Edward Island*

Over the last several decades archaeologists working in coastal environments have been working effortlessly to define means to better understand and manage the effects of climate change and sea level rise on the archaeological record. The impact of such changes and large impact events such as Fiona alters both our natural and cultural heritage as well as our relationships with these landscapes. The provincial archaeologists of Prince Edward Island have worked over the years on better understanding how these multi-scale events have altered the remaining archaeological record of this island that has been occupied for thousands of years. The coastlines of the island are being monitored and surveyed yearly to determine the short- and long-term impacts of coastal erosion on coastal archaeological sites. These visits allow us to collect data to better understand how the effects of sea level rise would alter past cultural and environmental landscapes. This type of interdisciplinary research allows us to better comprehend how archaeologically significant landscapes may have changed over time, are changing now and how they could be altered or potentially protected in the future. Whilst most sites appear to be significantly altered by our dynamic coastlines, some may have been protected by natural factors such as receding dunes covering previously exposed landscapes.

The great drowning – salt marsh loss on Nova Scotia coasts of the Gulf of St. Lawrence

Dr. David Garbary [1]

1. *St. Francis Xavier University*

Sea level rise resulting from global changes and regional subsidence along with the cumulated effects of climate change are causing significant salt marsh loss on the shores of Nova Scotia facing the Gulf of St. Lawrence. I used several decades of satellite imagery from Google Earth combined with more recent ground truthing beginning in 2022 to quantify changes in salt marsh extent. On shores facing the open Northumberland Straight salt marsh loss includes wholesale degradation of marshes where remnant peat masses up to 100 m wide no longer support the primary salt marsh grass *Sporobolus alterniflorus* (previously *Spartina alterniflora*). In estuarine marshes, dead zones with no erect shoots of *Sporobolus* were common at all sites at the lower margin of marshes. In addition, the calving of large chunks of marsh parallel to the water is a key step in marsh breakdown. Along barrier beaches where salt marshes often occur on the estuarine side of the dune system, upward migration of the *S. alterniflorus* also occurs with the salt marsh grass often present adjacent to the dune grass community. These observations demonstrate a major loss of salt marsh habitat in the southern Gulf of St. Lawrence along with their associated ecological roles in biodiversity and carbon sequestration. With another 50 cm rise in sea level many existing marshes on both the open coast and in protected estuaries are projected to disappear over the coming decades.

The impact of combined tides and local wind-generated waves on suspended sediment dynamics in the Minas Basin during Hurricane Fiona

Ms. Elise Rogers [1], ***Dr. Ryan Mulligan*** [2], ***Dr. Brent Law*** [3]

1. *Department of Civil Engineering, Queen's University,* ***2.*** *Department of Civil Engineering, Queen's U,* ***3.*** *Bedford Institute of Oceanography*

This study investigates spatial and temporal changes in sedimentation patterns across the Minas Basin, Bay of Fundy, where high suspended sediment concentrations are driven by the combination of wind-generated wave and tidal conditions. Detailed field observations were collected at three intertidal sites over several seasons. Turbidity sensors were deployed to collect turbidity data and sediment scrape samples were collected to characterize the sediment bed composition. Current profilers and pressure sensors were deployed to measure the hydrodynamic conditions at each intertidal site. A two-way coupled hydrodynamic-sediment-wave model (Delft3D FM-SWAN) is applied to simulate suspended sediment concentrations during a major storm event, Hurricane Fiona in 2022. Using a flexible mesh grid with high-resolution bathymetry, this coupled model is used to investigate the patterns in the suspended load of cohesive sediments. A month-long period was modelled and compared to observations, to investigate how strong storms impact the sediment resuspension and deposition patterns. Preliminary model results show that sedimentation patterns are impacted by the sediment characteristics of each site (e.g., grain size and critical erosion thresholds), and hydrodynamics processes such as tides, waves and currents that drive bed shear stress. The temporal and spatial analysis is developed to build a more comprehensive understanding of the suspended sediment patterns in a macrotidal basin.

The Impacts of Bluff Stabilization on Bank Swallows and a Habitat Compensation Solution on Lake Ontario

Ms. Jennifer Crilly [1], ***Ms. Fiona Duckett*** [1]

1. *Baird*

Annual monitoring of a cohesive bluff shoreline in Oakville, ON, triggered the need for shore protection to mitigate erosion and protect public park land. The eroding bluff is home to an active Bank Swallow colony and Bank Swallows are listed as endangered under Ontario's Endangered Species Act. The project determined that any method of bluff stabilization through the proposed shore protection would have adverse impacts on the colony which rely on continuous erosion of the bluff for the health and protection of their burrows.

As shore protection was required to protect the public park land, the project team applied for an overall benefit permit through the Ontario Ministry of Environment, Conservation and Parks and developed a plan to mitigate impacts to the colony by building habitat compensation nearby and to implement an extensive monitoring program to fill knowledge gaps for the species. The habitat compensation included the design and construction of a concrete habitat wall. The wall consists of 275 burrows, packed with sandy loam that lead to burrowing substrate behind the wall. This is the second habitat wall of its kind to be constructed in Ontario. Construction was completed in November 2024. The monitoring program will commence in the spring of 2025 to monitor the existing colony, and Bank Swallow use of the new habitat wall. The monitoring will extend over the next 3 years.

The Influence of Jetties on the Downdrift Nearshore Environment on the North Shore of Lake Erie

Mr. Cooper O'Rourke [1], ***Dr. Chris Houser*** [1]

1. *University of Waterloo*

The north shore of Lake Erie has been experiencing substantial rates of bluff and shoreline erosion with some areas experiencing over 10 meters of transgression per year. The considerable rates of both accretion and erosion occur at spatially distinct regions along the shoreline between Erieau, Ontario, and Long Point Provincial Park. These distinct regions occur directly updrift and downdrift of the four main jetties along the Canadian shoreline in the study area. This coastal infrastructure disrupts the littoral movement of sediment in the nearshore by trapping sediment on the updrift side while starving sediment downdrift of the jetty. To understand the influence that coastal infrastructure has on the highly erosional areas, we must understand the nearshore environment. Nearshore bathymetric maps are not as accurate as those in deeper waters due to the relatively deep draft of surveying vessels which limits their ability to enter the shallow areas of the nearshore. Due to the absence of high-quality nearshore maps, surveys were conducted by a shallow draft jet boat that allows for high quality bathymetric surveys by utilizing commercially available sonar sensors. The product of these surveys allows for a comprehensive analysis of the nearshore structure and morphology. By mapping the nearshore structure, we can determine the influence that jetties have on alongshore sediment transport and the scale-dependent nature of bluff retreat along the north shore.

The Littoral Ice Climate of Southeastern Lake Huron: Implications for Bluff Retreat and Sediment Transport

Mr. Ben Woodward [1], ***Dr. Chris Houser*** [1]

1. *University of Waterloo*

Since the 1970s, winter ice cover on the Laurentian Great Lakes has declined precipitously in both duration and maximum areal coverage due to anthropogenic climate change. However, ice cover in the littoral zone declined at half the rate of mid-lake ice between 1973 and 2002. Along the southeastern shoreline in Lake Huron (Sarnia to Point Clark), littoral ice cover generally forms in early to mid January and remains in place until late March. Since January and March are among the windiest months in southeastern Lake Huron, it is thought that littoral ice reduces rates of wave-driven bluff toe erosion in the study area. Littoral ice has an uncertain but non-negligible impact on sediment budgets, as sand to boulder sized particles can be transported through ice rafting onshore, alongshore, or beyond the nearshore zone depending on wind conditions. To gain insights into littoral ice cover trends in southeastern Lake Huron, a climatology of littoral ice cover with date ranges for formation and breakup was constructed using remotely sensed imagery (Landsat, Sentinel-2, and Planet) and NOAA ice charts. This climatology was paired with field observations and insights from semi-structured interviews with longtime shoreline residents, facilitating a robust discussion of the potential implications of declining littoral ice cover on coastal erosion and sediment transport in southeastern Lake Huron.

The relevance of regional scale adaptation processes in Canada – examples from Quebec and New Brunswick

Prof. Sebastian Weissenberger [1], ***Mr. Nicolas Bastien-Porlier*** [2], ***Prof. Jeff Birchall*** [3], ***Prof. Omer Chouinard*** [4]

1. *Université Téluq,* ***2.*** *Université du Québec à Montréal (UQAM),* ***3.*** *University of Alberta, Faculty of Science - Earth & Atmospheric Sciences,* ***4.*** *Université de Moncton*

Climate change adaptation is mainly a provincial responsibility, but in practice often relies on local governments, who often don't have the necessary resources. As a solution to increase adaptation capacity and the access to resources, regional governance models have emerged in Canada, spontaneously or in a planned manner. We present some examples from the provinces of New Brunswick and Quebec to illustrate this: 1) the institutional reforms in NB, 2) the regional planning process in the Acadian peninsula, 3) the Greater Moncton Adaptation Strategy, 4) the Participatory governance and resilience to climate change 2023 project in the Chaleur Bay, 5) the Pays de Cocagne (Kent County) climate change adaptation initiatives. We wish to understand what conditions lead to the emergence of governance systems, mainly through self-organisation, but partly also through the creation of institutional frameworks in response to observed governance deficits. Financing opportunities are a strong incentive for actors to unite around a common project. Often, the presence of « boundary organisations » such as NGOs, universities and research institutions is an indispensable catalyst for collective action at the regional scale. Other circumstantial factors favouring social cohesion, such as insular environments or the sense of belonging of the Acadians community can play a role. Favorable constellations of actors & institutions, resources and information allow the collective dynamics to unfold, often rooted in a history of collaboration.

The Science of Doing: Connecting the dots Between Environmental Stewardship and Community Well-being.

Mrs. Leticia Akwue Akwue [1]

1. *University of Prince Edward Island*

Leticia Chinyere Akwue

Climate change presents urgent challenges for island communities, demanding a multidimensional approach to education. As both climate science and sustainability are integral to addressing these challenges, educators must develop curricula and methods that foster awareness, critical thinking, and actionable skills. Project-Based Learning (PBL) offers a promising strategy, blending real-world problem-solving with experiential education to prepare youth for climate adaptation and mitigation.

This paper explores the transformative potential of PBL in island contexts, where communities are among the most vulnerable to climate impacts such as coastal erosion, flooding, and food insecurity. PBL's learner-centered approach builds teamwork, leadership, and critical thinking capacities in teamwork, leadership, and critical thinking, enabling students to address local climate issues with innovative solutions. Drawing from case studies such as Hoʻoulu ʻĀina in Hawaii, this paper demonstrates how integrating cultural education with ecological restoration fosters environmental stewardship and community well-being. Research shows that initiatives like restoring fishponds enhance ecological knowledge and improve youth mental health, strengthen community ties, and promote sustainable lifestyles.

By analyzing the unique challenges and opportunities for PBL in islands, this paper provides actionable recommendations for educators. It advocates for embedding PBL in curricula to nurture adaptive capacities, reduce overconsumption, and strengthen resilience against imminent climate impacts.

Keywords: Climate Change Education, Project-Based Learning, Sustainability, Adaptive Capacities, Youth, Island Resilience

The Seasonal Variation of Wave Energy Dissipation by Immature Coastal Saltmarshes: Insights from Large-Scale Flume Experiments

Ms. Ganga Caldera [1], ***Dr. Jacob Stolle*** [1], ***Dr. Damien Pham Van Bang*** [2], ***Dr. Enda Murphy*** [3], ***Mr. Paul Knox*** [4]

1. *Institut national de la recherche scientifique (INRS),* ***2.*** *École de technologie supérieure,* ***3.*** *University of British Columbia,* ***4.*** *National Research Council of Canada*

A series of large-scale physical model tests were conducted in a 5 m × 5 m × 120 m wave flume at the Laboratoire hydraulique environnemental (LHE) of Institut national de la recherche scientifique (INRS), Quebec City, Canada. The study investigated wave dissipation by three live saltmarsh species native to the East Coast of Canada, namely *Sporobolus alterniflorus, Sporobolus pumilus* and *Sporobolus michauxianus*.

This research represents one of the first controlled experiments examining wave energy dissipation on vegetated slopes with live vegetation. The results aim to address knowledge gaps in the seasonal performance of Canadian coastal saltmarshes and inform the design of effective living shorelines. The main objectives of the study were to assess the wave dissipation characteristics of immature saltmarsh vegetation and their temporal variations based on plant biophysical characteristics and hydrodynamic conditions.

The experimental series was conducted from August (summer) to early November (late autumn) 2023 and from May to August (summer) 2024 to evaluate the marsh performance after one year of growth cycle including post-winter effects. The data collected during the experiments were used to calibrate bulk (canopy-averaged) vegetation drag coefficients in a SWAN (Simulating Waves Nearshore) numerical wave model. Results indicate a modest increase in wave dissipation by vegetation after one year of growth, attributed to changes in plant morphological characteristics. However, wave energy dissipation by these young saltmarshes was limited, with wave breaking identified as the dominant dissipative mechanism.

The Sustainability of Coastal Protection Projects: Challenges and Trade-offs

Mr. Justin McKibbon [1]

1. *Lasalle-NHC*

In the field of coastal protection, sustainable solutions generally strive to provide efficient coastal flood and erosion risk management functions, while delivering environmental and other societal co-benefits, such as maintaining waterfront accessibility, preserving its recreational uses and cultural significance, reducing demands on limited resources, minimizing the environmental footprint of projects, conserving coastal ecotones, improving the ecological functions of the shoreline or of coastal defences and minimizing greenhouse gas emissions. Collectively, however, these objectives can sometimes become paradoxical and make developing a balanced coastal management approach challenging. Modern strategies must consider the broader settings in which shore protections are implemented in order to reduce the impacts of piecemeal projects. In this context, the long-term cumulative effects of recurring, low-impact interventions, like beach nourishments for instance, can sometimes match or even outweigh the stresses caused by high-impact and more invasive interventions, like groyne construction, depending on site conditions and procurement details.

With this in mind, the proposed presentation intends to highlight common reflections often considered by practitioners during project development and how they influence solution selection. A review of the typical coastal protection solutions (sediment-based, vegetation-based and hybrid solutions) and a summary of their capabilities and limitations in achieving holistic and sustainable coastal management approaches will be presented. The discussion will then identify some of the trade-offs required in order to achieve social and environmental acceptability, while reflecting upon how best to prioritize sustainability objectives.

The United Nations Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) – an Ocean and Coastal Science-Policy Interface Standing the Test of Time

Dr. Wendy Watson-Wright [1], ***Dr. Peter Wells*** [2]

1. *GESAMP,* ***2.*** *Dalhousie University and International Ocean Institute*

Established in 1969, GESAMP is a group of independent scientific experts providing advice to the UN system on scientific aspects of marine environmental protection. It is currently sponsored by ten UN entities. GESAMP conducts and supports marine environmental assessments; undertakes in-depth studies, analyses and reviews of specific marine topics; and identifies emerging issues impacting ocean health. GESAMP's core group currently consists of 17 independent scientific experts, drawn globally from many relevant disciplines. Studies and assessments are carried out by dedicated working groups, members of which come from the broader GESAMP network. To date, GESAMP has addressed a wide range of marine topics and produced 52 in-depth studies, 11 of which focus specifically on the coastal zone. Studies have involved more than 500 scientists from 50+ countries. GESAMPs core work is published as peer-reviewed reports in the on-line GESAMP Reports and Studies Series, and in scientific journals. Working Group 1's hazard assessments of bulk chemicals carried by ships provide key advice to policy makers and regulators within IMO, working under various international regulations and codes. The group's scientific output on key topics (e.g., plastics, chemicals at the air-sea interface) is used widely by the UN, national governments, intergovernmental groups, nongovernmental groups and the scientific community, one paper having been cited approximately 2000 times. Given escalating concerns about the ocean, both as a recipient of impacts as well as in its role in planetary climate change, GESAMPs assessments and advice will continue to be needed now and well into the future.

The Use of Nature-based Infrastructure for Mitigating Coastal Erosion in Newfoundland. Department of Geography, University of Newfoundland and Labrador, St John's, Newfoundland.

Ms. Marina Cuselli [1], ***Mr. Joseph Daraio*** [1], ***Ms. Carissa Brown*** [1]

1. *Memorial University of Newfoundland*

By 2100, the sea level in Newfoundland is projected to rise by 0.5-1 meter, which, combined with increased precipitation, will exacerbate vulnerability to coastal hazards. Coastal areas are high-energy, dynamic environments that are economically vital to the communities that live along them. Furthermore, it is important to protect coastal areas for their ecological and cultural value. In addition to artificial engineering structures for coastal protection, coastal wetlands and vegetation play a huge part in protecting and buffering against coastal hazards. Nature-based solutions for coastal protection are cost-effective, protect shorelines, benefit carbon sequestration, and restore habitats. Nature-based solutions have not been widely studied in Newfoundland, partly due to its unique coastal landscape, and our primary goal is to assess the potential use of such solutions on the island. Specifically, we aimed to i) characterize vegetation-coastal characteristic associations to determine the best species-environment matching for Newfoundland's coasts, ii) conduct transplantation and species-suitability trials of a subset of species identified in (i), and iii) carry out a Peak Over Threshold analysis (POT) to suggest limits to guide the implementation of our case study in Ferryland on the Avalon Peninsula. Our findings allow us to identify areas at higher risk of inundation and which areas might be best suited for planting terrestrial vegetation, with the ultimate goal of informing communities in their plans of adaptation and mitigation efforts along coastal Newfoundland.

Three years of Monitoring at the Truro-Onslow Dyke Realignment and Tidal Wetland Restoration Project

Ms. Kayla Williams [1]***, Ms. Jennie Graham*** [1]***, Mr. Tony Bowron*** [1]***, Dr. Danika Van Proosdij*** [2]***,***
Ms. Kirsten Ellis [3]

1. *CB Wetlands and Environmental Specialists,* ***2.*** *Saint Mary's University,* ***3.*** *CB Wetlands & Environmental Specialists*

Globally, the practice of re-introducing tidal flow to former dykelands and restoring tidal wetland habitat has been identified as a viable adaptation method to current and future risks associated with climate change. Located at the confluence of the North and Salmon Rivers near the town of Truro, the Onslow-North River Marshland provides an important opportunity to demonstrate the environmental and social benefits of a large-scale strategic dyke realignment project, as well as the benefits of a multidisciplinary and multi-stakeholder approach to tidal wetland restoration. Carried out in collaboration with the NS Department of Agriculture (NSDA), NS Public Works, and the Onslow-North River Marsh Body, this project included the construction of two sections of new dyke, a new aboiteau and the restructuring of the agricultural ditch network to create a foundation for a new hybrid tidal creek network, and the hydrodynamic modeling of dyke breach scenarios. A six-year monitoring program was initiated to establish baseline conditions at the site and track restoration efficacy. The old dyke was decommissioned and tidal flow re-introduced to the site in the fall of 2021, and the third year of post-construction monitoring was carried out in the summer of 2024. Flooding by higher high tides resulting in high levels of sedimentation throughout the site have increased elevations and created favorable conditions for vegetation and fish communities. Following three years of monitoring, the site has shifted towards a tidal-fresh marsh community with a functioning tidal creek network.

Tidal Wetlands in Nova Scotia: Plant Community Composition and Environmental Influences Across the Atlantic Coast, Northumberland Strait, and Bay of Fundy

Ms. Emily Hodgson [1]

1. *Saint Mary's University*

This study evaluates the composition and zonation of tidal wetland vegetation across three ecoregions in Nova Scotia, Canada: the Atlantic Coast, Bay of Fundy, and Northumberland Strait. These regions vary in tidal ranges, sediment characteristics, and climatic conditions, influencing tidal wetland structure and function. Field surveys conducted in 2023 at 30 sites (264 plots) were compared with historical data primarily from the Bay of Fundy to explore how environmental factors, including elevation (m), inundation frequency (hours per month), mean inundation time (hours per month), and soil nutrients, shape plant communities across regions.

Principal component analysis (PCA) of environmental data identified geographic location, elevation (m), and organic matter (%) as key drivers of community composition. Vegetation PCA revealed distinct communities, with *Sporobolus* alterniflorus and *Sporobolus pumilus* dominating many sites. Redundancy analysis further explored the vegetation, with brackish communities showing greater diversity than previously reported. Northern and eastern shores were characterized by species such as *Carex* paleacea, *Festuca rubra,* and *Juncus* balticus. In contrast, southwestern sites supported unique brackish and tidal freshwater communities dominated by species like *Schoenoplectus* americanus and *Eleocharis* rostellata. Organic marshes exhibited higher vegetation variability compared to minerogenic marshes, while brackish and freshwater plots were more prevalent along the Atlantic and Northumberland coasts.

These findings highlight the influence of ecoregional variability on tidal wetland vegetation communities and provide critical baseline data for conservation, restoration, and climate change adaptation efforts in Nova Scotia's coastal ecosystems.

Tourism Industry Monitoring of Near-Shore Hypoxia to inform Stewardship on the B.C. Coast

Dr. Russell Markel [1], ***Dr. Rebecca Martone*** [1], ***Dr. Jack Barth*** [2], ***Ms. Haley Hudson*** [2], ***Ms. Katherine MacRae*** [3], ***Mr. Nik Coutinho*** [3]

1. *Outer Shores Expeditions,* ***2.*** *Oregon State University,* ***3.*** *Wilderness Tourism Association of BC*

Along the west coast of Canada, climate change impacts - including marine heat waves, low oxygen levels, and ocean acidification - are of major concern to coastal communities. Many people depend on coasts and oceans for their livelihoods, food security, and cultural identities. Having more observations of environmental conditions, including temperature, oxygen, pH, and salinity, particularly in nearshore areas, is key to understanding and improving predictions of how changing ocean chemistry impacts coastal ecosystems and fisheries. In response to this need, the Wilderness Tourism Association's Small-Ship Tour Operators (SSTOA) have embarked on a large-scale, industry-led, citizen science project that harnesses the sea-going capacity and geographic range of the small ship marine tourism industry throughout the BC Coast. This region supports numerous commercial and First Nations fisheries and ecosystems that are highly vulnerable to the impacts of increasing ocean acidification and hypoxia (OAH); however, OAH observations and oceanographic science are particularly limited from this region. In collaboration with oceanographers at Oregon State University (OSU), SSTOA's fleet of 11 expedition tourism vessels are deploying oceanographic sensors that measure depth, temperature, salinity, and dissolved oxygen profiles in nearshore coastal areas. We will describe our approach to partnerships, sensor deployment, data management and analysis, and early lessons learned. This project demonstrates how partnerships among the tourism industry, academia, crown governments and Indigenous governments can work together to fill gaps and improve understanding of spatial and temporal variability in environmental conditions that can be useful for stewardship and conservation of coastal areas.

Transformative Adaptations to Social-Ecological Climate Change Trajectories (TranSECT)

Dr. Ian Stewart [1], ***Dr. Barret Kurylyk*** [2], ***Dr. Sarah Stewart-Clark*** [3], ***Prof. Lorn Sheehan*** [3], ***Prof. Fanny Noisette*** [4]

1. *University of King's College,* ***2.*** *Centre for Water Resources Studies, Dalhousie University,* ***3.*** *Dalhousie University,* ***4.*** *Institut des sciences de la mer*

The goal of this panel is to present to the CZC community details of an emerging research project, TranSECT, situated within a larger tri-council funded project, *Transforming Climate Action* (https://www.ofi.ca/programs/transform-climate-action), which is centered at Dalhousie University, Université Laval, Université du Québec à Rimouski, and Memorial University. TranSECT will be guided by two central research questions:

1. What kind of adaptations can be transformative for the resilience and sustainability of Atlantic Canadian coastal communities in the face of complex climate-related challenges?
2. How best can partnered academic research be a productive and transformative part of such adaptations?

In this panel an introduction and four presentations will report on the early stages of the research planned. A brief introduction (Stewart) will present TranSECT's overall approach using the social-ecological systems (SES) lens as applied in particular to inter–and trans-disciplinary research methodologies. Four case study reports will follow. One presentation (Kurylyk) will address the challenge of groundwater as an SES 'boundary object' under climate change for a project based in PEI. A second (Stewart-Clark) will present on climate change impacts on intertidal zone invertebrate aquaculture in PEI and NS. A third will share findings on links between adaptations in tourism to sea-level rise and other climate change challenges in key communities in rural NS. The last case study presentation (Noisette) will report on research in coastal QC communities on technical support structures as well as governance and policies support for diversifying aquaculture activities in a sustainable and equitable way in the face of climate change.

Understanding and Adapting to Climate Change in Coastal Environments: A Parks Canada Perspective

Dr. Stephanie Barr [1], ***Dr. Hilary Harrop Archibald*** [1], ***Dr. Elizabeth Nelson*** [1], ***Ms. Alice Yue*** [1], ***Mr. Sébastien Renard*** [1]

1. *Parks Canada*

Climate change poses significant challenges to coastal environments, affecting biodiversity, ecosystems, cultural heritage, infrastructure, and human communities. Rising temperatures, altered precipitation patterns, rising sea levels, and increased frequency and intensity of storms, are some of the most pressing impacts in these environments. Climate change impacts are being observed in coastal environments across the country at sites Parks Canada plays in a role in administering. Parks Canada is addressing this challenge and has developed a suite of tools and resources to assist with understanding and responding to these impacts.

This presentation will showcase climate change work at Parks Canada by providing examples of observed climate impacts at coastal sites, an overview of climate change tools and resources used to assess risk and vulnerability and to inform decision-making, and example adaptation actions sites have undertaken to address climate change. Key tools and resources include the Adaptation Framework for Parks and Protected Areas, climate summaries, adaptation workshops, climate-smart conservation, and the Resist-Accept-Direct framework. Using case studies from Atlantic Canada, we will share how Parks Canada has been learning, adapting, and using evidence-based decision-making to address climate change in the coastal environment.

Understanding the multifaceted challenges and solutions associated with climate change is vital for strengthening resilience and ensuring the sustainability of coastal ecosystems in a rapidly changing climate. Sharing knowledge, case studies, and lessons learned is essential to advance climate action across jurisdictions. Through our presentation, we hope to foster discussion and knowledge sharing related to climate change in the coastal environment.

Understanding the functions and activities of science-policy interfaces is key to effective coastal and marine decision-making

Dr. Bertrum H. MacDonald [1], ***Dr. Suzuette S. Soomai*** [1], ***Dr. Peter Wells*** [2]

1. *Department of Information Science, Dalhousie University,* ***2.*** *Dalhousie University and International Ocean Institute*

Coastal areas and communities, prominent at the land-sea interface in Canada, face numerous challenges, e.g., changes in environmental conditions, pressures on coastal uses and services, and vagaries of policies and politics. Governments at all levels may respond to these issues, but often slowly or inadequately. Why? What impedes the uptake of the large body of available evidence into policy decisions? For over two decades, the interdisciplinary Environmental Information: Use and Influence research program at Dalhousie University has been investigating barriers and enablers affecting the use of information in marine environmental decision-making. Working in collaboration with governmental, intergovernmental, and non-governmental organizations, this research is highlighting factors affecting the often-complex interactions of people, information, and issues at science-policy interfaces. For example, in an initiative to establish a coastal marine protected area, historical legacies of mistrust of government and misinformation influenced the planning processes. In another case, environmental non-governmental organizations filled pivotal roles as boundary organizations facilitating information exchanges among stakeholders. A third case revealed that stakeholder organizations, acting as coordinators, connectors, or information mediators, bridged government, academic, industry, and community groups in a network about marine renewable energy. In other cases, the format of information, e.g., technical reports, briefing notes, and factsheets, influenced knowledge mobilization by different audiences. Based on numerous case studies, this presentation will discuss the functions of science-policy interfaces to show why understanding information pathways can be instrumental in efforts to ensure that evidence is used in a timely manner in decision-making about coastal and marine conditions.

Use of CFD Model to Estimate Wave Loads on a Complex Ferry Ramp Structure

Mr. Saeed Valikchali [1], ***Mr. Dave Anglin*** [1], ***Mr. Jean-Michel Lamy*** [2]

1. *W.F. Baird & Associates Coastal Engineers Ltd.,* ***2.*** *Parsons Corporation*

Transport Canada (TC) is in the process of upgrading a number of ferry terminals in the Canadian Maritimes to accommodate larger ferries. For example, proposed marine infrastructure upgrades at the Souris, PEI ferry terminal include new wharf and movable transfer bridge (MTB) structures. Parsons, in association with Baird, were retained by Public Works and Government Services Canada to complete design development for the MTB. Parsons was responsible for the structural design of the MTB while Baird was responsible for the modeling and analyses required to define metocean design conditions, wave and ice loads for the structure. The focus of this paper/presentation is on the application of a computation fluid dynamics (CFD) model to simulate complex wave-structure interactions as required to develop design wave loads for the MTB.

More specifically, the paper and presentation will provide details on the following aspects of the project:

- Definition of design metocean conditions for the project site;
- Review and application of published empirical methods to estimate wave uplift loads on the proposed MTB structure;
- Development and application of CFD model to estimate wave-structure interactions;
- Post-processing of CFD model results and development of design wave loads for the MTB;
- Comparison of CFD model results to empirical methods;
- Recommendations for similar studies in the future.

Using fisher knowledge and scientific data to understand species importance in Chilika Lagoon, India

Ms. Natasha Serrao [1], ***Mx. Prateep Nayak*** [1]

1. *University of Waterloo*

Understanding the human-fish connection is especially important, as 120 million people globally rely on fish for their livelihoods and well-being. Over 90% of these individuals work within the small-scale fisheries sector. Fishers are negatively impacted by fish decline through income loss and food security. To mitigate this decline, a strong connection is required between scientific research and local practices. My research strengthens this association using keystone theory and community perspectives to understand fisheries conservation. To gather local perceptions on fish importance, I interviewed 90 individuals across three socially diverse villages in Chilika Lagoon, India. I captured responses across a range of demographic variables including age, gender, and caste. Interviewees were asked to identify fish shown in photographs I provided, to understand linkages between scientific and local naming. My study revealed a high variation of local names assigned to each species, with much of this diversity attributed to phonetic differences. Secondly, fish identification that matched the literature was higher in villages where fish were caught, likely related to active fishing of target species. My findings are critical to ensuring a shared language between fishers, resource users, and scientists, so that limited conservation resources can be allocated to target species.

Wave ‘Hello’: Introducing Newfoundland & Labrador’s Atlas of Storm Surge and Wave Climates

Mr. Ethan Slaney [1], ***Ms. Paula Dawe*** [1]

1. *Government of Newfoundland and Labrador*

Climate change is increasing coastal flood hazard for communities along Newfoundland and Labrador shorelines, resulting in increased damage to infrastructure and property, and risk to life. Sea level rise, disappearing pack ice, and the increasing frequency and intensity of extreme storm surge and wave events all highlight the need to examine the specific risks to these coastal communities. The government of Newfoundland and Labrador has developed a flood event inventory dating back to 1775. Coastal flooding accounts for approximately 20% of the province’s flood events, and the frequency of these events has increased over time.

In 2024, the province released the Newfoundland and Labrador Atlas of Storm Surge and Wave Climates developed with DHI. The Atlas was originally intended to provide boundary conditions for flood modelling and mapping studies at river discharge locations. But after the devastation of Hurricane Fiona in September 2022 to Newfoundland’s southwest coast, the scope expanded. The Atlas consists of outputs from a series of coastal hydrodynamic and wave models, including estimates of extreme nearshore surge levels and wave conditions for the entire coast of Newfoundland and Labrador—useful for those involved in coastal management. What is a regional storm surge and wave model? How can one make use of these data? The purpose of this presentation is to raise awareness of the model data, and to share some of the purposes to which the data can be put to use to better understand coastal flooding risk and mitigation strategies for vulnerable communities in the province.

Wave Hazard Assessment for Flood Mapping: Evaluating Methodologies and Supporting Best Practices for Coastal Canada

Mr. Pablo Cortes [1], ***Ms. Aline Kaji*** [1], ***Mr. Patrick Joynt*** [1], ***Mr. Josh Wiebe*** [2]

1. *DHI Water & Environment Inc.,* ***2.*** *Environment and Climate Change Canada*

Flood mapping is essential for managing flood risk, supporting emergency preparedness, regulatory planning, socio-economic assessments, and public awareness of exposure to hazards. A key component of flood mapping is the evaluation of wave hazards, which significantly influence coastal flooding. Current methodologies for assessing wave contributions vary widely, from empirical formulas to process-based models, creating challenges in standardization, validation, and cross-study comparisons. Converting 1D runup and overtopping results into 2D flood maps also requires detailed consideration of coastal characteristics, such as alongshore uniformity and inland geometry. This study examines methodologies for calculating wave runup and overtopping, and the delineation of flood maps, on diverse coastal profiles, focusing on empirical formulas and process-based models such as MIKE 3 Wave FM, XBeach, SWASH, and CSHORE. Empirical methods dominate existing guidelines due to their simplicity and established reliability, while process-based models excel in capturing wave dynamics in complex environments (such as complex cross-shore profiles) but face adoption challenges, including high computational demands and instabilities from fine resolutions required for short-period wave simulations.

Eight synthetic shoreline profiles, ranging from beaches to seawalls and dikes, were analyzed under various wave and water level scenarios. Real-world profiles were also evaluated, including comparisons with 3D numerical wave models of the study areas.

This work was initially carried out to support an Environment and Climate Change Canada initiative to develop technical guidance for conducting wave hazard assessments. When published, the voluntary guidance will provide a standardized framework for evaluating and mapping wave hazards.

Wave run-up on a highly dissipative beach

Ms. Carmen Holmes-Smith [1], ***Dr. Johannes Gemmrich*** [1]

1. *University of Victoria*

Wave run-up is a key contributor to coastal flooding and it is critical that we understand how to both accurately and practically predict its magnitude. This study uses long-term observations of wave run-up collected using video imagery of a highly dissipative sand beach on the West Coast of Vancouver Island. Spectral analysis of the timeseries shows a significant spectral transformation across the surf-zone, with a dominant peak frequency in the infragravity range. Using additional measurements of sea surface elevation from the surf-zone and offshore to draw correlations with sea-state variables, $\sqrt{HL}$ was the strongest predictor of run-up evaluated. A positive correlation is also observed between large run-up events and the relative amount of infragravity energy present in the incoming wave field. The crest-trough correlation parameter r can be easily calculated from 1-D wave buoy spectra and is shown to be a useful proxy for infragravity energy in the wave field. This suggests the potential for improving currently utilized empirical parameterizations of run-up, which are prone to error when applied across a wide range of beach/wave environments, by accounting for infragravity energy. Including r in empirical parameterizations with $\sqrt{HL}$ could improves estimates over using $\sqrt{HL}$ alone and can be integrated easily into existing and subsequent prediction models. These models will benefit coastal research and community stakeholders by improved prediction of run-up and coastal flooding.

What are the climate change-related risks for the fishing sector in coastal communities ? Sudy case in the Acadian Peninsula

Mr. Rajaonarimanana Nisa [1], ***Dr. Irina Randriantiana*** [1], ***Dr. Marion Tétégan Simon*** [2]

1. *VALORĒS, Coastal Zones Research Institute Inc., Nouveau-Brunswick, Canada,* ***2.*** *VALORES*

The Acadian Peninsula is a region where fishing is a highly significant economic activity. It currently has more than fifteen fishing ports, each capable to accommodate an average of over fifty fishing boats, depending on their capacity. Largely affected by coastal flooding, several infrastructures and facilities are at risk of severe flooding under various sea-level rise scenarios during storms. A high tide earlier in November 2024 caused the sea to overflow and damage boats docked in the port. The destruction or even disappearance of ports in the Acadian Peninsula could have economic and even social consequences for the fishing industry. The inventory of these infrastructures, the calculation of economic damages, the mapping of various flooding scenarios for the fishing ports, and the proposal of adaptation solutions were addressed during Phase I of the project. The logical next step of the project would be to raise awareness among stakeholders about the implementation of the identified adaptation solutions. This project is part of the Acadian Peninsula's climate change adaptation initiative. The results of this project could easily be replicated in other similar coastal areas in New Brunswick, across the Atlantic region, and beyond.

What's old is new again - How the Mi'kmaq people adapt to coastal changes

Mr. Andrew Sark [1]

1. *PEI Office of the Regional Chief*

Mi'kmaq people have coexisted with their natural environment since time immemorial. Residing and frequenting the coastlines and riverbanks of Mi'kma'ki have helped define the tenacity of Mi'kmaw culture over many generations. Can the Mi'kmaq adapt at the new expedited pace of a changing coastal scape?

About the Presenter: Andrew Sark is a Community Climate Engagement Officer with the PEI Office of the Regional Chief. His role involves community outreach events and workshops to discuss Climate change mitigation and adaptation. He and his team are also working on a Climate Change Strategic Plan for Island First Nation Communities. Andrew resides in Stratford and is a member of Lenox Island First Nation. His outreach training and experience is drawn from his time with Parks Canada, Environment Canada, Cape Breton University and the University of New Brunswick.

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