



Development of a Coastal Resilience Framework, Lake Erie North Shore Pilot

Pete Zuzek, Linda Mortsch, Larry Hildebrand
November 17, 2022

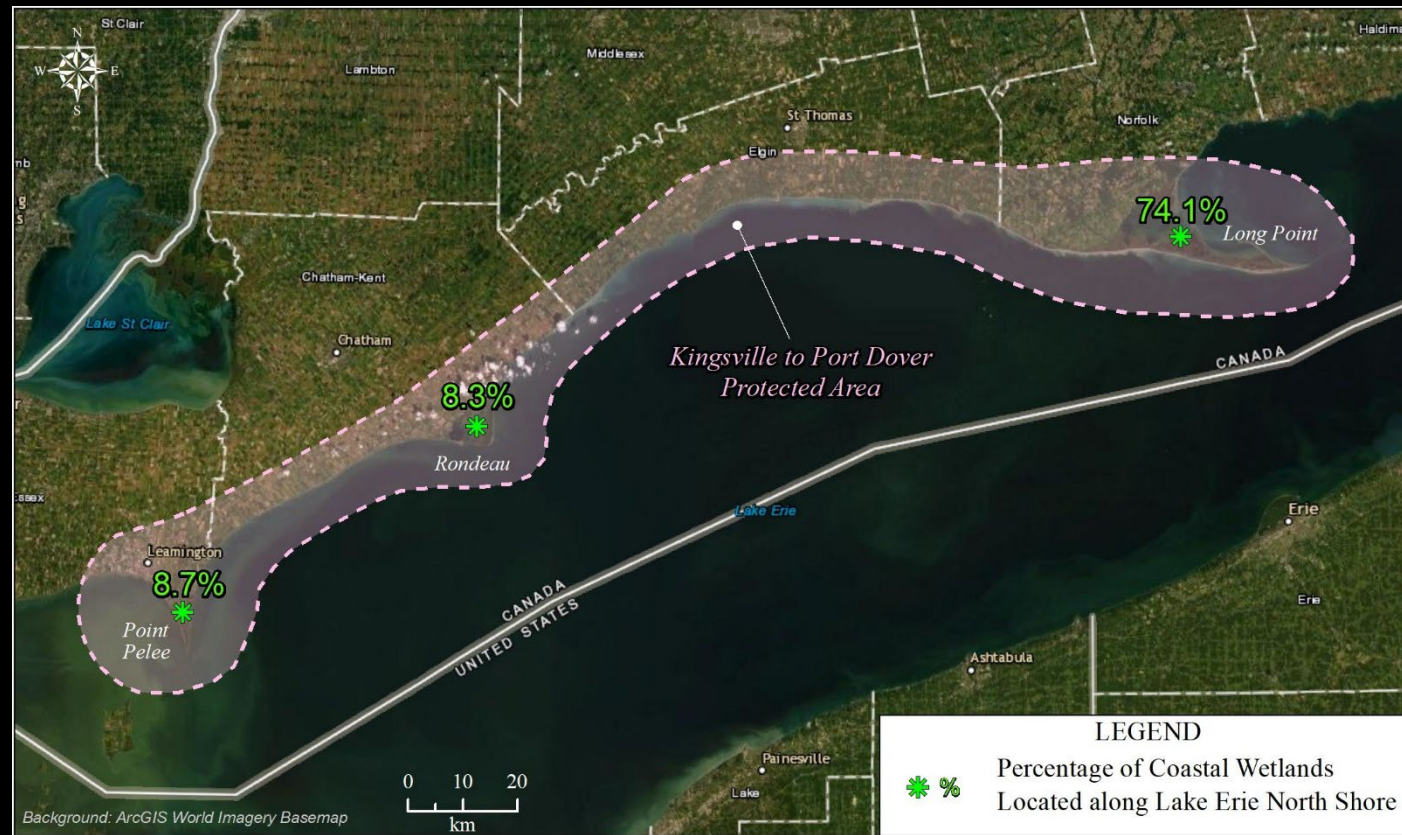


Presentation Outline

- I. Welcome and Recap of Previous Meeting
- II. Draft Process Overview and Timeline
- III. Focus of the Think Tank / Steering Committee
- IV. Defining Coast and Coastal Resilience
- V. Draft Narrative, Goals, and Outcomes
- VI. Review of Legislation and Policy Scan
- VII. Next Steps



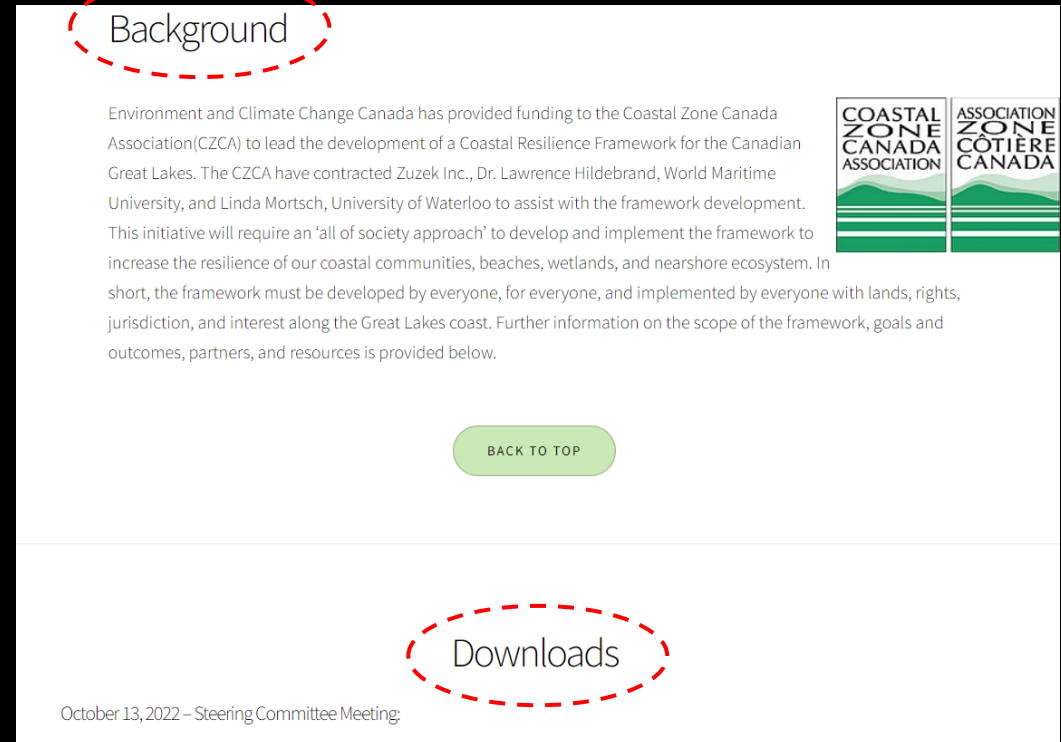
I – WELCOME AND RECAP OF PREVIOUS MEETING





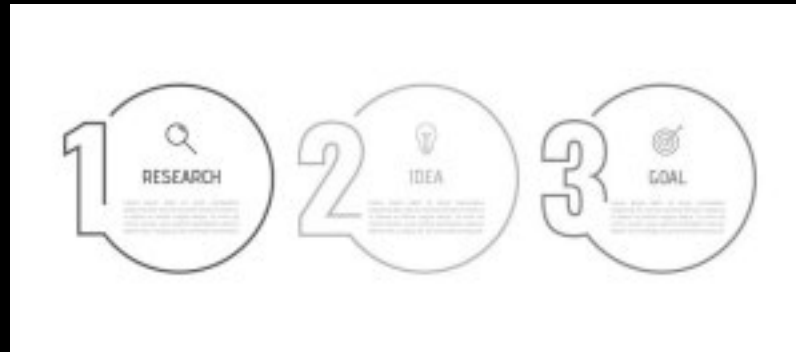
Project Website

- <https://zuzekinc.ca/ResilienceFramework/>
- Can we get permission to list the Think Tank / Steering Committee members on the site?





II – DRAFT PROCESS OVERVIEW AND TIMELINE



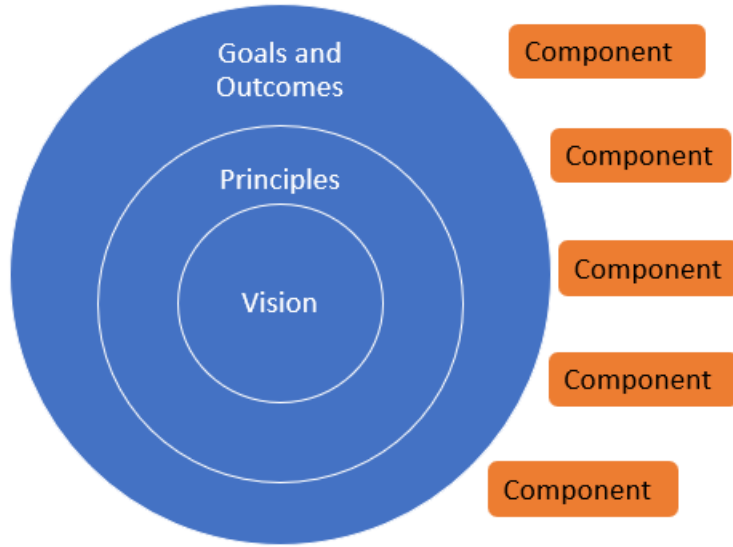


Collective Impact Model – Guiding Principles

1. **Backbone Support** — Creating and managing collective impact requires each unique organization (with their staff and a specific set of skills) to serve as the backbone for the initiative and coordinate with other participating organizations and agencies
2. **Equity** — Equal distribution of resources across society
3. **Common Agenda** — All participants have a shared vision for change including a common understanding of the problem and a joint approach to solving it through agreed upon actions
4. **Mutually Reinforcing Activities** — Participant activities can be differentiated yet are coordinated through a mutually reinforcing plan of action
5. **Shared Measurement** — Collecting data and measuring results consistently across all participants ensures efforts remain aligned and participants hold each other accountable
6. **Continuous Communication** — Consistent and open communication is needed across the many players to build trust, assure mutual objectives, and create common motivation

Meeting 1: Common Understanding and Shared Vision

*What is coastal resilience?
What are the narrative, goals and outcomes?
What are we aspiring to achieve?
Why do we Need It?*



November 2022

All of Society Approach
Equity in Collective

Meeting 2: Who Needs to Be Involved & What Others are Doing?

*Who is actively working on coastal resiliency (stakeholder mapping)?
What is happening internationally?*

December 2022

Meeting 3 & 4 Mutually Re-enforcing Activities

*What activity is already occurring?
What roles exist? What are possible leverage points to consider? How can current activity be better shared/coordinated?*

*Does anything work at cross purposes? What are the gaps? To improve resiliency outcomes, where could we start?
What actions are needed and by which organizations?*

*What governance models have worked?
What do we need to do (differently) to achieve the vision, goals, objectives? What kind of support and/or endorsement is needed?*

January-February 2023

Meeting 5: Draft Framework and Measuring Success

Continuous Communication

How can we design communication systems to keep momentum?

Engagement

*How can we get others excited to work on this?
What information do community partners need?*

Measuring Success

How will we measure success? (metrics)

Adaptation, Reflection

What processes will we put in place to reflect on progress, and confirm the course is still impactful?

March 2023

**Governance Model/
Backbone Support**



Draft Process Overview - Discussion

- Any feedback or questions?
- Anything to add, change, or delete



III – FOCUS OF THE THINK TANK / STEERING COMMITTEE



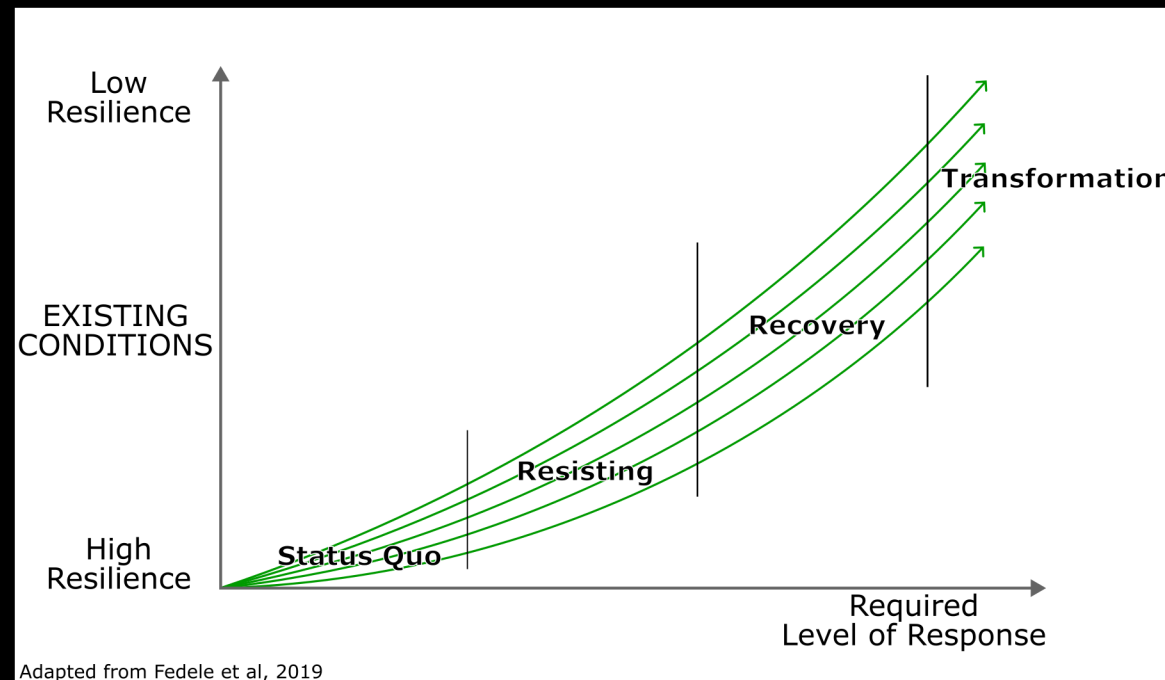


Focus of the Think Tank / Steering Committee

- Participate in monthly meetings and other special initiatives as required
 - Contribute knowledge, expertise, and resources to the framework development
 - Disseminate information to others within organization
 - Participate in the FY2 community engagement
-
- Participating will not only advance the framework but leverage resources and action that can strengthen individual agency mandates



IV – DEFINING ‘COAST’ AND ‘RESILIENCE’





By Everyone For Everyone

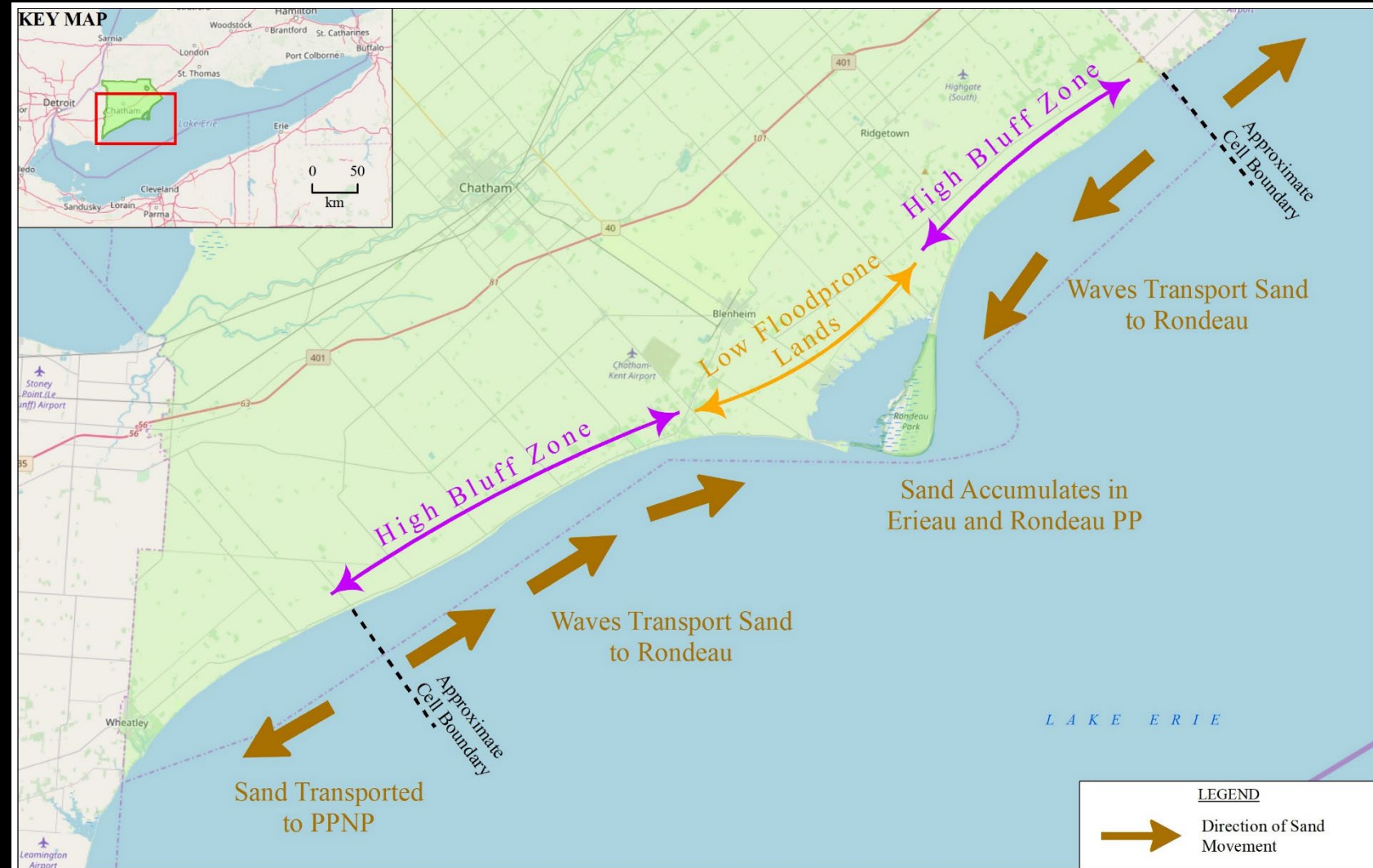
- The Coastal Resilience Framework requires an 'all of society approach'
- Government agency participation is critical for backbone support, to achieve the Resilience Framework goals, while also advancing each agency's mandates
- Landowner and Stakeholder participation begins in the next Fiscal Year (April 2023)
- The recent high lake level period exposed low coastal resilience





LITTORAL CELLS – Basic Spatial Unit

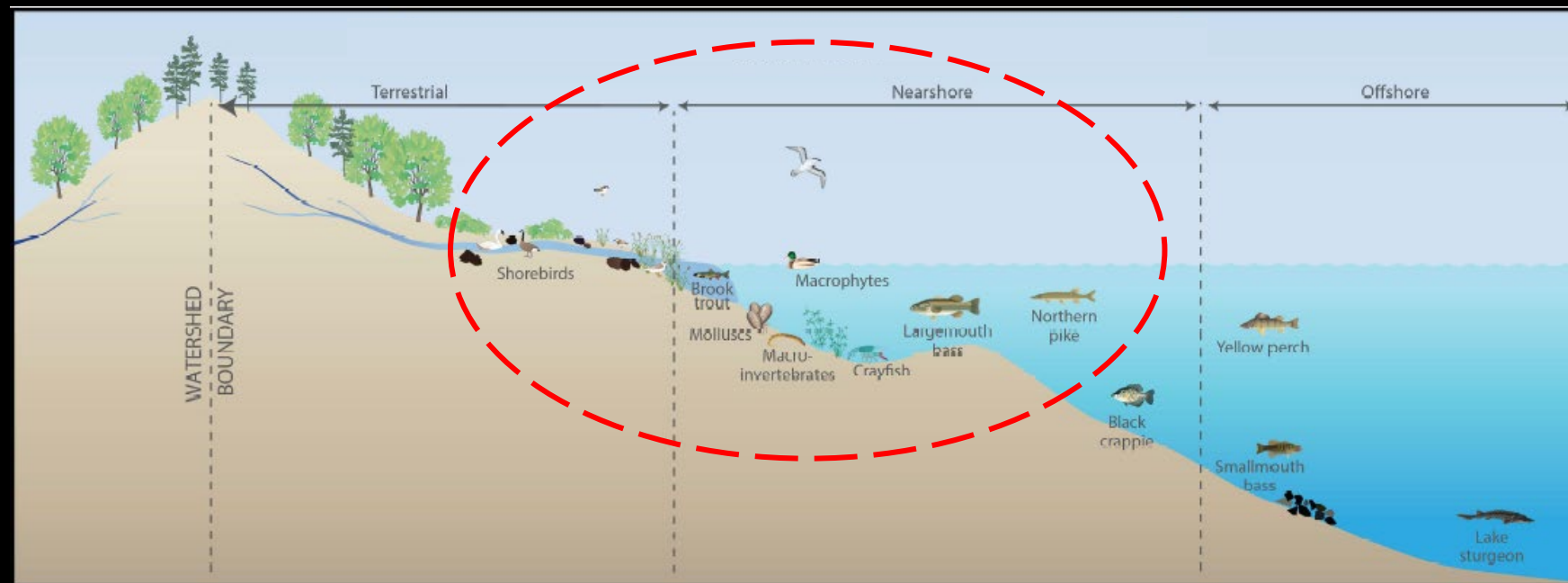
- ‘Scale’ is a critical component/organizing aspect of the framework
- Littoral Cells define sediment sources (sand and gravel), transport pathways, and depositional areas





GEOGRAPHIC FOCUS OF COASTL FRAMEWORK

- Areas impacted by lake level fluctuations and coastal hazards
- Sediment sources (sand and gravel), transport pathways, and depositional environments defined by littoral cells also define the geographic focus
- Not upper watershed or offshore





COASTAL AREAS INCLUDE...

- Land - water interface and nearshore (to depth of ~10 m)
- Coastal wetlands and nearshore habitat
- Upstream in rivers or tributaries limited by extent of lake level fluctuations
- Communities impacted by coastal hazards and lake level fluctuations
- Port infrastructure, marinas, and navigation channels

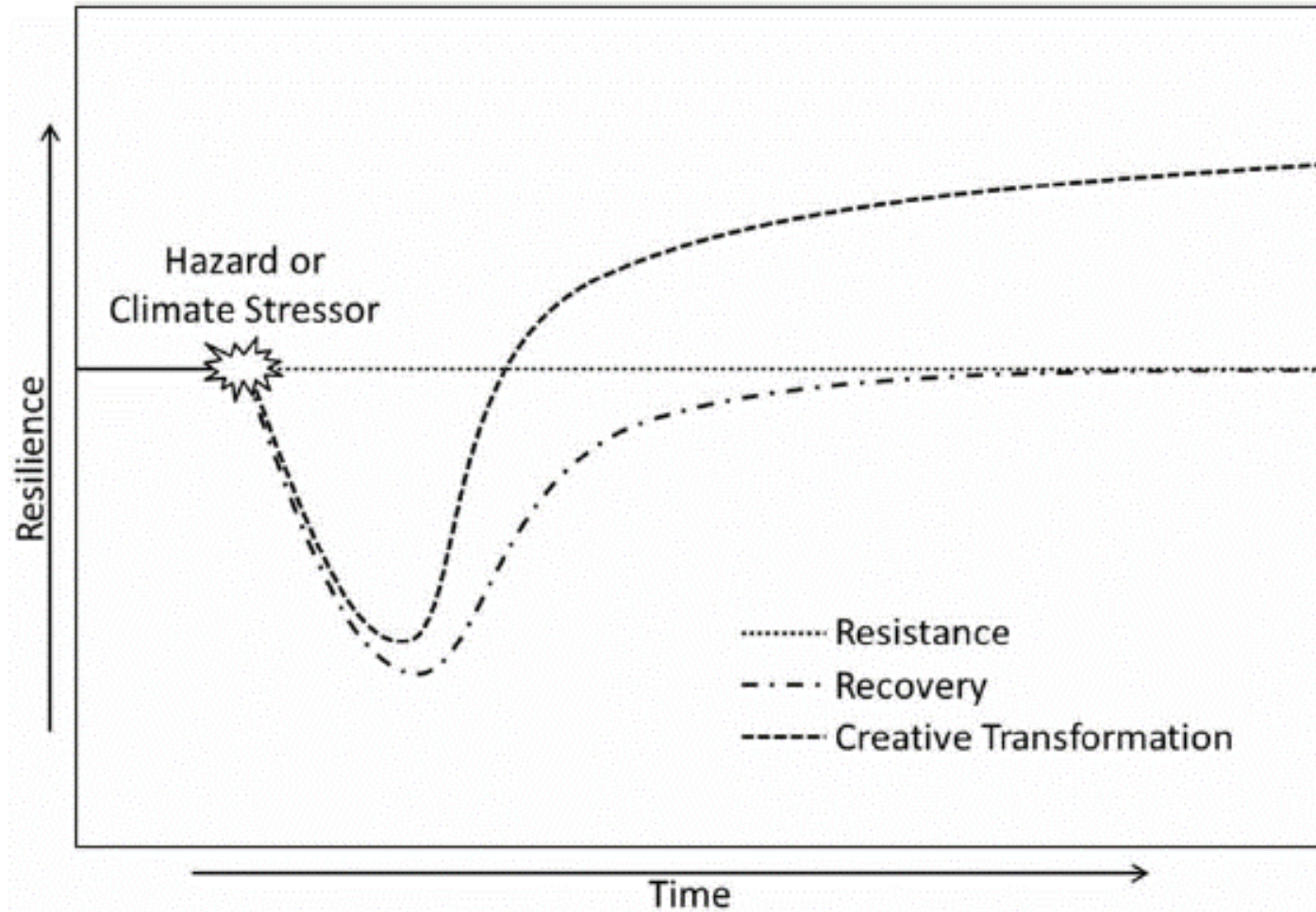


RESILIENCE

- Resilience pathways – resistance, recovery, and transformation:
 - Prevent: locate new development away from hazardous lands
 - Resistance: the ability of a system to withstand a disturbance or change without significant loss of ecological function or change in equilibrium state
 - Recovery: is the ability of a system to bounce back and recover from disturbances or changes
 - Transformation: changes the fundamental attributes of social-ecological systems in response to actual or future climate to increase resilience



RESILIENCE VISUAL (Joakim et al. 2015)





USA Great Lakes Coastal Resilience Study

- Resilience: “Coastal Resiliency is the ability of coastal areas to withstand, recover from, and adapt to disturbances and underlying stress while maintaining economic, environmental, social, and cultural values”
- Transformation not mentioned

UPDATE

- Natural and Nature Based Features (NNBF) Playbook in development
- Engineering with Nature (EWN)
- Multiple Lines of Defence (MLD)

Engineering With Nature Project Fact Sheet


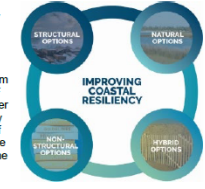
Great Lakes Engineering With Nature® (EWN®) NNBF/MLB Playbook

Background

Great Lakes communities along the Great Lakes coast line are experiencing increased frequency in coastal flooding and erosion, causing property damage, putting lives at risk, and disrupting local economies. Recent historic high lake levels illustrate the widespread vulnerabilities along the coast. Natural and Nature Based Features (NNBF) are measures and techniques that can be incorporated into shoreline protection to reduce flood risk and improve resilience of coastal and inland water systems. NNBF integrates naturally with the concept of Multiple Lines of Defense (MLD), whereby multiple strategies are used to erect a system of comprehensive, resilient, and sustainable coastal risk solutions. However, current understanding of NNBF and MLD coastal resiliency measures is mostly limited to ocean coast, resulting in lack of confidence on the applicability and cost-benefit of these measures in the Great Lakes. Engagements and discussions with Great Lakes Communities revealed the need for NNBF guidance specific to the Great Lakes. Without greater understanding and guidance, a paradigm shift from traditional flood risk management (FRM) practices to NNBF will not occur. USACE also needs this guidance to confidently consider these types of measure as part of the Great Lakes Coastal Resiliency Study (GLCRS) and related spin-off studies. There are 4,530 miles of U.S. coastline for the five Great Lakes, more than double the coastline along the U.S. Atlantic Ocean, and more than three times the coastline on the U.S. West Coast, further underlining the need for Great Lakes specific NNBF guidance.

Objectives

The objective of this project is to develop a Great Lakes specific guide (“playbook”) to Natural and Nature Based Features (NNBF) and Multiple Lines of Defense (MLD) to improve future coastal resiliency. The guide will significantly advance the understanding of NNBF and MLD emerging technologies as applied to the entire Great Lakes region. The guide will provide additional needed confidence to federal, state, and local government agencies to plan, design, and implement sustainable, adaptable and cost-effective NNBF measures, either instead of, or in addition to, traditional structural and non-structural flood risk management (FRM) practices.



Points of Contact: **Burton Suedel, PhD (ERDC-EL)**
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Engineering With Nature Project Fact Sheet


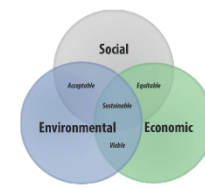
Approach

This project uses a three-pronged approach to developing the guidance, consisting of:

- Working with partners to identify existing NNBF and MLD projects and assess and quantify their performance and cost under a range of conditions in the Great Lakes.
- Utilize EWN principles to develop new conceptual designs specific to the Great Lakes that achieve greater resiliency and adaptability than conventional FRM designs.
- Estimate adaptive capacity, failure tipping points, and planning level cost/benefit performance outputs of innovative conceptual NNBF and MLD designs under a range of current conditions and future climate scenarios.

Outcomes

The project will enable innovative NNBF and MLD coastal resiliency solutions to be planned, designed and implemented across Great Lakes into the future, resulting in social benefits (less loss to recreational amenities and personal property), economic benefits (less disruption to local economic activities), and environmental benefits (restoration of Great Lakes coastal ecosystems).



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IPCC Resilience Definition and Revisions for the Great Lakes Coastal Resilience Framework

- **IPCC Resilience:** The capacity of social, economic and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity and structure, while also maintaining the capacity for adaptation, learning and transformation.

[Footnote: This definition builds from the one used by Arctic Council (2013).]

- The capacity of social, economic, environmental, and physical systems in coastal areas to cope with a hazardous event, trend, or disturbance, responding and reorganizing in ways that maintain their essential function, identity, and structure, while also building capacity for learning, innovative and equitable adaptation, and transformation.

[Footnote: This definition builds on the one used by THE IPCC (2018) and the Arctic Council (2013).]



Draft Definitions - Discussion

- Do you agree with the draft definition of the coast?
- Do you agree with the draft definition of coastal resilience?



V – NARRATIVE, GOALS, AND OUTCOMES





5W+H to explore the Resilience Framework and Outcomes (Meerow and Newell, 2019; modified by Dobie, in press)

- Whom: landowners, FNs/Metis, communities, ecosystems, government, NGOs
- What: develop/enhance “resilience” to coastal hazards and climate change
- Where: Canadian Great Lakes coast
- When: short-, medium-, and long-term (all)
- Why: Siloed coastal planning and management, neglect of coastal processes with declining geodiversity and biodiversity. Traditional responses (shoreline armouring) don’t consider downdrift impacts, exacerbate problems. CC is making all hazards more extreme and frequent. We need to change
- How: develop a framework that supports approaches to assess coastal hazards and risks of climate change; a littoral cell scale perspective; an all-of-society, innovative approach; a range of equitable responses including long-term sustainable plans and nature-based solutions; and recognises transformation



NARRATIVE (draft ...) **(and, but, therefore)**

- The Great Lakes are the world's largest freshwater resource, supplies drinking water to more than 40 million people, features unique habitat that supports endangered species, and provide many goods & services to the basin residents
- But the goods & services are under threat (e.g., water quality). Species and wetland habitat are disappearing, coastal hazards and risk are increasing due to climate change, and recent water level fluctuations highlight the low resilience of Great Lakes coasts
- Change is needed incorporating a range of perspectives. Starting globally, we need to embrace the United Nations Sustainability Goals and recent Sharm-El-Sheikh Adaptation Agenda. Then Canadian Adaptation Strategy, etc.
- Focusing on the Great Lakes watershed, we can leverage the existing working relationships government have developed through the Canada-Ontario Agreement and co-develop a Coastal Resilience Framework



Mental Health, Social Justice, and Equity

- Inclusion and consideration in Resilience/Adaptation is emerging
- Mental health recognizes social-psychological issues (PTSD, dealing with loss)
- Justice seeks to achieve an equal distribution of resources, benefits, and environmental burdens
- For example:
 - Lack of sediment bypassing at harbours/ports is causing negative downdrift impacts to landowners, stakeholders, and protected areas managed by the federal and provincial governments, Conservation Authorities, ENGOs, and Hunt Clubs
 - Shoreline armouring of private property causes negative downdrift impacts to natural areas used for recreation and preservation of habitat



GOALS (draft, for discussion)

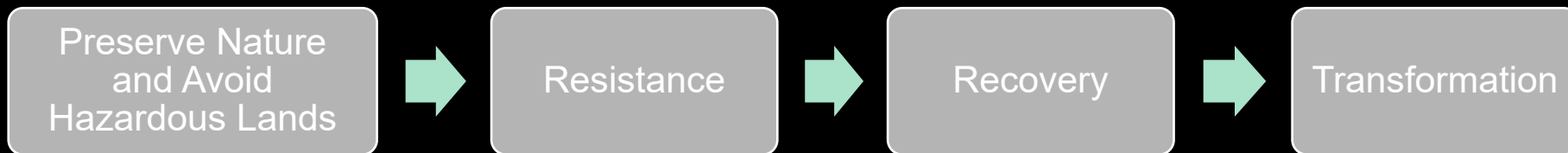
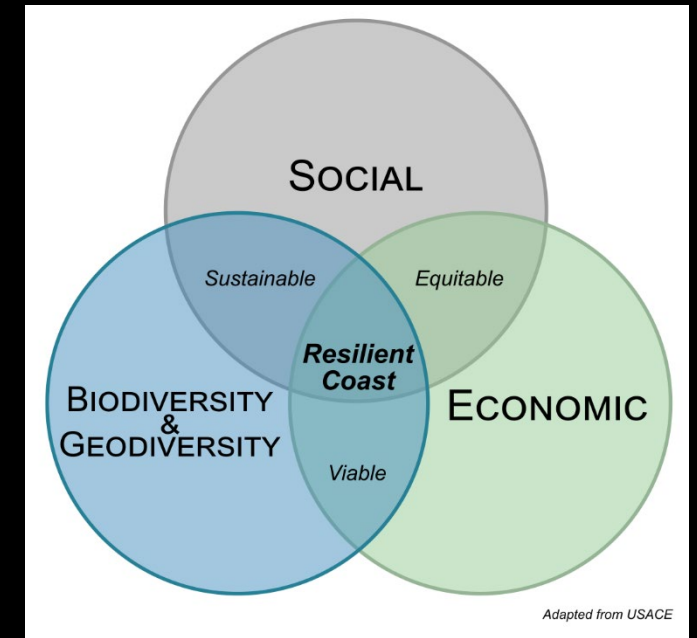
- Recognize the interconnected nature of our social, economic, environmental, and physical systems in coastal areas
- Promote sustainable development away from hazardous lands in coastal areas
- Share knowledge with stakeholders and increase coastal stewardship
- Co-create solutions following integrated planning and management principles
- Preserve natural areas and restore ecosystems with Nature-based Solutions
- Restore natural sediment dynamics in littoral cells
- Mitigate downdrift impacts of harbours and ports

- Move from conceptual solution space to implementing projects



OUTCOMES FROM THE COASTAL RESILIENCE FRAMEWORK

- Building resilience is a process and outcome
- Commitment to 'All of Society Approach'
- Collaboration across sectors, actors, and geography within littoral cells
- Develop and mobilize knowledge with stakeholders to advance coastal stewardship
- Adopt a phased approach to options development:





OUTCOMES FROM THE COASTAL RESILIENCE FRAMEWORK

- Resilience is a process, it evolves, and requires commitment and ongoing effort (like Adaptive Management)
- Stakeholders are aware of all components of a coastal resilience framework and use relevant components in planning and management
- Coastal ecosystems, communities, and infrastructure can withstand coastal disturbances and recover function and services
- When systems are not able to recover, adaptation options are co-developed, funded, and implemented
- If adaptation options don't address the magnitude of challenge, emerging risks, and/or are unaffordable, transformation is pursued



Draft Narrative, Goals, Outcomes - Discussion

- Does the narrative, goals, and outcomes convey what we are aspiring to achieve with the coastal resilience framework?
- Is your vision for the framework different?
- Will the framework collectively advance coastal resilience if implemented?



VI – REVIEW OF LEGISLATION AND POLICY SCAN





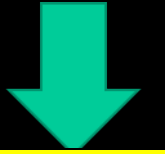
Legislation and Policy Scan

- Recommendation from Think Tank / Steering Committee discussions
- Sets baseline context for understanding coastal governance in Great Lakes region and analyses contribute to advancing coastal resilience framework
- Excel file is template for Think Tank / Steering Committee input



Scan Excel - Organization and Content #1

Component in Integrated coastal planning and management (dropdown)	Component detail	Scale Who (Binational, Federal, Provincial, Conservation Authority, Regional, Municipal)	Agency (lead unit(s))	Mandate(s)	Key Legislation (one per row with links)	Role in shoreline planning and management (short description)	Key activity in shoreline planning and management (dropdown, key word one per cell)
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- Coastal stewardship
- Coastal processes and geodiversity
- Coastal hazards
- Species and habitats
- Nearshore water quality
- Land use planning
- Economics and livelihoods
- Social justice, equity and mental health
- Infrastructure
- Recreation and tourism
- Navigation
- Climate change

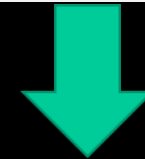
- Binational
- Federal
- Provincial
- Conservation Authority
- Regional
- Municipal
- Other

- Regulating
- Planning
- Assessment
- Monitoring
- Research
- Outreach & Communication
- Policy development
- Review
- Coordinating
- Funding
- Securing land
- Construction



Scan Excel - Organization and Content #2

Priorities OR Issues relevant to coastal resilience (descriptive text)	Programs relevant to components in integrated coastal planning and management for coastal resilience Priorities OR Issues (with links)	Tools/Instruments	Program outcome(s)	Key partners (Identify all from list)	Additional information
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- Federal agency
- Provincial agency
- Conservation Authority
- Region/County
- Municipality
- First Nations
- ENGOs
- NGOs
- Landowners
- Academia
- Consultants
- Businesses
- Engineering Firms



Draft Legislation and Policy Scan - Discussion

- Any feedback or questions?
- Anything to add or change?



VII – NEXT STEPS





MEETING ADJOURNED

