

Addressing Sensitive Coastal Ecosystems and Habitats as a Priority Coastal Issue in Nova Scotia

The May 2008 edition of the Marine Affairs Policy Forum highlighted some of the substantive and procedural elements affecting the success of Nova Scotia's long-awaited coastal management effort and the proposed Coastal Strategy. Six priority coastal issues were identified by the province to be addressed, namely sea-level rise and storm events, coastal access, working waterfronts, water quality, sensitive ecosystems and habitats, and coastal development.

This edition of the Marine Affairs Policy Forum focuses on the priority issue of sensitive coastal ecosystems and habitats and is the fifth of a priority coastal issues "six-pack". The goal of this series is to provide an overview of some of the key factors and policy implications for effective management of coastal issues in Nova Scotia. Although each edition of the "six pack" will focus on a specifically identified priority issue, linkages between the priority issues will be highlighted to demonstrate the interconnectedness among them.

Introduction

Coastal areas contain some of the most productive ecosystems in the world and provide a range of important ecological, social, and economic functions and services. The recent *State of Nova Scotia's Coast Report* identifies thirteen different coastal ecosystems in Nova Scotia including: (1) rocky shore; (2) boulder/cobble shore; (3) sandy shore; (4) dune system; (5) coastal forest; (6) coastal barrens; (7) estuaries; (8) mud flats; (9) coastal fresh water wetlands; (10) tidal marsh; (11) dykelands; (12) coastal islands, and (13) open water (rivers, streams, lakes and ponds). Coastal areas of Nova Scotia serve as important habitat for many species of wildlife including shorebirds, seabirds, plants, invertebrates, fish and marine mammals. For example, the estuaries and mud flats of the upper Bay of Fundy provide important staging habitat for 1-2 million shorebirds each year before their fall migration (Figure 1A). Three wetlands in Nova Scotia have been designated as "Wetlands of International Importance" under the *Ramsar Convention on Wetlands* including the Southern Bight in the Minas Basin, Musquodoboit Harbour and Chignecto National Wildlife Area (Figures 1A and 1B).

The province's coastal ecosystems provide a range of valuable functions and services such as erosion control, storm protection, water filtration and purification, food production, nutrient cycling, carbon sequestration, wildlife habitat, recreation, and natural aesthetics. The total value of these ecosystem services are worth billions of dollars each year. For example, a study by GPIAtlantic estimated that Nova Scotia's salt marshes alone provide an estimated \$557.3 million¹ worth of benefits in ecosystem services to Nova Scotians annually. To put this in context, consider that all ocean-related industries combined contribute approximately \$4.9 billion into Nova Scotia's economy each year.² While any attempt to place a dollar value

on ecosystems has its challenges and limitations, and is bound to draw some criticism, the point here is that coastal ecosystems are of tremendous importance to the economic, social, and ecological fabric of the province.

Coastal ecosystems and habitats are becoming increasingly threatened by growing populations and development in the coastal zone. Some ecosystems and habitats are particularly sensitive to human activities and have therefore been identified as one of the Government of Nova Scotia's priority coastal issues. The *State of Nova Scotia's Coast Report* recognizes that assessing a particular habitat or ecosystem's degree of sensitivity is difficult, but offers the following definition for the term *sensitivity*: "...any given ecosystem's vulnerability to, and ability to rebound from, human disturbance".

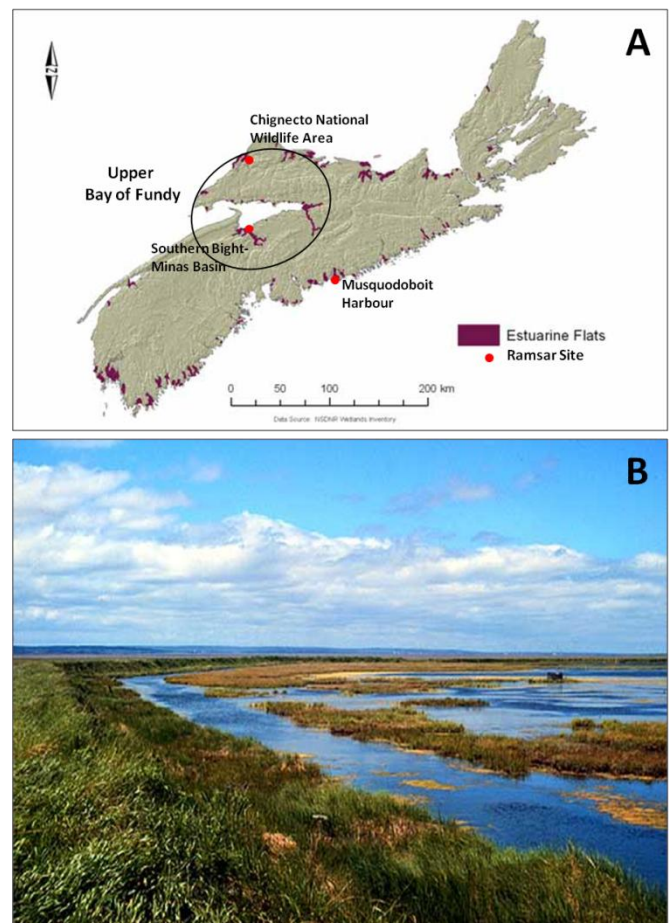


Figure 1. (A) Distribution of estuaries and mud flats in Nova Scotia and location of Nova Scotia's three Ramsar Sites. (B) Chignecto National Wildlife Area in the northern Bay of Fundy. Sources: (A) Government of Nova Scotia (modified); (B) Nova Scotia Forestry Association.

Where are coastal ecosystems and habitats under threat in Nova Scotia?

The province's coastal areas include some of the most sensitive and heavily altered ecosystems and habitats. Only about 1.6% of land in Nova Scotia within 2 km of the coastline is protected

under federal or provincial legislation, while 86% is privately owned. Currently, there are no province-wide standards or regulations for development on or near coastal ecosystems and habitats. Identifying the specific coastal ecosystems and habitats in the province which are most threatened requires detailed information on the type, intensity, and potential effects of the human activities and uses in coastal areas as well as information about the management measures in place which are designed to protect these ecosystems and habitats. In many cases, managing the impacts of human activity on the health of coastal ecosystems is complicated by the fact that it is a combination of activities and uses that degrade coastal ecosystems over time and these cumulative impacts can be difficult to predict.

There has never been a comprehensive assessment of the health of the province's coastal ecosystems and habitats. Data and information on coastal ecosystems and habitats in Nova Scotia is sparse and highly fragmented making it very difficult to perform such an assessment. In the *State of Nova Scotia's Coast Report*, thirteen of Nova Scotia's coastal ecosystems were given a general rating based on their sensitivity to harm from human activities (Table 1). From this table, it appears that the Bras d'Or Lakes, estuaries and mudflats, and coastal wetlands should be prioritized for management and protection because they are highly sensitive to human disturbance and only a small percentage of their total area is currently under protection.

Table 1. Nova Scotia's coastal ecosystems by type, sensitivity to human disturbance, total area, area protected and % of total area protected. Source: Government of Nova Scotia.

Coastal Ecosystem	Sensitivity	Total Area within 2km of Coastline (ha)	Area Protected within 2km of Coastline (ha)	% of Total Area Protected
Coastal Islands	Moderate	49,300	1,620	3.3
Rocky, Boulder and Cobble Shores	Low	Unknown	Unknown	Unknown
Sandy Shores and Sand Dunes	High	6,480	2,500	38.6
Coastal Forest and Barrens	Low	649,700	25,120	3.9
Estuaries and Mud Flats	High	205,500	28	0.01
Coastal Wetlands	High	76,780	2,760	3.6
Dykelands	Low	17,519	17,519	100
Bras d'Or Lakes	High	26,000	0	0

Certain types of coastal ecosystems in Nova Scotia have already been significantly impacted by development and human activity. Salt marshes are one of the most highly productive ecosystems in Nova Scotia, but it is estimated that 80% of the salt marshes along the Bay of Fundy and 65% of salt marshes province-wide have been lost to development. Water quality in many of the province's estuaries has been degraded by sewage and upstream activities and as a result, more than 939 km² and 3,314 km of coastline is closed to shellfish harvesting because of contamination. Excessive or inappropriate human activity at some provincial beaches has degraded or destroyed important

wildlife habitat. For example, beaches on the Atlantic coast of Nova Scotia serve as important nesting habitat for a species of shorebird known as the piping plover (*Charadrius melodus melodus*). Human activity on nesting beaches can disturb the birds, damage their nests, disrupt foraging and even force some nesting birds to abandon a beach. Loss of habitat from human use of beaches is the greatest threat to the species and has contributed to its listing as an *endangered* species under the federal *Species at Risk Act*. Eel grass (*Zostera marina*) is an ecologically significant species of marine plant which serves as important habitat for a variety of fish, including many commercially important species. There is evidence of widespread decline in eelgrass distribution and abundance in some areas of Nova Scotia. While the cause of this decline is not clear, researchers have suggested excessive nutrient loading, impacts from invasive species and environmental change as possible causes.

Residential development in coastal areas is putting increasing pressure on sensitive coastal ecosystems and habitats, particularly beaches and wetlands. Although certain types of development and activities are restricted on provincially-owned portions of protected beaches under the provincial *Beaches Act* and the *Beaches and Foreshores Act*, it is not uncommon for some of the land on protected beaches to be privately owned and for permanent and seasonal homes to be built on this land. In some areas, development has altered or damaged the beach system. Wetlands and salt marshes are another coastal ecosystem that is sometimes altered or infilled in order to build roads, houses and other structures. Some coastal residents and environmental NGOs have called for greater development controls on and near beaches and wetlands. The provincial government has mentioned plans to conduct a formal review of the *Beaches Act* in the past, but no such review has been completed to date. They are also in the process of developing a provincial *Wetlands Conservation Policy* which includes a goal of no loss in "ecologically significant wetlands" such as salt marshes and wetlands known to be important wildlife and species at-risk habitat.

Who should be concerned and why?

Key stakeholders and organizations with an interest in coastal ecosystems and habitats in Nova Scotia include the public; the provincial, federal and municipal governments; community groups and NGOs; and industry.

The Public: Coastal ecosystems provide a range of important ecological, social, and economic functions and services. For example, coastal features can provide protection from erosion and flooding during storm events. After Hurricane Juan struck the province in 2003, there was less damage to shorelines, roads and property in areas with intact barrier beaches and salt marshes than in areas without these natural features. Therefore it is in the best interest of the public to ensure that the province's coastal ecosystems continue to provide these important functions and services. The public also has a responsibility to advise the province of perceived inappropriate use/alteration of wetlands and other coastal features to ensure that the user is in compliance with provincial regulations and policies. Even with the best of policies in place, compliance and enforcement will only succeed with the public's involvement.

Private Landowners: Many coastal ecosystems and habitats are located on privately owned land. Therefore, the health of these coastal ecosystems and habitats will depend on how the land is used and managed by the land owners. Some types of coastal development can damage or destroy sensitive ecosystems and habitats. Laws or regulations designed to protect certain coastal

features, habitats and species could limit the types of development and activities allowed on private land.

Provincial Government: The provincial government has many responsibilities related to the protection and management of coastal ecosystems and habitats including reviewing permits for activities that impact coastal land, water, beaches and wetlands; managing provincial parks, protected areas and Crown land; managing dykelands; and managing certain species of wildlife and wildlife habitat in the coastal zone.

Federal Government: The federal government also has important responsibilities related to the province's coastal ecosystems and habitats including protecting fish and migratory bird habitat as well as the critical habitat of designated wildlife species at risk; regulating land-use on federally owned coastal lands; designating and managing marine protected areas; assessing the environmental impacts of certain development projects in coastal areas; and managing marine pollution.

Municipal Governments: Municipal governments have the authority for land-use planning on municipal lands and privately owned lands. Municipalities can establish land-use regulations that protect certain coastal features and habitats from harmful development. For example, under *Halifax Regional Municipality's (HRM) Planning Strategy*, municipal officials are required to take fish and wildlife habitat into consideration when designing open spaces and in the approval process for certain development agreements. The provincial government could introduce new province-wide land-use planning standards regarding land-use on or near sensitive coastal features and habitats as part of the provincial Coastal Strategy to which municipalities would be required to conform.

Community Groups and Environmental NGOs: There are many community groups and environmental NGOs in the province advocating for greater protection of coastal ecosystems and habitats. They are concerned about the long-term health and integrity of coastal ecosystems because of the high percentage of privately owned coastal land and the lack of province-wide standards for land-use planning and development in coastal areas. Some groups and NGOs have made recommendations to the provincial government on how to improve coastal management while others have established land trusts as a means of conserving important ecosystems located on privately owned land.

Industry: Some important industries which operate in the province's coastal zone such as marine renewable energy generation (wind and tidal), aquaculture, tourism, construction, and real estate can negatively affect or alter coastal ecosystems and habitats. For example, some technologies used to harness tidal power could alter ocean currents, increase sedimentation, damage marine habitat, harm or kill marine life, and disrupt commercial fisheries. Some forms of aquaculture could degrade water quality in poorly flushed bays and estuaries. Excessive tourist and recreational activity can damage coastal features and habitats. Construction and residential development can degrade nearby coastal ecosystems and even destroy coastal habitat. Laws and regulations designed to protect certain coastal features, habitats and species can affect these industries by limiting the type, location and scale of the activities they can undertake in the coastal zone.

Policy Implications

As it is outlined in the *State of Nova Scotia's Coast Report*, the issue of sensitive coastal ecosystems and habitats is quite broad and specific management goals and objectives have yet to be defined. The provincial government will need to narrow the scope of this issue and establish clear, focused and tangible

management goals under the Coastal Strategy. Use of the word "sensitive" in the formal name for this issue suggests that the government intends to focus on ecosystem or habitat types that are particularly vulnerable to human disturbance.



Figure 2. Seasonal homes along Kingsburg Beach in Lunenburg County. Source: Nova Scotia Department of Natural Resources & Jacques Whitford Environment Limited.

Expanding the province's network of coastal protected areas is likely the best approach for protecting larger areas of high ecological significance where human disturbance has been minimal. However, many coastal ecosystems and habitats are located on privately owned land where protected area designation is not always feasible. Furthermore, some coastal areas will undoubtedly be deemed too economically valuable to set aside for conservation purposes. In order to protect these ecosystems and habitats, the government could identify "sensitive coastal features" (e.g. beaches, wetlands, headlands, etc.) and then introduce province-wide regulations and minimum land-use planning standards for development and human activity on or near these coastal features. For example, the government could introduce a mandatory development setback around certain coastal features. This approach requires establishing criteria for delineating each of the "sensitive coastal features". Some of the current definitions and criteria the government uses to regulate development near certain coastal features have been the subject of some criticism. For example, the landward boundary of a beach is not clear in the formal definition used under the provincial *Beaches Act*. This has led to controversy over the spatial extent of some protected beaches where homes have been built on or near the beaches' dune systems (Figure 2).

In some areas of the province, coastal habitats have already been heavily damaged or destroyed by development. Therefore, support for new and existing habitat restoration programs should also be an important component of the government's Coastal Strategy.

Responsibilities related to coastal management in Nova Scotia are divided between many different agencies within the provincial, federal and municipal governments. A lack of coordination and communication between these various agencies has been a key challenge to successful coastal management in the province. This challenge must be overcome since the spatial extent of many coastal ecosystems and habitats cross the jurisdictional boundaries of these various government agencies. Improving intergovernmental cooperation and coordination regarding activities that impact the coastal environment will be paramount to protecting sensitive coastal ecosystems and habitats.

During a June 2008 workshop hosted by MAP, coastal management experts from the Atlantic region recommended

natural processes, biological features, and physical features as essential criteria for identifying the extent of coastal management areas that would be adequate to address the issue of sensitive coastal ecosystems and habitats in Nova Scotia. Additionally, experts at the workshop offered the following advice:

- Although easier to legislate and enforce, a fixed definition of the coastal management area would not be appropriate to address this issue.
- The landward boundary of the coastal management area must encompass the area where key features or habitat are present.
- The involvement of the public and their understanding and endorsement of the goals, objectives, and plans for addressing this issue are important considerations.

In addition to the coastal management program currently under development, the provincial government has recently taken a number of other steps to improve how coastal ecosystems and habitats are managed. Under the *Environmental Goals and Sustainable Prosperity Act* (EGSPA, 2007) the provincial government committed to protecting 12% of the province's land mass by 2015. In 2010, the province budgeted \$75 million to buy land for legal protection and the purchases included coastal lands of ecological significance. Approximately 9% of land in the province is currently protected. The government has also committed to a policy of preventing net loss of "ecologically significant" wetlands as previously mentioned. The government is also developing a water-resource management strategy and a natural resources strategy which will likely include new measures for protecting the health and integrity of the province's ecosystems.

There are some direct linkages between sensitive coastal ecosystems and habitats and the other priority issues identified by the provincial government that should be considered in the development of the Coastal Strategy. First, inadequate regulations and standards for land-use and development in coastal areas is a major driver behind the loss and degradation of coastal ecosystems and habitats. Some types of development may be unsuitable in areas with sensitive ecosystems and habitats. Second, excessive recreational use of the coast can harm sensitive coastal features. For example, pedestrian traffic on sand dunes can destabilize the dunes and increase the risk of a blow-out during storm events. It may be necessary to restrict public access to areas with particularly sensitive or ecologically significant coastal features in order to protect them from harm. Third, good coastal water quality is an important factor in the health of many coastal ecosystems and habitats. Pollution and sedimentation can damage or destroy important fish and wildlife habitat. Finally, sea-level rise and storm events are an important consideration in the future state of coastal ecosystems and habitats in the province. As sea-levels rise, wetlands and sand dunes will need to adapt by migrating inland. If development is too close to the shoreline, these coastal features will be unable to migrate inland and will be lost. This phenomenon is often referred to as "coastal squeeze" (Figure 3). Increased rates of coastal erosion and flooding can alter or degrade wildlife habitat, as it has on some important piping plover nesting beaches on the Atlantic coast of the province. Coastal features such as wetlands and barrier beaches can provide protection for development from flooding and wave action during storm events.

Concluding Comments

Since ecosystem values are difficult to calculate and express in economic terms, they are often not taken into consideration in decision-making processes involving how development or

human uses in coastal areas should be managed. In order to prevent more of the province's coastal ecosystems from being degraded or lost to development, there needs to be a greater appreciation for their true value. This appreciation will translate into more widespread, environmentally-conscious land-use planning and development in coastal areas of the province. Ultimately, the provincial government must find ways to minimize the impacts of economic growth and development in coastal areas on the health and integrity of coastal ecosystems, thereby promoting sustainable coastal development opportunities.

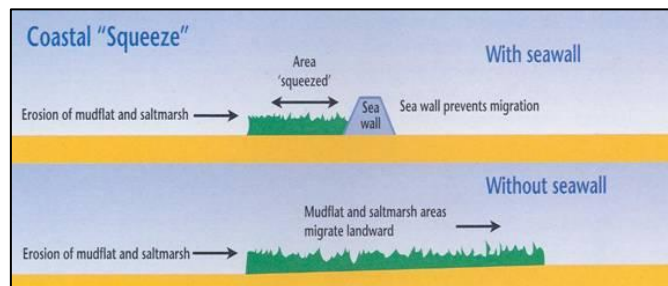


Figure 3. Illustration of the "coastal squeeze" phenomenon. Coastal development and shoreline protection structures can prevent the inland migration of coastal features, such as salt marshes, in response to sea-level rise and erosion. In a natural situation, salt marshes respond and adapt to coastal change by migrating inland. Source: *European Land Ocean Interaction Studies (ELOISE)*.

From a policy perspective, some of the outstanding questions that need to be addressed in order to manage this issue include:

- What are the management goals and objectives for the issue of sensitive coastal ecosystems and habitats?
- What ecosystem and habitat types are priorities for increased protection and where are they located?
- How will coastal ecosystems and habitats in Nova Scotia be affected by climate change and what can be done to ensure they can adapt?
- How can development in coastal areas continue to expand while at the same time ensuring that the health and integrity of coastal ecosystems and habitats are preserved?
- How can governments, NGOs, stakeholders and the public work together to protect sensitive coastal ecosystems and habitats?

This document is based on research undertaken by Christopher Burbidge and Lucia M. Fanning at the Marine Affairs Program, Dalhousie University. To enhance readability of this publication, references used to prepare the document are not included but are available upon request. Contact marine.affairs@dal.ca for details.

¹ Value adjusted to 2009 dollars using the Bank of Canada's inflation calculator: http://www.bankofcanada.ca/en/rates/inflation_calc.html.

² For more information on the methodology used to calculate these values please refer to: (1) Wilson, S.J. (2000). "Nova Scotia's Water Resource Values and the Damage Costs of Declining Water Resources and Water Quality". pp. 138-143. Available here: <http://www.gpiatlantic.org/>; and (2) Gardner et al. (2009). "Economic Impact of the Nova Scotia Ocean Sector 2002-2006". Available here: <http://www.gov.ns.ca/econ/publications/oceanindustries/default.asp>.