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ADAPTING TO CLIMATE CHANGE IN COASTAL COMMUNITIES OF THE ATLANTIC PROVINCES, CANADA:

LAND USE PLANNING AND ENGINEERING AND NATURAL APPROACHES

PART 2 LAND USE PLANNING TOOLS ADAPTATION OPTIONS

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SOLUTIONS D'ADAPTATION AUX CHANGEMENTS CLIMATIQUES POUR L'ATLANTIQUE

March 2016

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Adapting to Climate Change in Coastal Communities of the Atlantic Provinces, Canada: Land Use Planning and Engineering and Natural Approaches

Prepared for ACASA (Atlantic Climate Adaptation Solutions Association)

No. AP291: Coastal Adaptation Guidance – Developing a Decision Key on Planning and Engineering Guidance for the Selection of Sustainable Coastal Adaptation Strategies.

Part 1 Guidance for Selecting Adaptation Options

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Acknowledgements

Thank you to the following people who contributed ideas, provided information about land use planning tools and examples of tools for use in adaptation, or reviewed and critiqued various stages of *Part 2 Land Use Planning Tools Adaptation Options:*

Martin Batterson, Director, Geological Survey Branch, Department of Natural Resources, NL

Mary Bishop, FCIP, Planner, CBCL Limited, NL

Graham Fisher, Planner, Municipal Affairs, NS

Vahid Ghomashchi, MCIP, (formerly) Director of Planning, Development and Heritage, Town of Stratford, PE

Jeffrey Haggett, MCIP RPP, Planner, (formerly) WSP, Halifax, NS

Paul Jordon, MCIP RPP, Planner, Provincial and Community Planning Branch, Department of

Environment and Community Planning, New Brunswick

Doug Reid, Planner, Municipality of the District of Lunenburg, NS

Tracey Wade, Planner MCIP RPP, Planner, Southeast Regional Service Commission, NB

And, the mayors, councilors, staff and committee members who participated in the community engagement sessions that shaped the products of these adaptation guidance resources.

PREFACE

The Atlantic Provinces of Canada have established enduring patterns of land use and development at the coast. All of the region's coastal communities are vulnerable to marine coastal hazards and climate change impacts; their future relies on adapting to the impacts of climate change in the coastal zone.

Adapting to Climate Change in Coastal Communities of the Atlantic Provinces, Canada provides guidance on strategies and tools to manage climate change-driven sea level rise and coastal flooding and erosion. This set of three guidance documents supports the Atlantic Climate Adaptation Solutions Association (ACASA) web-based Coastal Community Adaptation Tool, and the associated Community Profile for identifying community capacity for adaptation. Combined, these resources help decision-makers define their coastal climate change adaptation needs and select the most appropriate land use planning or engineering tools for their community's coastal context and climate change impact challenges.

Part 1 Guidance for Selecting Adaptation Options, introduces climate change adaptation for the coastal regions of the Atlantic Provinces. It describes the five main adaptation approaches, describes climate change impacts in the Atlantic Region, characterizes the coastal environments, presents criteria for adaptation decision-making, and links adaptation tools and strategies to the coastal settings of the Atlantic Provinces.

Part 2 Land Use Planning Tools Adaptation Options, presents over 50 land use planning tools for coastal climate change adaptation. The tools and examples in this guidance document are the land use planning options of the ACASA web-based Coastal Community Adaptation Tool. The document also includes overviews of the land planning and management frameworks and legislation that could support coastal climate change adaptation in each of the four Atlantic Provinces and First Nations.

Part 3 Engineering Tools Adaptation Options, presents over two dozen engineering tools to manage coastal flooding and erosion, describes the suitability of the tools for different coastal conditions and climate change adaptation objectives (e.g. short to long-term, low, medium or high cost), and identifies the technical and permitting requirements for using engineering as an adaptation approach. The tools and examples in this volume are the engineering options of the ACASA web-based Coastal Community Adaptation Tool.

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CHAPTER 1: INTRODUCTION

Adapting to Climate Change in the Atlantic Provinces Canada, Part 2 Land Use Planning Tools Adaptation Options is a reference collection of land use planning tools for climate change adaptation in rural, coastal communities. The tools described in this guidance document are also the land use planning outputs for ACASA's web-based Coastal Community Adaptation Tool, and the associated Community Profile for climate change adaptation for decision-makers. This guidance is organized in three sections:

"Land use planning adaptation for coastal impacts of climate change" describes land use planning, coastal land use planning, and land use planning tools to address climate change impacts in coastal communities.

"Context for coastal land use planning in the Atlantic Provinces" (Chapter 2) explains the organization of land use planning and identifies provincial legislation for land and coastal planning and management in New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland and Labrador, and First Nations.

"Land use planning adaptation options for climate change" (Chapter 3) presents over 50 tools of land use planning, illustrated with examples of how they are being used by coastal communities regionally, nationally and internationally. The tools cover the diversity of land use planning from capacity building to policy and planning frameworks, strategic and community plans, to regulatory tools and tools geared to changing land use, and finally tools for site level planning and design.

1.1 Land use planning adaptation for coastal impacts of climate change

Land use planning is an activity of society involving government and citizens to make the best and most efficient use of land for the benefit of society, according to the vision and goals set by that society. Land use planning aims to balance private and public interests of land use, and to avoid conflicts between uses that are not compatible with one another. Modern land use planning aims to use the land sustainably so that its value continues for future generations. Sustainable land use includes protecting the natural quality of the land for the value that nature contributes to society; it can also mean protecting the interests of society from the unwise use of land, such as avoiding hazards.

Because of its inherent purpose of ensuring long-term sustainable social, economic and environmental benefits, land use planning is well-suited to addressing the emerging and long term challenges of climate change impacts. The common time frames of land use planning, as it is practiced at the community level, are 5, 10, and 25 to 30 years, time-frames that work for developing short- and medium-term responses to planning for climate change. Land use planning is also adaptive: as circumstances change, plans change to respond to the changing conditions and contexts. It is a long-term exercise because it is responsive and continuous.

One hundred years is the common long-term projection horizon for climate change scenarios; it is also a realistic length of time for very long-range land use planning because the outcomes of land use planning can be enduring. Planning and development decisions and actions of today establish the landscapes of tomorrow. We see the evidence of these historical patterns of land use all around us in the cities, towns, villages and rural landscapes of the Atlantic Provinces.

Coasts are the continental edge where land and sea meet and are therefore places where many diverse and competing land uses concentrate; they are also where nature and human land development and other activities overlap, not always in safe or harmless ways. Communities of Atlantic Canada concentrate along the coast or the region's tidal rivers. Coasts are also the impact zone of climate change carried to the land by the sea. Sea level rise and more frequent or more powerful storms with stronger winds and storm surges are challenging our usual behaviours and patterns of coastal land use and also our safety.

Land use planning for coastal environments is complex because of the many uses that occupy coastal land and also the overlapping government jurisdictions in the coastal zone. It has become even more complicated with the emergence of climate change and the quickening pace of environmental change brought on by sea level rise and the strength of impacts from higher energy storms. Land use planning's role in coastal land management is to ensure that:

- only land uses compatible with coastal and marine environments, or reliant on them and able to withstand the energy of the coast, locate along this edge;
- land use is not or does not become hazardous;
- land uses that need the coastal space have access to it;
- coasts can respond to the coastal climate through the natural processes of erosion and deposition; and
- coastal structures persist and function as natural spaces and habitats and as protection for development behind the coast.

This role of land use planning for coasts is the same in the context of climate change, except that climate change has made planning of coastal land use more urgent than ever. The need for adapting to climate change is good reason to use the many tools that land use planning has to offer, tools that can help communities achieve beneficial, sustainable land use at the coast, and ensure environmental security and safety in the era of a changing climate.

1.2 LAND USE PLANNING TOOLS AND CLIMATE CHANGE

Land use planning has a great array of tools that communities can use for adapting to and managing the impacts of climate change. The tools of land use planning range from those that influence human behaviour and decisions about land use to those that influence the type and form of land use directly. Land use planning tools include techniques to educate and gently persuade people to adopt good land use practices, methods to gather and organize land information, frameworks for putting land use planning in place, rules and regulations that control the type and extent of land use, and standards that guide the design of land use and structures on the land.

This guidebook describes over 50 land use planning tools and illustrates using them for coastal management and climate change adaptation. The illustrations come from diverse resources and are drawn from examples in the Atlantic Provinces, other parts of Canada[i], and internationally. The tools are grouped into four categories: Capacity Building Tools, Planning Framework Tools, Regulations and Land Use Change Tools, and Site Design Tools.

LAND USE PLANNING TOOLS CATEGORIES

Capacity Building Tools – Capacity building tools add to a community's knowledge and understanding of local environment and culture and increase the ability to respond effectively to change. Increasing knowledge about local environments can involve collecting information about the land and how it works. Increasing knowledge about local culture may include identifying valuable community assets and their uses or finding the people in the community who have special knowledge about local land uses or traditions. Knowledge from capacity building tools should be shared amongst decision-makers, municipal staff, residents of a community and others who can help apply the knowledge to planning. When used for coastal climate change adaptation, capacity building includes increasing knowledge about coastal environments and weather patterns, past severe weather and its impacts at the coast, changes in sea level and natural coastlines, and vulnerability and risks to coastal climate change impacts. Capacity building is an important part of coastal and climate change adaptation planning and of using any of the tools listed in this guidebook.

Planning Framework Tools – Planning framework tools are used by governments to guide land use and related activities. They include official plans of incorporated communities that direct the affairs and development of a community. They also include a variety of other plans and strategies that manage activity in different contexts, such as watersheds, or manage environmental resources, or establish systems to support certain specific needs (such as emergency management plans). They also work at different scales – provincial, regional, and municipal. These plans are common to communities everywhere, but the focus of this guidebook is the coastal setting and climate change adaptation planning for coastal areas and communities.

Regulations and Land Use Change – Regulations and land use change tools include tools that control land use, subdivision of land, change in land use, or ownership of land. Only incorporated municipalities and provincial governments can use some of these tools. Non-incorporated communities can still advocate for use of these tools by the land use authority of their area, however. Other tools in this category do not require land use planning authority and can be used in partnerships with other organizations such as a land trust.

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[i] For another example of land use planning tools in the Canadian coastal context, please see *Sea Level Rise Adaptation Primer – A Toolkit to Build Adaptive Capacity on Canada's South Coasts*. Arlington Group Planning + Architecture, EBA a Terra Tech Company, DE Jardine Consulting and Sustainability Solutions Group. British Columbia Ministry of Environment, 2013.

Site Design – Site design tools include tools used for site specific, physical planning and design – designing, modifying, and creating physical spaces and structures, both natural and man-made. Use of these tools may be regulated by a provincial government or the local government or agency with land use planning authority for an area. These tools overlap with engineering tools.

1.3 LAND USE PLANNING TOOLS FOR CLIMATE CHANGE ADAPTATION AT THE COAST

This guidebook illustrates the use of planning tools to manage climate change impacts, specifically by adapting coastal land use behaviour. These tools work to achieve adaptation to the changing environmental conditions. There are five approaches to adaptation that allow for a range of responses that communities can use. Which approach to use depends on the type, age, density, function and value of development, or development needs, at the coast; the amount of time a community has to respond to the change; and the tolerance for risk a community has for climate change impacts. The five adaptation approaches are **Avoid**, **Retreat**, **Accommodate**, **Protect**[1,2] and **Procedural**. Each approach can be used alone but is often combined with one or more of the other approaches for adaptation planning[ii].

Avoid is a strategy for discouraging or preventing development in hazardous places or places that might become hazardous in the future. The strategy requires identifying such areas and the risk to future development. Avoiding hazardous places and keeping development away from them may have added benefits such as environmental protection and increased public access to the coast.

Retreat is a strategy to relocate people and infrastructure away from hazardous coastal areas to areas with lower risks. The strategy is a long-term adaptation approach. This strategy increases public safety and is used instead of replacing expensive protection measures over time.

Accommodate allows for continual use of coastal lands but changes the use of the land or the current infrastructure. Changes in land use may be from uses that do not need access to the water to uses that do need water access. Changes to infrastructure may include designing to accommodate flooding with raised, flood proofed or floating structures.

Protect is often a reaction to coastal erosion or flooding. Protect is the most common form of adaptation in coastal areas throughout the world. It almost always involves some kind of engineering at the coast. Protection aims to allow the current uses of the land to continue without change. Protection methods are usually short-term solutions to coastal issues and must be upgraded over time. Protection is typically expensive over the long term and may become more expensive with climate change as sea level rises over the next century.

Procedural approaches include projects and activities that aim to educate people about climate change and how it can affect the coast and coastal communities; collect climate information and local data about the coast to guide local adaptation decisions; organize the information so that it is available and easy to understand, such as in maps; and use the information to make climate change resilient communities through community and land use policy and planning. Activities and initiatives in this category may stand alone (e.g. an education program) but they usually support the other strategies or provide an overarching framework for adaptation planning.

[ii] There are many descriptions of adaptation strategies and examples of how they are used. For another treatment of adaptation in the Canadian coastal context see *Sea Level Rise Adaptation Primer – A Toolkit to Build Adaptive Capacity on Canada's South Coasts*. Arlington Group Planning + Architecture, EBA a Terra Tech Company, and DE Jardine Consulting. British Columbia Ministry of Environment, 2013.

Planning tools work to achieve the objectives of the different adaptation approaches. Some tools are specific to one approach, but many of the tools serve two or more of the five approaches. Land use planning uses many tools, whether at the same time, in combination, or in a particular sequence. Many tools depend on having another tool already in place. For example, community engagement and education tools (capacity building tools) inform the public about climate change and coastal issues and help gain public support for developing a climate change adaptation plan (planning framework tools) or for using regulatory tools (regulation and land use change tools) as part of an official plan (planning framework tools) to control coastal development in hazardous areas. Land use planning success, and therefore climate change adaptation planning success, is more likely when using a variety of tools in the right sequence.

1.4 Collection of Land Use Planning Tools for Climate Change Adaptation

The tools in this guidebook are grouped and presented in the four land use planning tool categories: capacity building tools, planning framework tools, regulation and land use change tools and site design tools. There is a description of each tool including how the tool applies to coastal and climate change adaptation planning, the adaptation approach it serves, the opportunities (or advantages) of the tool, constraints of the tool (where it might not work, or things that may need to be in place for the tool to work), and how to get started with creating or using the tool. Examples illustrate where the tool has been used already for coastal and climate change planning, or illustrate opportunity for use in coastal climate change adaptation. The examples are a mix of regional, national and international applications.

Table 1.1 is a summary of the tools. It organizes the tools by category as they occur in the guidebook, shows the adaptation approaches each tool can address, and shows how tools fit with the normal planning process (can be brought in as part of a routine official plan review, or require a new initiative to use the tool), and the adaptation time-frame as it relates to planning and to climate change impact. Planning tools are suited to and can be used for all time-frames in adaptation planning, but have greatest effect over the medium (5 to 20 years) and long term (more than 20 years) as behaviours (and consequently environments and land) change in response to the tool.

Table 1.2 repeats the tools and for each tool identifies when other tools must be in place first before the tool can be used, and suggests tool combinations that can be effective for adaptation planning.

TABLE 1.1 LAND USE PLANNING ADAPTATION TOOLS

Land Use Planning Tools Applicable for Coastal Climate Change Adaptation					Can be part of the planning process	May require a new initiative	Time to effectiveness (implementation and impact) for climate change adaptation		
							Short-term adaptation (up to 5 years)	Medium-term adaptation (5 to 15 years)	Long-term adaptation (15+ years)
	Capacity Building Tools	Pr		Provincial policy statements or statements of interest		x		x	x
		Pr		Partnerships	x	x	x	x	x
		Pr		Education programs	x	x	x	x	x
		Pr		Local committees	x	x	x	x	x
		Pr		Community engagement	x	x	x	x	x
		Pr		Community asset mapping		x	x	x	x
		Pr		Visualization		x	x	x	x
		Pr		Scenario planning		x	x	x	x
		Pr	Data gathering & mapping	Hazard and risk mapping	x	x	x	x	x
		Pr		Vulnerability assessment	x	x	x	x	x
		Pr		Floodplain mapping	x	x		x	x
		Pr		Land classification mapping	x	x		x	x
	Policy and Planning Framework Tools	Pr		Emergency preparedness and/or management plan			x	x	
		P, Pr, A, Av, R		Statutory community plan (municipal planning strategy,	x		x	x	x
		P, Pr, A, Av, R		Secondary plan or area plan	x		x	x	x
		P, Pr, A, Av, R		Regional plan (non-statutory), land use policy, land use	x			x	x
		P, Pr, A, Av, R	Guidance, action, and management plans	Integrated community sustainability plan	x	x	x	x	x
		P, Pr, A, Av, R		Climate change action/adaptation plan	x	x	x	x	x
		Pr, A, Av, R		Shoreline/coastal management plan	x	x		x	x
		Pr, Av, R		Watershed management plan	x	x		x	x
		Pr, Av		Stormwater management plan	x	x	x	x	x
		Pr, Av, R		Strategic land acquisition (land bank)	x	x		x	x
		Pr, A, Av	Incentive	Tax incentive	x	x	x	x	x
		Pr, A, Av		Density Bonusing	x	x	x	x	x
		Pr, A, Av		Development incentive	x	x	x	x	x
		Pr, Av, R	Wetland policy		x		x	x	x
	Regulations and Land Use Change Tools	Pr, Av, R	Wetland regulations		x	x	x	x	x
		A, Av, R	Zoning	Land use zoning	x		x	x	x
		A, Av, R		Overlay zoning	x		x	x	x
		A, Av, R		Hazard zoning	x		x	x	x
		A, Av		Performance zoning (PUD)	x		x	x	x
		A, Av		Conservation/protection zoning	x		x	x	x
		A, Av		Temporal zoning	x			x	x
		A, Av, R		Down zoning	x		x	x	x
		Av, R	Setbacks	Retreating/migrating setbacks	x		x	x	x
		Av		Fixed setbacks	x		x	x	x
		Av		Horizontal (lateral)	x		x	x	x
		Av		Elevation (vertical)	x		x	x	x
		Av		Buffers	x		x	x	x
		Av		Land use type setbacks	x		x	x	x
		Av	Subdivision by-law or regulations		x			x	x
		A	Development standards		x		x	x	x
		Av	Development agreements		x		x	x	x
		Av	Transfer of development credits			x		x	x
		R, Av	Land swap			x		x	x
		R, Av	Land use conversion & re-development		x	x		x	x
		A	Variances		x		x	x	x
		A	Waiver		x		x		
		R, Av	Land trust			x		x	x
		R, Av	Rolling easements			x		x	x
		R, Av	Conservation easements			x		x	x
		R	Managed retreat and managed abandonment		x	x		x	x
		R	Abandonment		x	x		x	x
		Pr	Foreshore lease			x		x	x
	Site Planning and Design Tools	A, Av	Urban design standards		x	x	x	x	x
		Av	Conservation subdivision design		x	x	x	x	x
		Pr, A	Coastal Development Rating System			x	x	x	x
		Pr	Site Monitoring		x	x	x	x	x

P - Protect
Pr - Procedural
A - Accommodate
R - Retreat
Av - Avoid

TABLE 1.1 LAND USE PLANNING TOOLS PREREQUISITES

Land Use Planning Tools Applicable for Coastal Climate Change Adaptation			Other tools that are required before implementing	Other tools that are beneficial for supporting implementation
Capacity Building Tools	Provincial policy statements or statements of interest			
	Partnerships			
	Education programs			Community engagement, visioning, scenario planning, data gathering and mapping
	Local committees			Partnerships
	Community engagement			Education programs, visioning, scenario planning, data gathering and mapping
	Community asset mapping		Community engagement	Data gathering and mapping
	Visualization		Data gathering and mapping	Partnerships, education programs, community engagement
	Scenario planning		Data gathering and mapping	Partnerships, community engagement
	Data gathering & mapping	Hazard and risk mapping	Data gathering and mapping	Partnerships, local committees
		Vulnerability assessment		Partnerships, local committees
		Floodplain mapping		
		Land classification mapping	Partnerships, data gathering and mapping	
Policy and Planning Framework Tools	Emergency preparedness and/or management plan		Data gathering & mapping, partnerships, education programs, community engagement	Provincial policy statements, local committee, scenario planning
	Statutory community plan (municipal planning strategy, municipal plan, official plan, regional plan)		Data gathering & mapping, community engagement, local committees, provincial policy statements	Education programs, visioning, community asset mapping, scenario planning, regional plan
	Secondary plan or area plan		Data gathering & mapping, community engagement, local committees, provincial policy statements	Education programs, visioning, community asset mapping, scenario planning, regional plan
	Regional plan (non-statutory), land use policy, land use plan		Partnerships, data gathering & mapping, local committees	Provincial policy statements, education programs, community engagement, visioning, scenario planning
	Guidance, action, and management plans	Integrated community sustainability plan	Data gathering & mapping, local committees, partnerships	Education programs, community engagement, visioning, community asset mapping, scenario planning
		Climate change action/adaptation plan	Data gathering & mapping, local committees, partnerships	Education programs, community engagement, visioning, community asset mapping, scenario planning
		Shoreline/coastal management plan	Data gathering & mapping, community engagement, local committees, partnerships	Education programs, visioning, community asset mapping, scenario planning, statutory community plan
		Watershed management plan	Data gathering & mapping, local committees, partnerships, regional plan	Community engagement, education programs, visioning, community asset mapping, scenario planning
		Stormwater management plan	Partnerships, data gathering & mapping	Education programs, community engagement, visioning, scenario planning, statutory community plan, secondary community plan, guidance, action, or management plans, wetland policy, wetland regulations, zoning, subdivision by-law or regulations
		Strategic land acquisition (land bank)	Data gathering & mapping, local committees, partnerships	Community engagement, education programs, visioning, community asset mapping, subdivision by-law
	Incentive	Tax incentive	Statutory community plan or secondary community plan, land use zoning and bylaws, subdivision by-law or regulations	Data gathering and mapping, partnerships, guidance, action, and management plans, local committees , community engagement, education programs, development agreements, transfer development credits, land use conversion & redevelopment, managed retreat and managed abandonment
		Density Bonusing		
		Development incentive		
	Wetland policy		Data gathering & mapping, local committees, partnerships, education programs	Statutory municipal plan, regional plan, community engagement
Regulations and Land Use Change mechanisms	Wetland regulations		Data gathering & mapping, local committees, partnerships, statutory municipal plan or secondary community plan	Regional plan, guideance, action, and management plans, education programs, community engagement
	Zoning	Land use zoning	Statutory community plan or secondary community plan, data gathering and mapping, local committee	Education programs, scenario planning, guidance, action, and management plans, regional plan, development agreements, transfer development credits, land use conversion & redevelopment, variances, waiver, managed retreat and managed abandonment
		Overlay zoning		
		Hazard zoning		
		Performance zoning (PUD)		
		Conservation/protection zoning		
		Temporal zoning		
		Down zoning		
	Setbacks	Retreating/migrating setbacks	Statutory community plan or secondary community plan, zoning and/or subdivision by-law or regulations	Education programs, scenario planning, guidance, action, and management plans, regional plan, wetland policy, wetland regulations, development agreements, transfer of development credits, variances, waiver
		Fixed setbacks		
		Horizontal (lateral)		
		Elevation (vertical)		
		Buffers		
		Land use type setbacks		
	Subdivision by-law or regulations		Statutory community plan	Education programs, scenario planning, guidance, action, and management plans, regional plan, incentives, wetland policy, wetland regulations, development agreements, transfer of development credits, variances, waiver, urban design standards, conservation subdivision design
	Development standards		Data gathering and mapping, statutory community plan or secondary community plan	Guidance, action, and management plans, incentives, zoning, land use conversion and redevelopment, land trust, conservation easement, managed retreat and managed abandonment
	Development agreements		Statutory community plan or secondary community plan, community engagement	Data gathering and mapping, guidance, action, and management plans, incentives, zoning, setbacks, subdivision by-law or regulations, development standards, variances, waiver, urban design standards
	Transfer of development credits		Statutory community plan	Data gathering & mapping, guidance, action, and management plans, regional plan, incentives, zoning, subdivision by-law or regulations, land swap, land trust, conservation easements
	Land swap		Partnerships, education programs, data gathering & mapping	Guidance, action, and management plans, incentives, land use conversion and redevelopment, land trust, conservation easement, managed retreat and managed abandonment
	Land use conversion & re-development		Statutory community plan or secondary community plan, zoning, municipal guiding document/plan	Data gathering and mapping, guidance, action, and management plans, incentives, development standards, land swap, land trust, conservation easements, managed retreat and managed abandonment
	Variances		Data gathering and mapping, statutory community plan or secondary community plan	Community engagement, guidance, action, and management plans, zoning, setbacks, subdivision by-law or regulations, development standards, development agreements, waiver, urban design standards
	Waiver		Data gathering and mapping, statutory community plan or secondary community plan	Guidance, action, and management plans, zoning, subdivision by-law or regulations, development standards, variances, urban design standards
	Land trust		Partnerships, conservation easements	Education programs,community engagement, data gathering and mapping, guidance, action, and management plans, incentives, transfer of development credits, land use conversion and redevelopment
	Rolling easements		Partnerships, provincial legislation	Education programs, community engagement
	Conservation easements		Partnerships, land trust	Education programs,community engagement, data gathering and mapping, guidance, action, and management plans, incentives, transfer of development credits, land use conversion and redevelopment
	Managed retreat and managed abandonment		Data gathering & mapping, education programs, community engagement, guidance, action, or management plans	Partnerships, statutory community plan, secondary community plan, regional plan, incentives, zoning, setbacks, transfer of development credits, land swap, land use conversion and redevelopment, land trust, rolling easements, conservation easements, abandonment, site monitoring
	Abandonment			
	Foreshore lease		Partnerships	Data gathering & mapping
Site Planning and Design Tools	Urban design standards		Community engagement, statutory community plan or secondary community plan or guidance, action, and management plans or subdivision by-law or regulations	Visioning, data gathering and mapping, zoning, setbacks, development standards
	Conservation subdivision design		Partnerships, data gathering & mapping	Education programs, visioning, scenario planning, guidance, action, or management plans, incentives, wetland policy, zoning, setbacks, subdivision by-law or regulations
	Coastal Development Rating System		Partnerships	Education programs, community engagement, visioning, data gathering & mapping
	Site Monitoring		Data gathering & mapping	Partnerships, education programs, community engagement, scenario planning, guidance, action, and management plans

[1] Arlington Group Planning + Architecture, EBA, a Tetra Tech Company, and DE Jardine Consulting Sustainability Solutions Group. (2013). Sea level rise adaptation primer: A toolkit to build adaptive capacity on Canada's south coasts. British Columbia Ministry of Environment. Retrieved from http://www2.gov.bc.ca/gov/topic.page?id=F09F1EC7576643CEB5FB1536913730BA

[2] NOAA. (2010). Adapting to Climate Change: A Planning Guide for State Coastal Managers. NOAA. Washington, DC Retrieved 15 May, 2014 from http://coastalmanagement.noaa.gov/climate/docs/adaptationguide.pdf and http://coastalmanagement.noaa.gov/climate/adaptation.html

CHAPTER 2. THE CONTEXT FOR COASTAL LAND USE PLANNING IN THE ATLANTIC PROVINCES

Canada's four Atlantic provinces of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador are distinct from one another in their arrangements of land ownership, governance, planning, and management. The smallest province, Prince Edward Island, is almost entirely in the hands of private landowners; only 10% of the land mass is public land. In contrast, provincial, public land accounts for 95% of the land area of Newfoundland and Labrador, the largest of the four provinces.

Land use planning and management happens through local government or provincial initiatives, but the distribution of authority or control over land use planning varies widely between the four provinces. Nova Scotia has the most extensive distribution of local government and authority for local land use control. The entire province (except for federal lands and First Nations communities) is organized into municipalities. The other provinces are a mix of municipalities with local land use control and unincorporated areas, or local service districts with provincial land use control.

The provinces delegate land use planning and management authority to local governments through enabling legislation. Municipalities may accept the authority for land use planning and development control. If they do, they develop plans and legislation to guide and regulate land use, such as land use by-laws. Land use plans and regulations may apply broadly to the entire municipality or be targeted to specific areas in a municipality through secondary or local plan areas. Municipal plans and legislation must follow the rules of provincial land use regulations.

Areas not subject to municipal land use and development controls are still subject to provincial policy and regulation. Land is managed at the provincial level for resource development such as forestry and mining; wildlife and habitat protection through protected areas; environmental protection for wetlands, watercourses, and shorelines; and recreation such as parks. Agricultural land use is also subject to provincial regulations. Agriculture is a special case because it is private land development but it uses soil, an environmental resource. Some provinces use zoning to protect agricultural land from development for other uses.

First Nations in Atlantic Canada have land use planning authority through Federal Government legislation, including the *Indian Act*, the *First Nations Land Management Act*, treaties, modern treaties, or self-government agreements. Each type of legislation gives varying amounts of authority for land use planning and land management to First Nations.

Coastal planning and management is part of land use planning and management. In this case land use planning and controls are applied to a defined area, the coast. Planning tools are designed to address the opportunities and constraints to land uses presented by the coastal environment and its natural processes. Any land use tools used by a municipality or First Nations community, or the policy and regulatory tools used by the provinces to control land and resource activities, can be applied in coastal planning.

The following sections describe the land use planning and management context for coastal and climate change adaptation in the four Atlantic Provinces and in First Nations.

2.1 New Brunswick

New Brunswick has 105 municipalities that have land use planning authority. Municipalities exist as cities, towns, and villages. Rural communities are another type of community, similar to municipalities. Rural communities are formed by adjacent local service districts, or local service districts and towns or villages, that choose to amalgamate. Villages and rural communities can assume responsibility for providing local services as they are able to and have their own rural plans. They rely on the Province for providing services until they choose to provide services locally.[1] New Brunswick also has local service districts that rely on the Province to provide services. Local service advisory committees can be set up to provide advice to the Minister but they have no contractual land use planning authority.[2]

New Brunswick also has 12 regional service commissions with boards that are made up of mayors of municipalities and local service district representatives. These commissions are not another tier of government; they act as service delivery agents and ensure that communities receive the services they pay for. They invoice municipalities and the province (for local service districts) for those services.[3]

Overview of land use planning decision-making authority and relevant legislation in New Brunswick

Table 2.1 New Brunswick Regional Service Commissions

Regional Service Commission	
Decision-Makers	The regional service commission is controlled by a board of directors. The board of directors consists of the mayors of each municipality and rural community and representatives from local service districts (Section 9[1], *Regional Service Delivery Act*). An executive director must be appointed by the board of directors (Section 13, *Regional Service Delivery Act*).
Staff	The executive director can appoint a planning director or other employee to ensure that the services, powers, and duties of the commission are carried out (Section 14, *Regional Service Delivery Act*).
Development Plans	A regional development plan is prepared in consultation with municipalities and rural communities within its region (Section 17, *Community Planning Act*). Regional development plans contain planning policies for economic, social, and physical development within the region, including managing natural resources, water resources, pollution control, and urban and rural land use (Section 17[4], *Community Planning Act*). A regional plan can require that a village or rural community develop a municipal or rural plan (Section 17[5 and 6], *Community Planning Act*). The commission provides land use planning services to municipalities or rural communities that are not providing their own services (Section 25, *Regional Service Delivery Act*).
Zoning By-law	Can propose a use of land or building that is not permitted within the existing zoning by-law.

TABLE 2.2 NEW BRUNSWICK MUNICIPALITIES

Municipality (City, Town, or Village) and Rural Community	
Decision-Makers	Council consists of a mayor, deputy mayor and council.
Staff	The planning director may act as the development officer and approve regional developments and administer subdivision by-laws and regulations for villages and rural municipalities (Section 4[2], *Community Planning Act*). A municipality or rural community that provides its own land use planning may appoint a municipal planning director or a municipal planning officer. A planner must be appointed to adopt a municipal plan, development scheme, or urban renewal scheme and to enact a zoning or subdivision by-law (Section 16[1], *Community Planning Act*). The treasurer is the chief financial and accounting officer (Section 77[1], *Municipalities Act*). The position of solicitor of the municipality must be a member of the Law Society of New Brunswick (Section 80[1], *Municipalities Act*). The position of municipal engineer must be held by a registered professional engineer (Section 80[2], *Municipalities Act*). The auditor of a municipality must be a certified general accountant (Section 82[1], *Municipalities Act*). The chief administrative officer is responsible for the administration of the affairs of the municipality (Section 90.1, *Municipalities Act*). The municipal planner is responsible for zoning and other planning matters (Section 90.1, *Municipalities Act*). A building inspector is responsible for enforcing by-laws and laws respecting building and construction (Section 90.1, *Municipalities Act*).
Committees	Council must establish an advisory committee with five to fifteen members for a city or town and three to six members for a village or rural community (Section 12, *Community Planning Act*). Council may approve a local improvement association to improve public spaces and care for public buildings and landmarks (Section 150).
Strategic Plans	A municipality must comply with a regional plan if one has been put into effect for the area. The council of a village may adopt a rural plan if no municipal plan, basic planning statement, or zoning by-law is in place for the village (Section 27.2[1], *Community Planning Act*). Where a rural plan is not in effect, a basic planning statement can be prepared (Section 29[1], *Community Planning Act*). The regional service commission provides land use planning services to municipalities or rural communities that are not providing their own services (Section 25, *Regional Service Delivery Act*).
Zoning By-law	A municipality with a municipal plan must enact a zoning by-law to carry out the intent of the plan (Section 34[1], *Community Planning Act*). A municipality with a basic planning statement may enact a zoning by-law (Section 34[2], *Community Planning Act*). A zoning by-law must divide the municipality into zones and prescribe purposes, structures, and uses for the zones including restrictions on other purposes, structures and uses (Section 34[3], *Community Planning Act*).
Subdivision By-law	Council may enact a subdivision by-law regulating the subdivision of land within the municipality; the by-law must be consistent with the regional plan, municipal plan, or basic planning statement (Section 42*, Community Planning Act*).
Building By-law	A council may prescribe building standards for demolishing, altering, repairing, or location of a building (Section 59, *Community Planning Act*).
Flood Risk Area By-law	Municipalities and rural communities can request that the Minister designate any area within the community as a flood risk area. A flood risk by-law can be enacted for these areas to maintain floodways, conserve flood-water storage capabilities, and protect new development from flood risks (Section 41.1, *Community Planning Act*).
Public Beaches	Municipalities and rural communities may declare a beach to be a public beach (Section 182, *Municipalities Act*) and make by-laws for the uses at that beach (Section 183, *Municipalities Act*). Municipalities and rural communities can enter into an agreement with a person to develop a public beach (Section 184, *Municipalities Act*).

New Brunswick Department of Environment and Local Government

The Department of Environment and Local Government has a mandate to integrate stewardship into land use planning, zoning, and management. The department also ensures the enforcement of environmental legislation, and has the mandate to provide financial support, assistance, and advice for municipal activities. The department works with communities interested in restructuring and sharing regional services.[4]

Relevant Legislation

Coastal Areas Protection Policy for New Brunswick

The *Coastal Areas Protection Policy for New Brunswick* was created to manage coastal resources by establishing standards for the development and management of coastal lands.

The objectives of the policy include reducing risks to public safety during storm and flood events; minimizing the contamination of water and wetlands from hazardous material; minimizing salt water intrusion into wells; maintaining a coastal buffer; maintaining coastal ecosystems; and minimizing the cost of repairing damage to public property and infrastructure.

The policy recognizes three zones in the coastal area, two of which are used in reviewing development applications and issuing permits. Zone A, the core area, is the area closest to the water that is most sensitive to coastal impacts; this zone includes beaches, dunes, marshes, rock platforms, and dyked lands. Zone B, the buffer area, includes land 30 metres landward of Zone A. There is recognition of coastal impacts and risks in this zone but less than for the areas in Zone A, therefore, a greater range of activities is permitted in Zone B. The policy includes a list of acceptable activities for each zone; Zone A allows the least number of activities and Zone B allows activities that follow the objectives of the policy. The policy also lists coastal activities that would or would not require a formal environmental review.[5]

New Brunswick Wetlands Conservation Policy

The *New Brunswick Wetlands Conservation Policy* was created in conjunction with the New Brunswick Department of Natural Resources and describes the functions of wetlands and their benefits to the environment and communities. It contains statements on what the Government of New Brunswick will do to conserve wetlands in the province. The first statement is that the province will prevent the loss of provincially significant wetland habitat and to have no net loss of wetland functions for all wetlands over one hectare in size. Significant wetlands, including coastal marshes, will be identified and mapped. Other statements are that the province will develop wetland education programs to increase awareness and promote stewardship through cooperation among governments and stakeholders.

The policy proposes that no human activities should occur within 30 metres of a provincially significant wetland, with a few exceptions such as activities that provide necessary public functions. Exceptions require an environmental impact assessment. There is a development review process for activities within 30 metres of wetlands larger than one hectare.[6]

Long-Term Wetland Management Strategy

The *Long-Term Wetland Management Strategy* outlines the province's intentions for regulating wetlands into the future. Some of the new approaches include requiring compensation for wetland loss, improving wetland area mapping, developing a wetland management system, consulting with municipalities on wetland management, managing wetland on agricultural land and woodlots, and informing the public on permit appeals.[7]

Flood Risk Reduction Strategy

New Brunswick's *Flood Risk Reduction Strategy* is a first step towards addressing the increased risk of coastal and inland flooding in the province. The strategy contains three objectives, each linked to a set of actions and desired outcomes. The objectives are: 1) accurate identification of locations at risk of flooding; 2) development of a local planning

framework that will take flooding into account and avoid development in flood risk areas; and 3) reduction of flood risk for people and structures already susceptible to flooding. The strategy is intended as an enabling framework for a variety of future actions.

Community Planning Act and the Regional Service Delivery Act

The *Community Planning Act* provides the authority and context to conduct land use planning in New Brunswick. The *Regional Service Delivery Act* provides the authority for Regional Service Commissions to provide land use planning services in New Brunswick.

There are twelve Regional Service Commissions in New Brunswick with the mandate to provide land use planning and inspection services primarily to unincorporated areas. Municipalities may either provide their own land use planning and inspection services or purchase those services from a Regional Service Commission.

Under the *Community Planning Act* municipalities may create a municipal plan or in the case of smaller municipalities and Rural Communities they may create a Rural Plan.

There are several land use planning tools available under the *Community Planning Act* that communities can use to manage climate change risks:

- municipal plans and zoning by-laws;
- rural plans;
- a provincial subdivision regulation; however, the Act allows municipal councils and rural communities to create their own subdivision by-law;
- development schemes/secondary plans (also known as neighbourhood plans) if a community has a municipal plan; and
- a flood risk area by-law.

Clean Environment Act

The *Clean Environment Act* deals with water quality and environmental impact assessments within the province. The Act defines the environment as the air, water and soil. The definition of coastal areas is "the air, water, and land between the lower low water large tide and one kilometre landward of the higher high water large tide or one kilometre landward of any coastal feature" (Section 1). Coastal features include beaches, marshes, rock platforms, dunes, and dyked lands. The Act also defines wetlands as "land that periodically or permanently, has a water table at, near or above the land's surface or that is saturated with water and sustains aquatic processes" (Section 1). The province can regulate activities that may impact coastal waters within the province's jurisdiction, groundwater, and surface water (Section 1).[8]

Clean Water Act

The *Clean Water Act* contains regulations for altering a watercourse or water wells, and managing watershed protected areas. Watershed protected areas are covered by Regulation 2001–83 under the *Clean Water Act*. This regulation protects the watersheds that are used as a source of potable water for public water supplies. Thirty watershed areas are protected under this regulation.[9]

Watercourse and Wetland Alteration Permit

The Department of Environment and Local Government administers the *Watercourse and Wetland Alteration Permit Program*. A Permit is required when carrying out the following activities within 30 metres of a watercourse or wetland: constructing or repairing structures, operating machinery, disturbing ground, removing vegetation, depositing materials, pumping water, and altering the natural flow of water.

New Brunswick Department of Natural Resources

The New Brunswick Department of Natural Resources is responsible for managing crown lands in the province. Crown lands include the foreshore, or intertidal area, of the coast. The department's mandate is "to manage the natural resources of the province in the best interest of its people". The department manages fish, wildlife, Crown timber, and land resources. The Regional Operations and Support Services Branch provides direction, support, and technical provision to regions and districts for natural resource development projects.

The department has created a number of documents and products that provide a background for coastal planning. Documents include *The Coast and Beaches Fact Sheet* for coastal property owners, *Private Land Stewardship in New Brunswick: A Guide for Landowners*, and a *Crown Waterfront Reserve Fact Sheet*.[10]

Relevant Legislation

Submerged Land Policy

The *Submerged Land Policy* was created to provide guidance to the department's staff for administering land use applications for submerged Crown lands. Submerged lands include tidally-influenced lands as well as rivers and lakes. The policy states that water-dependent structures, works, or activities may be permitted on submerged Crown lands with the department's approval. Seasonal or temporary structures, works, or activities that meet certain requirements do not require the approval of the department. Non-water-dependent works are not permitted on submerged lands, but some exceptions apply. If structures can be located on non-submerged land, then they are not permitted to be built on submerged land. This document goes into further detail on types of structures, works, and activities on submerged lands that do or do not require authorization from the Department of Natural Resources.[11]

New Brunswick Wetland Classification for 2003–2012 Photo Cycle

The Department of Natural Resources has mapped wetlands and classified them into seven habitats: freshwater marsh, coastal marsh, aquatic bed, bog, fen, shrub wetland, and forested wetland. The department has also mapped and classified coastal/shoreline feature classes that are described in this document including rocky shores, beaches, tidal flats, and dunes.[12]

New Brunswick Wetlands Conservation Policy

See Department of Environment and Local Government (Page 12) for description of this policy.

Crown Lands and Forests Act

The *Crown Lands and Forests Act* enables the Minister to manage Crown lands by regulating the following on Crown lands: access and travel, harvesting and renewing timber, habitat for wildlife, forest recreation, and rehabilitation (Section 3[1]). The Minister has the authority to grant Crown lands at a public auction, to a board, commission or corporation, and to a municipality or rural community (Section 13). Grants do not include land below the high water mark and must maintain a ten metre right-of-way from the normal high water mark of any river or lake for public access (Section 15). The Act does not regulate uses of coastal lands specifically, but applies to Crown lands along the coast.[13]

New Brunswick Department of Agriculture, Fisheries and Aquaculture

The New Brunswick Department of Agriculture, Fisheries and Aquaculture is responsible for the development of food production and value-added products of the food sector and related industries. The Environmental Services Unit provides advice on water management, land development, and environmental stewardship to farmers. The department also oversees fish health, research activities, dyke and marshland development, and aquaculture and processing sectors.[14]

Relevant Legislation

Aquaculture Act

The *Aquaculture Act* regulates licensing for aquaculture facilities in the province and requires that all aquaculture activities be carried out under an aquaculture license (Section 6). Under the Act, the Minister may designate areas of water as aquaculture bay management areas, and regulate the aquaculture product and length of fallow period for an area (Section 5[2]). Licenses are subject to terms and conditions related to minimizing environmental degradation (section 13[1]). The Minister may also designate areas of land for aquaculture (Section 32). The Minister can develop aquaculture leases, designate aquaculture land, and impose regulations that the Minister considers appropriate (Section 33[2]).[15]

[1] New Brunswick Department of Environment and Local Government. (2013). *Process for becoming a rural community: empowering New Brunswickers with the ability to make local decisions*. Retrieved from http://www2.gnb.ca/content/dam/gnb/Departments/lg-gl/pdf/ProcessBecomingRuralCommunity.pdf

[2] New Brunswick Department of Environment and Local Government. (2015). *Local service districts*. Retrieved from http://www2.gnb.ca/content/gnb/en/services/services_renderer.9495.Local_Service_Districts_%28LSDs%29.html#serviceDescription

[3] New Brunswick Department of Environment and Local Government. (2015). *Introduction*. Retrieved from http://www2.gnb.ca/content/gnb/en/departments/elg/local_government/content/promos/action_plan_local_governance/introduction_rsc.html

[4] New Brunswick Department of Environment and Local Government. (2015). *Environment and local government*. Retrieved from http://www2.gnb.ca/content/gnb/en/contacts/dept_renderer.139.html#mandates

[5] New Brunswick Department of Environment and Local Government. (n.d.). *A coastal areas protection policy for New Brunswick*. Retrieved from http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Water-Eau/CoastalAreasProtectionPolicy.pdf

[6] New Brunswick Department of Environment and Local Government & New Brunswick Department of Natural Resources and Energy. (2002). *New Brunswick wetlands conservation policy.* Retrieved from http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Report-Rapport/WetlandsTerresHumides.pdf

[7] New Brunswick Department of Environment and Local Government. (2012). *Long term wetland management strategy.* Retrieved from http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/WetlandStrategyStrategieTerresHumides.pdf

[8] Clean Environment Act. Department of Environment and Local Government (1973, c. C-6). Retrieved from the New Brunswick Attorney General website: http://laws.gnb.ca/en/ShowPdf/cs/C-6.pdf

[9] Clean Water Act. Department of Environment and Local Government (1989, c. C-6.1). Retrieved from the New Brunswick Attorney General website: http://laws.gnb.ca/en/ShowPdf/cs/C-6.1.pdf

[10] New Brunswick Department of Natural Resources. (2015). *Natural resources.* Retrieved from http://www2.gnb.ca/content/gnb/en/departments/natural_resources/contacts/dept_renderer.604.html#mandates

[11] New Brunswick Department of Natural Resources. (2014). *Submerged crown lands policy*. Retrieved from http://www2.gnb.ca/content/dam/gnb/Departments/nr-rn/pdf/en/Publications/CLM0142004.pdf

[12] New Brunswick Department of Natural Resources. (2006). *New Brunswick wetland classification for 2003-2012 photo cycle.* Retrieved from http://www2.gnb.ca/content/dam/gnb/Departments/nr-rn/pdf/en/Publications/WETLANDS-Classificaton.pdf

[13] Crown Lands and Forests Act. New Brunswick Department of Natural Resources (1980, c. C-38.1). Retrieved from the New Brunswick Attorney General website: http://laws.gnb.ca/en/ShowPdf/cs/C-38.1.pdf

[14] New Brunswick Department of Agriculture, Aquaculture and Fisheries. (2015). Agriculture, aquaculture and fisheries. Retrieved from http://www2.gnb.ca/content/gnb/en/departments/10/contacts/dept_renderer.137.html#mandates

[15] Aquaculture Act. New Brunswick Department of Agriculture, Aquaculture and Fisheries (2011, c. 122).Retrieved from the New Brunswick Attorney General website: http://laws.gnb.ca/en/ShowPdf/cs/2011-c.112.pdf

2.2 Prince Edward Island

Prince Edward Island is distinct among the Atlantic Provinces, and in Canada generally, because of the high proportion of private land ownership. Approximately 90% of the land area of Prince Edward Island is privately owned.

Thirty percent of the Island's land area is incorporated into 73 municipalities, including the two cities of Charlottetown and Summerside, 10 towns, and 61 communities. Under the Prince Edward Island *Planning Act*, municipalities have the option of taking responsibility for land use planning, while the province holds planning authority for unincorporated areas and retains authority for municipalities that do not have official plans. Thirty-two municipalities have developed official plans and land use by-laws; their planning covers 10% of the provincial land area. The province is responsible for planning and development control in the remaining 90% of the provincial land area.

Overview of local land use planning decision-making authority and relevant legislation in Prince Edward Island

Table 2.3 Prince Edward Island municipalities

City, Town, and Community	
Decision-Makers	Councils of the city of Charlottetown and the city of Summerside must have elected members and a mayor in accordance with their respective charters: *Charlottetown Area Municipalities Act* (Section 5[1]) and the *City of Summerside Act* (Section 5[1]), respectively. Towns must have six elected members and a mayor (Section 15[1], *Municipalities Act*). The mayor can appoint a deputy mayor to act in his/her place during an absence (Section 16[2], *Municipalities Act*).
	Council of a community must have 3 to 6 elected members and a chairperson (Section 15[1], *Municipalities Act*). The chairperson can appoint a vice chairperson to act in his/her place during an absence (Section 16[2], *Municipalities Act*).
Staff	Council must appoint a chief administrative officer who is not a member of council (Section 24[1], *Municipalities Act*; Section 22[1], *Charlottetown Area Municipalities Act*; Section 22[1], *City of Summerside Act*). Council must appoint an auditor to audit the finances of the municipality (Section 27, *Municipalities Act*; Section 24[1], *Charlottetown Area Municipalities Act*; Section 24[1], *City of Summerside Act*). Council may appoint by-law enforcement officers to report to the administrator of the municipality (Section 29.1, *Municipalities Act*; Section 23[1], *Charlottetown Area Municipalities Act*; Section 23[1], *City of Summerside Act*).
Committees	The mayor or chairperson may appoint standing committees from among members of the council (Section 22[1], *Municipalities Act*; Section 94(1) *Charlottetown Area Municipalities Act*; Section 19[1] *City of Summerside Act*). Council may appoint special committees, chaired by a councillor and served by residents, for any particular purpose (Section 22[2 and 3], *Municipalities Act*; Section 94[2 and 3], *Charlottetown Area Municipalities Act*; Section 19[2 and 3], *City of Summerside Act*). A planning board may be appointed to review and make recommendations to council on a proposed plan or amendments to a plan (Section 9[2 and 3], *Planning Act*). A planning board is made up of a chairperson, who is a member of council, and at least two other members who may be councillors (Section 9[4], *Planning Act*).

City, Town, and Community	
Expropriation	Council of a municipality can expropriate land to provide municipal services (Section 51, *Municipalities Act*; Section 49*, Charlottetown Area Municipalities Act*; Section 50, *City of Summerside Act*).
Official Plans	Council may appoint a planning board to review and recommend to council a proposed plan or amendment to a plan (Section 9[2 and 3], *Planning Act*). An official plan must be approved by council and the Minister (Section 15, *Planning Act*). All by-laws and regulations for the area must conform to the official plan (Section 15, *Planning Act*).
By-laws	Council can make by-laws for the "peace and order" of the municipality, the provision of municipal services, and any other matter within the jurisdiction of the municipality (Section 57, *Municipalities Act*). Council may make by-laws respecting the services it is authorized to provide, parks and recreational land, municipally owned land, control of surface water flow, stormwater and drainage systems, minimum building and site development standards (Section 64, *Municipalities Act*). By-laws are subject to the approval of the Minister (Section 17, *Planning Act*). A planning board can make recommendations to council for by-laws that will support the official plan (Section 9[3], *Planning Act*).

TABLE 2.4 PRINCE EDWARD ISLAND AREAS UNDER PROVINCIAL AUTHORITY FOR LAND USE PLANNING

Unincorporated Area, Special Planning Areas, Municipalities without Official Plans	
Decision-Makers	The Lieutenant-Governor in Council may adopt provincial land use development policies and make regulations respecting public health and safety, environmental protection, and landscape features (Section 7[1], *Planning Act*).
Powers	The Lieutenant-Governor in Council may adopt planning regulations that apply to any area except within a municipality that has an official plan and by-laws (Section 8[1], Planning Act). Through the *Province-Wide Minimum Development Standards* (Section 7[1c]), the Lieutenant-Governor in Council may adopt regulations that apply everywhere, including municipalities with official plans.
Land use Regulation	The Lieutenant-Governor in Council has the authority to implement regulations with respect to establishing land use zones and prescribing uses and structures within each zone in unincorporated areas and in municipalities without official plans and by-laws (Section 8[1], *Planning Act*). The Lieutenant-Governor in Council has the authority to establish and regulate areas for conservation and environmentally sensitive areas outside of municipal boundaries (Section 8[1], *Planning Act*).
Subdivision Regulation	The Lieutenant-Governor in Council has the authority to implement regulations with respect to the subdivision of land including restriction, governing, and prohibiting land subdivision in areas not covered by municipal official plans (Section 8[1], *Planning Act*).

Prince Edward Island Department of Communities, Land and Environment

Municipal Affairs and Provincial Planning Division

Municipal Affairs Branch

The Municipal Affairs Branch is the primary connection between the province and municipalities, municipal interest groups, and the public. It provides assistance to municipalities on forming a municipality, municipal elections, amalgamation, finance, boundary changes, and adopting official plans and land use by-laws.[1]

Provincial Planning Branch

The Provincial Planning Branch deals with provincial land use policies, legislation, and regulations. The branch also provides assistance to organizations and individuals regarding sustainable development.[2]

Task Force on Land Use Policy

In 2014, the Task Force on Land Use Policy submitted its final report of recommendations on land use policy for Prince Edward Island. The Task Force completed a consultation document in 2013 and held public consultations for feedback on the report. The final report includes recommendations on the following topics:

- protecting the quality and quantity of water,
- maintaining and improving soil quality,
- protecting natural areas and conserving natural ecosystems,
- developing a coastal zone management policy,
- preserving working rural landscapes,
- protecting agricultural land,
- enhancing the diversity and connectedness of forested areas,
- protecting fishing and aquaculture resources,
- reducing risks to people, property and infrastructure, and
- optimizing existing infrastructure.

The Task Force's recommendations include making amendments to the statements of provincial interest, provincial land use policies, regional land use plans, and developing a future land use map and designated zones.[3]

Relevant Legislation

Planning Act

Under the *Planning Act* the council of a municipality with an official plan is responsible for administering the official plan and implementing by-laws and regulations that meet the requirements of the municipality's official plan (*Planning Act*, Part III Municipal Planning, Sections 9 to 22). The official plan and land use by-laws must be consistent with provincial land use and development regulations (Section 9.1). The municipality may appoint a planning board that recommends planning policy to the council (Section 9.3). Two or more municipalities can establish a joint planning board (Section 22 [1]).[4]

The *Planning Act* gives the Lieutenant-Governor in Council the authority to adopt provincial land use policies and to make regulations that establish province-wide minimum development standards for public health and safety and environmental protection (Section 7). Municipalities with official plans and by-laws must ensure that their requirements are not less stringent than any province-wide regulation (Section 7). The Lieutenant-Governor in Council may make provincial land use planning regulations in any area not regulated through a municipal official plan. Regulations may address planning and land use, subdividing land, development, and building standards.

Regulations for planning and land use may include defining the areas to be regulated and establishing zones, permitting and restricting uses and structures within zones, establishing conservation zones, establishing environmentally sensitive areas, and establishing special planning areas. Regulations for subdivision of land include governing and restricting the subdivision of land. Subdivision regulations may require subdividers of land to convey up to 10% of the subdivided land as open space to the Crown. Regulations for developing land and providing services include governing the service of streets, sidewalks, and piped services. Regulations for building standards will soon ensure province-wide compliance with the National Building Code.

The Lieutenant-Governor in Council may also regulate development and subdivision permits, identify and prevent certain uses or subdivision of lands through a land identification program, and is responsible for respecting environmental protection as laid out in the *Environmental Protection Act 1988* (Section 8).[5]

Chapter P-8, Planning Act: Subdivision and Development Regulations

The regulations in this chapter of the *Planning Act* apply to all areas of the province except municipalities with an official plan (Section 2). The province administers the Subdivision and Development Regulations, including subdivision and development control. Within this Act "coastal areas" are defined as being any area within 500 metres inland and seaward of the high water mark of all tidal waters. This Act requires that any proposed subdivision in a coastal area, and adjacent to a beach, is required to have a buffer of at least 18.3 m (60 ft) or 60 times the annual erosion rate. Any proposed subdivision adjacent to a sand dune is required to have a buffer of 60 feet from the inland boundary of the dune (Section 16). The subdivision of land on off-shore islands is prohibited in this Act (Section 64).[6]

Lands Protection Act

The *Lands Protection Act* regulates property rights on Prince Edward Island to address the challenges of absentee landowners, the province's small land area and relatively high population density, and protection of the natural environment, ecology, and lands on the Island (Section 1.1). No persons shall hold more than 1,000 acres of land, and no corporation shall own more than 3,000 acres (Section 2). Non-residents shall own a maximum of 5 acres and no more than 165 feet of shore frontage (Section 4). Permits for larger land holdings can be provided by the Lieutenant-Governor in Council; conditions can be placed on these permits including that the land may be designated as "non-development use" or it may not be subdivided except for uses such as agriculture, conservation, or parks (Section 9). Land that has been designated as "non-development use" cannot be used for commercial or industrial uses or subdivided without an amendment or cancellation of the identification. Under Section 17 the Lieutenant-Governor in Council is given the authority to establish a land identification program. Any land conveyed to the Crown is presumed to be identified for "non-development use" unless specified otherwise (Section 21).[7]

Other Statutes

The Province of Prince Edward Island also has two statutes that apply to the city of Charlottetown, the towns of Cornwall and Stratford, and the city of Summerside: the *Charlottetown Area Municipalities Act,*[8] and the *City of Summerside Act.*[9]

Environment Division

The Environment Division of the Department of Communities, Land and Environment provides a range of services to protect the environment, and public health and safety. Environmental protection is managed for air, water, and land in the province. Issues that the department oversees include climate change, pesticide use, hazardous material, environmental impact assessments, land development and subdivision, beaches and shorelines, and drinking and wastewater.[10]

Relevant Legislation

Environmental Protection Act

The *Environmental Protection Act* regulates the activities that affect the environment including discharges into the air, water, or land. It regulates the environmental impact assessment process for the province and requires that a developer planning a project must receive approval from the Minister before proceeding (Section 9). The Act also regulates activities that may alter a watercourse or wetland and establishes a watercourse buffer zone (Section 25). Watercourses are defined as any stream, river, lake, bay, estuary, or coastal body including any sediment bed that may or may not contain water. On the coast, activities on sand dunes and beaches are regulated to protect the natural supply and movement of sand and maintain stabilizing vegetation (Section 22).[11]

Natural Areas Protection Act

The intent of the *Natural Areas Protection Act* is to preserve natural areas in the province. Through this

Act the Minister can designate areas for natural protection on Crown land and landowners can enter into a restrictive covenant to protect natural areas on their land (Section 3). Natural areas targeted for protection include sand dunes, marshes, rivers, ponds, bogs, forests, offshore islands, cliffs, and marine areas.[12]

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2.3 NOVA SCOTIA

Around 70% of the land area of Nova Scotia is privately owned. The remaining land, excluding federal property and First Nations communities, is provincial or municipal public land.

There are 51 municipalities in Nova Scotia and all land in the province falls within a municipal boundary; however, federal land inside a municipality is not subject to municipal governance. Provincial land inside municipal boundaries takes municipal land use planning into consideration. The 51 municipalities include three regional municipalities, 27 towns, and 21 rural municipalities (12 districts and 9 counties). There are also 22 villages in Nova Scotia. Villages are unincorporated communities that exist within rural municipalities. Villages have limited powers of governance and taxation that allow them control over infrastructure such as sewer and water and how their communities develop.

Municipalities have land use planning authority through the Nova Scotia *Municipal Government Act*; they execute their authority for planning and development within their jurisdiction through the adoption of municipal planning strategies and land use by-laws. Many rural areas within the municipalities of Nova Scotia do not have land use planning in place, however. Development control on Crown lands falls under the jurisdiction of the Nova Scotia Department of Natural Resources.

Overview of land use planning decision-making authority and relevant legislation in Nova Scotia

Table 2.5 Nova Scotia municipalities

Municipalities (Regional, Town, County, and District)	
Decision-Makers	In a Regional Municipality decision-makers are a mayor, deputy mayor, and councillors. Mayors and councillors are elected at large (Section 12[8], *Municipal Government Act*).
	In a Town, County, or District, decision-makers are a mayor or warden, deputy mayor or deputy warden, and councillors. The Warden is chosen by the councillors (Section 12[1], *Municipal Government Act*). Mayors and councillors are elected at large (Section 12[8], *Municipal Government Act*).
Staff	Council must appoint the following positions: • a municipal auditor to report to council on accounts and funds (Section 42, *Municipal Government Act*); and • a development officer to administer its land use by-law and subdivision by-law (Section 243, *Municipal Government Act*). Council can appoint a chief administrative officer (Section 28, *Municipal Government Act*) or fulfill the responsibility of the chief administrative officer (Section 29, *Municipal Government Act*). The chief administrative officer appoints the following positions: • a clerk to keep records of council meetings, by-laws and policies (Section 33*, Municipal Government Act*); • a treasurer to manage all moneys of the municipality (Section 37 and 38, *Municipal Government Act*); • an administrator to enforce the dangerous and unsightly premises provisions (Section 41, *Municipal Government Act*); and, • an engineer (Section 39, *Municipal Government Act*). Council may allow the chief administrator to act as the clerk, treasurer, administrator, and engineer (Section 31[4], *Municipal Government Act*).
Committees	A council may establish standing, specialty, and advisory committees (Section 24[1], *Municipal Government Act*). Citizen advisory committees can be established to advise council (Section 26, *Municipal Government Act*). A community committee can be established for a defined area within the municipality to make recommendations to council and monitor the provision of services in the area (Section 27, *Municipal Government Act*). A council may establish a planning advisory committee for the municipality, an area within the municipality, or jointly between two or more municipalities. The planning advisory committee advises the municipality on amendments to planning documents and planning matters (Section 200, *Municipal Government Act*).
By-laws	A council may make by-laws for municipal purposes: including, regulating development, activity, industry, and business (Section [2b], *Municipal Government Act*) and the retention of existing trees and vegetation (Section 172B[2], *Municipal Government Act*).

Municipalities (Regional, Town, County, and District)	
Planning and Development	Municipalities have primary authority for land use planning within their jurisdiction. Municipalities may adopt planning strategies and land use by-laws that are consistent with provincial interests (Section 190, *Municipal Government Act*). Planning documents are subject to review by the Director of Municipal Affairs with the Province (Section 208, *Municipal Government Act*).
Strategic Plans	A municipality can enact a Municipal Planning Strategy for all, or part, of the municipality. There may be additional strategies for different areas of the municipality (Section 212, *Municipal Government Act*). Municipal planning strategies guide and establish policies for development and management of the municipality (Section 213, *Municipal Government Act*). Planning strategies may include goals and objectives for the future including the physical, economic, and social environment of the municipality (Section 214[1], *Municipal Government Act*). Two or more municipalities may adopt an inter-municipal planning strategy (Section 215, *Municipal Government Act*). Secondary planning strategies can be adopted for specific areas within a municipality that is not adequately addressed in the municipal planning strategy (Section 216, *Municipal Government Act*).
Land Use By-law	Council must adopt land use by-laws that carry out the intent of the municipal planning strategy (Section 219, *Municipal Government Act*). A land use by-law divides the planning area into zones and outlines the restricted, prohibited, and permitted uses within each zone (Section 220[1 and 2], *Municipal Government Act*). A land use by-law may also regulate or prohibit development within zones (Section 220[3], *Municipal Government Act*).
Subdivision By-law	A municipality that does not have a subdivision by-law is deemed to have adopted the provincial subdivision regulations (Section 270[5], *Municipal Government Act*). A subdivision by-law applies to the whole municipality but may contain different requirements for different parts of the municipality (Section 271, *Municipal Government Act*).

TABLE 2.6 NOVA SCOTIA VILLAGES

Village	
Decision-Makers	Governed by a commission consisting of three to five commissioners (Section 405, *Municipal Government Act*). The commissioners elect a chair and vice-chair for the commission (Section 408, *Municipal Government Act*).
Staff	The commission must appoint a clerk and treasurer for the village (Section 420[1], *Municipal Government Act*). The village may employ persons necessary for the purposes of the village (Section 422, *Municipal Government Act*).
Committees	An area advisory committee can be established to advise municipal council on matters affecting all or part of a village (Section 201, *Municipal Government Act*). The village commission may establish standing, special, and advisory committees (Section 408[1], *Municipal Government Act*).
Power to Make By-laws	Village commissions have the authority to put in place by-laws for the management and security of public properties owned by the Village and to regulate and protect drains, sewers and watercourses (Section 426[c, d], *Municipal Government Act*).

Nova Scotia Department of Municipal Affairs

The Department of Municipal Affairs acts as the liaison between the province and Nova Scotia's municipalities and maintains the legislative framework for municipal operations. The department provides advice, assistance, and support to municipalities in the development of strategies, policies, programs, initiatives and funding opportunities. The department also makes available programs, funding, and grants to community groups.

The Department of Municipal Affairs administered the development of the *Integrated Community Sustainability Plans* and *Municipal Climate Change Action Plans* for the municipalities of Nova Scotia.[1]

Relevant Legislation

Municipal Government Act

The *Municipal Government Act* regulates all aspects of land use planning and development and includes the Provincial Subdivision Regulations (described below). Through this Act, municipalities are given primary authority for land use planning within their jurisdiction and are given the authority to adopt planning strategies and land use by-laws. These policies must be consistent with the interests and regulations of the province. Land use planning policies can contain statements regarding stormwater (Section 343), erosion control, re-grading of the land, vegetation prevention, subdivision of land (Sections 268–271), development agreements (Section 225), comprehensive development districts, and site plan approval areas (Section 231 and 232). The *Municipal Government Act* also provides a framework for inter-municipal planning strategies created jointly between two municipalities, as well as secondary planning strategies that apply to a certain area within a municipality.

The Act defines the governance, organizational structure, and authority of villages within the province. Villages are located within municipalities and must follow the municipal by-laws. Although they are not independent governing units, villages do have the authority to make by-laws for the lands, management, and security of public properties owned by the village. Villages can also spend revenue on preventing or decreasing flooding, lands and buildings required for any purpose of the village, trails, bicycle paths, recreational facilities, public grounds, squares, halls, parks, tourist information centres, community centres, water systems, wharves and public landings.

Under Section 355 of this Act "[a]ll docks, quays, wharves, slips, breakwaters and other structures connected with the shore are within the boundaries of the municipality." (Section 355) On undeveloped coastlines, the municipal boundary reaches to the high water mark along the coast.[2]

Schedule B: Statements of Provincial Interest

The *Statements of Provincial Interest* are included as regulations under Schedule B of the *Municipal Government Act*. The statements provide an outline of the province's interests in protecting land and water resources and address issues related to the growth of Nova Scotian communities. There are six statements covered under this section regarding drinking water, flood risk areas, agricultural land, infrastructure, and housing.

With respect to drinking water, the goal is to protect municipal drinking water supply watersheds. The goal regarding flood risk areas is "to protect public safety and property and to reduce the requirement for flood control works and flood damage restoration in floodplains." (*Municipal Government Act*, pg. 291). Provisions under this section state that planning documents must identify flood risk areas and restrict development in these regions.[3]

Provincial Subdivision Regulations

The Provincial Subdivision Regulations outline the requirements and procedure for submitting a subdivision application within the province. Subdivisions on island lots are permitted; if no road is on the island each lot must have six metres of water frontage (Section 6[2]). Applications are sent to the Department of the Environment, which regulates on-site sewage disposal and well water. Subdivision applications must contain the location of a "watercourse, wetland, marine water body and other features that may influence the design of the on-site

sewage disposal system, including any ditch, road, driveway or easement" (Section 49[4]).[4]

Nova Scotia Environment

Nova Scotia Environment is responsible for the management and protection of the environment including air quality, drinking water, and climate change. The department monitors and inspects activities that affect the environment. Divisions within the department include the Policy Division, Sustainability and Applied Science Division, and Environmental Health and Food Safety Division.[5]

Relevant Legislation

Environment Act

The *Environment Act* is the primary legislation that regulates the impacts that human activities have on the natural environment and gives the Minister of the Environment the authority over wetland management. This Act contains the following sections that have relevance to coastal planning and water resources: Activities Designation Regulations; Environmental Assessment Regulations; On-site Sewage Disposal Regulations; Water and Wastewater Facility Regulations; and Protected Areas (Water Areas) – Designations and Regulations. Activities Designation Regulations control watercourse alteration, pesticide application, sewage and storm drainage, and industrial effluent. Environmental assessment regulations require that assessments are carried out for any undertaking that disturbs a total of two hectares or more of wetland. Regulations under the on-site sewage disposal include minimum lot sizes and clearance distances for on-site services. Regulations under the water and wastewater facilities include the classifications of water treatment, wastewater treatment, water distribution, and wastewater collection facilities. The protected areas section gives authority to the Minister to designate a region as a protected area for a water supply source. Municipalities and operators can apply to have a region designated as protected.[6]

Environmental Goals and Sustainable Prosperity Act

The *Environmental Goals and Sustainable Prosperity Act* required the provincial government to enact a policy to prevent a net loss of wetlands by 2009, including coastal wetlands.[7]

Nova Scotia Wetland Conservation Policy

The *Nova Scotia Wetland Conservation Policy* gives direction and a framework for wetland conservation. It supplements existing policies, regulations, and legislation that are designed to manage wetlands in the province. The *Nova Scotia Wetland Conservation Policy* clarifies the role of the government and the public in protecting wetlands and provides information on wetlands and wetland conservation.[8]

Nova Scotia Department of Natural Resources

The Minister of Natural Resources (NSDNR) manages activities on Crown lands in Nova Scotia. Crown lands cover around 29% of the province's land and includes most of the land between the mean high water mark and low water mark; the exception to this is federally and privately (pre-confederation water lots) owned coastline. Crown lands do not include provincially owned wilderness areas, protected areas, roads, highways, and provincial buildings.[9]

The department has an *Integrated Resource Management* process in place to guide government decisions on Crown land use. A variety of interests for Crown lands have the potential to cause conflicts. The *Integrated Resource Management* process is used for all applications for activities and leases on Crown lands in order to minimize land use conflicts.[10]

Relevant Legislation

Crown Lands Act

The *Crown Lands Act* gives the Minister of Natural Resources the authority to give permission for activities on Crown land. Activities covered in this Act relevant to coastal interests include the building of structures on submerged land such as wharves, infilling and aggregate removal. The Minister has the authority to set the terms and conditions for approval of activities on Crown land.[11]

Beaches Act

The purpose of the *Beaches Act* is to protect beaches and dune systems in the province for the benefit and

education of current and future generations. In the Act "beaches" are defined as "any area of land on the coast lying seaward of the mean high water mark and the area of land immediately adjacent thereto to the distance determined by the Governor in Council, and includes any lakeshore area declared by the Governor in Council to be a beach" (Section 3[a]). Habitats landward of the high water mark are only protected if they are designated within this Act.

Section 8(1) of the *Beaches Act* lists activities that are prohibited on designated beaches; including, that no person shall cause disturbance, be intoxicated, endanger other beachgoers, litter, or destroy property or natural resources. The Governor in Council is given the authority to make regulations for designated beaches including granting leases, licenses, and permits for the removal of sand and other material from beaches, to preserve the flora and fauna of the beach, to restrict vehicular and pedestrian traffic, and to manage adjacent crown lands (Section 13).[12]

Wetland Inventory

In 2004, the Nova Scotia Department of Natural Resources (NSDNR) developed a province-wide wetland inventory. According to this inventory approximately 6.5% of Nova Scotia's landmass is freshwater wetlands and salt marshes. [13] The wetlands are grouped into the following classes: Open Water, Marsh, Swamp, Bog or Fen, Fen. This inventory is available on the Nova Scotia Department of Natural Resources website.[14]

Wildlife Habitat and Watercourses Protection Regulations

The Wildlife Habitat and Watercourse Protection Regulations were made under Section 40 of the *Forests Act* and pertain to habitat and watercourse protection for forestry operations. The regulations require that "special management zones" be established next to watercourses in order to protect the watercourse and adjacent habitat from forestry activities. A watercourse is defined as "the bed and shore of a river, stream, lake, creek, pond, marsh, estuary or salt-water body that contains water for at least part of each year." (Section 2[i]).[15]

Wildlife Act

The *Wildlife Act* gives the NSDNR authority to designate wildlife management areas and regulations for each area. Wildlife management areas can include areas of coastal habitat and islands.[16]

Nova Scotia Department of Fisheries and Aquaculture

The Department of Fisheries and Aquaculture is responsible for managing, promoting, supporting and developing fisheries, aquaculture, and seafood processing in Nova Scotia. [17] The department's Aquaculture Division regulates and manages aquaculture by leasing aquaculture sites, licensing aquaculture activities, environmental management, and conducting public outreach activities. The department's Marine and Coastal Services Division provides coastal zone management services for commercial fisheries and rockweed harvesting; the division oversees the monitoring and enforcement of the department's acts and regulations.[18]

Relevant Legislation

Fisheries and Coastal Resources Act

The purposes of the *Fisheries and Coastal Resources Act* include consolidating the fisheries laws, assisting with and increasing productivity of the aquaculture industry, expanding recreational sport-fishing and ecotourism, and involving communities in managing coastal resources. In this Act fishery resources are described as "all vertebrate and invertebrate animals and all plants that spend all or part of their life in the aquatic or marine environment" (Section 3[e]).[19]

Nova Scotia Department of Agriculture

The mandate of the Department of Agriculture is to support the development of the agriculture and agri-food industries in Nova Scotia. The Department has a 10-year strategy for making the agriculture industry more innovative and profitable.[20]

Relevant Legislation

Agricultural Marshland Conservation Act

Under the *Agriculture and Marshland Conservation Act* the Minister has the authority to designate the

boundaries of marshland sections in the province. Each marshland section has individual land use regulations for conservation, protection, management, and/or development within the designated boundaries. This Act also gives authority to the Minister to construct a dyke, aboiteau, breakwater, canal, ditch, drain, road or other structure to develop marshland for agriculture and for the improvement of agricultural purposes.[21]

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2.4 Newfoundland and Labrador

The Province of Newfoundland and Labrador has 280 municipalities with land use planning authority. Municipalities in Newfoundland and Labrador are cities and towns; there are three cities, St. John's, Mount Pearl, and Corner Brook. One hundred and thirty eight of the province's municipalities have municipal plans, six have planning staff, and three have development control staff. The Province also has 170 local service districts which have no legislative planning or development control authority. Less than 10% of the population resides in unincorporated areas.

A substantial area of the province has no local government. There are three Regional Planning Areas: North East Avalon, Corner Brook – Humber Valley, and the Labrador Inuit Settlement Area. Regional Planning Areas can include municipalities, local service districts, and unincorporated areas. The Regional Planning Areas create visionary documents that identify priorities for the area.

Overview of land use planning decision-making authority and relevant legislation in Newfoundland and Labrador

Table 2.7 Newfoundland and Labrador cities and towns

City and Town	
Decision-Makers	Council consists of five to nine councillors as decided by the Minister (Section 13, *Municipalities Act*). Mayors are elected at large or by council following an election (Section 18, *Municipalities Act*).
Staff	A town council may establish a position of town manager and appoint a person to the position (Section 53[1], *Municipalities Act*). The manager is the chief executive and administrative officer of the council (Section 54, *Municipalities Act*). A manager may also be appointed as the clerk (Section 53[3], *Municipalities Act*). Council must establish the position of clerk and appoint a person to that position (Section 59, *Municipalities Act*). A council may establish departments and department heads as well as employee positions for the administration of the region (Sections 63 and 65, *Municipalities Act*). Council may appoint a municipal enforcement officer to enforce regulations made under the *Municipalities Act* within the municipality (Section 179, *Municipalities Act*). Town council may appoint a youth representative to sit with council and participate in discussions; the youth representative does not make decisions (Section 13.1, *Municipalities Act*).
Committees	Council can appoint standing or special committees to make recommendations to council on matters referred by council (Section 25[1], *Municipalities Act*). The mayor or council appoint committee members (Section 25[2], *Municipalities Act*).
Powers	Council may acquire and establish parks and recreational facilities within the municipality (Section 174, *Municipalities Act*). Council can, with the approval of the minister, expropriate land (Section 50[1], *Urban and Rural Planning Act*).
Planning and Development	Council may prepare a municipal plan (section 10, *Urban and Rural Planning Act*). A plan must include objectives, policies to be carried out under the plan, land use classes, proposals for land use zoning regulations, proposals for implementing the plan, and plan for a 10 year period (section 13[2], *Urban and Rural Planning Act*). A plan can also include established areas for comprehensive development, provide for the protection of environmentally sensitive land, provide for stormwater and erosion control, provide for the use of natural resources, and provide for the non-removal of trees and vegetation (section 13[3], *Urban and Rural Planning Act*). Council must make regulations to control sewer systems, septic tanks, water supplies and source of water, the design and construction of buildings, minimum lot sizes, occupancy of buildings and classes of buildings (section 414, *Municipalities Act*).
Subdivision By-law	A council may make regulations requiring that an applicant for a subdivision dedicate up to 10% of the land to be subdivided to the municipality for park land or public use (Section 37[1], *Urban and Rural Planning Act*).
Development Schemes	Where a plan and development regulations have been established, a council or regional authority may adopt a development scheme to amplify the details of the proposal or carry out local improvement schemes (Section 29[1], *Urban and Rural Planning Act*). The scheme may provide for the acquisition, consolidation, subdivision, or sale of land to carry out the development scheme; may reserve land for future acquisition of land for a park or open space; specify the manner in which a certain area of land can be used, subdivided, or developed; and make land available for agriculture, residential, commercial, industrial, or other uses (Section 29[2], *Urban and Rural Planning Act*).

TABLE 2.8 NEWFOUNDLAND AND LABRADOR REGIONAL PLANNING AREAS

Regional Planning Area	
Decision-Makers	Established by the Lieutenant-Governor in Council on recommendation from the Minister (Section 26, *Municipalities Act*). The Minister can appoint a regional authority or act as the regional authority (Section 7, *Urban and Rural Planning Act*). The Minister may designate a council or the provincial government to implement the regional plan (Section 8[2], *Urban and Rural Planning Act*). The Lieutenant-Governor in Council designates powers to the regional council for the entire region or part of the region (Section 34[1], *Municipalities Act*). Council is elected at large or appointed, and the chairperson and deputy chairperson of the council are elected by council (Section 45, *Municipalities Act*).
Staff	Regional council must establish a position of regional manager and appoint a person to that position (Section 53[2], *Municipalities Act*). A manager may also be appointed as the clerk (Section 53[3], *Municipalities Act*). Council must establish the position of clerk and appoint a person to that position (Section 59, *Municipalities Act*). A council may establish departments and department heads as well as employee positions for the administration of the region (Sections 63 and 65, *Municipalities Act*). Council may appoint a municipal enforcement officer to enforce regulations made under the *Municipalities Act* within the municipality (Section 179, *Municipalities Act*).
Committees	The regional council may provide for an elected advisory committee where a local service area has been established; the advisory committee may make recommendations on local planning and development control for the local service area (Section 38, *Municipalities Act*). Regional council may establish standing or special committees for matters that it deems desirable; the committee makes recommendations to council on designated matters (Section 52, *Municipalities Act*).
Powers	Potential powers that may be designated include the provision of water supplies, sewer disposal, storm drainage systems, solid waste disposal; police, ambulance, and fire service; and regional and local area planning and development control (Section 35, *Municipalities Act*). Regional council can establish local service areas within the regional planning area (Section 37, Municipalities Act). A regional authority can, with the approval of the minister, expropriate land (Section 50[1], *Urban and Rural Planning Act*).
Strategic Plans	A regional plan must be established for a regional planning area by the regional authority (Section 8[1], *Urban and Rural Planning Act*).
Land Use By-law	Council may establish minimum lot sizes for the municipality (Section 193, *Municipalities Act*).
Subdivision By-law	A regional authority may make regulations requiring that an applicant for a subdivision dedicate up to 10% of the land to be subdivided to the municipality for park land or public use (Section 37[1], *Urban and Rural Planning Act*).

TABLE 2.9 NEWFOUNDLAND AND LABRADOR LOCAL SERVICE DISTRICTS

Local Service District	
Decision-Makers	The Minister may establish an unincorporated area of the Province as a local service district (Section 387, *Municipalities Act*).
Staff	The committee may appoint officers, clerks, and employees that may be necessary to conduct the business of the local service district (Section 403.4[5], *Municipalities Act*).
Committees	A committee established for local service districts and the members of the committee are elected (Section 390, *Municipalities Act*). There must be at least five committee members (Section 403.4, *Municipalities Act*).

Newfoundland and Labrador Department of Municipal and Intergovernmental Affairs

The Department of Municipal and Intergovernmental Affairs is responsible for all matters regarding provincial and municipal affairs and intergovernmental affairs. The department's mandate relating to municipal affairs is to support and assist local governments in delivering services by selecting and financing infrastructure, and by providing administrative tools that enable local governments to govern effectively. Pertaining to effective governance, the department formulates land use policy and regional approaches to service delivery, provides municipal training to elected officials, advises local officials, administers grants and subsidies to local infrastructure projects, provides operational support, and supports regional cooperation initiatives. The department also guides infrastructure investments by assessing needs for and giving advice on municipal infrastructure investments, providing financial support, monitoring infrastructure projects, and advocating to the federal government to secure ongoing funding.[1]

Relevant Legislation

Municipalities Act

The *Municipalities Act* gives authority to councils to provide local governance by establishing policies and providing services. It regulates the structure of municipal governance including the establishment of council and committees. The Act outlines the requirements for municipal elections. For regions, the Act gives authority to the province to establish, amalgamate, and disestablish regional planning areas (Section 26). A regional council may establish local service areas under this act (Section 37).[2]

Urban and Rural Planning Act

The *Urban and Rural Planning Act* regulates land use planning in Newfoundland and Labrador. It gives authority to the province to develop land use policy for the province, and areas of the province, or for a certain land use (Section 3). It also enables municipal planning areas to be developed and empowers municipal councils to control development within those areas. The Act requires that council prepare municipal plans and land use policies to guide future development (Section 10). The Act states what must, and can, be included in a plan and development regulations (Section 13): planning objectives, land use classes, zoning regulations, and plan implementation must be included (Section 13[2]). A plan can also include protection for environmentally sensitive land and natural resources, stormwater and erosion controls, requirements for environmental studies prior to development, and prohibit the removal of vegetation (Section 13[3]).

The *Urban and Rural Planning Act* also deals with regional planning and authorizes the Minister to create a regional planning area governed by a regional authority. The regional authority must develop a regional plan which has the same requirements as a municipal plan (Section 6). The Act also includes the procedures for making amendments to municipal and regional plans and requires that plans be reviewed every five years (Section 28).[3]

Lands Act

The *Lands Act* regulates the leasing, granting, and easements of Crown lands in the province. Crown lands are defined as all lands within the province, except lands that have been lawfully separated or alienated from the Crown (Section 2). The Act permits Crown lands to be transferred to other provincial departments or to the Crown in right of Canada (Sections 53 and 54).

The shoreline of Crown lands is protected through Section 7 of this Act. Fifteen metres of land adjacent to a lake, pond, seashore, or river is not included in grants, leases, and licenses of Crown land. Exceptions to this are lands used for residential purposes or for water, sewer, or road works; for these uses the buffer must be at least ten metres wide around water bodies.

Under Section 57 of this Act, the Minister can designate an area of land as a special management area. These areas can have land use restrictions placed on them, including for leasing or licensing, constructing a building or structure, or using the land for agriculture, commercial, industrial, recreational, or residential purposes (Section 59). Regulations for

each special management area are laid out under the *Lands Act*.[4]

Regional Service Board Act

The *Regional Service Board Act* allows for the creation of Regional Service Boards by the province. These boards are enabled to provide regional services including waste disposal, water systems, and sewage disposal. Board members are appointed by the Minister and represent municipal authorities within the region. The Act regulates how the budget for services is managed and the borrowing and expenditure powers for providing services.[5]

Evacuated Communities Act

The *Evacuated Communities Act* enables the Minister to declare a community as a vacated community (Section 3). Under this Act, construction or occupancy of any building is prohibited in a vacated community without a permit from the Minister.[6]

Newfoundland and Labrador Department of Environment and Conservation

The Department of Environment and Conservation deals with matters of environmental protection, enhancement, and conservation. The department manages provincial lands, provincial parks, wildlife, endangered species, provincial water resources, development of natural resources, and environmental assessments. The department's vision is to have a sustainable environment and healthy ecosystems for the well-being of the province.[7]

Relevant Legislation

Environmental Assessment Act

The purpose of the *Environmental Assessment Act* is to manage the province's natural resources, and protect the environment and quality of life of residents through environmental assessment procedures (Section 3). The Act applies to all undertakings except for those exempt by the Minister. Undertakings are defined as "an enterprise, activity, project, structure, work or proposal and a modification, abandonment, demolition, decommissioning, rehabilitation and an extension of them that may, in the opinion of the minister, have a significant environmental effect" (Section 2[p]). Undertakings must be registered with the Minister before proceeding and the Minister has the authority to require that an environmental assessment be performed before an undertaking proceeds. This Act regulates the process of environmental assessments including assessment committees, guidelines, public hearings, monitoring, and regulations.[8]

Environmental Protection Act

The *Environmental Protection Act* regulates the release of substances into the environment, waste disposal and litter, waste management, air quality management, contaminated sites, dangerous goods, and pesticides in the Province. Environmental assessments are also covered in *Part X: Environmental Assessment* of this Act. The Act gives authority to the Minister to compile information and contribute to, or sponsor, environmental research for environmental education (Section 5).[9]

Wilderness and Ecological Reserves Act

The *Wilderness and Ecological Reserves Act* enables the province to designate areas as wilderness or ecological reserves. Little to no human activity is permitted in wilderness reserves in order to preserve those areas continually. Wilderness reserves can be designated to preserve areas for a particular species or areas with extraordinary characteristics. Some recreational activities may take place in a wilderness reserve including hunting, fishing, and travel (Section 4). Ecological *Environmental Protection Act* reserves can be set aside by the province in areas with unique ecosystems or natural phenomena. These reserves are established to provide for scientific research and education, to protect a certain habitat, to provide development standards, and to preserve natural landscape characteristics (Section 5).The Lieutenant-Governor in Council has the authority to establish and discontinue reserves in the province (Section 18). A Wilderness and Ecological Reserves Advisory Council advises the Lieutenant-Governor in Council on matters relating to wilderness and ecological reserves including the boundary description, management plan, and regulations (Section 17). The Act lists prohibited activities in reserve areas including altering the flow of water, use of motorized vehicles, road or path construction, logging, or mining (Section 24).[10]

Newfoundland and Labrador Department of Natural Resources

The Department of Natural Resources deals with management of the province's natural resources including mines and energy. The department facilitates responsible resource management activities and monitoring of those activities. The department also works with stakeholders to develop policy and programs to promote sustainable development.[11]

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[1] Newfoundland and Labrador Department of Municipal and Intergovernmental Affairs. (2015). *About the department*. Retrieved from http://www.miga.gov.nl.ca/department/index.html

[2] Municipalities Act, 1999. Newfoundland and Labrador Department of Municipal and Intergovernmental Affairs (1999, c. M-24). Retrieved from the Newfoundland and Labrador House of Assembly website: http://www.assembly.nl.ca/Legislation/sr/statutes/m24.htm

[3] Urban and Rural Planning Act, 2000. Newfoundland and Labrador Department of Municipal and Intergovernmental Affairs (2000, c. U-8). Retrieved from the Newfoundland and Labrador House of Assembly website: http://www.assembly.nl.ca/Legislation/sr/statutes/u08.htm

[4] Lands Act. Newfoundland and Labrador Department of Municipal and Intergovernmental Affairs (1991, c. 36). Retrieved from the Newfoundland and Labrador House of Assembly website: http://www.assembly.nl.ca/legislation/sr/statutes/L3691.htm

[5] Regional Service Board Act, 2012. Newfoundland and Labrador Department of Municipal and Intergovernmental Affairs (2012, c. R-8.1). Retrieved from the Newfoundland and Labrador House of Assembly website: http://assembly.nl.ca/Legislation/sr/statutes/r08-1.htm

[6] Evacuated Communities Act. Newfoundland and Labrador Department of Municipal and Intergovernmental Affairs (1990, c. E-15). Retrieved from the Newfoundland and Labrador House of Assembly website: http://www.assembly.nl.ca/Legislation/sr/statutes/e15.htm

[7] Newfoundland Department of the Environment and Conservation. (2014). *About the department*. Retrieved from http://www.env.gov.nl.ca/env/department/index.html

[8] Environmental Assessment Act, 2000. Newfoundland Department of the Environment and Conservation (2000, c. E-14.1). Retrieved from the Newfoundland and Labrador House of Assembly website: http://www.assembly.nl.ca/legislation/sr/annualstatutes/2000/E14-1.c00.htm

[9] Environmental Protection Act. Newfoundland Department of the Environment and Conservation (2002, c. E-14.2). Retrieved from the Newfoundland and Labrador House of Assembly website: http://www.assembly.nl.ca/legislation/sr/statutes/e14-2.htm

[10] Wilderness and Ecological Reserves Act. Newfoundland Department of the Environment and Conservation (1990, c. W-9). Retrieved from the Newfoundland and Labrador House of Assembly website: http://www.assembly.nl.ca/legislation/sr/statutes/w09.htm

[11] Newfoundland Department of Natural Resources. (2015). *About the department.* Retrieved from http://www.nr.gov.nl.ca/nr/department/index.html

2.5 First Nations

There are various ways in which land use planning and management is organized in First Nations in Canada. Some First Nations are subject to the *Indian Act*, others have opted to use the *First Nations Land Management Act*, and others have historic treaties, modern treaties (also called comprehensive land claims), or self-government agreements. These various legislative tools give First Nations different levels of autonomy for land use planning. For example, under the *Indian Act,* First Nations must receive permission from the federal government for land use planning initiatives; with self-governance, First Nations control land use and land management independently.

Some First Nations have treaties that were negotiated between a First Nation and the Crown. The rights given to First Nations through these treaties have been only partially defined.[1] Treaties in place in Atlantic Canada are the Treaty or Articles of Peace and Friendship Renewed 1752,[2] and the Treaty of Peace and Friendship 1760.[3] More recently, First Nations are negotiating with the federal government to obtain self-governance agreements and modern day treaties and comprehensive land claims. These agreements give First Nations greater autonomy over governance and land use. The following First Nations in Atlantic Canada have agreements or are in the process of negotiating agreements as of 2014:[4]

- The Mi'kmaq of Prince Edward Island are in exploratory discussions for a comprehensive land claim with self-government. This agreement is being developed for the communities of Lennox and Abegweit.
- The Mi'kmaq of Nova Scotia have an agreement-in-principle for a comprehensive land claim with self-government. This agreement includes the communities of Acadia, Annapolis Valley, Bear River, Potlotek First Nation, Eskasoni, Glooscap First Nation, Membertou, Millbrook, Paqtnkek Mi'kmaw Nation, Pictou Landing, Wagmatcook, and Waycobah First Nation.
- The Labrador Innu Nation has a final agreement on a comprehensive land claim with self-government. This agreement includes the communities of Sheshatshiu Innu First Nation and Mashuau Innu First Nation.
- The Miawpukek First Nation of Conne River has a final agreement on self-government.
- The Mi'kmaq and Maliseet of New Brunswick have a framework agreement for a comprehensive land claim with self-government. This agreement includes the communities of Buctouche, Burnt Church No. 14, Eel Ground, Eel River Bar First Nation, Fort Folly, Indian Island, Kingsclear, Metepenagiag Mi'kmaq Nation, Oromocto, Pabineau, and Tobique.

TABLE 2.10 FIRST NATIONS SUBJECT TO THE *INDIAN ACT*

First Nations (Subject to the *Indian Act*)	
Decision-Makers	A band must have one chief. The chief is elected either by the majority of votes of band members or by the elected councillors. A band must also have one councillor for every one hundred members of the band; however, the number of councillors cannot be less than two or more than twelve. Councillors are elected by the majority votes of band members. Whenever the Minister deems it advisable, an election can be called to select a chief and councillors (Section 74, *Indian Act*).
Plans and Subdivisions	The Minister may authorize the preparation of plans and reports for reserves. The Minister may also divide the whole, or a portion of, a reserve into lots (Section 19, *Indian Act*).
Regulations	The Governor in Council may make regulation for land use purposes including: • Preserving and protecting fur-bearing animals, fish, and game. • Providing inspection of premises and the destruction, alteration, or renovation of a premise. • Constructing and maintaining boundary fences (Section 73, *Indian Act*). Written permission from the Minister is required for any person to remove resources from a reserve including minerals, stone, gravel, clay, soil, trees, saplings, shrubs, underbrush, timber, cordwood, or hay (Section 93, *Indian Act*).
By-laws	The council of a band may make by-laws for land use purposes including: • Constructing and maintaining watercourses, roads, bridges, ditches, fences, and other local works. • Dividing reserve land into zones with restrictions on the construction or maintenance of buildings and land uses. • Regulating the construction, repair, and use of buildings owned by the band or individuals. • Allotting reserve lands among members of the band and establishing *Certificates of Possession*. • Constructing and regulating the use of wells, cisterns, reservoirs and waste supplies. • Preserving, protecting, and managing fur-bearing animals, fish, and game. The by-laws must be consistent with the *Indian Act* and any other regulation made by the Governor in Council or the Minister (Section 81[1], *Indian Act*). Each by-law must be approved by the Minister who may withhold approval.

TABLE 2.11 FIRST NATIONS SUBJECT TO THE *FIRST NATIONS LAND MANAGEMENT ACT*

First Nations (Subject to the *First Nations Land Management Act*)	
Decision-Makers	The power to manage land is exercised by a council of a First Nation or by a person or group that the council delegates power to (Section 18[3], *First Nations Land Management Act*). A proposed land code can be approved if the majority of eligible voters participate in the voting process and the majority of voters approve the land code (Section 12[1], *First Nations Land Management Act*). Eligible voters are any First Nations member the age of eighteen or older (Section 10[2], *First Nations Land Management Act*). A land code can also be approved through any other manner that is agreed upon by the First Nation and the Minister (Section 12[1c], *First Nations Land Management Act*).
Land Code	A First Nation land code gives a First Nation the interests and rights over land within the land code boundary. No interest or right may be acquired over this land except if in accordance with the land code (Section 16, *First Nations Land Management Act*). A land code gives a First Nation the authority to manage land as an owner of the land. It may be used to grant licenses for land use, manage natural resources, and receive and use money acquired by the First Nation (Section 18, *First Nations Land Management Act*). First Nations that wish to manage reserve land must adopt a land code that applies to all land in a reserve. The land code must include: • Rules and procedures for the use and occupancy of First Nation land. • Rules and procedures respecting revenues from natural resources. • Community consultation process for the development of rules and procedures for occupation and possession of First Nation land. • Rules and procedures for councils' authority to manage land. • The procedures that apply to approve an exchange of First Nation land (Section 6[1], *First Nations Land Management Act*). If more than one reserve has been established for a First Nation, the First Nation can manage land on any or all of the reserves (Section 6[2], *First Nations Land Management Act*). First Nations are given the authority to acquire and hold property, enter into contracts, borrow money, spend and invest money, and be party to legal proceedings (Section 18[2], *First Nations Land Management Act*).
Land Expropriation	A First Nation can expropriate First Nation land that is necessary for community works and purposes (Section 28[1], *First Nations Land Management Act*). The First Nation must pay a fair compensation for expropriated land (Section 28[5], *First Nations Land Management Act*). First Nation land can be expropriated by the Governor in Council of the Federal Government; land can be expropriated for the use of a federal department for uses that serve national interest (Section 29 [1 and 2], *First Nations Land Management Act*).
Environmental Impact Assessments	A First Nation that establishes land use planning must enter into an agreement with the Minister describing the environmental assessment process that will be used for projects (Section 3[a], *First Nations Land Management Act*).
By-laws	Council of a First Nation has the authority to enact laws respecting licensing in relation to the land, development, conservation, protection, management, use, and possession of land (Section 20[1], *First Nations Land Management Act*). Laws may also respect the regulation, control, and prohibition of land use and development through zoning and subdivision by-laws; environmental assessments and protection; and the provision of local services (Section 20[2], *First Nations Land Management Act*). A land code must include an environmental protection system and environmental assessment system for First Nation land (Section 21[1], *First Nations Land Management Act*)

Relevant Legislation

Indian Act

The *Indian Act* gives some authority to many of Canada's First Nations for land use planning and management. First Nations under this Act must, however, have land use management authorized and agreed upon by the federal government. Under this Act, reserve land is held by the federal government for the use and benefit of First Nations. The Governor in Council may determine appropriate uses for, and apply regulations too, reserve land for the benefit of a band (Section 18).[5]

First Nations Land Management Act

The *First Nations Land Management Act* was passed in 1999. This Act gives First Nations the option of replacing 34 land-related sections of the *Indian Act* to develop their own land use planning regulations, called land codes. There are 94 First Nations in Canada that have opted to use the *First Nations Land Management Act* in place of the land-related sections of the *Indian Act*. These First Nations have, or are developing, their own land use plans to manage land, the environment, and most resources.

The *First Nations Land Management Act* also protects First Nations land from expropriation by Canadian governments by over-riding the *Expropriation Act*. It also over-rides the *Canadian Environmental Assessment Act* and allows First Nations to apply their own laws to deal with environmental assessments.[6]

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[1] Government of Canada Department of Aboriginal Affairs and Northern Development. (2014). *Peace and Friendship Treaties*. Retrieved from https://www.aadnc-aandc.gc.ca/eng/1100100028589/1100100028591

[2] Government of Canada Department of Aboriginal Affairs and Northern Development. (2010). *Treaty or articles of peace and friendship renewed 1752.* Retrieved from https://www.aadnc-aandc.gc.ca/eng/1100100028593/1100100028594

[3] Government of Canada Department of Aboriginal Affairs and Northern Development. (2010). *Treaty of peace and friendship 1760.* Retrieved from https://www.aadnc-aandc.gc.ca/eng/1100100028593/1100100028594

[4] Government of Canada Department of Aboriginal Affairs and Northern Development. (2014).*Comprehensive land claim and self-government negotiation tables.* Retrieved from https://www.aadnc-aandc.gc.ca/eng/1346782327802/1346782485058

[5] Indian Act. Government of Canada (1985, c. I-5). Retrieved from the Government of Canada Justice Laws Website: http://laws-lois.justice.gc.ca/eng/acts/i-5/

[6] First Nations Lands Management Act. Government of Canada (1999, c. 24). Retrieved from the Government of Canada Justice Laws Website: http://laws-lois.justice.gc.ca/eng/acts/F-11.8/

CHAPTER 3. LAND USE PLANNING ADAPTATION OPTIONS FOR CLIMATE CHANGE

This section presents over 50 land use planning tools for use in coastal climate change adaptation. The tools are organized according to categories: **Capacity Building Tools, Policy and Planning Framework Tools, Regulation and Land Use Change Tools,** and **Site Design Tools**.

Each tool description begins a chart that matches the tool with one or more of the climate change adaptation strategic approaches: **Avoid, Retreat, Accommodate, Protect** and **Procedural**. There is a key word summary of the time frame for tool implementation and effectiveness, planning context and process (provincial, municipal, professional, formal, community, informal, etc.), and considerations for implementing the tool for adaptation. The description also summarizes the opportunities and constraints of the tool and suggests some ways to get started with developing and using the tool.

Examples of each tool follow the description. The tool examples are from around the world and include innovative regional adaptation planning practices and national and international examples relevant to the coastal environments of the Atlantic Provinces and climate change impacts. The examples come from local and regional professional knowledge of climate change adaptation practice, other guidebooks, and websites of governments and organizations leading development in coastal climate change adaptation planning. The examples are meant to be informative, and to help the reader visualize the tool and understand how it can be used for climate change adaptation.

The land use planning tools in this collection are well researched and representative, but the authors could not always verify the content through the original source. The examples illustrate the tools and hopefully inspire ideas for local application, but the authors do not make representation of accuracy or endorse the claims made in the source documents and websites.

3.1 Land Use Planning Tools for Capacity Building

3.1.1 Provincial Policy Statements

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time-frame: Medium- to long-term

Implementation time-frame: Medium-term

Planning level: Provincial

Planning process and plan type: Formal; professional; policy planning; adaptive; may be a policy amendment or may require a new initiative

Adapting to climate change: Update with new climate change information during the plan review.

Provincial policy statements provide policy direction at the provincial level. Provincial policy statements can guide both provincial and local land use planning. Policies may include direction on local land use management, environmental protection, and resource use. For example, each province in Atlantic Canada has provincial wetland protection policies that include land use restrictions in and around wetlands (See the Legislative Context section of this document for information on wetland policies for each of the Atlantic Provinces.) Provincial policy can guide local land use policy and plans. Local policies may place greater restrictions on development than required by provincial policy, but they cannot contain weaker restrictions.

Provincial policy statements can be powerful tools for addressing climate change impacts through land planning and management, and can be directed to the coastal environment.

OPPORTUNITIES	CONSTRAINTS
• Covers the entire landmass of the province. • Supports local jurisdictions on land use regulations.	• Communities do not have decision-making authority over what is included in the statements.

Getting started and first steps – Provincial policy statements are developed and put into action at the provincial level but local governments have a role in advocating for provincial policies. When provincial policies are in place, communities have baseline guidance for land use planning and management, and provincial support for local regulatory tools such as setbacks and zoning. Advocating for provincial coastal policies and including climate change impact management is a proactive way of gaining provincial support for coastal and climate change adaptation planning. Here are some first steps towards advocating for a provincial policy statement:

- Contact the provincial department responsible for environment and/or municipal affairs. The roles of provincial departments are described in the legislative section of this guidebook.
- For a community with planning authority, identify opportunity in the official plan and by-laws to represent and implement the intent of coastal and climate change statements of interest.

PROVINCIAL POLICY STATEMENTS EXAMPLE (REGIONAL)

PROVINCE OF PRINCE EDWARD ISLAND

Profile	
Coast	Atlantic
Region	Gulf of St. Lawrence
Impact Concerns	Coastal erosion and flooding
Population	145,855
Community Type	Province
Area	5,685 km^2
Year	2013 - Present
Funding	Province of Prince Edward Island

Summary – The province of Prince Edward Island is developing a provincial land use policy. The Province created a six-member citizen *Land Use Policy Task Force* that researched planning policies in the Province and led public engagement on land use planning. In January 2014, the Task Force presented its recommendations for land use policy and implementation strategies in the *Report of the Task Force on Land Use Policy*.[1] The recommended policies inform both the provincial and municipal planning process.

The policy recommendations aim to improve the quality of life for Islanders by improving the environment, society, and economy in Prince Edward Island. The recommendations are notable for the attention given to climate change impacts and the need to plan and manage land use at the coast for these impacts and other coastal development concerns. One of the goals recommended by the Task Force is Goal 4: "Develop a coastal zone management policy for the entire Island", and includes the following policy recommendations:

1. 4.1 Prohibit or regulate development in areas potentially at risk from flooding, storm surges and the adverse effects of climate change; identify non-development areas, required setbacks, and buffer zones.
2. 4.2 Regulate development in the coastal area in order to minimize incompatible land uses, minimize effects on marine life and industry, and protect heritage resources.
3. 4.3 Prohibit development that has the potential to increase shoreline erosion, including erosion on adjacent properties, and continue to regulate the fortification of eroding shorelines by artificial means; consider the need to protect public infrastructure.
4. 4.4 Preserve, enhance and where appropriate, expand public and recreational access to the shore.[2]

[1] Government of Prince Edward Island. (2014). *Report of the task force on land use policy: January 2014.* Retrieved from http://www.gov.pe.ca/photos/original/fema_TFreport14.pdf

[2] Ibid.

3.1.2 Partnerships

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term

Implementation time-frame: Short-to medium-term

Planning level: Provincial, regional, municipal, community

Planning type and process: Formal and informal, professional to volunteer, capacity building, community planning

Adapting to climate change: Review periodically to ensure arrangements and expertise match changing needs for adaptation.

Forming partnerships and building relationships can open doors to information, resources, and expertise. Partnerships can be formal or informal. Formal partnerships involve an official signed agreement and agreed-upon responsibilities for each partner. Informal partnerships are non-binding. In both cases partners work together and support each other in achieving a common goal.

A community can form partnerships with organizations and individuals, including citizens, local community groups, other municipalities, non-government organizations, nature trusts, universities and colleges, consulting companies, and provincial and federal government departments. Partnerships benefit each party involved by drawing on each other's strengths and resources. Partnerships can help a community to complete projects or join forces on services and policies.[1]

Climate change impacts affect communities widely and adapting to climate change will more often than not require a collective effort from governments and organizations. If a community does not have expertise in present and future climate change impacts, they can form partnerships with other organizations to undertake initiatives that contribute to climate change adaptation.

OPPORTUNITIES	CONSTRAINTS
• Maximizes a community's resources and expertise. • Builds relationships throughout the local community, and beyond.	• Can be difficult to coordinate with multiple partners.

Getting started and first steps – Partnerships are an important first step for communities that need help from outside resources and can build a community's adaptive capacity. There are many things that a community needs to consider when starting a partnership:

- Determine if a partnership is the best way for a community to complete a project, solve a problem, or take advantage of an opportunity.
- Consider the experience of past partnerships that the community has been involved with. The community should identify the positive aspects of past partnerships and how partnerships could have been improved.
- Compile an inventory of what the community has to offer its partners.
- Look at similar partnerships elsewhere. A community can learn from the experience of others in similar situations.[2]

Partnership Example (Regional)

Stephenville Crossing, Newfoundland and Labrador

Profile	
Coast	Atlantic
Region	Gulf of St. Lawrence
Impact Concerns	Wetland degradation
Population	1,140 (2011 Census)
Community Type	Town
Year	1995 - 2000
Funding	ECO Action 2000 program

Summary – The town of Stephenville Crossing signed a Stewardship Agreement with the Province of Newfoundland and Labrador in 1995. The Agreement gives the Town access to resources from the *Eastern Habitat Joint Venture*. A local community group formed: the Stephenville Crossing Environmental Conservation Committee. The Committee has restored local wetlands with the resources provided through the Town and by the Eastern Habitat Joint Venture.

Following the infilling of many of the Town's wetlands in 1998, citizens began a campaign of wetland rehabilitation with money from the ECO Action 2000 program, and public and private donations. Biologists employed with the Eastern Habitat Joint Venture, together with local stakeholders and the Stephenville Crossing Environmental Conservation Committee, re-established a network of wetlands; these wetlands have become the centrepiece of the Town's identity and eco-tourism industry. The Town was able to use resources for these projects because it signed the Stewardship Agreement with the Province of Newfoundland and Labrador. In 2003 and 2011, the Stephenville Crossing Environmental Conservation Committee received the Newfoundland and Labrador Environmental Award recognizing their work to restore the wetlands.[3,4]

Recommended Resources

Government of Nova Scotia's Handbook for Inter-Municipal Partnership and Co-operation for Municipal Government:

http://www.novascotia.ca/dma/pdf/mun-handbook-on-inter-municipal-partnership-and-co-operation-for-municipal-government.pdf

Online wetland stewardship resources from the State of Washington:

http://www.ecy.wa.gov/programs/sea/wetlands/stewardship/index.html

Educational tools and resources for wetland conservation from the Wetland Network:

http://www.wetlandnetwork.ca/pg_ResourceDetails.php?int_ResourceId=245

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[1] Government of Nova Scotia, Department of Municipal Affairs. (n.d.*). Handbook for inter-municipal partnership and co-operation for municipal government.* Retrieved from http://www.novascotia.ca/dma/pdf/mun-handbook-on-inter-municipal-partnership-and-co-operation-for-municipal-government.pdf

[2] Ibid.

[3] Town of Stephenville Crossing. (n.d.). *The Town of Stephenville Crossing: the shoreline*. Retrieved from http://www.townofstephenvillecrossing.com/?page_id=417

[4] The Georgian (2011). Stephenville Crossing environmental group wins provincial honour. The Georgian. June 10, 2011. Retrieved from http://www.thewesternstar.com/?controllerName=article&page=1&contextId=2575536&siteId=23&action=changeRating&bizClass=article&bizId=2575536&rateValue=

3.1.3 Education Programs

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term

Implementation time-frame: Short-to medium-term

Planning level: Regional, municipal, community

Planning type and process: Formal and informal; professional to volunteer; capacity building; community planning and community-based planning

Adapting to climate change: Review periodically to ensure arrangements and expertise match changing needs for adaptation.

Education increases the adaptive capacity of communities by raising awareness of issues facing a community. Education also supports communication between community members and unites communities. Education helps to motivate community adaptation. Short- and long-term communication strategies are useful for educating the public and promoting climate change adaptation planning. [1] Even when residents are aware of the threat of sea level rise and storm surge they are not necessarily aware of the risks locally to them, their property, and their community.[2] Good communication with the public helps to gain support for adaptation plans and to maintain plans over time.

Blue tape is displayed by small business owners affiliated with the South Carolina Businesses acting on Rising Seas organization (SCBARS). Blue tape is placed in storefront windows to show where sea level rise will be at that location by the end of the century. (Image Source: SCBARS[3])

OPPORTUNITIES	CONSTRAINTS
• Gains public support for adaptation plans if they are aware of the risks associated with coastal issues. • Can motivate community members to take action on their own once they are aware of coastal issues.	• Not a direct or comprehensive action to protect a community from community-wide coastal issues.

Getting started and first steps – Education comes from a wide variety of sources, community groups, municipalities, non-governmental organizations, universities, schools, federal government departments, and provincial government departments. Working in **partnership** with others to provide education to the public will deliver a more rounded education on coastal issues and climate change.

Education about sea level rise and climate change can be delivered through many approaches. Approaches for education include community mapping exercises, workshops, presentations, school presentations, visualization tools, focus groups, interviews, environmental monitoring, facts sheets, traditional media, and social media. Information presented to residents should be specific to the local context, use local examples and images, and be tailored to the target audience.[4] These are some first steps to set up an education program:

- Contact experts for help developing material and understanding the local context. Experts may be provincial staff, environmental non-profit organizations, or academics at a college or university.
- Define the target audience.
- Choose an approach that will reach that target audience.

Education Programs Example (Regional)

Chéticamp, Nova Scotia

Profile	
Coast	Atlantic
Region	Gulf of St. Lawrence
Impact Concerns	Erosion and flooding
Community Type	Village
Population	2,300 (2011 Census)
Year	2013
Funding	Agriculture and Agri-Food Canada: Rural Secretariat Program

Summary – The Ecology Action Centre (EAC) is an environmental non-government organization that carried out an education project to help the community of Chéticamp recognize and build its adaptive capacity.[5] The project used a participatory approach to engage community members. The project focused on understanding the knowledge gaps and barriers to climate change adaptation in the two industries central to the community's economy: tourism and fisheries. The project took place over two years and included 13 educational tools to support five education themes, or building blocks for adaptation: **awareness and education**, **information gathering**, **community engagement**, **feedback and consultation**, and **building partnerships**. The educational tools that supported the five building blocks included mapping, workshops, presentations, focus groups, environmental monitoring, performing arts, visualization, and social media.

Before and after representations of a 1-in-100 year flood in 2100 shown at an open house in Chéticamp. (Image Source: Paul Maher)

One aspect of the project, illustrated here, was visualizing sea level rise. Halifax graphic designer and visual artist, Paul Maher, experimented with bringing the future forward in representations of inundation and flooding using familiar settings and future water level projections.[6] Visualizations such as this one must be used with caution, however, and in combination with other tools like maps and workshops. People viewing the images must understand the future context and the projections used to create them. The images represent what 'could be' if nothing changed. Adaptation is about communities working for resilience to the emerging, different, coastal and climate conditions.

The EAC is an outside organization that partnered with other groups in Chéticamp for this project. In its post-project review, the EAC identified the benefits and challenges of being an outside organization in a community project. The organization found that it was able to bring together people that may not have otherwise connected but also had difficulty attracting some key participant groups and individuals, specifically fishers, to community events. The EAC recognized that hiring a researcher or project facilitator with a fisheries background and establishing key contacts within the industry would have helped for engaging with this group.[7]

Partners – The project was carried out by the EAC, an environmental organization. Twenty-four other partners also contributed: local community groups, the municipality, a local radio station, universities, colleges, consultation companies, and Parks Canada.[8]

RECOMMENDED RESOURCES

Description of the Chéticamp project and each educational tool:

http://www.cccheticamp.ca/CCT_English_April16-webDPI.pdf

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[1] CBCL. (2005). *A guide for incorporating adaptation to climate change into land-use planning.* Retrieved from https://www.iaia.org/IAIA-Climate-Symposium-DC/documents/Canada_CC_Land%20Use%20GuideNOV05.pdf?AspxAutoDetectCookieSupport=1

[2] Lieske, D.J. (2012). *Visualizations and their role in communicating the risk of coastal flooding: a Tantramar case study.* Geospatial Modelling Lab, Mount Allison University. Retrieved from http://atlanticadaptation.ca/sites/discoveryspace.upei.ca.acasa/files/Tantramar-CommunicatingRiskofCoastalFlooding-MtA-2012.pdf

[3] Southern Carolina Businesses Acting on Rising Seas. (2013). *Phase 2: See the blue tape.* [image].Retrieved from http://www.scbars.org/phase-2-see-the-blue-tape/

[4] Lieske, D.J. (2012). *Visualizations and their role in communicating the risk of coastal flooding: a Tantramar case study.* Geospatial Modelling Lab, Mount Allison University. Retrieved from http://atlanticadaptation.ca/sites/discoveryspace.upei.ca.acasa/files/Tantramar-CommunicatingRiskofCoastalFlooding-MtA-2012.pdf

[5] Brzeski, V., Graham, J & Baker, J. (2013). *Engaging Coastal Communities Towards Climate Change Adaptation: Experiences in Cheticamp*. Ecology Action Centre.

[6] Maher, P. Personal communication. December 13, 2015

[7] Brzeski, V., Graham, J & Baker, J. (2013). *Engaging Coastal Communities Towards Climate Change Adaptation: Experiences in Cheticamp*. Ecology Action Centre

[8] Ibid.

3.1.4 Local Committees

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term

Implementation time-frame: Short-term

Planning level: Municipal, community

Planning process and plan type: Formal and informal; professional to volunteer; capacity building; community planning

Adapting to climate change: Review periodically to ensure arrangements and expertise match changing needs for adaptation.

Local committees can advise community municipal councils on matters related to climate change, coastal issues, and adaptation planning. There are two types of committees: a standing advisory committee and a specialty advisory committee. A standing advisory committee is a long-term committee, such as a planning advisory committee, that provides advice to council as part of regular council decision-making. A specialty advisory committee is an ad-hoc committee that provides advice to council on a particular topic.

Committees typically comprise citizens, usually as volunteers, staff, and often a member of council. Including a councillor on a committee improves communication between the committee and council and keeps council informed. Other committee members include experts on the topic covered by the committee. Local committees are a powerful tool for guiding decision-making in a community and therefore a powerful tool for climate change adaptation. Committees gather valuable information for decision-makers and support policies, plans and strategies for the community.

OPPORTUNITIES	CONSTRAINTS
• Informs decision-makers on the local context of issues such as climate change and coastal planning. • Incorporates local expertise into planning decisions.	• May be difficult to find local experts and volunteers. • Small communities have limited or no staff to support committees.

Getting started and first steps – In incorporated communities, such as municipalities, councils typically determine the need for a committee and establish one through municipal process. For incorporated communities, the process for forming committees is legislated by the provinces (*see* Legislative Context). Council can establish a committee for the set purpose of providing guidance on matters related to coastal planning and climate change impacts. Citizens and organizations can also form committees on their own to advance work in a community. The committees can advocate for coastal climate change adaptation, for example, and provide expertise to local and provincial decision-makers. Here are some first steps toward forming a committee:

- Identify a councillor or a community champion to advocate for the idea to council and/or within the community.
- For communities with a **statutory community plan**, amend the plan to include a strategy for forming a committee.

Local Committee Example (Regional)

County of Colchester and Town of Truro, Nova Scotia

Profile	
Coast	Atlantic
Region	Bay of Fundy
Impact Concerns	Inland and coastal flooding and erosion
Community Type	Town and County
Area	3,628 km^2
Year	2012-2013
Funding	Federal Gas Tax Rebate

Summary – The county of Colchester and the town of Truro, Nova Scotia, created a Regional Climate Change Committee to produce a joint *Municipal Climate Change Action Plan (MCCAP)*. The ad-hoc Committee acted as the core working group for developing the Plan. It consisted of staff members from both municipalities including a director of community development, director of planning and development, chief administrative officer, senior engineer, GIS technician, emergency management coordinator, and sustainable community coordinator.

The mandate of the Committee was to complete a MCCAP by the deadline given by the province of Nova Scotia, December 2013. The Plan would identify the actions and measures necessary for the municipalities to address climate change impacts.

The municipalities hired a consultant to help with developing the Plan. The Committee contributed to and advised on Plan content. The Committee members recognized that they needed a better understanding of climate change trends, projections, hazards, and impacts. To do this they reached out to experts for assistance. Experts from government, academia and private industry included a geologist, geoscientist, climatologist, forester, meteorologist, climate change specialist, mapping technicians, and oceanographers. The Committee also engaged with stakeholders through workshops. Stakeholders included councillors and administrators from both municipalities, provincial departments, and local and regional organizations.[1]

[1] County of Colchester & Town of Truro. (2013). Keeping the heart and the hub of Nova Scotia strong: regional plan for climate resilience for the County of Colchester & Town of Truro.

3.1.5 Community Engagement

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term

Implementation time-frame: Short-term

Planning level: Municipal, community

Planning process and plan type: Formal and informal; professional to volunteer; capacity building; community and community-based planning

Adapting to climate change: Review periodically to ensure arrangements and expertise match changing needs for adaptation; incorporate requirements for best practice engagement strategies during plan reviews.

Engaging with community members is important for sharing knowledge, building partnerships and capacity, identifying community priorities, and gaining support for adaptation planning. Community engagement can be informal, providing an opportunity for community members to meet, share their concerns, and exchange information. It can also be formal or more structured, incorporating expert-led workshops such as scenario-based planning exercises, design charrettes, or role-playing activities. Diversity in community engagement has become standard, best practice in modern planning culture.

Community engagement session with community elders in Glenburnie-Birchy Head- Shoal Brook, Newfoundland and Labrador. The group discussed past weather events and changing weather patterns in the community. (Image Source: Manuel & Herring[1])

OPPORTUNITIES	CONSTRAINTS
• Leads to more equitable planning outcomes. • Allows for knowledge sharing between experts, decision-makers, and community members. • Empowers citizens by including them in making community decisions. • Can result in greater public support for adaptation planning.	• Can cause conflict within the community during engagement sessions. • Can be difficult to attract participants to engagement sessions.

Getting started and first steps – Any level of government, group, or organization can set up community engagement. Here are some important first steps:

- Define the target audience and determine its level of understanding of climate change and coastal issues.
- Define engagement objectives and collect the coastal information that will be shared with participants.
- Establish an engagement strategy which corresponds with the audience and the project objectives.
- Consider follow-up sessions and ongoing communication strategies in order to maintain positive momentum.

Community Engagement Example (International)

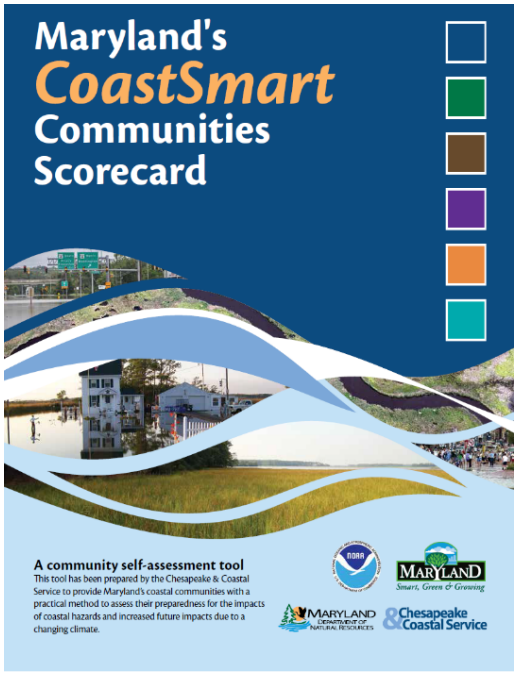
Coast Smart Communities, State of Maryland, United States of America

Profile	
Coast	Atlantic
Region	Chesapeake Bay
Impact Concerns	Inland and coastal flooding
Community Type	State
Area	6,400 km of coastline
Year	2009
Funding	State of Maryland

Summary – The state of Maryland has a 6,400 km coastline. In 2009 the state of Maryland set up the Coast Smart Community Program with the purpose of engaging citizens in the task of climate change adaptation planning in coastal areas.

Role-playing is a key engagement tool of the Program. Role-playing helps participants think about and eventually understand other points of view. At the start of the Program facilitators set up pilot role-playing exercises in which participants play in simulated negotiations about coastal land management. The simulation models the various people, processes, issues, and potential solutions involved in coastal climate change adaptation planning. Approximately 150 people (about half those originally invited) participated, including community leaders, planning professionals, and experts in the field of climate change adaptation. This state-wide community engagement session provided a model for Maryland's coastal communities to use in their own jurisdictions.[2]

The Program is ongoing: municipalities can use on-line resources that include detailed instructions for simulations and decision-making scorecards (pictured right[3]) for conducting similar role-playing community engagement sessions at the local level.[4]



Scorecard from the State of Maryland Coast Smart Communities. (Image source: Chesapeake & Coastal Service) [5]

Even though there are scores and points available in each section of the scorecard tool, the purpose is primarily to facilitate and gently encourage a discussion among local departments within a local government around coastal hazards. [6] Different departments may use different language to talk about 'climate adaptation' using terms such as 'floodplain management,' 'hazard mitigation', 'flood risk reduction', etc. This tool helps to bridge the communication gaps among departments working on climate adaptation. It also helps a community understand where it is currently with addressing coastal hazards, including how community members see their community in the future, where to set adaptation priorities, and how to move forward with resiliency strategies. The scorecard helps create some parameters for adaptation or resiliency planning by establishing a baseline risk and capacity assessment for a community.[7]

Recommended resources

Building Coast Smart Communities resources from the State of Maryland:

http://maryland.coastsmart.org/

Adapting to Climate Change: A Planning Guide for State Coastal Managers, developed by NAOO:

http://coastalmanagement.noaa.gov/climate/docs/adaptationguide.pdf

Paper on innovative techniques and story collecting for local community engagement on climate change adaptation:

http://global-cities.info/wp-content/uploads/2013/11/Innovative-Technologies.pdf

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[1] Manuel, P., & Herring, S. (2011). Mainstreaming climate change tools for the professional planning community. Climate change adaptation plan for Glenburnie-Birchy Head- Shoal Brook, Newfoundland and Labrador. Volume 1: background report [image]. Retrieved from https://www.cip-icu.ca/Files/Resources/GBS_CCAP_VOL1_E

[2] Flemming, M., & McCall, C. (2013). Fostering strong coastal program stakeholder engagement and improving data-to-decision making throughout Maryland's coastal environments. National Oceanic and Atmospheric Administration, Maryland Department of Natural Resources, and Maryland's Chesapeake and Coastal Service. Retrieved from https://coast.noaa.gov/cms/fellows/pdfs/2014_MD.pdf

[3] Maryland Department of Natural Resources, Consensus Building Institute & MIT-USGS Science Impact Collaborative. (n.d.). Building coast-smart communities: game materials. Retrieved from http://maryland.coastsmart.org/?page_id=114

[4] Maryland Department of Natural Resources, Consensus Building Institute & MIT-USGS Science Impact Collaborative. (n.d.). Building coast-smart communities: role playing exercise rallies MD coastal communities around climate change. Retrieved from http://maryland.coastsmart.org/

[5] Chesapeake & Coastal Service (n.d.). *Maryland's CoastSmart Communities Scorecard.* CoastSmart Scorecard: a Community Self-Assessment Tool. Cheseapeake & Coastal Service, Maryland Department of Natural Resources. Retrieved from http://dnr2.maryland.gov/ccs/coastsmart/Pages/cs_Scorecard.aspx

[6] Skaggs, K. Personal communication. December 12, 2015.

[7] Ibid.

3.1.6 Community Asset Mapping

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term adaptation

Implementation time-frame: Short-term

Planning level: Municipal, community

Planning process and plan type: Formal and informal; professional to volunteer; capacity building; community planning and community–based planning

Adapting to climate change: Renew mapping as community values change; incorporate into plan reviews as part of community engagement.

Community asset mapping is a positive approach to adaptation planning. The tool helps communities understand their resources and assets rather than focusing on their shortfalls. Assets can take many forms: the knowledge and skills in the community; civic, social and business organizations; government services; valued buildings, structures, and spaces; and natural resources. Community asset mapping identifies the existing assets a community has for dealing with issues or challenges such as climate change adaptation. Asset mapping can also be scaled down to focus on a certain type, or types, of assets.

Community members list and map the assets of the community. The process of listing and mapping assets increases communication between people, which further strengthens a community's adaptive capacity. [1] The information collected through community asset mapping can be used to guide climate change adaptation planning. Mapping will also highlight which assets are at risk due to coastal hazards.

OPPORTUNITIES	CONSTRAINTS
• Informs a community of its potential to act on an issue and its assets available to do so. • Uncovers ways that a community can adapt without the need for outside resources. • Shows which assets are located in potentially hazardous areas. • Informs decision-makers about the desires of the community.	• Does not involve direct action to protect a community from its coastal hazards.

Getting started and first steps – Any community can carry out community asset mapping. Mapping can be a collective exercise of many people coming together, individuals can take on the task to compile and map information on behalf of the community, or people can participate individually and remotely through web-based technology. Here are first steps for community asset mapping:

- Use **community engagement** tools including surveys, interviews, workshops, and telephone calls to collect information about assets. Phone directories, bulletin boards, businesses, community groups, and organizations are all sources of information about community assets.
- Map assets using paper maps or computer mapping software and on-line mapping.
- Make maps publically available to provide knowledge to community members and decision-makers about assets they may not have been aware of, and also about the relationship between valued assets and coastal processes.[2]

Community Asset Mapping Example (Regional)

Municipality of the District of Lunenburg, Nova Scotia

Profile	
Coast	Atlantic
Region	South Shore
Impact Concerns	Assets at risk of coastal flooding
Community Type	District Municipality
Population	25,118 (2011 Census)
Project Area	Over 600 km of coastline
Year	2012
Funding	Atlantic Climate Adaptation Solutions

Summary – Residents of the Municipality of the District of Lunenburg, Nova Scotia, participated in community asset mapping to identify valued assets at risk of climate change impacts. The mapping supports proactive adaptation planning: the community can prioritize actions and resources for managing assets at risk. The project focused on identifying assets that are important for community life and enjoyment: social assets. Local residents participated in mapping workshops or stopped by public engagement booths set up at key locations in the Municipality. They identified 284 social assets including structures, beaches, trails, parks, boating and fishing areas and the coastline itself. Mapping of sea level rise and storm surge scenarios along the municipal coastline showed that 148 of the identified assets could be vulnerable to flooding by 2100. This database and mapping of at-risk social assets will inform climate change adaptation planning for the Municipality.[3]

Partners – The project was carried out by the Atlantic Climate Adaptation Solutions Association in partnership with Dalhousie University, the Nova Scotia Department of the Environment, the district of Lunenburg, and residents of Lunenburg.[4]

Social assets identified around the areas of Petite Riviere, Green Bay, and Broad Cove in the District of Lunenburg. Social assets are orange, dark green indicates where today's water level is, and light green along the coast indicates a 2025 sea level.

Recommended resources

Community asset mapping website: Describes steps to be taken for community asset mapping:

http://ctb.ku.edu/en/table-of-contents/assessment/assessing-community-needs-and-resources/develop-a-plan/main

Community asset mapping workbook: Walk through of community asset workshop exercises:

http://www.abcdinstitute.org/docs/Diane%20Dorfman-Mapping-Community-Assets-WorkBook%281%29-1.pdf

[1] Heaven, C. (2013). Developing a plan for assessing local needs and resources. Retrieved from http://ctb.ku.edu/en/table-of-contents/assessment/assessing-community-needs-and-resources/develop-a-plan/main

[2] Dorfman, D. (1998). Strengthening community education: the basis for sustainable renewal - Mapping community assets workbook. Retrieved from http://www.abcdinstitute.org/docs/Diane%20Dorfman-Mapping-Community-Assets-WorkBook%281%29-1.pdf

[3] Cochran, M., Wollenburg, Z., Rapaport, E., Manuel, P. (2012). Municipality of the District of Lunenburg: a case study in climate change adaptation. Part 2 – Section 3: social asset identification and climate change impact risk mapping in the District of Lunenburg, Nova Scotia. Atlantic Climate Adaptation Solutions Association and Dalhousie University. Retrieved from http://atlanticadaptation.ca/sites/discoveryspace.upei.ca.acasa/files/Lunenburg%20Part%202%20-%20Section%203-%20Social%20Assets%20Identification%20August%2030_1.pdf

[4] Ibid.

3.1.7 Visualization

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term adaptation

Implementation time-frame: Short-term

Planning level: Municipal, community

Planning process and plan type: Formal and informal; professional; capacity building; community planning

Adapting to climate change: Renew visualizations as new climate change information and new technology become available; incorporate into plan reviews as part of community engagement.

Images help to communicate information about climate change and coastal impacts to a broad audience. The complexity of climate change and its effects on coastal areas can be challenging to communicate. The impacts are also often in the future and not immediately noticeable. The combination of complexity and time makes it difficult for decision-makers and community members to understand the climate change impacts that their coastal community faces. Visualization is a powerful communication tool for supporting successful adaptation planning in coastal areas.

Climate change impacts and adaptation can be shown in many ways, including flooding and erosion maps, photographs from past climate events, computer simulation models, videos, signage, and creative art. This visual information can be communicated through community engagement workshops and presentations.

Computer simulation models have become an especially influential means through which climate change scenarios are made more concrete in the minds of community members and decision-makers.[1] Better understanding of climate change impacts and their implications supports adaptation planning. *Coastal Impacts Visualization Environment* (CLIVE) is a visualization tool developed through the University of Prince Edward Island Climate Lab and the Spatial Interface Lab at Simon Fraser University. CLIVE uses computer game technology to show future sea level rise and erosion for Prince Edward Island coastlines. It communicates what land uses and infrastructure are at risk.

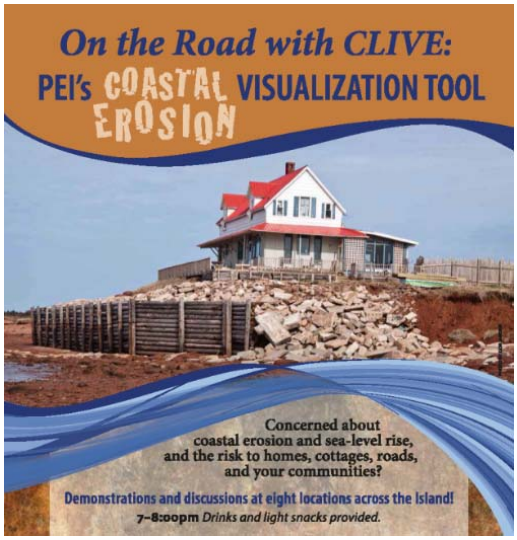
Maintaining a photographic record of the impacts of storm surge and flooding events is an effective way to communicate the need for coastal adaptation. (Image Source: Don Jardine University of Prince Edward Island)

OPPORTUNITIES	CONSTRAINTS
• Informs community members of the local impacts of climate change and promotes the need to adapt in coastal areas. This can lead to community supported planning outcomes. • Accessible and believable due to advances in computer technology.	• Focuses on the negative repercussions of climate change and coastal impacts which can leave community members feeling powerless. • Requires a high level of technology and technical skill.

Getting started and first steps - Visualizing climate change and coastal adaptation planning can be done by anyone, but is usually carried out by people with particular skills or access to technology, including academics, multi-media consultants, people working in community organizations, or people in government agencies. Visual artists also produce climate change visualizations. Here are some first steps toward using visualization:

- **Partner** with colleges and universities to develop visualizations of local climate change scenarios. Some non-governmental organizations also work with visualization and can be valuable partners for completing visioning projects.
- Develop a **community engagement** strategy for sharing visualizations of climate change and its impacts. A strategy ensures that people understand the context of the images and, for future scenarios, the time frame. The strategy should be an opportunity to discuss the future and talk about how to manage impacts through adaptation planning.

Image from CLIVE showing expected erosion on Lennox Island. (Image Source: UPEI Climate Lab[2])



POSTER ADVERTISING A COMMUNITY ENGAGEMENT TOUR OF UPEI CLIMATE LAB'S COASTAL IMPACTS VISUALIZATION ENVIRONMENT (CLIVE) TOOL.

Visualization Example (National)

Delta, British Columbia

Profile	
Coast	Pacific
Region	Lower Mainland
Impact Concerns	Inland and coastal flooding
Community Type	District Municipality
Population	25,118 (2011 Census)
Year	2012
Funding	Natural Resources Canada and Fraser Basin Council

Summary – *Future Delta* is "an immersive and interactive virtual environment that acts as a tool for communication between researchers and the public."[3] The project was developed by the University of British Columbia's *Collaborative for Advanced Landscape Planning* (CALP), directed by Dr. Stephen Sheppard. The objectives are to visualize climate change scenarios through the use of 3-dimensional animation software and to make the issues and solutions to climate change more understandable through a video game interface.

Future Delta was run as a pilot program from 2009 to 2012 in cooperation with public schools and the citizens of the Corporation of Delta, BC, in the Fraser River Estuary. Delta is built on low-lying land that is highly susceptible to coastal and inland flooding. The response from those who participated in the pilot program indicates that interactive visualization has been effective for communicating adaptation planning strategies and climate change scenario education.[4] Plausible future scenarios for Delta were created with input from residents, municipal staff, and the mayor and council. The video game is now available for secondary school teachers who can use it as a teaching tool to get students involved in environmental sustainability.[5]

Recommended resources

Climate Communication for Local Governments:

http://www.icleiusa.org/action-center/engaging-yourcommunity/ICLEI_Climate_Communication_Local_Governments.pdf

Coastal Impacts Visualization Environment (CLIVE) description and video:

http://projects.upei.ca/climate/2014/10/31/meet-clive/

Visualization of adaptation scenarios in Delta, BC:

http://delta-adaptation-bc.org/category/adaptation-scenarios/

Visualization of impact/adaptation and mitigation scenarios in Delta, BC. (Image Source: D. Flanders, CALP[6])

[1] Knapp, D. (2011). Climate communication for local governments: five guidelines to help city and county staff and elected officials message climate solutions, science, and local impacts. *ICLEI-Local Governments for Sustainability USA.* Retrieved from http://www.icleiusa.org/action-center/engaging-your-community/ICLEI_Climate_Communication_Local_Governments.pdf

[2] University of Prince Edward Island Climate Lab (2014). *On the road with CLIVE: PEI's coastal erosion visualization tool* [image]. Retrieved from http://projects.upei.ca/climate/2014/06/23/on-the-road-with-clive-peis-coastal-erosion-visualization-tool/

[3] Collaborative for Advanced Landscape Planning. (n.d.). *Participatory flood management planning in Delta, BC – BC Regional Adaptation Collaborative.* Retrieved from http://calp.forestry.ubc.ca/participatory-flood-management-planning-in-delta-bc-bc-regional-adaptation-collaborative-natural-resources-canada-regional-adaptation-collaborative-and-the-fraser-basin-council/

[4] Ibid.

[5] Collaborative for Advanced Landscape Planning. (n.d.). *Professional learning opportunity: video game for experiential learning based in climate change science and Delta BC planning.*Retrieved from http://calp.forestry.ubc.ca/projects/

[6] Collaborative for Advanced Landscape Planning. – CALP. (n.d.). *Participatory flood management planning in Delta, BC – BC Regional Adaptation Collaborative.* Retrieved from http://calp.forestry.ubc.ca/participatory-flood-management-planning-in-delta-bc-bc-regional-adaptation-collaborative-natural-resources-canada-regional-adaptation-collaborative-and-the-fraser-basin-council/

3.1.8 Scenario Planning

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term adaptation

Implementation time-frame: Short-term

Planning level: Provincial, regional, municipal

Planning process and plan type: Formal; professional; capacity building; scenario and strategic planning

Adapting to climate change: Renew scenarios as new climate change information becomes available.

Scenario planning is a strategic planning tool that takes into account multiple, plausible scenarios for the future of a community. It involves identifying known drivers, or causes, of change. In the context of coastal climate change adaptation planning, drivers could include sea level rise and demographic changes in a community. Scenario planning involves acknowledging uncertainties about future projections that a community has no control over. Uncertainties may include the amount of change in rainfall, the amount of sea level rise, the timing of storm events, or changes in society or technology. After identifying drivers (or causes) and uncertainties, a range of plausible scenarios are developed. The range of scenarios are used when making decisions and choosing adaptation options.[1]

Scenario planning requires data collection and mapping of potential climate change scenarios and demographic projections of a community. It requires a discussion to understand drivers and uncertainty, which can include community members through education programs and community engagement.

OPPORTUNITIES	CONSTRAINTS
• Takes multiple drivers and uncertainties about the future of a community into account. • Brings groups together to discuss potential future scenarios for the community. • Engages community members in the planning process.	• Can be difficult to identify all uncertainties and some may be missed in the scenario planning process. • Can be difficult to develop scenarios that are more complex than best and worst-case scenarios.[2]

Getting started and first steps – Community groups and citizens can use scenario planning as a brainstorming activity. **Community engagement** will help to identify drivers and uncertainties of climate change. A **local committee** can also carry out a scenario planning process or organize community engagement sessions. **Partnerships** with academics and government staff can also help to strengthen scenario planning as they can provide expertise and access to information on climate change scenarios. Here are some first steps for organizing a scenario planning event:

- Invite key decision makers, experts, and engaged community members to the session.
- Identify an issue or question to address.
- Develop four different, possible future scenarios to explore during discussions.

Scenario Planning Example (International)

South East Queensland, Australia

Profile	
Coast	South Pacific
Region	Coral Sea
Impact Concerns	Extreme Weather Events
Community Type	Region
Population	3.05 million
Year	2012
Funding	Queensland Smart State Innovative Fund[3]

Summary – The *South East Queensland Climate Adaptation Research Initiative* did scenario planning to explore climate change vulnerabilities and adaptation options for the region. The scenario planning involved workshops, surveys, and interviews with stakeholders in the region, including state representatives from state government departments, local government councils, representatives from non-government organizations, community groups, and private sector organizations.

The Initiative used two scenarios to explore six different adaptation options. The adaptation options were directed at reducing the impacts from climate change on built up areas of the coast. The first scenario was called the "shared path" scenario. It depicts a future with inclusive governance where the citizens accept responsibility for climate change and believe that government involvement is the solution. The second scenario is called the "free ride" scenario. It involves a future with low community involvement in governance and low acceptance of responsibility for climate change.

Discussions of the scenarios resulted in several priorities for adaptation in the region: preparing the community; supporting vulnerable communities; community leadership; proactive (anticipatory) initiatives; disaster and recovery management; and, managing the (urban) environment. One common message was that climate change adaptation needs to be on-going to be successful over the long term. All stakeholder groups advocated for more collaboration and partnerships between stakeholder groups and citizens.

Responses also suggested that there is a need for state level regulations and interventions that would be backed by local governments. Participants also responded that there is a need for further research on infrastructure standards for adaptation.[4]

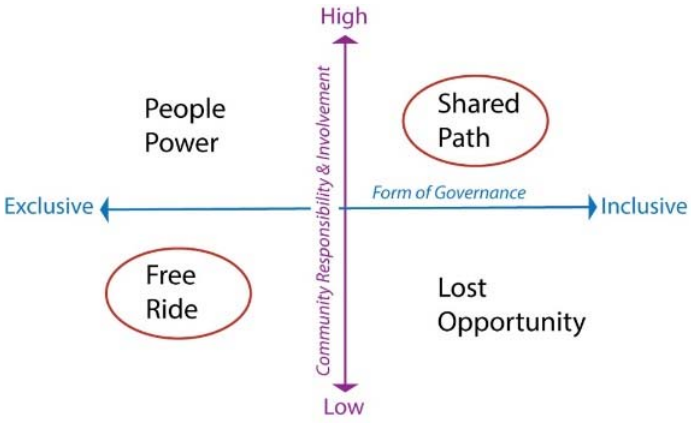
Recommended Resources

Guidance document for resource managers on scenario planning for climate change adaptation:

http://scc.ca.gov/files/2013/07/Scen-planning_17july2013_FINAL-3.pdf

Scenario planning for climate change adaptation in Queensland document:

http://www.griffith.edu.au/__data/assets/pdf_file/0004/464251/Griffith-University-SEQCARI-Scenario-Report-Oct-2012.pdf



Two scenarios, described above, considered during workshops, surveys, and interviews for adaptation in the region of South East Queensland. (Image Source: Penelope Kuhn, Dalhousie University, modified from South East Queensland Climate Adaptation Research Initiative[5])

[1] Scenarios to Strategy Inc. (n.d.). The scenario planning process. Retrieved from http://scenarios2strategy.com/docs/planning.html

[2] Moore, S., Seavy, N.E., & Gerhart, M. (2013). Scenario planning for climate change adaptation: A guidance document for resource managers. Retrieved from http://scc.ca.gov/files/2013/07/Scen-planning_17july2013_FINAL-3.pdf

[3] Griffith University. (n.d.). South East Queensland Climate Adaptation Research Initiative. Retrieved from http://www.griffith.edu.au/research/research-excellence/griffith-climate-change-response-program/research/projects/south-east-queensland-climate-adaptation-research-initiative

[4] South East Queensland Climate Adaptation Research Initiative. (2012). Scenario planning for climate change adaptation. Retrieved from http://www.griffith.edu.au/__data/assets/pdf_file/0004/464251/Griffith-University-SEQCARI-Scenario-Report-Oct-2012.pdf

[5] South East Queensland Climate Adaptation Research Initiative. (2012). Scenario planning for climate change adaptation [image]. p 6. Retrieved from http://www.griffith.edu.au/__data/assets/pdf_file/0004/464251/Griffith-University-SEQCARI-Scenario-Report-Oct-2012.pdf

3.1.9 Data Gathering and Mapping and Vulnerability Assessments

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short to long-term adaptation

Implementation time-frame: Short- to medium-term

Planning level: Provincial, regional, municipal

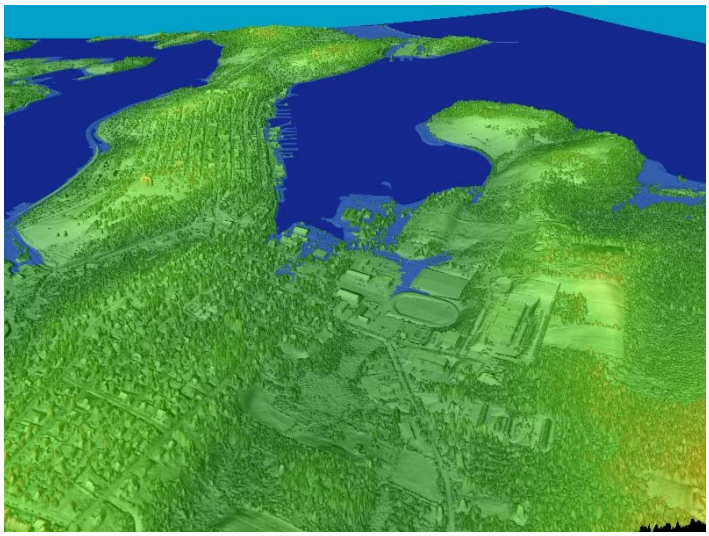
Planning process and plan type: Formal and semi-informal; professional to volunteer; capacity building; community planning; environmental planning

Adapting to climate change: Renew mapping as new climate change information becomes available and as coastal environment and land uses change.

Gathering and mapping data and information on coastal issues is an important first step for coastal climate change adaptation. Coastal information, especially in map form, is critical for the planning process. Mapped information is also valuable as an education tool for decision-makers and citizens. There are several types of important information that communities can gather: potential hazards; floodplains and flood zones; and land use and type classifications. Gathering these types of data and mapping them informs a community of its coastal land types, land uses, hazards, and potential climate change impacts that a community must consider when identifying appropriate adaptation measures.

Hazard and Risk Mapping – For flooding, important hazard information includes areas that have flooded in the past and that may flood in the future. For erosion, important hazard information includes areas at risk to erosion and erosion rates along the community's coast over time. Information on local sea level rise projections will help a community understand future risks of flooding and erosion.

Floodplain Mapping – From 1975 to 1996 Environment Canada ran the *Flood Damage Reduction Program* in collaboration with the provincial and territorial governments. This Program produced thousands of kilometres of flood hazard mapping across the country. Public Safety Canada is developing a *National Floodplain Management Framework* that builds upon the previous flood hazard mapping program and aims to update flooding maps and set national standards for flood hazards.[1] Floodplain and flood hazard maps are essential tools for land use planning in flood prone areas, including low-lying coastal areas that are now experiencing sea level rise caused by climate change. Flood mapping is also an important tool for community and decision-maker education.



Sea level rise mapping for the town of Lunenburg. The light blue shows the area at risk to sea level rise inundation by 2100. Flood risk mapping was done as a part of an Atlantic Climate Adaptation Solutions Association project in 2011. (Image source: Webster, T. et al[2])

Vulnerability Assessment – Vulnerability assessments are one way to interpret hazards and risks within a community and the land uses, activities and infrastructure that could be impacted. Hazard, risk and vulnerability assessment allows a community to set priorities for reducing risks. One model, the *Hazard Risk Vulnerability Assessment*, uses a table to organize the interpretation of hazards (*see* image below) based on likeliness to occur and the severity of the hazard. The combination of occurrence and severity results in a hazard rating of low, medium, or high. Hazards rated as high and medium receive priority for action. This approach was used by Nova Scotia municipalities in developing their *Municipal Climate Change Action Plans.*

		Severity of Hazard				
		Negligible	Slight	Moderate	High	Very High
Likeliness of Occurrence	Very Unlikely	Low	Low	Low	Low	Medium
	Unlikely	Low	Low	Low	Medium	Medium
	Possible	Low	Low	Medium	Medium	High
	Likely	Low	Medium	Medium	High	High
	Very Likely	Low	Medium	High	High	High

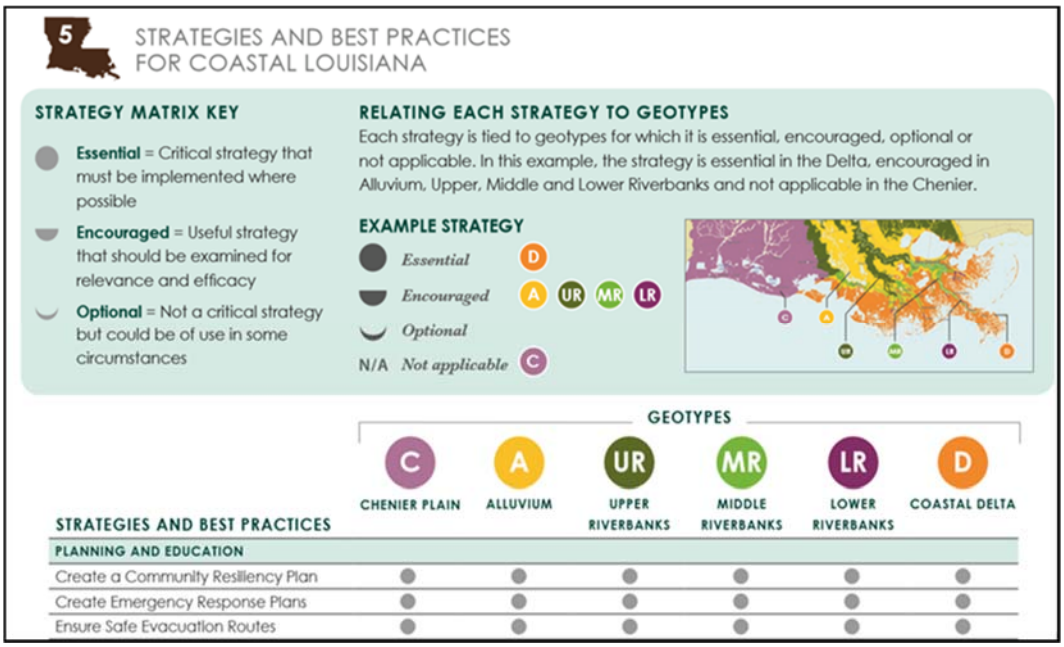
ONE MODEL FOR RANKING RISKS INVOLVES USING A TABLE TO COMPARE THE SEVERITY OF A HAZARD AND THE LIKELINESS OF THAT HAZARD OCCURRING. HAZARDS ARE RATED AS LOW, MEDIUM, OR HIGH.

Land Classification Mapping – Coastal land classification involves evaluating and defining coastal features and grouping them according to common characteristics. Coastal classification can inform zoning and determine acceptable land uses according to coastal features. Coastal classification can help to target coastal climate change adaptation by tailoring it according to coastal characteristics. Land classification simplifies land use planning at the local level, while also serving as an educational tool for understanding coastal processes. Land classification can also be used for resource protection and conservation, managing hazards, and environmental education.[3]

The *Best Practices Manual for Coastal Louisiana* was developed in 2013. The Manual is a tool to aid local planning authorities and developers in establishing sustainable land use practices, including climate change adaptation, by paying attention to the characteristics of different parts of the coast.

Land classification and mapping is usually an activity of higher levels of government. Nevertheless, municipalities and local stakeholders can contribute to the process by providing valuable first-hand insights and assisting with data collection.

OPPORTUNITIES	CONSTRAINTS
• Informs other land use planning tools. • Identifies coastal land-forms and conditions that could become hazards if development occurs in these areas. • Simplifies decision-making in coastal areas. • Educates citizens and decision-makers about the coastal landscape, which in turn supports informed decision-making.	• Can be costly to access scientific information and risk analysis. • Does not directly reduce coastal hazards. • Data requirements are extensive. • Requires expertise to gather and integrate information used in land classification.



COASTAL GEOTYPES HAVE BEEN MAPPED IN LOUISIANA ALONG WITH ADAPTATION STRATEGIES FOR EACH GEOTYPE (IMAGE SOURCE: CENTRE FOR PLANNING EXCELLENCE[4])

Getting started and first steps – Gathering information is an important first step towards climate change adaptation. Information can be collected in a number of ways. Historic information on climate events, flooding, and erosion informs how these issues are likely to affect an area in the future. For example, areas that suffered damage in a previous storm event are likely to suffer damage in future storm events. Mapping the information visualizes areas at risk of coastal hazards.

One valuable source of information is local community members. Community members hold a wealth of knowledge about coastal processes and past events. Gathering their knowledge through **community engagement** workshops, **mapping** exercises, and community science initiatives provides local information about coastal issues. This also allows for community members to participate in adaptation planning and empowers them in the decision-making process.

Other sources of information can be found through scientific research including LiDAR mapping, Geographic Information Systems analysis and mapping, and climate change scenarios. These types of information illustrate, through maps and diagrams, where problems are likely to occur in the future due to climate change and sea level rise.

Many sources gather and fund information including community groups, municipalities, federal and provincial government departments, and universities and colleges. Information specific to a local area may be more difficult to obtain through outside sources and collecting site-specific information can require special data collection projects.

Recommended resources

Downloadable hazard risk vulnerability assessment toolkit from Emergency Management British Columbia:

http://embc.gov.bc.ca/em/hrva/toolkit.html

Best practices manual for development in coastal Louisiana:

http://coastal.cpex.org/

A guide to land use planning in coastal areas of the Maritime Provinces:

www.dfo-mpo.gc.ca/Library/316491.pdf

[1] MMM Group Limited. (2014). *National floodplain mapping assessment – final report*. Retrieved from http://www.slideshare.net/glennmcgillivray/national-floodplain-mapping-assessment

[2] Webster, T., K., McGuigan, & and MacDonald, C. (2011). Lidar processing and Flood Risk Mapping for Coastal Areas in the District of Lunenburg, Town and District of Yarmouth, Amherst, County of Cumberland, Wolfville and Windsor. Retrieved from http://atlanticadaptation.ca/sites/discoveryspace.upei.ca.acasa/files/Flood%20risk%20in%20ACAS%20municipalities_0_0.pdf

[3] Appenbrick, N., Bolen, G., Manning-Broome, C., Deshotels, M., DUbinin, J., Fregonese, J., Gabbe, C.J., Koole, S., Logiudice, S., Malbrough, O., Meffert, D., Milazzo, J., Pacello, T., & Tharp, J. (2013). Best practices manual for development in coastal Louisiana. *Centre for Planning Excellence*. Retrieved from http://www.cpex.org/best-practices-manual-coastal/

[4] Ibid.

3.2 Policy and Planning Framework Tools

3.2.1 Emergency Preparedness and/or Management Plan

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Adaptation time frame: Short to medium-term

Implementation time-frame: Short- to medium-term

Planning level: Provincial, regional, municipal

Planning process and plan type: Formal; professional; emergency planning

Adapting to climate change: Update with new climate change information and environment and land use changes during mandatory plan reviews and plan renewal.

Communities develop emergency preparedness and management plans to prepare for and respond to emergencies and disasters. In coastal areas emergency preparedness and management involves identifying risky coastal conditions and vulnerable places and communicating this information to citizens. It involves using this information for evacuation planning and coordinating response to emergency events. Emergency preparedness uses planning strategies and regulations designed to lessen impacts on communities. Emergency management plans set out the steps to reduce damage from disasters and steps for response after a disaster occurs.[1]

Four steps for emergency management. (Image created from steps outlined by Environment Canada[2])

OPPORTUNITIES	CONSTRAINTS
• Increases public safety during emergency events and disasters. • Prevents damage and saves on the cost of post-disaster response. • Improves coordination between public agencies.	• Requires an effective communication strategy in order to function. • Needs to be reviewed and re-communicated to the public often to remain current.

Getting started and first steps – Every community in Atlantic Canada has emergency management measures in place for their area. Emergency management plans at the federal and provincial level cover land in all local communities. Municipalities are also enabled, or required, by provinces to develop local or regional emergency management plans. Regional emergency management plans are developed in partnership with neighbouring communities. For example, the six municipalities within Pictou County, Nova Scotia, worked together to develop a regional *Inter-municipal Emergency Services Agreement*, and created a Regional Emergency Measures Organization in 2003. Each municipality revised their emergency measures by-laws to support the new agreement and then developed one *Emergency Response Plan* for the six municipalities. [3] Here are some first steps toward using this tool for climate change adaptation at the coast:

- Become familiar with emergency plans in place for the area.
- Update existing plans to include measures to deal with coastal risks, especially as they are increasing with climate change.
- For communities without a local or regional emergency management plan, look to other plans in the area as potential models for a new plan.
- Work with the local and provincial emergency management organization. Each of the Atlantic Provinces has developed guides to assist municipalities in creating an emergency management plan. See the links below under 'Recommended resources'.

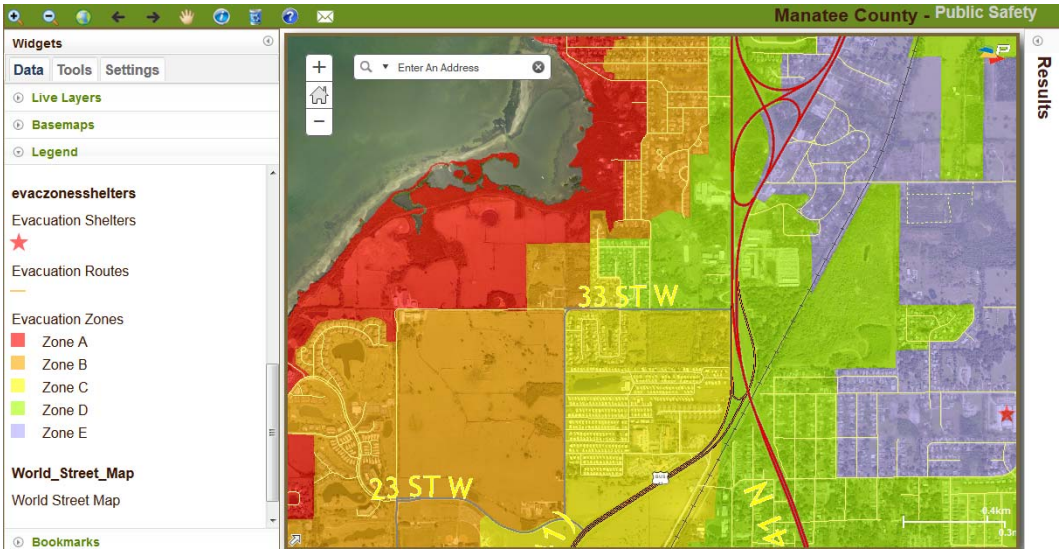
Emergency Preparedness and/or Management Plan Example (International)

Manatee County, Florida

Profile	
Coast	Gulf of Mexico
Region	Western Florida
Impact Concerns	Storm events
Population	322,833 (2010 Census)
Community Type	County
Area	2,313 km^2
Year	2010
Funding	State of Florida

Summary – Manatee County is located on Florida's Gulf Coast. The County comprises six incorporated municipalities. Manatee County has experienced fifteen presidentially declared disasters since 1965. Most of the disasters were from hurricanes or tropical storms. Vulnerability assessments have shown that the region is at significant risk of widespread flood damage in the event of a Category 1 or 2 hurricane. A Category 5 hurricane could damage or completely destroy over 107,000 homes.

Manatee County has developed a comprehensive hurricane response plan that includes detailed mapping of flood risk, evacuation routes, and shelters. The plan includes resource guides and storm preparation manuals for residents and a sophisticated communication strategy. Manatee County has also taken part in a state run pilot program to develop standards for post-disaster redevelopment. The program addresses future hazard mitigation and community redevelopment after a disaster. This program requires extensive collaboration between state government departments, municipalities, community stakeholders, and non-governmental organizations. Overall, emergency preparedness in Manatee County has made significant progress; however, officials have indicated reluctance from community members to accept weather predictions and the need for pre-disaster planning.[4]



Evacuation zone and route maps were developed in Manatee County. They are available for residents in case of emergency. Each zone covers an area at risk to varied storm surge heights. For example, Zone A covers areas affected by a six foot storm surge and Zone E covers areas affected by a twenty-eight foot storm surge.[5] (Image Source: Manatee County[6])

Recommended resources

Environment Canada's description of emergency management steps:

http://www.ec.gc.ca/ouragans-hurricanes/default.asp?lang=En&n=31DADDF5-1

Municipal Emergency Management Program Guide from the Prince Edward Island Office of Public Safety:

http://www.gov.pe.ca/photos/original/EMO_MUN_EMG.pdf

Municipal Emergency Response Plan guide from the New Brunswick Emergency Measures Organization:

http://www2.gnb.ca/content/dam/gnb/Departments/ps-sp/pdf/emo/Municipal-e.pdf

Community Event Emergency Response Planning guide from the Emergency Management Office Nova Scotia:

http://novascotia.ca/dma/emo/resources/docs/com_event_response_plan.pdf

Twelve Steps to Developing an Effective Emergency Management Plan from the Fire and Emergency Services Newfoundland and Labrador:

http://www.gov.nl.ca/fes/emo/12Stepswithtemplate.pdf

Manatee County Disaster Planning Guide for residents:

http://www.mymanatee.org/home/government/departments/public-safety/emergency-management/publications.html

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[1] Tampa Bay Regional Planning Council. (n.d.). *Manatee County disaster management guide.* Retrieved from http://www.mymanatee.org/home/government/departments/public-safety/emergency-management/publications.html

[2] Environment Canada. (2013). *Emergency management basics*. Retrieved fromhttp://www.ec.gc.ca/ouragans-hurricanes/default.asp?lang=En&n=31DADDF5-1

[3] Town of New Glasgow. (2013). Emergency measures. Retrieved from http://www.newglasgow.ca/departments/emergency-measures

[4] Post-Disaster Redevelopment Planning. (2013). *Post disaster redevelopment plan: case study Manatee County.* Retrieved from http://pdrp.org/documents/cat_view/49-manatee-county/61-case-study?limit=5&limitstart=0&order=date&dir=DESC

[5] Manatee County. (2015). *Evacuation and route map*. Retrieved from https://www.mymanatee.org/home/government/departments/public-safety/emergency-management/emergency-resources/evacuation-zones.html

[6] Manatee County. (2010). *Interactive GIS evacuation zone map* [image]. Retrieved from http://www.mymanatee.org/gisapps/mobile/index.html?type=public-safety

3.2.2 Statutory Community Plan (Municipal Planning Strategy, Municipal Plan, Official Plan, Regional Plan)

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term.

Implementation time-frame: Short- to medium-term

Planning level: Regional, municipal

Planning process and plan type: Formal; professional; community planning

Adapting to climate change: Update with new climate change information and environment and land use changes during mandatory plan reviews and plan renewal

A statutory community plan is a legislative tool that presents a vision for the future of a community and strategies for achieving that vision and dealing with challenges. The plan guides all other planning documents and by-laws developed by a municipality: it is the tool to put land use planning into action. A statutory community plan can include a generalized future land use map, a land use zoning by-law and a strategy for establishing setbacks from hazardous or environmentally sensitive areas through the municipality's land use by-law. Statutory community plans must abide by policies and regulations of the provincial government. A statutory community plan is a powerful tool for climate change adaptation planning.

OPPORTUNITIES	CONSTRAINTS
• Informs all other municipal plans. • Can be used to plan and manage land use in a municipality. • Can be used to present the objectives of a municipality for dealing with coastal and climate change adaptation. • Can be amended to incorporate coastal adaptation policies and strategies during a regular review. • Must be reviewed periodically as a part of the planning process.	• Subject to political controversy and compromise during plan development or amendments.

Getting started and first steps – The first step is for council and citizens to acknowledge the need for a plan to better manage the affairs of a municipality, including land use planning. Here are steps toward building a community plan:

- Begin citizen engagement immediately and be inclusive of all interests. An inclusive **community engagement** strategy is crucial to ensure citizen participation in developing the plan and eventual acceptance of the plan.
- **Gather and map data** and organize education programs for the public. **Education** helps to gain public support for the development and implementation of a plan or amendments to an existing plan. Reviews of an existing plan must be conducted after a set amount of time. Reviews are opportunities to include objectives for climate change adaptation into an existing plan.

Statutory Community Plan Example (Regional)

Beaubassin-est, New Brunswick

Profile	
Coast	Atlantic
Region	Northumberland Strait
Impact Concerns	Flooding & Erosion
Population	6,200 (2011 Census)
Community Type	Rural Community
Area	291 km^2
Year	2009
Funding	Part of the planning process

Summary – The community of Beaubassin-est partnered with the Beaubassin Planning Commission and citizens to develop the *Beaubassin-est Rural Community Rural Plan*. The Plan was approved in 2009 and includes objectives and policies for adaptation in coastal areas. Adaptation objectives include concentrating development around existing infrastructure, controlling the location of new developments, protecting the natural environment, and establishing building standards.

The Plan sets out a number of policies and proposals for environmental conservation relating to coastal systems. Policies include preserving the natural environment as a protection measure from hazards, and controlling developments in order to prevent erosion, flooding, and pollution in ecologically sensitive areas.

One proposal in the Plan suggests that developments that pose a threat through erosion, flooding, or pollution can be permitted if the developer demonstrates a risk management strategy and council approves the use through an integrated development zone. Such a zone, when created, would carry terms and conditions specific to the development. Another proposal is that all wetland areas must be preserved for conservation. An application for development next to or near a wetland must show the wetland boundaries. The Plan also proposes informing landowners of flood risk by advising coastal landowners who apply for a building permit of the location of their properties in relation to flood risk zones.[1]

Recommended Resources

Beaubassin-est Rural Community rural plan:

http://www.nbse.ca/media-planning/library/BE-BL09-1-RuralPlan.pdf

[1] Beaubassin-est Rural Community. (2009). *Beaubassin-est Rural Community rural plan.* Retrieved from http://www.nbse.ca/media-planning/library/BE-BL09-1-RuralPlan.pdf

3.2.3 Secondary Plan or Area Plan

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term.

Implementation time-frame: Short- to medium-term

Planning level: Municipal

Planning process and plan type: Formal; professional; community planning

Adapting to climate change: Update with new climate change information and environment and land use changes during mandatory plan reviews and plan renewal.

A secondary plan, or area plan, is a legislative tool to manage a specific area within a municipality. Secondary plans are developed in the context of statutory community plans. Secondary plans include policies to control future land uses in the designated area. For example, a secondary plan may be developed for a village located within a regional municipality. Adaptation solutions within the village may differ from adaptation solutions in less populated areas.

Communities with land use planning authority can use this tool to address issues that affect smaller areas within the community. A secondary plan includes a vision for the future of the area and strategies for achieving that vision and dealing with challenges; it guides land use by-laws and zoning for the area. Like the municipal or community plan, these plans must follow land use policies set out by the provincial government.

OPPORTUNITIES	CONSTRAINTS
• Can be used to state the objectives of a municipality for planning and managing land use, including coastal land, in an area. • Must be considered for future developments in the area. • Must be reviewed as a part of the planning process. • Can be amended to incorporate coastal and climate change adaptation policies and strategies during a regular review.	• Subject to political controversy and compromise during plan development or amendments.

Getting started and first steps – The first step is for council and citizens to acknowledge the need for a plan to better manage an area of the municipality. Here are some next steps:

- Begin citizen engagement immediately and be inclusive of all interests: an inclusive **community engagement** strategy is crucial to ensure citizen participation in developing the plan and eventual acceptance of the plan.
- **Gather and map data** and develop **education programs** for the public. Education can help to gain public support for the development and implementation of a plan. Reviews of an existing plan must be conducted after a set amount of time. Reviews are opportunities to include objectives for climate change adaptation into an existing plan.

Statutory Community Plan Example (National)

Town of Gibsons, British Columbia

Profile	
Coast	Pacific
Region	Southwest BC
Impact Concerns	Sea level rise, drinking water supply
Population	4,437 (2011 Census)
Community Type	Town
Area	4.3 km^2
Year	2013
Funding	Part of the planning process

Summary – The town of Gibsons updated its *Official Community Plan* in 2013. In Gibsons, sea level rise is expected to pose a risk to private property, the Town's harbour shoreline, the sewer line, and aquifer. The Plan incorporates climate change and addresses it through the community's objectives.

The *Official Community Plan* includes plans for specific areas within the community. One area plan focuses on the Town's harbour area. Some of the Town's goals for the harbour area include protecting the aquifer and water quality, ensuring that the waterfront is accessible to the public, and taking a "no-net-loss" or 'net gain' approach to existing habitats.

Some of the policies for the harbour area are to:

- Maintain a publicly accessible inventory of sensitive environmental features.
- Require environmental impact studies for all new re-zonings in the Harbour Area.
- Maintain and enhance the natural shoreline and aquatic zone through planning, by avoiding 'hard' infrastructure in the foreshore, and by creating wetlands and marsh areas for habitat and to protect shorelines against erosion.
- Implement a re-vegetation plan for streams within the Harbour Area to reduce erosion and sediment flow into the harbour, daylight buried streams (streams in pipes), and create new habitat.
- Increase environmental education and signage focused on the foreshore area.[1]

In 2015 the town of Gibsons endorsed an *Eco-Asset Strategy* to maintain healthy ecosystems and to manage risks to drinking water and from flooding. The objectives of the *Eco-Asset Strategy* align with the objectives of the *Official Community Plan*. Eco-assets, or natural assets, "refer to assets of the natural environment such as aquifers, creeks and foreshore that provide equivalent civil (engineered) municipal goods and services." [2] The Town is the first Canadian municipality to recognize natural ecosystem services as capital assets through this strategy.[3]

Recommended resources

Town of Gibsons Smart Plan (Official Community Plan):

http://www.gibsons.ca/bylaws

Town of Gibsons Eco-asset strategy:

http://www.gibsons.ca/eco-assets

[1] Town of Gibsons. (2013). *Official Community Plan*. Retrieved from http://www.gibsons.ca/bylaws

[2] Town of Gibsons. (2015). *Eco-asset strategy*. p 5. Retrieved from http://www.gibsons.ca/eco-assets

[3] Town of Gibsons. (2015). *Eco-assets.* Retrieved from http://www.gibsons.ca/eco-assets

3.2.4 Regional Plan (Non-statutory) or Land Use Policy

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: Medium-term

Planning level: Regional

Planning process and plan type: Formal; professional; regional planning and policy planning Adapting to climate change: Update with new climate change information and environment and land use changes during plan reviews and plan renewal; may require a new initiative.

A regional plan or land use policy involves municipalities planning together for the future of a region. A regional plan can address matters of land use planning broadly, or have a narrower planning and management theme, one that can benefit from a regional approach, such as transportation, waste management, or emergency events. A regional approach allows local governments to share resources and to cover a broader area. It is a tool that requires cooperation and coordination between communities. It may or may not be a statutory plan.

New Brunswick has a system of regional planning delivered through regional service commissions. Each community within a regional service commission area must comply with its regional plan.[1]

OPPORTUNITIES	CONSTRAINTS
• Involves sharing resources between communities. • Effective approach to issues that span across municipal boundaries.	• May cause conflict if communities have different planning objectives.

Getting started and first steps – A regional approach to planning requires partnerships with other local jurisdictions, organizations, and the province. Here are first steps towards developing a regional plan:

- Frame the theme of the regional plan (the issue or issues the plan will address).
- Establish which communities will be partners in the plan, or in regional planning.
- Determine what each community has to offer in a **partnership**.

Regional Plan (Non-statutory) or Land Use Policy Example (International)

Yorkshire and the Humber, United Kingdom

Profile	
Coast	Atlantic
Region	North Sea
Impact Concerns	Flooding & Erosion
Population	5,284,000 (2011 Census)
Community Type	Region
Area	15,420 km^2
Year	2009
Funding	A number of local government bodies

Summary – Yorkshire and the Humber is an alliance of local governments that work in partnership on issues affecting the region. The alliance was established in 2006 with the aim of influencing national and regional developments through a united voice for local governments.[2] In 2009, the alliance developed a *Climate Change Plan for Yorkshire and the Humber* to give direction for dealing with climate change in the region from 2009 to 2014.

The alliance also completed a *Regional Adaptation Study* to understand risks from climate change. Much of the region is low-lying land and a lot of it is below the high tide line. It is at high risk to flooding from sea level rise. Expectations are that the coastal areas of the region will experience increased erosion, coastal habitat loss, and increased tidal flooding.[3]

The purpose of the *Climate Change Plan for Yorkshire and the Humber* was to identify gaps in existing national, regional, and local initiatives for climate change mitigation and adaptation. The plan is a framework for action: it does not list detailed actions that each government needs to put in place. Instead, it provides planning principles that inform and influence development planning and management over five years.[4]

The Plan describes seven priority areas for decision makers of all sectors in the region: strategy and monitoring, the built environment, transport, health services, business, land management, and citizen engagement.[5]

Recommended resources

Description and links for the Climate Change Plan for Yorkshire and the Humber:

http://www.yhref.org.uk/pages/climate-change-plan-yorkshire-and-humber

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[1] New Brunswick Department of Environment and Local Government. (2014). Action plan for a new local governance system. Retrieved from http://www2.gnb.ca/content/gnb/en/departments/elg/local_government/content/promos/action_plan_local_governance.html#rsc

[2] Local Government Yorkshire and Humber. (n.d.). Local authorities working together. Retrieved from http://www.lgyh.gov.uk/About-Us/What-is-LGYH-and-how-does-it-work/

[3] Local Government Yorkshire and Humber. (2009) Climate change plan for Yorkshire and the Humber: your climate, our future 2009-2014. Retrieved from http://www.yhref.org.uk/system/files/documents/Climate%20change%20A5.pdf

[4] Yorkshire and Humber Environment Forum. (n.d.). Climate change plan for Yorkshire and the Humber. Retrieved from http://www.yhref.org.uk/pages/climate-change-plan-yorkshire-and-humber

[5] Ibid.

3.2.5 Guidance, Action, and Management Plans

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

A guidance, action, or management plan is a document that sets goals and objectives for a specific topic within a community. In a municipality with land use planning authority a plan can guide or regulate development in a way that addresses a local topic or issue. Community groups or organizations can also develop plans. These plans are not legal tools: they are guidelines and strategies and can also serve as educational tools for certain topics or issues. Plans may cover the entire community or a certain area within the community.

There are a variety of guidance, action, and management plans that communities and organizations can use to address coastal climate change issues:

1. integrated community sustainability plans (ICSPs),
2. climate change action/adaptation plans,
3. shoreline/coastal management plans,
4. watershed management plans,
5. stormwater management plans, and
6. strategic land acquisition.

OPPORTUNITIES	CONSTRAINTS
• Address a certain topic or issue in detail. • Guide communities to address or manage an issue or topic. • Tailored to the needs of the community.	• Not enforceable by law.

3.2.5.1 Guidance, Action, and Management Plans – Integrated Community Sustainability Plan

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term

Implementation time-frame: Short- to medium-term

Planning level: Municipal, community

Planning process and plan type: Formal; professional to semi-professional; community planning Adapting to climate change: Update with new climate change information and environment and land use changes during plan reviews.

Integrated Community Sustainability Plans (ICSPs) are management plans that present a vision for a liveable, healthy, and safe community into the future. The plans include goals for the economy, society, and the environment. Goals may include ways to deal with coastal planning, flood protection, climate change adaptation, community stewardship, economic diversity, green space, recreational opportunities, and ecosystem protection. ICSPs outline short and long-term action plans for land use planning and can guide a municipality in prioritizing actions.[1]

OPPORTUNITIES	CONSTRAINTS
• Can be used to address coastal issues, including climate change impacts. • Atlantic Canada communities are likely to support a plan that addresses coastal issues.	• Cannot be used to directly regulate development if not adopted as legislation by a community with land use planning authority.

Getting started and first steps - ICSPs are usually developed by communities with land use planning authority but the principles of an ICSP can be developed into a plan by any community. They are supported by the federal government and provincial governments who provide a gas tax refund to municipalities who complete a plan. Municipalities who received gas tax refunds were required to complete an ICSP by a date chosen by each province. Communities can hire a consultant to assist them in developing a plan and seek assistance from community groups and organizations.

Guidebooks are available to help in creating an ICSP. Creating a plan generally involves several steps:

- Form a **committee** to oversee development of the plan.
- Set up **community engagement** to help identify community issues and create a vision statement.
- Outline goals and plans for action and identifying benefits that will result from the plan.
- Identify **partners** that a community can work with to achieve the goals it sets out in its integrated community sustainability plan.[2]
- A community with land use planning authority can choose to amend its **statutory community plan** with an integrated community sustainability plan. An ICSP can also be the foundation for a new or revised statutory community plan.

Integrated Community Sustainability Plan Example (Regional)

Mahone Bay, Nova Scotia

Profile	
Coast	Atlantic
Region	South Shore
Impact Concerns	Flooding and erosion
Population	943 (2011 Census)
Community Type	Town
Area	3 km^2
Year	2010
Funding	Federal Gas Tax Rebate

Summary – The town of Mahone Bay addresses coastal conditions and sea level rise in its *Integrated Community Sustainability Plan*. The Plan includes a vision for waterfront development, a valuable asset for the Town. The vision is to preserve and enhance the waterfront and harbour with a focus on public access and environmental stewardship.

The Plan outlines a number of factors that the Town needs to consider to achieve the waterfront vision. It describes the current situation of the waterfront including problems of sewage overflows, sea level rise, and shoreline erosion. The Plan presents a number of actions to deal with challenges and achieve the vision for the waterfront. Actions include intercepting stormwater that causes sewage overflows, purchasing coastal land, and using protective engineering structures. The Plan also lists the resources and people needed, as well as potential partnerships to help achieve the vision for the waterfront. The Plan also identifies opportunities and challenges for the future of the waterfront.

When developing the Plan, the Town engaged with the public through a conference and design workshop. Participants contributed their ideas for a desirable future for the Town which were included in the Plan. Small action groups formed during these workshops to continue working on the sustainability actions. The Town also engaged with the School of Planning at Dalhousie University and developed a class project to help gather background material about the Town. Information collected by the students was integrated into the Plan and their reports are included in the Plan as an appendix.[3]

Recommended resources

Federation of Canadian Municipalities integrated community sustainability plan webinar:

http://www.fcm.ca/home/events/past-webinars-and-workshops/planning/webinar-quick-start-icsp-on-the-fast-track-to-sustainability.htm

Newfoundland and Labrador integrated community sustainability plan guide:

http://www.miga.gov.nl.ca/publications/icsp/

Nova Scotia integrated community sustainability plan guidebook:

http://www.nsinfrastructure.ca/pages/ICSP-Introduction.aspx

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[1] Newfoundland and Labrador Department of Municipal Affairs. (2009). *Integrated community sustainability plan guide: ICSP options and content requirements*. Retrieved from http://www.miga.gov.nl.ca/publications/icsp/newfoundland-and-labrador-icsp-guide.pdf

[2] Nova Scotia Department of Municipal Affairs. (2007). Integrated community sustainability plans: municipal funding agreement for Nova Scotia*. Canada – Nova Scotia Infrastructure Secretariat*. Retrieved from http://www.nsinfrastructure.ca/pages/ICSP-Introduction.aspx

[3] Town of Mahone Bay. (2010). *Integrated community sustainability plan: Mahone Bay searches its future* Retrieved from http://www.townofmahonebay.ca/index.php?option=com_docman&task=cat_view&gid=35&Itemid=124

3.2.5.2 Guidance, Action, and Management Plans – Climate Change Action/Adaptation Plans

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term

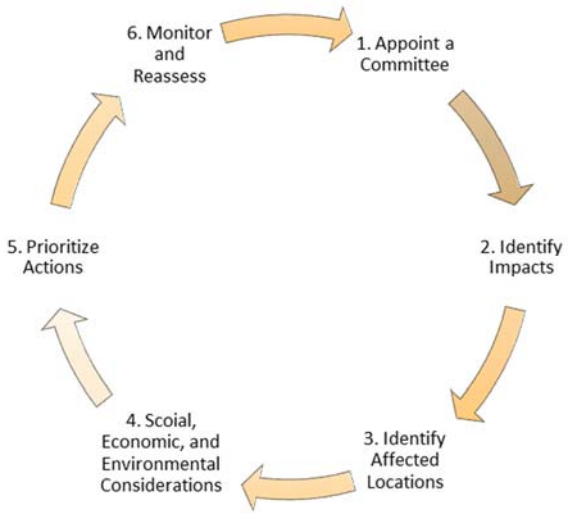
Implementation time-frame: Short- to medium-term

Planning level: Provincial, regional, municipal, community

Planning process and plan type: Formal; professional to semi-professional; environmental planning and community planning;

Adapting to climate change: Update with new climate change information and environment and land use changes during plan reviews.

Climate change action and adaptation plans identify the priorities for action to deal with climate change in a community. Creating a plan that specifically addresses the impacts expected at the local scale will help a community adapt to these changes. Gaining knowledge about local effects informs how a community will plan for the future. Developing a plan involves data gathering and mapping to identify impacts and affected areas. It also requires a community to consider the economic, environmental, and social impacts. Plans may include a hazard risk vulnerability assessment to help prioritize actions. An incorporated community can amend its statutory community plan to contain the climate change plan. Adaptation planning is a cyclical process and the plan should be revisited and updated over time.



OPPORTUNITIES	CONSTRAINTS
• Informs future planning decisions. • Lessens future risks from climate change. • Can be used as an educational tool for local government and the public on climate change in the local context.	• Cannot be used to directly regulate development if not adopted as legislation by a community with land use planning authority.

Getting started and first steps – A climate change action or adaptation plan can be a guidance document or adopted into an integrated community sustainability plan or statutory community plan. A community should account for the directives of its climate change action or adaptation plan in all future planning and actions. Here are some first steps toward creating a climate change plan:

- Appoint a climate change **committee**.
- Set up **community engagement** to find out about past events and impacts already occurring in the community.
- Seek outside expertise and **partnerships** where needed for help with climate change scenarios.

Climate Change Action Plans Example (Regional)

Municipal Climate Change Action Plans, Nova Scotia

Profile	
Coast	Atlantic
Region	Nova Scotia
Impact Concerns	Climate Change
Community Type	Regional, District, County, and Town Municipalities
Year	2013
Funding	Federal Gas Tax Extension Agreement

Summary – Every municipality in Nova Scotia developed a *Municipal Climate Change Action Plan* (MCCAP) by the end of 2013 as a condition of receiving Federal Gas Tax funding. The MCCAPs are an amendment to the municipalities' *Integrated Community Sustainability Plans* and focus on climate change adaptation and mitigation. The plans also present the steps that a municipality will take for adaptation. Most municipalities used a hazard risk vulnerability assessment to establish adaptation priorities. Each community approached its analysis differently depending on its community context and climate change impact issues. Each municipality was dealing with concerns unique to its area. Communities differed in their level of expertise and available information.

The Nova Scotia Department of Municipal Affairs put together a guide book to lead municipalities through the plan-making process. The guidebook gives guidance without using a prescriptive approach. The guidebook describes six steps that municipalities can follow for creating their action plan:

- build a team,
- identify impacts and hazards,
- identify affected locations,
- identify affected facilities and infrastructure,
- identify social, economic, and environmental considerations, and
- identify priorities for adaptive actions.[1]

Almost all of province's municipalities have completed an action plan and many examples can be drawn from these plans for ideas on how to follow each of the steps listed above.

Climate Change Adaptation Plan Example (Regional)

Glenburnie-Birchy Head-Shoal Brook, Newfoundland and Labrador

Profile	
Coast	Atlantic
Region	Gulf of St. Lawrence
Impact Concerns	Coastal flooding, erosion, landslides
Population	229 (year round)
Community Type	Town
Area	6.5 km of shoreline
Year	2009 – 2010
Funding	Canadian Institute of Planners

Summary – The Canadian Institute of Planners helped the town of Glenburnie–Birchy Head-Shoal Brook (GBS), Newfoundland and Labrador, develop a *Climate Change Adaptation Plan.* The goal was to create a plan to minimize negative impacts and maximize potential benefits from climate change. Community engagement meetings and workshops helped to identify and prioritize issues facing the community and to identify solutions.

The project team determined the main concerns facing GBS. They did this by collecting local stories of changes and events that had already occurred, including coastal flooding, erosion, landslides, and avalanches. People also identified concerns about potential social and economic impacts from climate change including groundwater quality, road safety, changing community traditions, and infrastructure damage.[2]

Overlay mapping combined information about environmental features and processes, including projected coastal flood zones, to identify areas at risk of climate change impacts and therefore not suitable for future development.

The project team identified priority areas for adaptation, including infrastructure, environment, economic development, culture and traditions, governance, and capacity building and proposed strategies for implementation. In 2012, GBS council formerly adopted the *Climate Change Adaptation Plan*, and in 2013 the Plan provided foundation information for re-framing the community plan through the plan review process.[3]

Partners – This project was initiated by the Canadian institute of Planners through the Atlantic Planners Institute (API) and received funding from Natural Resources Canada. The project was completed by a team of two volunteer planners from API, working collaboratively with the climate change coordinator for GBS, and with assistance from climate change researchers, environmental specialists from universities and provincial government agencies and Parks Canada (Gros Morne National Park). Many citizens participated in the project: including community elders, school children, educators, representatives from local culture and environment groups, the local fire department, and town council.[4]

Recommended resources

Nova Scotia Municipal Climate Change Action Plan Guidebook:

http://www.nsinfrastructure.ca/pages/Municipal-Climate-Change-Action-Plan-Guidebook1.aspx

Nova Scotia website that describes the MCCAP process and includes links to the resources given to Nova Scotian communities to assist them in developing their MCCAP:

http://www.nsinfrastructure.ca/pages/Municipal-Climate-Change-Action-Plan-Guidebook1.aspx

Canadian Institute of Planners Topics in Planning - Climate Change website provides many resources to communities for climate change adaptation planning, including the results of the pilot project that supported the GBS Climate Change Adaptation Plan and three other initiatives in the Atlantic Provinces.

https://www.cip-icu.ca/Topics-in-Planning/Climate-Change#

[1] Nova Scotia Department of Municipal Affairs. (2012). Municipal climate change action plan guidebook. *Canada – Nova Scotia Infrastructure Secretariat.* Retrieved from http://www.nsinfrastructure.ca/pages/Municipal-Climate-Change-Action-Plan-Guidebook1.aspx

[2] Manuel, P., & Herring, S. (n.d.). *Mainstreaming climate change tools for the professional community. Climate change adaptation plan for Glenburnie-Birchy-Head-Shoal Brook, Newfoundland and Labrador.* Volume 1: Background Report. Retrieved from https://www.cip-icu.ca/Files/Resources/GBS_CCAP_VOL1_E

[3] Jensen, J., personal communication.

[4] Manuel, P., & Herring, S. (n.d.). *Mainstreaming climate change tools for the professional community. Climate change adaptation plan for Glenburnie-Birchy-Head-Shoal Brook, Newfoundland and Labrador.* Volume 1: Background Report. Retrieved from https://www.cip-icu.ca/Files/Resources/GBS_CCAP_VOL1_E

3.2.5.3 Guidance, Action, and Management Plans – Shoreline/Coastal Management Plan

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium - to long-term

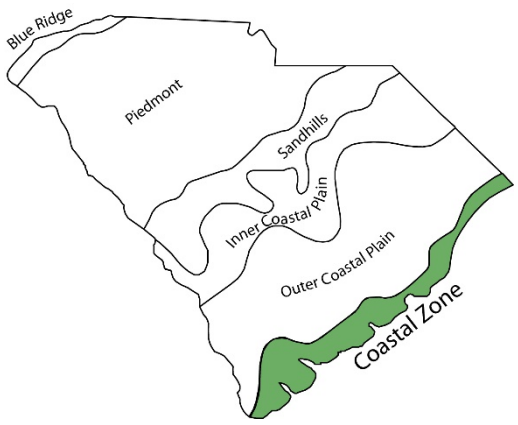
Implementation time-frame: Medium-term

Planning level: Provincial, regional, municipal

Planning process and type: Formal, semi-formal; professional to semi-professional and informed amateur; environmental planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best-practice standards during plan reviews.

A shoreline or coastal management plan is a tool for managing land use or development at the coast. Consequently, a shoreline or coastal management plan can be a powerful tool for community adaptation to climate change impacts along its coastline. A plan must be tailored to a community's culture and the local coastal environment. A plan can have a number of goals. A plan might aim, for example, to provide community education about coastal issues and to protect the natural environment. A plan can include strategies for more and better public access to the coast. These management plans often address coastal issues such as coastal hazards. Shoreline and coastal management plans include a variety of ways to manage the coast. Although they can include using engineering techniques like armour rock or sea walls, they usually focus on preventing damage to the coastal environment or keeping development back from the coast. Examples of these measures can include coastal wetland restoration, managed retreat strategies, setbacks, and development guidelines.[1]



Example of defining a coastal zone including inland classifications. (Image Source: Emma Poirier, St. Mary's University, modified after Hall[2])

OPPORTUNITIES	CONSTRAINTS
• May be used to prevent development in hazardous areas. • Benefits a community financially by addressing issues before damaging events happen. • Recognizes the shoreline area as part of a larger natural system and helps maintain a healthy and attractive shoreline. • Can be updated through the normal planning process with new information over time. • Can reduce conflict between coastal neighbours if controversial coastal activities are restricted.	• Usually does not require people to move away from hazardous areas where development already exists. • May require outside, hired, expertise to develop a plan. • May be complicated by jurisdictional issues if dealing with areas seaward of the high water mark. • May become outdated if not amended within a normal planning timeframe. • Can come into conflict with property and development rights.

Getting started and first steps – Community groups, local committees, or municipal staff (or a consultant) can help with the development of a shoreline or coastal management plan. Usually, these groups work together to develop a plan. A community can adopt a plan as municipal policy. Plans that include changes to the inter-tidal zone need approval from the province and will also usually involve partnerships with the province. Neighbouring communities that share a coastline can collaborate in a partnership to develop a plan.

Shoreline and coastal management plans require knowledge of local coastal issues and the aspirations of a community for using its coastal land and resources. Information for the plan can come from a variety of sources including community members, and scientific research. Community members will have first-hand knowledge of coastal issues and past events. They are also essential for understanding cultural values and local land use practices and interests. Scientific or other professional input ensures accurate information about coastal environments and processes and can provide insight to future conditions.

The following are the first steps in developing a shoreline or coastal management plan:

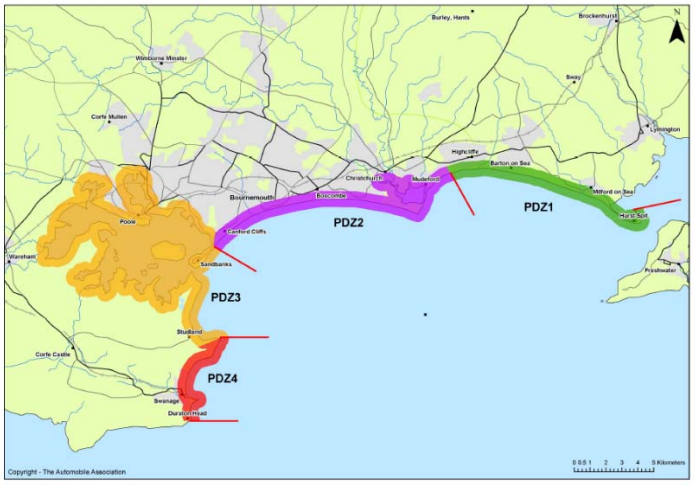
- Identify and map the coastal zone or shoreline boundary of the community.
- Organize a shoreline management local committee.
- Develop a strategy for community engagement.
- Gather and map data, which may include completing an inventory of assets in the coastal zone.
- Develop management goals and objectives that match what was heard through community engagement[3] and that are appropriate for the type of coast.

Shoreline/Coastal Management Plan Example (International)

Poole and Christchurch, England

Profile	
Coast	Atlantic
Region	Southern Coast
Impact Concerns	Receding shoreline
Population	208,928 (2011 Census)
Community Type	Two towns
Area	115 km^2
Year	2011
Funding	National

Summary – The *Shoreline Management Plan* for Poole and Christchurch is one of 26 regional shoreline management plans in England. Plan development is supported by the United Kingdom's Department of Environment, Food and Rural Affairs. All of these plans use the national coastal plan, *Shoreline Management Plan Guidance Volume 1: Aims and Requirements (2006),* for guidance.[4]



Management areas map from the Poole and Christchurch Bays Shoreline Management Plan. The management areas were determined by natural coastal processes of sediment transport. (Image Source: Bournemouth Borough Council[5])

The region of Poole and Christchurch has some of the most heavily managed shoreline in the country. The coastal geology varies between soft sand and clay beaches to harder limestone and high chalk cliff faces. Extensive coastal defences have been built in the bay. As a result, the shoreline has been radically altered over time and is receding due to a lack of sediment supply. Sediment erosion, transport and deposition was the normal shoreline process before the defences were built.

The Plan includes a detailed description of the cultural values and environmental conditions in the region and includes the details of sediment migration and deposition in the bay. The Plan also provides local management options and describes how the options comply with the national coastal planning mandate. The management plan is a living document that must be reviewed and updated regularly to incorporate changing coastal conditions and new approaches in coastal planning over time.[6]

Recommended Resources

State of Washington Shoreline Planners Toolbox, online material:

http://www.ecy.wa.gov/programs/sea/shorelines/smp/toolbox.html

[1] State of Washington Department of Ecology. (n.d.). *Shoreline Masters Program*. Retrieved from http://www.ecy.wa.gov/programs/sea/sma/st_guide/SMP/SMPintro.html

[2] Hall. (n.d.). Geographical regions of South Carolina coastal zone [image]. Retrieved from http://scregions.weebly.com/coastal-zone.html

[3] National Oceanic and Atmospheric Administration. (2012). Shoreline Management Plans. http://coastalmanagement.noaa.gov/initiatives/shoreline_ppr_planning.html

[4] Department for Environment Food and Rural Affairs (2006). *Shoreline management plan guidance Volume 1: Aims and requirements* (2006). Retrieved from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/69206/pb11726-smpg-vol1-060308.pdf

[5] Bournemouth Borough Council. (2011). *Our shoreline: SMP subcell 5f* [image]. Retrieved from http://www.twobays.net/our_shoreline.htm#Sed

[6] Bournemouth Borough Council. (2011). *Poole and Christchurch shoreline management plan: The final SMP2.* Retrieved from http://www.twobays.net/smp2.htm

3.2.5.4 Guidance, Action, and Management Plans – Watershed Management Plan

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term.

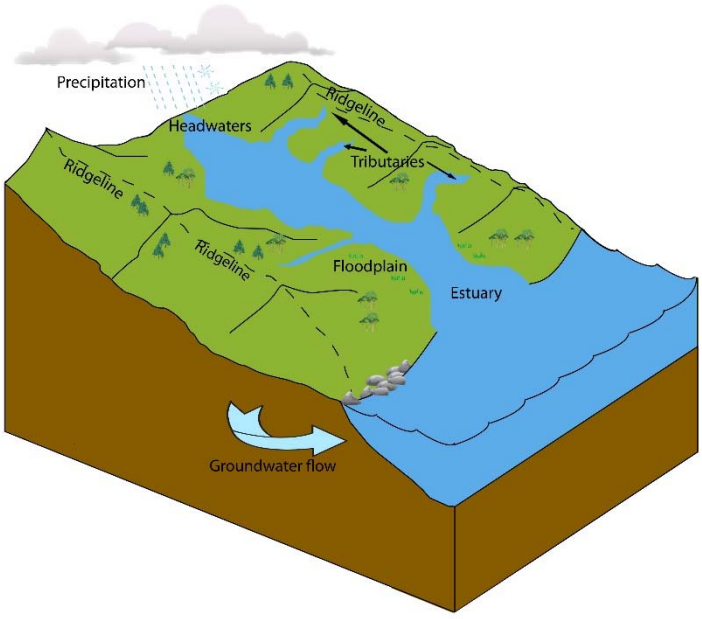
Implementation time-frame: Medium-term.

Planning level: Provincial, regional

Planning process and plan type: Formal, semi-formal; professional to semi-professional and informed amateur; environmental planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best-practice standards during plan reviews.

A watershed management plan is a natural resource and land planning and management tool that protects water resources. A watershed is the land area from which water drains to a common drainage system and a common body of water. Bays and estuaries are ultimately where drainage water ends up. Watershed management plans are strategies designed to address existing and future water resource issues within a defined watershed area.[1] They do this by managing development activities on the land. Watershed management plans focus on preventing pollution, protecting natural habitats, and controlling stormwater runoff within a watershed area. Developing a watershed management plan involves a regional approach that often includes multiple communities and organizations working in a partnership.



Profile of a watershed area that can be used as a boundary for land use management. (Image Sources: Emma Poirier, Saint Mary's University).

OPPORTUNITIES	CONSTRAINTS
• Can protect drinking water and other natural resources. • Safeguards natural habitats. • Can reduce demand for engineered stormwater infrastructure.	• Management can be complicated because watersheds usually cover large areas with multiple communities and governments. • Can require the collection of large amounts of diverse data. • Can be contentious because of conflicting land and water management interests.

Getting started and first steps – Communities with and without land use planning authority can develop and carry out watershed management plans. Community groups often initiate watershed management, typically organizing as local watershed groups. They do the preparation to make a plan possible. Developing a watershed management plan requires a solid understanding of how water flows in a watershed, and how the natural and built environments within the watershed work. Here are some first steps towards creating a watershed management plan:

- Create a watershed **committee** to oversee the development and management of a plan.
- Define the watershed area and **map** its component features, including which communities fall within the watershed area.
- Identify and make connections with organizations and management **partners**.
- Identify issues affecting the watershed that will become the focus of a plan.

Watershed Management Plan Example (International)

Lamprey River Watershed Plan, Great Bay Estuary, New Hampshire

Profile	
Coast	Atlantic
Region	Northeast
Municipal Type	14 towns
Population	N/A
Area	342 km^2
Year Implemented	2013
Funding	Cooperative Institute for Coastal and Estuarine Environmental Technology

Summary – The Lamprey River Watershed is the largest watershed that drains to the Great Bay Estuary of the Atlantic coast of the northeastern United States. The estuary has been protected under National Reserve status since 1989. Although much of the watershed remains uninhabited, there are 14 towns in the watershed and development in the watershed lands has quadrupled over the last 40 years.[2] Concerns about development include the increased amount of cleared land and hard surfaces resulting in increased stormwater runoff, erosion, and pollution, all of which affect the estuary. In 2009 people and groups with an interest in the watershed including scientists, volunteers, resources managers, local officials, and state government officials came together to share information about the watershed, and discuss concerns and strategies for managing activity in the watershed. The conference attendees created a committee that lobbied the State to give the Lamprey River protected status at the watershed scale. That status was granted in 2011. A watershed council and advisory committee made up of local citizens are responsible for the management and protection of the river and watershed.[3]

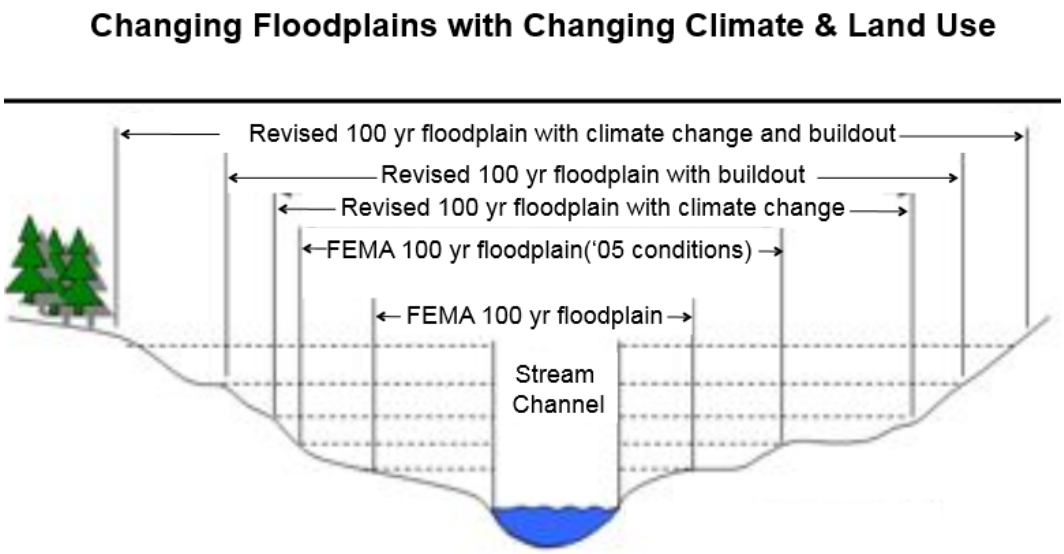
The council and committee reviewed an existing watershed plan from 2007 to create the *2013 Lamprey Rivers Watershed Plan.* The Plan has three main goals: to protect the ecosystems of the rivers; to promote responsible use of the rivers and surrounding area; and, to protect the interests of property owners and to gain their support as stewards of the watershed.[4] The plan incorporates climate change projections in its floodplain scenario mapping.

Partners – Researchers at the University of New Hampshire and Antioch University New England, in collaboration with the *Great Bay National Research Reserve* and the *Lamprey River Watershed Association* developed 100-year flood maps that illustrate a variety of climate and development scenarios for the watershed.

Recommended resources

Environmental Protection Agency handbook on developing watershed plans:

http://www.epa.gov/nps/watershed_handbook



CHANGES TO THE 1-IN-100-YEAR FLOODPLAIN LEVEL IN THE LAMPREY RIVER WATERSHED UNDER VARIOUS SCENARIOS. BUILD-OUT IS PROJECTED RATES OF DEVELOPMENT BASED ON DEVELOPMENT RATES OVER THE LAST FOUR DECADES.[5] (IMAGE SOURCE: UNH[6])

[1] United States Environmental Protection Agency. (2013). *Handbook for developing watershed plans to restore and protect our waters.* Retrieved from http://water.epa.gov/polwaste/nps/handbook_index.cfm#contents United States Environmental Protection Agency. (2012). *Coastal watershed factsheets - oceans and coastal protection: your coastal watershed.* Retrieved from http://water.epa.gov/type/oceb/fact1.cfm

[2] Lamprey River Watershed Association. (2011). *About the watershed.* http://www.lrwa-nh.org/about-the-watershed/

[3] National Oceanic and Atmospheric Administration. (n.d.). *Encouraging collaborative decision-making across the watershed in New Hampshire*. Retrieved from http://www.csc.noaa.gov/digitalcoast/stories/lampreyriver

[4] Lamprey Rivers Advisory Committee. (2013). *2013 Lamprey River watershed plan: updated and expanded from 2007 edition*. Retrieved from http://des.nh.gov/organization/divisions/water/wmb/rivers/documents/lmp-wshed-plan.pdf

[5] Wake, C., Scholz, A., & Simpson, M. (2011). *Assessing the risk of 100-year freshwater floods in the Lamprey River watershed of New Hampshire resulting from changes in climate and land use: CICEET Progress Report for the Period 03/01/2011 through 08/31/2011*. Retrieved from http://ciceet.unh.edu/news/releases/fall11_reports/pdf/wake09_pr_fall_2011.pdf

[6] University of New Hampshire, Great Bay National Estuarine Research Reserve, UNH Stormwater Centre, Antioch University New England, UNH Cooperative Extension, & Vermont Law School. (2012). *Past, present, and potential future 100-year floods in the Lamprey River* Watershed [image]. Retrieved from http://100yearfloods.org/resources/pdf/120601_Wake_100yr_floods_v2.pdf

3.2.5.5 Guidance, Action, and Management Plans – Stormwater Management Plan

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: Short- to medium-term

Planning level: Municipal

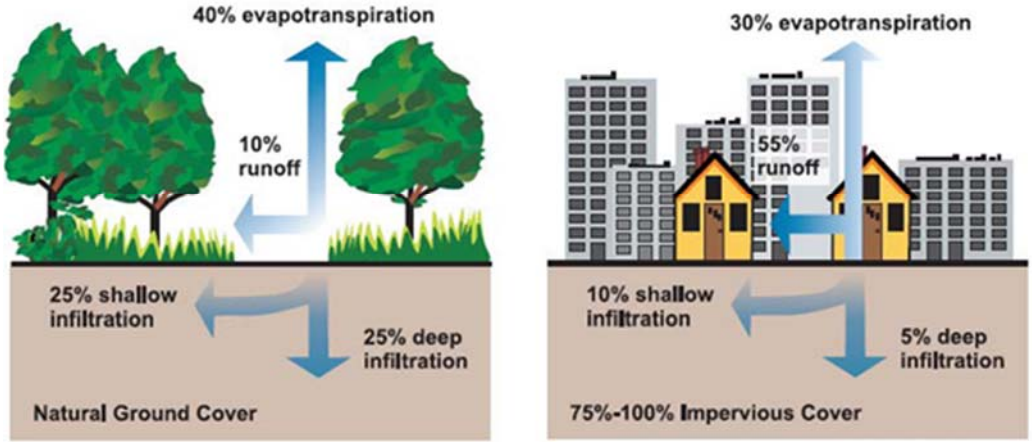
Planning process and type: Formal; professional to semi-professional; environmental planning and physical planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best-practice standards during plan reviews.

Stormwater is rainwater and snow meltwater that is either absorbed into the ground and flows through it or flows over the land and into drainage systems. The drainage systems are natural watercourses and waterbodies and retention ponds, drainage pipes, ditches, canals, and other man-made drainage control structures. Stormwater is crucial for maintaining healthy stream and lake levels, but too much stormwater flowing into waterbodies too quickly can lead to flooding. In coastal areas, river flooding can combine with a storm surge to make coastal flooding worse. Climate change affects the water cycle as well as the strength of storms that impact the coast. Stormwater management is a very important tool for addressing impacts of climate change everywhere in the system from the headwaters to the coast.

Stormwater management is a proactive planning and design tool used to manage the amount and speed of runoff entering natural and built drainage systems. The aim of stormwater management is to allow as much water as possible to be absorbed into the ground or flow slowly through ponds and wetlands. The aim is to manage the stormwater flow to as close to natural conditions as possible. When stormwater moves slowly through soil or land vegetation or ponds and wetlands it is cleaned of sediment and other pollutants. The water also does not rush into rivers and to the coast, so flooding is reduced.

OPPORTUNITIES	CONSTRAINTS
• Prevents flooding from overland run-off • Improves the aesthetics of a place through green stormwater infrastructure such as vegetated watercourses and land areas. • Can make small improvements over time rather than requiring one large project. • Encourages property owners to participate by catching rainwater on their properties and slowing down its flow.	• Only deals with inland flooding sources rather than ocean flooding. • May be difficult to implement in highly developed areas if there is little to no open space.



WATER MOVES VERY DIFFERENTLY OVER NATURAL GROUND COVER COMPARED TO DEVELOPED SURFACES. NATURAL COVER ALLOWS MORE WATER TO SEEP INTO THE GROUND. SOME WATER WILL FLOW DEEP TO REPLENISH GROUNDWATER. MOST WATER FALLING ON HARD SURFACES IN BUILT-UP AREAS FLOWS DIRECTLY IN SURFACE DRAINAGE SYSTEMS. (IMAGE SOURCE: FEDERAL INTERAGENCY STREAM RESTORATION WORKING GROUP [1])

Getting started and first steps – Communities can use a stormwater management plan to introduce design guidelines for new developments and to retrofit existing development. Communities can also set up a grant and education program to help promote building rain gardens on private properties. A community with land use planning authority can use this plan to develop by-laws that prohibit developments from adding additional stormwater into municipal systems. Here are some first steps toward developing a stormwater management plan:

- For communities with a **statutory community plan**, amend the plan to include strategies for dealing with stormwater.
- Establish a **committee** to help develop a grant, **education program**, design guidelines, or by-law.
- **Partner** with an expert or hire a consultant on stormwater design.

Stormwater Management Example (International)

City of Portland, Oregon, United States of America

Profile	
Coast	Pacific
Region	Northwest
Impact Concerns	Stormwater run-off and pollution
Population	609,456 (2010 Census)
Community Type	City
Area	375 km^2
Year	1999 - 2014
Funding	City

Summary – The city of Portland Oregon has adopted a *Stormwater Management Manual* that provides policy, practice, and design guidelines for both public and private properties. The requirements in the manual apply to all new developments, redevelopments, and improvement projects. The manual was initially adopted in 1999 and was revised in 2014; the updates ensure the Manual is providing guidance with the newest and best practices and technologies

Requirements in the Manual address absorption of stormwater into the ground, controlling water flow, and reducing pollution. Operations and maintenance requirements for stormwater infrastructure are also included in the Manual. Other things covered include development submission guidelines, approved manufactured technologies, and stormwater calculators. [2] This is a comprehensive document designed for a large city but the concept and much of the content is relevant to a community of any size. It contains state-of-the art stormwater management tools and many natural, low-cost management examples.

Recommended Resources

City of Portland 2014 Stormwater Management Manual:

https://www.portlandoregon.gov/bes/64040

Design features such as curb cuts, pictured left, are included in the Stormwater Management Manual. Up to date, innovative design features have been included in the latest version of the manual. Many of these features use green technologies to capture stormwater. (Image Source: ©City of Portland, Courtesy of Bureau of Environmental Services[3])

[1] Federal Interagency Stream Restoration Working Group. (n.d.). *In stream corridor restoration: principles, processes, and practices* [image]. Retrieved from http://www.nrcs.usda.gov/Internet/FSE_MEDIA/nrcs143_024824.jpg

[2] City of Portland. (2014). *2014 Stormwater Management Manual* (SWMM). Retrieved from https://www.portlandoregon.gov/bes/64040

[3] City of Portland. (2014). *2014 Stormwater Management Manual* (SWMM) [images]. Retrieved from https://www.portlandoregon.gov/bes/64040

3.2.5.6 Guidance, Action, and Management Plans – Strategic Land Acquisition and Land Bank

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: Medium- to long term

Planning level: Regional, municipal

Planning process and plan type: Formal; professional; strategic planning

Adapting to climate change: Update with new climate change information and environment and land use changes when reassessing strategic land acquisition needs.

Strategic land acquisition or land banking is a plan or strategy to proactively obtain land for public purposes. A plan outlines how to acquire lands and gives a framework for council decision-making about acquisition opportunities. Councils of coastal communities can use land acquisition and banking to identify and acquire coastal property to increase public safety, prevent future damage to structures, or preserve or restore natural habitats. The plan can also be used to meet a number of community goals along the coast such as increasing coastal access, preserving natural heritage, and enhancing natural assets. For example, at risk areas can be identified for possible acquisition in order to prevent future development or to remove vulnerable structures.[1]

OPPORTUNITIES	CONSTRAINTS
• Increases public safety during emergency events and Enables a community to proactively acquire lands that have been identified as valuable to the community or which are at risk to coastal hazards. • Identifies the means available for acquiring land. • Can encourage the donation of land. • Provides a framework for decision makers to make quick decisions when properties are offered up for acquisition. • Outlines funding sources for acquisition.	• Can be costly to acquire land. • External funding may be required to purchase land.

Getting started and first steps – A strategic land acquisition plan can be created by a land trust, community, or provincial and federal governments. Here are some first steps:

- Develop a **partnership** with land trusts, community groups, and residents to draft land acquisition strategies.
- Form a **committee** to guide the development of an acquisition plan.
- **Gather and map data** to inform what lands are appropriate for the strategies outlined in an acquisition plan.
- Amend existing guidance documents, such as an open space plan, **integrated community sustainability plan**, municipal **climate change action plan**, **shoreline or coastal management plan**, **watershed management plan**, or **stormwater management plan**, to include strategic land acquisition objectives.

Strategic Land Acquisition Example (International)

Town of Barnstable, Massachusetts

Profile	
Coast	Atlantic
Region	Northeast
Impact Concerns	Flooding, storm events, wind
Population	45,193 (2010 Census)
Community Type	Town
Year	2010
Funding	Part of the normal planning process

Summary – The town of Barnstable, Massachusetts incorporates sea level rise and flood mitigation into its *Open Space and Recreation Plan* (2010).[2] The Plan includes a land acquisition strategy. This comprehensive open space plan considers many open space needs of the Town, including protecting fresh and marine waterbodies, wildlife habitat, agricultural land, and public access to the coast. The Plan also supports property reclamation and "undevelopment" as land use strategies. "Undevelopment" involves removing structures from acquired lands and changing the use of the land to passive open space uses.

According to a model developed by the National Weather Service, a large amount of land, 7,475 acres, is in hurricane surge zones. According to FEMA Flood Insurance Rate Maps, 8,000 acres are in flood zones. Eighteen properties have already suffered from repetitive damage in the town.[3]

The Town acquired and 'undeveloped' six properties including a former motel on Craigville Beach Road. The land is now a coastal remediation nursery where coastal plants are cultivated for use in other areas of the Town. The nursery is an educational center for the public to learn about coastal vegetation and its uses. A Gulf Gas Station property in Hyannis has also been transformed into a pocket park.[4]

Partnerships – The Town's Growth Management Department and a *Land Acquisition and Preservation Committee* drafted the *Open Space and Recreation Plan*. Contributors to the Plan included members of the Town Council, the Town's Recreation Commission, Conservation Commission, Planning Board, Community Preservation Committee, the *Barnstable Land Trust*, and town residents who filled out surveys, attended hearings, and provided feedback.

Recommended resources

Town of Barnstable Open Space and Recreation Plan:

http://www.townofbarnstable.us/ComprehensivePlanning/RecPlan/OpenSpaceRecPlan.asp

THE TOWN OF BARNSTABLE ACQUIRED THE FORMER SUNI SANDS MOTEL IN 2008. THE MOTEL WAS DEMOLISHED AND THE LAND CONVERTED TO OPEN SPACE AND A PLANT NURSERY. (IMAGE SOURCE: TOWN OF BARNSTABLE[5])

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[1] Arlington Group Planning + Architecture, EBA a Terra Tech Company, DE Jardine Consulting and Sustainability Solutions Group. (2013). Sea level rise adaptation primer: A toolkit to build adaptive capacity on Canada's south coasts. *British Columbia Ministry of Environment.* Retrieved from http://www2.gov.bc.ca/gov/topic.page?id=F09F1EC7576643CEB5FB1536913730BA

[2]Town of Barnstable. (2010). *2010 open space and recreation plan*. Retrieved from http://www.townofbarnstable.us/ComprehensivePlanning/RecPlan/OpenSpaceRecPlan.asp

[3] Town of Barnstable. (2010). Multi-hazard mitigation plan. Retrieved from http://www.townofbarnstable.us/ComprehensivePlanning/MitigationPlan/2010%20Barnstable%20Multi-Hazard%20Mitigation%20Plan.pdf

[4]Town of Barnstable. (2010). *2010 open space and recreation plan*. Retrieved from http://www.townofbarnstable.us/ComprehensivePlanning/RecPlan/OpenSpaceRecPlan.asp

[5] Town of Barnstable. (n.d.). *Centerville's new Coastal Remediation Nursery* [Image]. Retrieved from http://www.townofbarnstable.us/PropertyManagement/CoastalRemediation.pdf

3.2.6 Incentives

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short to long-term

Implementation time-frame: Short- to medium-term

Planning level: Municipal

Planning process and plan type: Formal; professional; community planning; development planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during mandatory plan reviews and renewal.

A range of incentives are available for coastal climate change adaptation planning including tax incentives, density bonusing, and development incentives. These incentives go hand in hand with other tools in this guidebook as described below.

Tax incentives are a tool to entice development into certain areas (see below) or can reward not developing land: they can reward the donation of land to a land trust, or setting up conservation easements. Any community can promote incentives through a land trust and this could be part of a strategic land acquisition strategy.

Density bonusing allows developers to increase the occupancy (number of units) permitted in a development area in exchange for assigning a larger amount of the developable property to land uses such as parks, open space, or to affordable housing. In coastal areas density bonusing could be used to gain coastal lands and move new development inland.

Development incentives are a form of tax incentive for new developments and can be granted for areas identified for the purpose of a municipality. The requirements to obtain the incentive are set by the municipality, such as providing amenities for the public or using particular building and design standards. Incentives can also be used in exchange for the cost of a building permit. These incentives can help boost commercial activity.

OPPORTUNITIES	CONSTRAINTS
• Can encourage development in areas set back from the coast. • Can promote development within a given area. • Can promote the use of climate change resilient building and design standards.	• Can cost a municipality in tax revenue. • May not be affordable for some municipalities

Getting started and first steps – Communities with land use planning authority can set up incentive programs. A municipality must clearly establish the purpose of the program, identify the areas eligible for the program and amenities the program will generate. For example, coastal communities could prioritize coastal land acquisition or protection through density bonusing when coastal developments are approved. Here are some first steps:

- Form a **committee** to determine the structure of an incentives program. This committee can also operate as a selection committee once the program. The selection committee decides which developments qualify for the incentive.
- Determine the type of incentive that will be most effective in the community.

Incentives Example (National)

District of Highlands, British Columbia

Profile	
Coast	Pacific
Region	Vancouver Island
Impact Concerns	Offset negative development impacts
Population	2,120 (2011 Census)
Community Type	District
Year	1997
Funding	Part of the normal planning process

Summary – The District of Highlands, BC introduced amenity density bonusing in its *Official Community Plan* in 1997. The Plan allows for rezoning and increasing density if a developer clusters development and provides amenities for the community. The objectives of amenity development are to offset negative impacts from new developments, achieve municipal objectives, and integrate new developments into the community.[1]

Appendix A of the *Official Community Plan* presents the type of amenities for which the District is willing to rezone, including high value environmental areas and parkland. The *Plan* also identifies (in Section 2.11) amenity infrastructure needed to meet municipal goals for community development, sustainability, and trail development: a community centre, land to connect existing trails, and land to extend an existing parkway. A developer can also pay into a municipal reserve fund (cash-in-lieu) that the municipality can use to buy land to meet an amenity objective. Council considers each proposal individually and requires public participation. A proposal for density bonusing must meet criteria described in the Plan. Criteria include long-term costs to the municipality, characteristics of the land, and the monetary value of the amenity.

The District of Highlands has used this tool for conservation of valuable environmental areas. Through one agreement the District was able to conserve 90% of a 190-hectare lot on Scafe Hill. It was able to do this through acquiring some of the land as an amenity for the District and requiring that each lot have a conservation covenant in place on 75% of the lot. In return, the developer was permitted to subdivide the land into 26 lots rather than 15, the usual limit. The conserved land includes wetlands, watercourses, and forests.[2]

The District has been successful with negotiating density bonusing because it is firm on lot sizes otherwise permitted by its zoning by-laws. Negotiating over amenities is appealing for developers because it is an opportunity to develop more lots than are usually permitted.

Recommended resources

Green Bylaws Toolkit for Conserving Sensitive Ecosystems and Green Infrastructure document. Pages 59 to 72 describe incentives enabled through zoning:

http://www.greenbylaws.ca/images/greenbylaws_web1207.pdf

[1] District of Highlands. (2013). *District of Highlands Official Community Plan.* Retrieved from www.greenbylaws.ca/images/greenbylaws_web1207.pdf

[2] The Wetland Stewardship Partnership. (2007). *Green bylaws toolkit for conserving sensitive ecosystems andgreen infrastructure.* Retrieved from http://www.greenbylaws.ca/images/greenbylaws_web1207.pdf

3.2.7 Wetland Policy, Plan and Guidelines

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium to long-term

Implementation time-frame: Medium-term

Planning level: Provincial, regional, municipal

Planning process and type: Formal; professional; policy planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during mandatory plan reviews and renewal.

Wetland policies guide decision makers on development practices with respect to wetlands. Policies aim to protect wetland habitat but are not legislated through law. Legal requirements are met through regulations to implement the policies. In some cases wetland retention policies also incorporate strategies designed to rehabilitate or even construct new wetlands.[1]

Wetlands are areas of land that are saturated with water either permanently or seasonally.[2] They form in upland and coastal environments. Coastal wetlands are salt marshes (in the mid and high latitudes) and mangroves (in the tropics and subtropics). They form in the tidal zone in protected bays and estuaries and behind barriers such as spits and bars. They also form behind dunes when there is a tidal channel connecting the low area behind the dune to the sea. Wetlands are valuable environments of the natural coastal landscape: they act as a natural barrier between the coastline and development. They reduce the risk of flooding because they can take on extra water during flooding events;[3] they filter and clean water flowing from the upland to the estuary or the bay; and they absorb wave energy to protect the land from erosion. Wetland retention policies protect these valuable environments and their functions by preventing or controlling development in and around wetland areas.

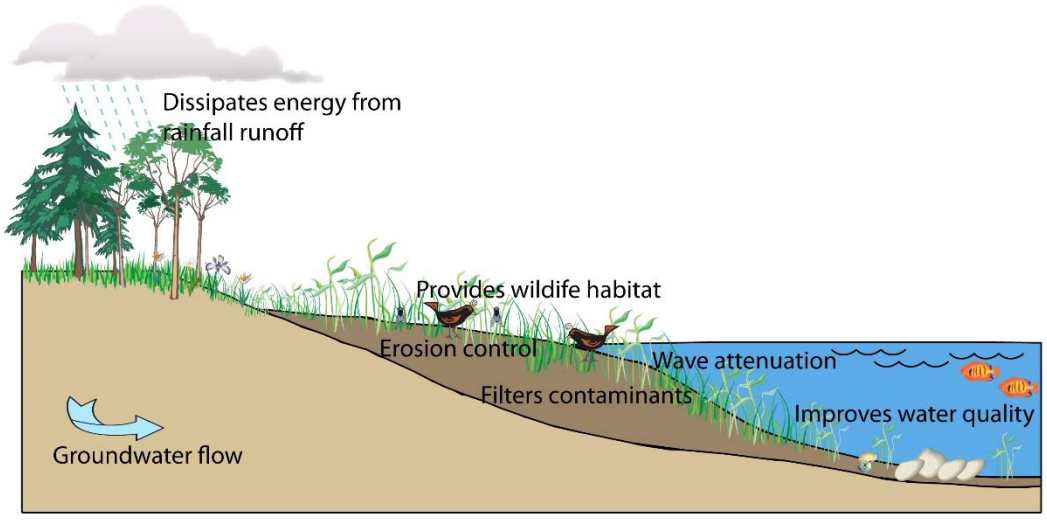


Illustration of valued wetland functions. (Image Source: Emma Poirier, Saint Mary's University)

OPPORTUNITIES	CONSTRAINTS
• Protecting and restoring wetlands provide important services such as flood protection and erosion control, filtering pollutants from inland water runoff, and improving landscape aesthetics. • Natural wetland services can replace more costly build infrastructure.	• Insects can become a health risk because wetlands are insect habitat; maintaining healthy surrounding upland habitat and good water circulation controls insect populations. • Building and restoring wetlands requires maintenance until the wetland is established.

Getting started and first steps – Wetland policies already exist at the provincial level for each of the four Atlantic Provinces (described in the Legislative Section of this document). Local communities must comply with the provincial policies and can also adapt local or regional policies. Local and regional policies can be used to impose stricter rules on development in wetland areas and can be tailored to the local context. Here are first steps toward using wetland policies:

- Become familiar with provincial level policies.
- For communities with land use planning authority, adapt **provincial policies** into local land use zoning, and by-laws.
- Promote the stewardship of wetlands through **education** and **community engagement**. Effective stewardship of wetlands requires that community members take an active role in their management.

Wetland Policy, Plan, and Guideline Example (International)

Massachusetts, United States

Profile	
Coast	Atlantic
Region	North Eastern United States
Impact Concerns	Flooding
Population	6.5 million (2010 Census)
Community Type	State
Year	2013

Summary – The State of Massachusetts has a *Massachusetts Wetland Program Plan 2013 to 2017: 2nd Edition* [4] to guide the protection and improvement of wetlands. The first edition of this Plan was written in 2010. The goal of the Plan is to preserve the natural functions of wetlands. It recognizes that wetlands provide the services of maintaining the quality of ground and surface water, protecting structures from flood and storm damage, preventing pollution, and protecting aquatic and wildlife habitat. The Plan has four sections of monitoring and assessment, regulation, voluntary wetland restoration and protection, and water quality standards for wetlands

Each section has a goal and objectives as well as a list of actions to achieve the goal and objectives. For example, the objective for monitoring and assessment is to establish a baseline inventory of wetland areas and conditions and to document gains and losses of wetland areas. One of the activities listed under this section is to develop a strategy for using wetland monitoring tools to improve permit decisions. Another activity is to continue to test wetland conditions where major project permits were approved to assess the impacts on wetlands.

The objectives for regulation include strengthening existing regulations, developing mapping tools for regulation, enforcing compliance, and developing innovative outreach programs. One action for regulation is to make revisions to the *Massachusetts Wetland Protection Act*. This action was carried out in 2014. Another action is to complete a study on climate change adaptation and revise size criteria for bridges and culverts to accommodate projected increases in precipitation.

The objective for voluntary wetland restoration and protection is to develop restoration goals, provide restoration expertise and guidance, and streamline the restoration permitting process. One action for developing restoration goals is to work with multiple agencies to develop common goals. Another action for providing expertise and guidance is to maintain a list of restoration projects.

The objective for water quality standards for wetlands is to classify wetlands as waters within the State's water quality program. One action in this section is to revise existing surface water quality regulations in the water quality program.[5]

Each of the actions in the *Massachusetts Wetland Program Plan* has a proposed year for completion. The intent is complete of all of the actions by 2017.

Recommended resources

Government of Newfoundland and Labrador – Policy for Development in Wetlands: Policy:

http://www.env.gov.nl.ca/env/waterres/regulations/policies/wetlands.html

Government of Nova Scotia – Wetland Conservation Policy:

http://www.novascotia.ca/nse/wetland/conservation.policy.asp

Government of Prince Edward Island – A Wetland Conservation Policy for Prince Edward Island:

http://www.gov.pe.ca/photos/original/2007wetlands-po.pdf

Government of New Brunswick – Wetlands Conservation Policy:

http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Report-Rapport/WetlandsTerresHumides.pdf

[1] US Environmental Protection Agency. (2013). *Wetlands: an introduction*. Retrieved from http://water.epa.gov/type/wetlands/basic.cfm

[2] Environment and Climate Change Canada. (n.d.). *Wetlands*. https://www.ec.gc.ca/eau-water/default.asp?lang=En&n=27147C37-1

[3] State of Washington Department of Ecology. (n.d). *Wetland stewardship.* Retrieved from http://www.ecy.wa.gov/programs/sea/wetlands/stewardship/index.html

[4] Massachusetts Department of Environmental Protection, Environmental Protection Agency, & Enhancing State and Tribal Programs. (2013). *The Massachusetts wetland program plan 2013-2017: 2nd edition.* Retrieved from http://www.epa.gov/region1/topics/ecosystems/pdfs/MAWPP.pdf

[5] Ibid.

3.3 Regulatory and Land Use Change Tools

3.3.1 Wetland Regulations

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term

Implementation time-frame: Short- to medium-term

Planning level: Provincial, regional, municipal

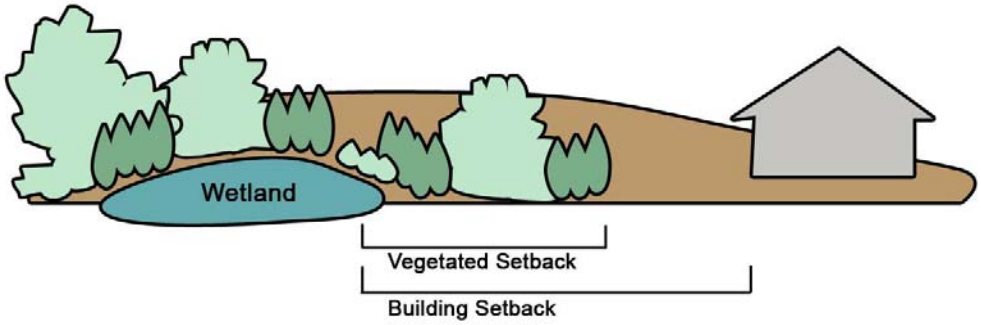
Planning process and play type: Formal; professional; regulatory; community planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during mandatory plan reviews and renewal

Wetland regulations are a legislative tool enacted through law. They restrict and control development in and around wetlands. Restrictions involve prohibiting activities that damage or destroy a wetland, such as dredging, draining, in-filling, or removing vegetation, and development within a prescribed distance of a wetland boundary. Regulations can set development setbacks from wetlands of a certain size. In some cases regulations also include strategies to restore or construct new wetlands, typically to make up for destroying a wetland when this cannot be avoided.[1]

Wetlands are areas of land that are saturated with water either permanently or seasonally.[2] They form in upland and coastal environments. Coastal wetlands are salt marshes (in the mid and high latitudes) and mangroves (in the tropics and subtropics). They form in the tidal zone in protected bays and estuaries and behind barriers such as spits and bars. They also form behind dunes when there is a channel connecting the low area behind the dune to the sea. Wetlands are valuable elements of the natural coastal landscape: they act as a natural barrier between the coastline and development. They reduce the risk of flooding because they can take on extra water during flooding events;[3] they filter and clean water flowing from the upland to the estuary or the bay; and they absorb wave energy to protect the land from erosion. Wetland policies protect these valuable environments and their services by preventing or controlling development in and around wetlands.

OPPORTUNITIES	CONSTRAINTS
• Enforced through law. • Protecting and restoring wetlands can provide important services such as flood protection and erosion control, filtering pollutants from inland water runoff, and improving landscape aesthetics. • Natural wetland services can replace more costly built infrastructure.	• Insects can become a health risk because wetlands are insect habitat; maintaining healthy surrounding upland habitat and good water circulation controls insect populations. • Building and restoring wetlands requires maintenance until the wetland is established.



SETBACKS THAT CAN PROTECT WETLANDS FROM ADJACENT DEVELOPMENT. (IMAGE SOURCE: YVONNE REEVES, DALHOUSIE UNIVERSITY)

Getting started and first steps – The Province of Prince Edward Island has wetland regulations in place. These regulations apply to all lands within the Province. The other three Atlantic Provinces have wetland regulations. Local communities cannot implement regulations but can advocate to the province to strengthen existing regulations or to develop regulations from existing provincial policies. Here are some first steps toward using, and advocating for, wetland regulations:

- Become familiar with provincial wetland regulations, or policies.
- Ensure that local land use by-laws comply with provincial regulations.
- For communities with land use planning authority, enact a by-law, or amend an existing by-law to place more stringent restrictions on development than the existing provincial regulations.
- For communities without land use planning authority, advocate to the province for developing and enforcing wetland regulations.
- Report any wetland regulation violations to the provincial department responsible for the regulation (see legislative section for the responsibilities of provincial departments).

Wetland Regulations Example (International)

Massachusetts, United State

Profile	
Coast	Atlantic
Region	North Eastern United States
Impact Concerns	Flooding
Population	6.5 million (2010 Census)
Community Type	State
Year	2014
Coast	Atlantic

Summary – The State of Massachusetts has a *Wetland Protection Act* that describes regulations for the protection of coastal and inland wetlands. The Act protects the following interests:

- Public and private water supplies,
- Groundwater supplies,
- Flood control and storm damage protection,
- Pollution prevention,
- Protection of wildlife and fisheries, and
- Protection of land containing marine shellfish.

This statute applies to the protection of freshwater wetlands, coastal wetlands, beaches, dunes, marshes, swamps, and banks that border on the ocean, estuaries, creeks, rivers, streams, ponds or lakes, land that is under a water body, land at risk to tidal action, and land at risk to flooding.

Activities and uses within 100 feet from these areas are also regulated. Minor activities such as planting native species, building fences, and building accessory buildings on lawn areas are permitted within the 100 foot buffer zone. Septic systems are permitted but must be set back 50 feet from any coastal bank, beach, dune, or salt marsh. Any proposed activities that will "remove, fill, dredge, or alter that area" require a permit through a Conservation Commission.[4]

Conservation Commissions are local environmental agencies responsible for protecting wetlands and waterways by administering the *Wetland Protection Act* in their local jurisdictions. A commission decides after public hearings whether or not to permit a proposed activity in areas designated under the Act. A commission can permit an activity with conditions that will protect the interests listed in the Act. Commissions also have the authority to create open space and recreation plans in their jurisdictions. They have the authority to place further restrictions on wetland conservation areas in addition to the restrictions described in the *Wetland Protection Act*. Additional restrictions are enforceable by law. [5]

Recommended resources

Government of Prince Edward Island – Watercourse and Wetland Protection Regulations:

http://www.gov.pe.ca/law/regulations/pdf/E&09-16.pdf

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[1] US Environmental Protection Agency. (2013). *Wetlands: an introduction*. Retrieved from http://water.epa.gov/type/wetlands/basic.cfm

[2] Environment and Climate Change Canada. (n.d.). *Wetlands*. https://www.ec.gc.ca/eau-water/default.asp?lang=En&n=27147C37-1

[3] State of Washington Department of Ecology. (n.d). *Wetland stewardship*. Retrieved from http://www.ecy.wa.gov/programs/sea/wetlands/stewardship/index.html

[4] Government of Massachusetts. (2014). 310 CMR 10.00: The wetlands protection act part A. Retrieved from http://www.mass.gov/eea/docs/dep/service/regulations/310cmr10a.pdf

[5] Massachusetts Association of Conservation Commissions. (n.d.). About conservation commissions. Retrieved from https://www.maccweb.org/about_commissions.html

3.3.2 Land Use By-law and Zoning

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short to long-term.

Implementation time-frame: Short to medium-term

Planning level: Regional, municipal

Planning process and plan type: Formal; professional; community planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during mandatory plan reviews and renewal.

Communities with land use planning authority can control land use and development through land use zoning and by-laws. Land use by-laws are used to achieve the goals and objectives of a statutory community plan for land use and development. Only communities that have a statutory community plan can use by-laws. Within a land use by-law, zoning organizes land uses and development. Land use zones are mapped and typically include categories of residential, commercial, industrial, institutional, parks and open space, resource, mixed use, and general use. Specialty zones address specific land uses or areas such as coastlines. The land use by-law describes the details of permitted land uses and developments in each zone and enforces the zones.

Land use controls can be very effective tools for managing climate change adaptation in coastal areas. By-laws enacted for a coastal zone can ensure the area is used for the public good and for environmental protection. A number of by-laws can be used in a coastal zone that manage the risks to a community while supporting suitable development.

There are seven different types of zoning that can be used for climate change adaptation in coastal areas.

1. **Land use zoning –** This type of zoning regulates the type of land use and development that is permitted within the zone. For example, land use in coastal areas could be restricted to low-intensity uses such as recreation. The land would be zoned 'recreation' or parks and open space and the by-law would describe the details of what can happen in this zone. This type of land use designation restricts development, permitting only those structures needed to support low-intensity use, like trials for example; reduces risks to public safety; and limits future damage to structures. An added benefit of restricting development is that there is increased public access to the coast and open space.
2. **Overlay zoning –** This type of zoning does not change the existing, permitted, land uses but imposes additional by-laws upon them. Additional by-laws in coastal areas can be used to protect people and structures. Overlay zones often include by-laws that require setbacks, include building regulations, or restrict hazardous materials. An overlay zone can be placed over top of all existing zones that are already in place.
3. **Hazard zoning –** This type of zoning identifies where environmental hazards exist and specifically addresses those hazards. The zone can be in the form of a land use zone (see above) or an overlay zone (see above).
4. **Performance or prescriptive zoning –** This type of zoning is an alternative to land use zoning. It permits any development that achieves a specified performance criterion. For coastal planning, performance criteria are based on technical information that determine standards; in the context of coastal planning standards could respond to erosion potential and flood risks. The

developer must collect the necessary information and decision-makers determine if the development proposal meets the zoning criteria and standards.[1]

DEMONSTRATION OF DEFINING A COASTAL ZONE USING BEST PRACTICES. THE COASTAL ZONE INCLUDES WETLANDS AND AREAS SURROUNDING THE FRESHWATER SYSTEMS THAT DRAIN INTO THE OCEAN. (IMAGE SOURCE: MAINE SEA GRANT[2])

5. **Conservation or protection zoning –** These zones are used to protect natural habitats, such as beaches and wetlands. Land uses are often restricted in these zones to recreational activities. Removing vegetation is also often prohibited in these zones. Using these zones to protect natural coastal habitats also stops development in the zone. Protecting coastal habitat maintains a protective buffer between human development and coastal hazards. The protection also provides room for natural habitats to move landward with sea level rise.
6. **Temporal zoning –** This type of zone is typically used to protect species that breed in certain coastal areas by restricting certain activities for specific times of the year.
7. **Downzoning –** This type of zoning is used to reduce the current density or intensity of use in a developed coastal area. Future density from development can be reduced through subdivision by-laws. Downzoning can also be used to prevent the rebuilding of structures that are damaged after storm events. They may also require structures to be rebuilt with new building restrictions that accommodate for sea level rise. Downzoning can be used as an overlay zone or land use zone (see above).

OPPORTUNITIES	CONSTRAINTS
• Can protect coastal ecosystems by restricting development and other damaging activities. • Can protect development and activities from coastal hazards. • Can tailor permissions and restrictions to the specific coastal environment, anticipate changes in coastal conditions, and the circumstances of the community.	• May have limited effectiveness in developed areas where non-conforming uses will be grandfathered forward. • Rezoning can be controversial and requires transparency and community engagement. • Can affect property values or prevent building on small lots that do not have space for restrictions such as siting structures, or setbacks.

Getting started and first steps – Any community with land use planning authority can establish a zone to deal with coastal issues. Communities without land use planning authority can advocate to provincial authorities to establish provincial coastal zoning. New Brunswick has already established coastal zones for the province in the *Coastal Areas Protection Policy*. Here are some first steps toward establishing a zone and by-law for adaptation to climate change at the coast:

- **Gather and map** date of coastal features and areas at risk of flooding and/or erosion to identify a coastal zone. The information will also support selecting the type of zoning and by-laws necessary for adaptation that will protect the public and the environment.
- Create a zone by amending an existing land use by-law or by developing a new land use by-law.

- Place restrictions within the zone, such as setbacks, that will protect public safety and environmental and cultural features. Restrictions in a by-law must comply with the strategies in a community's **statutory community plan** and should not contradict **guidance, action and management plans.**

- **Gather data and map** expected sea level rise and erosion to back up setback or buffer requirements that take these issues into account.

Land Use By-law and Zoning Example (International)

Town of Scarborough, Maine

Profile	
Coast	Atlantic
Region	Gulf of Maine
Impact Concerns	Storm events, flooding, receding beaches
Population	18,919 (2010 Census)
Community Type	Town
Year	2006
Funding	Included in normal planning process

Summary – The town of Scarborough, Maine, is located on gently sloping land. Elevations in the town range from sea level to 215 feet. The Town's shoreline includes sand beaches, bedrock outcrops, working harbours, and a large coastal wetland estuary system.

Coastal structures, including homes and cottages, in the Town are already at risk of climate change impacts such as storm surge and sea level rise; storms have caused significant damage in the past. The Town uses a sea level rise scenario of 2 feet for adaptation planning. Two feet of sea level rise could potentially impact 1,100 existing buildings by 2100.

The town of Scarborough introduced a cluster subdivision design (or conservation subdivision design) by-law into three existing land use zones in its comprehensive plan. The by-law applies in these zones when any of the following conditions exist:

- the land to be subdivided contains one acre of wetland,
- 20% of the land to be subdivided is wetland,
- 20% of the land to be subdivided is within the shoreland zone, and
- a subdivision would alter 4,300 square feet or more of wetland if developed in a conventional layout.

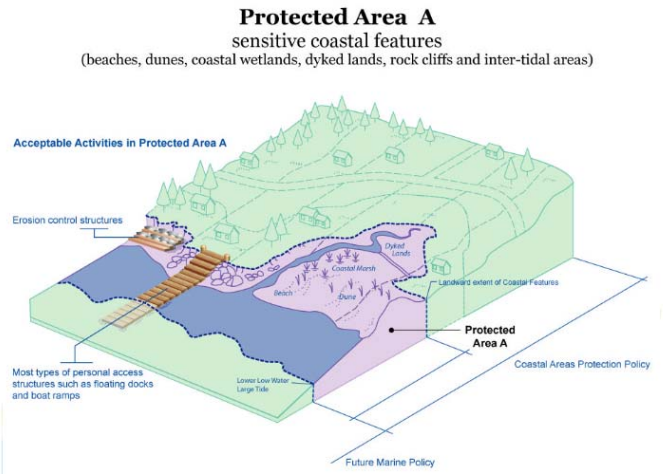
These by-laws are used to set back coastal developments and preserve natural wetland habitats. The Town has used development agreements to obtain beach lots in the community of Pine Point. The lots were exchanged for higher density allowances for a development setback from the shoreline. This was used as an incentive for developers.[3]

The Town of Scarborough included regulations requiring that conservation subdivision design methods are used for new developments in areas with wetlands. (Image Source: Scarborough Economic Development Corporation, Scarborough, Maine[4])

Zoning Example (Regional)

Coastal Areas Protection Policy, Province of New Brunswick

Profile	
Coast	Atlantic
Region	Bay of Fundy, Northumberland Strait, Gulf of St. Lawrence
Impact Concerns	Sea level rise and previous planning
Community Type	Province
Year	2002
Funding	Government of New Brunswick
Coast	Atlantic



Zone A, the "Core" area is the most restrictive zone in the Coastal Areas Protection Policy. Within this zone, land uses are restricted mainly to recreational uses and coastal industries. (Image Source: New Brunswick Department of Environment & Local Government Sustainable Planning Branch[5])

Summary – The *Coastal Areas Protection Policy* for New Brunswick was introduced by the Department of Environment and Local Government in 2002. The Policy recognizes that poor planning decisions in the past have had negative impacts on coastal areas. It also recognizes that sea level rise will have detrimental effects on these areas. The intent of the Policy is to provide a sustainable provincial framework that simplifies coastal management at the local level. The purposes of the Policy are to reduce hazards, protect water resources, conserve the environment, and minimize coastal infrastructure costs.

Central to the *Coastal Areas Protection Policy* is a zoning system that establishes setback distances according to coastal sensitivity and land use criteria. Protected Area A has the most restrictions and includes locations with sensitive coastal features. Protected Area B includes lands 30 m landward of Protected Area A, and the "Transition" zone which is landward of Protected Area B and still pending definition.[6]

Prescriptive (Performance) Zoning Example (Regional)

Town of Le Goulet, New Brunswick

Profile	
Coast	Atlantic
Region	Gulf of St. Lawrence
Impact Concerns	Sea level rise, reduced sea ice
Population	800
Community Type	Town
Year	2004 - ongoing
Funding	Atlantic Climate Adaptation Solutions Association

Summary – The town of Le Goulet is working towards prescriptive zoning in coastal areas. The zoning will allow for appropriate development that takes sea level rise and climate change into account. Developers will be responsible for meeting criteria that the municipality is developing with help from the province of New Brunswick.[7]

The Town is dealing with multiple coastal issues. Reduced sea ice has increased the erosion of local sand dunes from a maximum height of two metres above sea level to only a half a metre above sea level. Storm surge and extreme weather events have damaged homes, caused saltwater intrusion into wells, overfilled septic tanks, and blocked roadway access. Residents are dealing with ongoing issues of well contamination and mould from these events. The Town is exploring the options of relocating at-risk homes; it intends to use prescriptive zoning to address future developments. The Town chose prescriptive zoning to ensure the use of appropriate measures to accommodate risk rather than prohibiting all development in flood risk areas.[8]

Partners – Coastal specialists at the University of Moncton worked with citizen-based working groups to identify areas at risk and develop a draft adaptation plan to address the risks. Le Goulet also participated in an Atlantic Climate Adaptation Solutions Association project to develop planning tools to deal with coastal issues, including detailed maps of the effects of climate change on the coast. The working group suggested implementing two risk-based zones based on sea level rise projections for 2055, a 1-in-50 year storm surge, and erosion projections for 2100. The Town is working with the New Brunswick Department of the Environment to develop criteria for new developments in the zone.[9]

Resources for Further Information

A Coastal Areas Protection Policy for New Brunswick:

http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Water-Eau/CoastalAreasProtectionPolicy.pdf

New Brunswick Department of the Environment and Local Government E-mail: coastalareas-

zonescotieres@gnb.ca

Maine Shoreland Zoning - a Handbook for Shoreland Owners:

http://www.maine.gov/dep/blwq/docstand/szpage.html

[1] MacDonald, S.M. (2013). *Exploring the potential for performance zoning within the practice of marine spatial planning.* Master of Marine Management Thesis. Dalhousie University, Halifax, NS. pdf. Retrieved from http://dalspace.library.dal.ca/bitstream/handle/10222/37031/Macdonald,%20S%20-%20Graduate_Project2013.pdf?sequence=1

[2] Maine Sea Grant. (n.d.). *Main property owner's guide to managing flooding, erosion, and other coastal hazards* [image]. Retrieved from http://www.seagrant.umaine.edu/coastal-hazards-guide/permitting-and-rules

[3] Schechtman, J.D. & Brady, M. (2013). Cost efficient climate change adaptation in the North Atlantic. Retrieved from http://seagrant.uconn.edu/CEANA/Scarborough.pdf

[4] Scarborough Economic Development Corporation. (n.d.). *Scarborough, Maine* [image]. Retrieved from https://sites.google.com/a/scarboroughmaine.org/town/

[5] New Brunswick Department of Environment and Local Government Sustainable Planning Branch. (2002). *A coastal areas protection policy for New Brunswick* [image]. Retrieved from http://coinatlantic.ca/documents/aczisc_meeting_presentations/55NBCAPP.pdf

[6] New Brunswick Department of Environment and Local Government Sustainable Planning Branch. (2002). *A coastal areas protection policy for New Brunswick*. Retrieved from http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/WaterEau/CoastalAreasProtectionPolicy.pdf

[7] Department of Natural Resources Canada. (2010). *Adapting to climate change. Chapter 3: Le Goulet'sclimate change adaptation plan*. Retrieved from https://www.nrcan.gc.ca/environment/resources/publications/impacts-adaptation/tools-guides/16299

[8]Atlantic Climate Adaptation Solutions Association. (2012). Adapting to climate change: coastal flooding,Le Goulet. Government of New Brunswick, *Department of Natural Resources Canada*. Retrieved from http://atlanticadaptation.ca/sites/discoveryspace.upei.ca.acasa/files/CS_LeGoulet_en_dr3.pdf

[9] Ibid.

3.3.3 Setbacks

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short - to long-term

Implementation time-frame: Short- to medium-term

Planning level: Provincial, regional, municipal

Planning process and plan type: Formal; professional; regulatory; community planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during plan review.

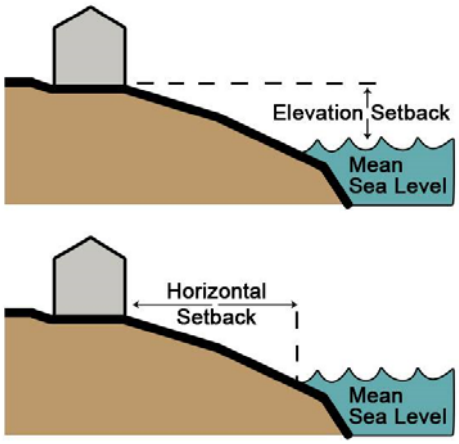
Setbacks prevent damage from flooding and erosion and protect coastal habitats and green space. Coastal setbacks enforce mandatory distances between the water and built structures. They minimize the vulnerability of infrastructure to coastal hazards, protect public health and safety, and limit environmental damage. [1] There are a variety of setback types that account for horizontal distances, or elevations, that are a fixed and uniform distance from a boundary (such as a coastline or high water mark) or that move, or retreat, when the boundary itself moves (such as an eroding coastline); or they are varying widths that are appropriate for changing conditions along a boundary.

Horizontal setbacks (or lateral setbacks) require that structures or activities are kept a certain distance away from a boundary, such as the high water mark or the edge of a steep embankment. Horizontal setbacks protect human activity from hazardous coastal conditions and protect coastal process and structures from human impacts.

Fixed setbacks maintain a fixed horizontal distance or elevation over time. They do not account for coastal changes such as sea level rise or erosion. They can, however, be adjusted (with an amendment to a by-law) to account for changing conditions.

Retreating setbacks account for changing conditions and migrate landwards with changes to the boundary, such as a changing coastline.

Buffers are similar to setbacks but they also prohibit removing vegetation within a certain distance from the coast. Vegetation preserves habitat, filters stormwater, and reduces erosion. Buffers are commonly used along banks and shores of streams and lakes and can also be applied to coasts.



Elevation setbacks (or vertical setbacks) require that structures, or the uses within a structure, are located at a certain elevation above the high water mark. Elevation setbacks protect activities and structures from flooding. Less vulnerable uses can occupy lower elevations, and more vulnerable uses, such as living space (residential) must locate above the elevation setback.

Horizontal (or lateral) **setbacks** are typically measured from the high water mark. They may also be established by other landscape features. (Image Source: Created by Yvonne Reeves, Dalhousie University)

OPPORTUNITIES	CONSTRAINTS
• Increases public safety during severe weather events. • Prevents damage to structures and infrastructure. • Conserves coastal habitats and open space. • Increases public access to the coast. • Can protect property values over time.	• Requires scientific data on coastal processes, such as erosion, and sea level rise to support legislation. • Can cause conflict with developers and property owners. • Requires monitoring to be effective.

Getting started and first steps – The Provinces of New Brunswick and Prince Edward Island have adopted standardized coastal setback requirements for all localities under their authority. All four provinces have setbacks for watercourses (see Legislative Context section). Where this type of provincial legislation does exist, municipalities must comply with provincial setbacks.

Communities with land use planning authority can apply stricter coastal setbacks and buffers in their area. Buffer regulations are already commonly used for streams, lakes and wetlands. Communities implement setback or buffer requirements with land use by-laws.[2]

Here are first steps toward implementing setbacks:

- Form a **committee** to research and make recommendations on setbacks.
- Review applicable **provincial legislation** in order to determine the criteria for setbacks or buffers.
- **Gather data and map** areas at risk to flooding and/or erosion, important coastal habitats, and other coastal areas that are valued by the community.
- **Gather data and map** projected sea level rise and erosion to back up setback or buffer requirements that take these issues into account.
- Establish a **community engagement** strategy highlighting the principles and justifications for introducing setbacks.

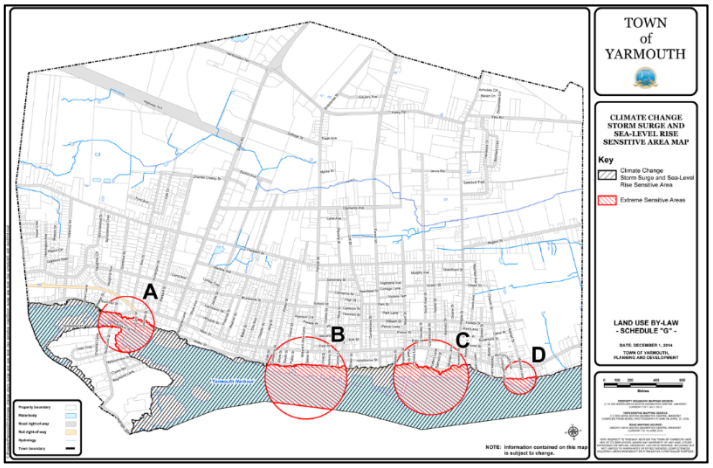
Setbacks Example (Regional)

Town of Yarmouth, Nova Scotia

Profile	
Coast	Atlantic
Region	Gulf of Maine
Impact Concerns	Sea level rise and storm surge
Population	6,761 (2011 Census)
Community Type	Town
Year	2014
Funding	Part of the normal planning process

Summary – The town of Yarmouth has amended its land use by-law to include an overlay zone. The zone requires vertical and horizontal setbacks for development within a new Climate Change Storm Surge and Sea-Level Rise Sensitive Areas Zone. The zone is now part of the *Town of Yarmouth's Municipal Planning Strategy*. Land use along the Town's waterfront is mainly industrial and commercial uses with some institutional and residential uses. The Town is concerned about damage that could be caused by sea level rise and storm surge to public and private property.

The Town used LiDAR imaging to map coastal areas at risk of flooding. Flood mapping assumes a worst-case scenario for storm surge by 2100. The mapping was completed through a partnership with the Atlantic Climate Adaptation Solutions Association. The Town's land use by-law requires setback restrictions for main buildings, accessory buildings, water dependant buildings, non-water dependant buildings, and buildings with hazardous materials. For example, main buildings that are non-water dependent must have a horizontal setback of 7.6 metres and a vertical setback of 4.8 metres. Main buildings that are water dependent do not have a horizontal setback but must have a vertical setback of 4.6 metres. Underground storage of hazardous materials is prohibited in the zone. Basements and sub-basements are also prohibited.[3]



Designated climate change and sea level rise sensitive areas requiring setbacks. (Image Source: Town of Yarmouth[4])

Recommended Resources

Town of Yarmouth Municipal Planning Strategy:

https://townofyarmouth.ca/index.php/town-services-main-menu/planning-developmen/municipal-planning-strategy

Town of Yarmouth Land Use By-law:

http://www.townofyarmouth.ca/attachments/article/80/LUB%20Current%20Version.pdf

[1] New Brunswick Department of Environment and Local Government. (n.d.). A coastal areas protection policy for New Brunswick. Retrieved from http://www2.gnb.ca/content/dam/gnb/Departments/env/pdf/Water-Eau/CoastalAreasProtectionPolicy.pdf

[2] Stewart, P.L., Rutherford, R.J., Levy, H.A., & Jackson, J.M. (2003). A guide to land use planning in coastal areas of the Maritime Provinces. *Fisheries and Oceans Canada: Oceans and Environment Branch.* Retrieved from www.dfo-mpo.gc.ca/Library/316491.pdf

[3] Town of Yarmouth. (2013). *Town of Yarmouth municipal planning strategy*. Retrieved from https://townofyarmouth.ca/index.php/town-services-main-menu/planning-developmen/municipal-planning-strategyTown of Yarmouth. (2014). *Town of Yarmouth land use bylaw*. Retrieved from http://townofyarmouth.ca/attachments/article/196/Land%20Use%20By-law%20Current%20Version.pdfTown of Yarmouth. (2013). *Climate change action plan workshop, Town of Yarmouth - July 17th, 2013*. Retrieved from https://townofyarmouth.ca/attachments/article/556/2013_workshop_powerpoint.pdf

[4] Town of Yarmouth. (2014). *Town of Yarmouth land use bylaw* [image]. Retrieved from http://townofyarmouth.ca/attachments/article/196/Land%20Use%20By-law%20Current%20Version.pdf

3.3.4 Subdivision By-law or Regulation

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term

Implementation time-frame: Short- to medium-term

Planning level: Provincial, regional, municipal

Planning process and plan type: Formal; professional; community planning; regulatory

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during mandatory plan reviews.

Subdivision by-laws can be used to regulate development in coastal areas. Sub-division by-laws control the size and configuration of lots (and therefore the number of lots for any given property, thus controlling density). A subdivision by-law may require a developer to provide a report from a qualified professional that shows where flooding or erosion will occur. The developer must also show how the land subdivision will avoid development in areas at risk or environmentally sensitive areas. A subdivision by-law may also require that the developer convey a minimum percentage of the land to the municipality for public use. This provision enables a community to acquire land along the coast. Within a subdivision agreement, the approving officer can also require that the developer will follow certain development standards and sign a waiver of liability. Subdivision by-laws can also include provisions that require setbacks, or enable conservation subdivision design.

OPPORTUNITIES	CONSTRAINTS
• Can amend an existing subdivision by-law to include regulations that account for coastal conditions and climate change. • Can tailor a by-law to each community's issues or objectives. • Can educate developers on coastal and climate change issues and adaptation.	• Cannot implement a local by-law without land use planning authority. • Can be contentious with landowners and developers with increasing restrictions or requirements in a by-law.

Getting started and first steps – Any municipality with land use planning authority can implement a local subdivision by-law. Local subdivision by-laws must comply with provincial subdivision legislation. Each province has legislation regarding subdivision by-laws (see Legislative Section). Here are first steps toward implementing a local subdivision by-law:

- Determine the local climate change issues and appropriate subdivision restrictions for dealing with those issues. Municipal planners, hired expertise, or a **committee** can carry out research into issues and appropriate subdivision restrictions for climate change at the coast.
- For communities with land use planning authority, develop a local subdivision by-law, or amend an existing one, to include subdivision restrictions deemed appropriate for the community in dealing with climate change.
- For communities that do not have land use planning authority, advocate to the province to develop subdivision regulations that address coastal protection and climate change adaptation. The province of Prince Edward Island already has regulations within its subdivision by-law that address coastal issues.

Subdivision Bylaw Example (Regional)

Souris, Prince Edward Island

Profile	
Coast	Atlantic
Region	Northumberland Strait
Impact Concerns	Erosion
Population	1,173 (2011 Census)
Community Type	Town
Area	3.8 km^2
Year	2002
Funding	Part of the normal planning process

The town of Souris is located in northeastern Prince Edward Island on the Northumberland Strait-Gulf of St. Lawrence coast. The Town is low-lying and has a soft, erodible coastline. (Image Source: Don Jardine, University of Prince Edward Island)

Summary – The town of Souris has provisions in its *Zoning and Subdivision Control Bylaw* that regulate subdivision of land that contains dunes and beaches. The Town's geography includes long sandy beaches, rolling hills, soft bedrock, and prominent cliffs. The land is gently sloping and the highest elevation is 38 metres above sea level. Port facilities in the town support fishing and agriculture.[1]

The Town's subdivision by-law requires that any subdivision of land needs a permit that must be approved by council. The subdivision of land that includes primary or secondary sand dunes, or baymouth barrier sand dunes, is limited to no more than five lots with a minimum of 2 acres per lot. Lot configuration must be such that all structures built in the subdivision will be at least 100 feet away from the sand dunes. No building or structure can be built on any sand dune and must be at least 100 feet from primary or secondary sand dunes.[2]

Recommended Resources

Town of Souris Zoning and Subdivision Control Bylaw:

http://www.sourispei.com/town_hall/by_laws/Zoning%20and%20Subdivision%20%28Development%29%20Bylaws.pdf

[1] Town of Souris. (n.d.). *Souris official plan*. Retrieved from www.sourispei.com/community/official_plan/offialplan.pdf

[2] Town of Souris. (n.d.). *Town of Souris: zoning & subdivision control (development) bylaw.* Retrieved from http://www.sourispei.com/town_hall/by_laws/Zoning%20and%20Subdivision%20%28Development%29%20Bylaws.pdf

3.3.5 Development Standards

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term

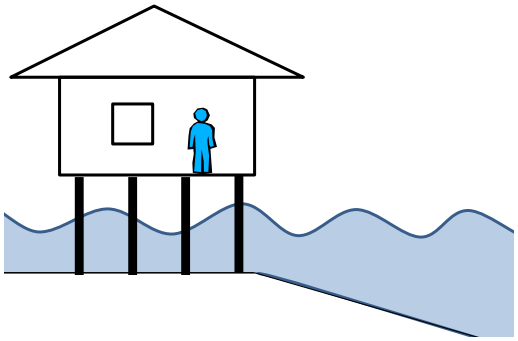
Implementation time-frame: Short to medium-term

Planning level: Municipal

Planning type and process: Formal; professional; community planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during plan review

Communities can use development standards to regulate the design of buildings, neighbourhoods, and infrastructure. Standards describe the requirements for subdivision, design, and construction. Local governments can develop, implement, monitor, and enforce standards within their jurisdiction. Standards can apply to the entire jurisdiction or a specific area. Development standards can direct development away from (avoid) or accommodate risks of climate change impacts including flooding and erosion.



Raised infrastructure is an accommodation adaptation technique. Raised infrastructure can be required through development standards. (Image source: Vincent Leys, CBCL Limited)

Development standards for buildings are applied through land use by-laws and zoning, urban design standards, and building codes. Setback requirements can be used to avoid risks. Structural requirements, such as floodwalls, wet flood proofing buildings, raised infrastructure, and floating buildings are development standards to accommodate risks.

Development standards for neighbourhoods can be applied through subdivision by-laws and urban design standards. The configuration of subdivisions can require that there is room for coastal setbacks.

Development standards for infrastructure can be applied through technical guidelines. Guidelines can be used to implement stormwater management through drainage ditches, detainment ponds, and rain gardens and constructed wetlands. These standards help to reduce inland flooding. Standards for infrastructure can also require that water and sewer pipes, roads, and sewage treatment facilities are set back from areas at risk to flooding and erosion.

OPPORTUNITIES	CONSTRAINTS
• Are enforced through law. • Can be used for new developments and reconstruction.	• Do not apply to existing structures.

Getting started and first steps – Any community with land use planning authority and a **statutory community plan** can use development standards. Here are first steps toward implementing development standards:

- **Gather data** about anticipated local hazards and risks due to climate change.
- Determine what standards are appropriate for dealing with climate change risks.
- Amend the **statutory community plan** to include development standards. Standards can be applied to the entire area of the municipality or a part of the municipality where there is **zoning.**
- Include development standards in a **land use by-law** or **subdivision by-law.**
- For communities without land use planning authority, advocate to the province to include climate change adaptation into provincial development standards.

Development Standards Example (International)

North Carolina, United States

Profile	
Coast	Atlantic
Region	Southeastern
Impact Concerns	Flooding and erosion
Population	9.9 million (2010 Census)
Community Type	State
Year	1989

Summary – The state of North Carolina has a coastal management section in *Chapter 7* of the *North Carolina Administrative Code*.[1] The section regulates development through land use planning requirements for areas of environmental concern including estuaries and ocean hazard areas.

Development standards are tailored to each area of environmental concern. For example, the development standards in estuaries regulate the size, location, and materials used for drainage ditches and the location of marinas, piers, docking areas, bulkheads, and groins. Standards for wetland areas prohibit marinas and any use that requires dredging. Standards also regulate non-water-dependent developments along estuary coasts. New developments must have a 30 foot buffer between the structure and the normal high water mark. Standards also prohibit developments from interfering with public access-ways to the water.

Ocean hazard areas have a number of design standards for four identified hazard areas. Setbacks in ocean hazard areas are measured by the vegetation line rather than the high water mark. No portion of the building, including roof overhangs, can extend seaward of the setback requirement. Setback requirements are based on the size of a building's footprint: for example, a building less than 5,000 square feet must be set back 60 feet or 30 times the shoreline erosion rate. A building larger than 5,000 square feet but smaller than 10,000 square feet must be set back 120 feet or 60 times the annual erosion rate. As building footprints grow the setback requirements increase from the vegetation line. Additions to an existing structure must comply with the setback requirements and cannot increase the footprint of a building if the building is not set back enough for the increase in size.

In ocean hazard areas infrastructure and utilities also have setback requirements: roads and bridges and utilities such as electricity, water, and sewer must be set back by 60 feet or 30 times the erosion rate. Parking lots over 5,000 square feet must be set back by 120 feet or 60 times the erosion rate.

There are also standards for temporary erosion control measures for ocean hazard areas. For example, sandbags can be used to protect primary buildings, septic tanks, roads, and bridges. A standard stipulates the location, duration and use of sandbag placements: landward of the high water mark, for two to eight years, as an erosion control measure. The standard also regulates the colour and size of sandbags.

Recommended resources

Coastal management in North Carolina (regulated under the North Carolina Administrative Code):

http://portal.ncdenr.org/web/cm/current-ruless-governing-coastal-development

Federal Emergency Management Agency's coastal construction manual:

http://www.fema.gov/media-library/assets/documents/3293

[1] Division of Coastal Management (1989). North Carolina administrative code: title 15A, chapter 7, coastal management. North Carolina Department of Environment and Natural Resources. Retrieved from http://portal.ncdenr.org/web/cm/current-ruless-governing-coastal-development

3.3.6 Development Agreements

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Short- to long-term

Implementation time-frame: Short-term

Planning level: Municipal

Planning type and process: Formal; professional; community planning; update with new climate change information and environment and land use changes and best practice standards during mandatory plan review

Development agreements can be used to direct development away from environmentally sensitive environments and areas at risk. The agreement is between a landowner and the land use planning authority. It is used to specify the standards and conditions that will be in place when the property is developed. Entering into an agreement is voluntary on both sides but is binding once it is made.

A development agreement is required for any development where a developer wants to develop in a form that is different from what the existing by-laws (is not 'as-of-right' or according to the regulations); or for development in areas where flexibility is possible and each development is considered individually (although certain criteria still apply such as land use mix, maximum densities, minimum lot sizes, protected areas, amenities, etc.). The local jurisdiction can place restrictions on the development to ensure that the community benefits from the project and that the development does not negatively impact adjacent neighbourhoods or the community. A community can also use this tool as an opportunity to allow for innovative developments, or as a bargaining tool to gain public amenities such as open or recreational space. [1] The developer will benefit usually from gaining more density.

OPPORTUNITIES	CONSTRAINTS
• Can use these agreements to allow development innovations that are not included in by-laws but that will be beneficial to the community. • Can include a positive trade-off for both the landowner and the community. • Can approve an agreement with site-specific information.	• Cannot implement this tool without land use planning authority. • Can be contentious with the public if community members do not agree with the terms set out by a development agreement.

Getting started and first steps – Any community with land use planning authority can enter into a development agreement with a landowner or developer in each of the four Atlantic Provinces.

- Develop strategies for development agreements in a **statutory community plan** or **guidance, action, and management plans**. This simplifies decision-making when development agreements are brought forward by developers and prevents poor development decisions when approving developments that deviate from the by-law.

Development Agreement Example (Regional)

Town of Bridgewater, Nova Scotia

Profile	
Coast	Atlantic
Region	South Shore
Impact Concerns	Flooding and erosion
Population	8,241 (2011 Census)
Community Type	Town
Year	2014
Funding	Part of the planning process

Summary – The town of Bridgewater has included a section in its *Municipal Planning Strategy* to address development along the estuary of the LaHave River using development agreements. The section describes the current conditions along the estuary, and requirements for development in the area. Bridgewater partnered with the Applied Research Geomatics Group in 2012 to carry out a flood and erosion risk assessment based on climate change scenarios. The Town designated a LaHave River Development Agreement Area using information gathered from this research. The area is also included in the Town's *Land Use By-law* and zoning map.[2]

A section of the Town of Bridgewater's Zoning Map showing the LaHave River Development Agreement Area in hatching. The zone overlays other land use zones. (Image source: Town of Bridgewater[3])

According to the land use by-law, development must comply with all other existing requirements for land use zones as well as requirements for the LaHave River Development Agreement Area.[4] The zoning map for the Town shows where the zone overlays other zones. Council can only permit new developments in this area through a development agreement and must consider the flood and erosion risk assessment in all development agreement applications for the area.

Council must consider a set of 15 criteria contained in the *Municipal Planning Strategy* for development in the zone. One criterion is that no development can be permitted in areas where people and property are at risk of flooding. Another criterion is that the development cannot include institutional buildings such as hospitals, nursing homes, and care facilities (they are prohibited). Any excavation or infilling that is associated with development in the zone must not increase the risk of ice jamming or alter the flow of water in a way that will increase or create flooding issues along the river.[5]

The *Municipal Planning Strategy* also includes a policy that council must consider acquiring land in the Lahave River Development Agreement Area for public purposes.

Recommended Resources

Town of Bridgewater Land Use By-law:

http://www.bridgewater.ca/document-library/planning/planning-documents/768-2014-land-use-by-law-zoning-map/file

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[1] Municipal Research and Service Centre. (2013). Development agreements in plain English. Retrieved from http://www.mrsc.org/subjects/planning/lu/developagreements.aspx

[2] Town of Bridgewater. (2014). Municipal planning strategy. Retrieved from http://www.bridgewater.ca/document-library/planning/planning-documents/767-2014-municipal-planning-strategy-maps/file

[3] Town of Bridgewater. (2014). Land use by-law: zoning map [image]. Retrieved from http://www.bridgewater.ca/document-library/planning/planning-documents/768-2014-land-use-by-law-zoning-map/file

[4] Town of Bridgewater. (2014). Land use by-law. Retrieved from http://www.bridgewater.ca/document-library/planning/planning-documents/768-2014-land-use-by-law-zoning-map/file

[5] Town of Bridgewater. (2014). Municipal planning strategy. Retrieved from http://www.bridgewater.ca/document-library/planning/planning-documents/767-2014-municipal-planning-strategy-maps/file

3.3.7 Transfer of Development Credits

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

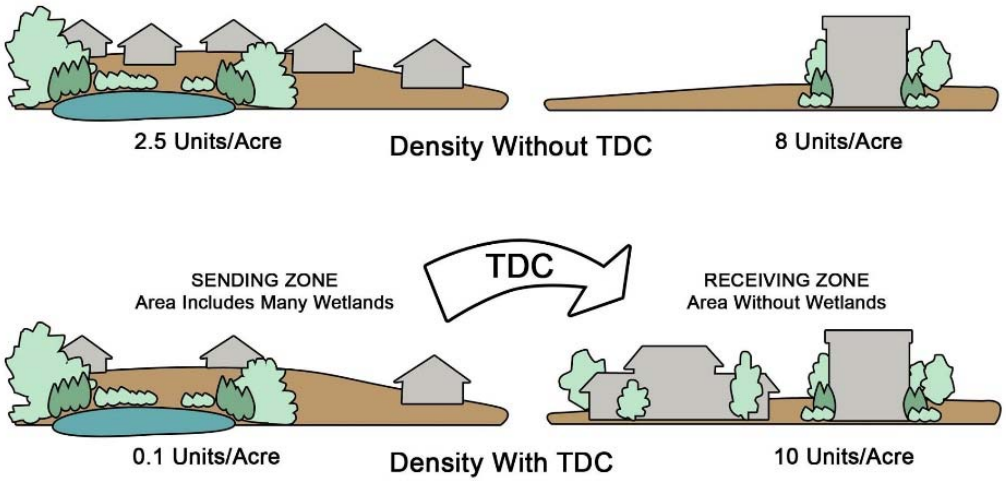
Implementation time-frame: medium- to long-term

Planning level: Provincial, regional, municipal

Planning process and plan type: Formal; professional; community planning.

Adapting to climate change: Update with new climate change information and environment and land use changes when assessing 'sending zone' locations

Transfer of development credits is a tool used during the development of new subdivisions. It can be used to preserve coastal open space and recreational opportunities, avoid hazards, and protect habitats, all desirable actions for climate change adaptation. Transferable development credits are market incentives designed to move development away from areas not suited for development, such as hazardous or environmentally sensitive areas, referred to as sending areas, to areas suitable for development, referred to as receiving areas. The development potential of the sending area is calculated and sold to developers with interests in receiving areas. Receiving areas are then developed with increased density, height, or floor area allowances.[1] The tool is more commonly used in the United States but it has also been used in Canadian municipalities.[2]



Example of how transfer of development credits (transfer development rights in the USA) work and can be used to increase density. (Image Source: Yvonne Reeves, Dalhousie University, modified from image by Huron River Watershed Council[3])

OPPORTUNITIES	CONSTRAINTS
• Protects public safety by preventing development in hazardous areas. • Promotes sustainable development by increasing density in designated areas. • Compensates coastal property owners and reduces legal conflicts.	• Can be difficult to implement and administer. • "Down-zoning" of sending and "up-zoning" of receiving areas can result in conflict. Building and restoring wetlands requires maintenance until the wetland is established.

Getting started and first steps – A system of transfer of development credits is usually set up through **zoning** and **by-laws**. Once the development potential of a sending area is sold, **conservation easements** are typically established on the property in order to ensure that no future development takes place.

Here are some first steps:

- **Gather data and map** areas desirable as sending areas: places that support important natural processes and serve as natural protective barriers; or areas of natural hazards such as those prone to flooding and erosion.
- Establish a **community engagement** strategy to promote the program.
- Develop a land use **zone and by-law** for sending area properties.

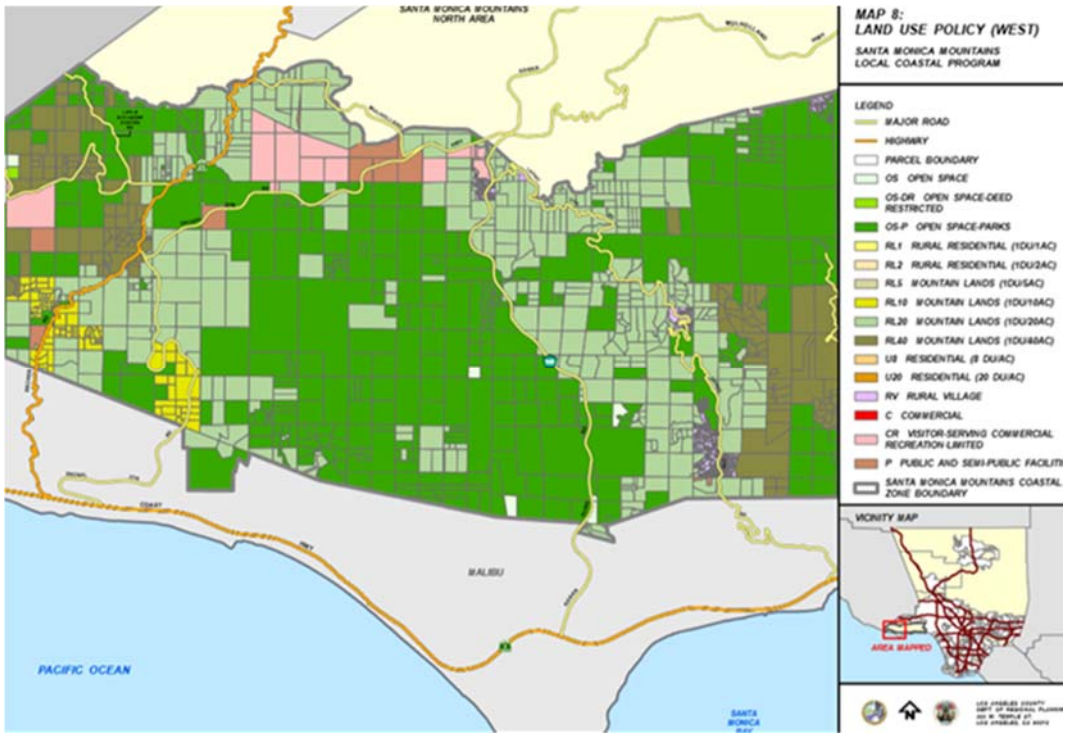
Transfer of Development Credits Example (International)

City of Malibu, California

Profile	
Coast	Pacific
Region	California
Impact Concerns	Flooding and landslides
Population	12,000 (2010 census)
Community Type	City
Year	2002
Funding	Part of the normal planning process

Summary – The City of Malibu is located within the jurisdiction of Los Angeles County. The City extends along 34 km of California's southern coast. Most of the City's residents live within several hundred metres of the coastal beaches and bluffs.

The community was built long before there were subdivision regulations. As a result, many properties are in areas that are now considered unsuitable for development due to a high potential for floods, wildfires, and landslides. One such location is the Santa Monica Mountain Coastal Zone, an area characterized by steep clay cliffs. The Zone has been designated as a "sending area" under Malibu's zoning by-law. Under this by-law, new subdivision development within the City, with the exception of affordable housing units, is possible only with the purchase of development rights from donor lots within the Santa Monica Coastal Zone. Once they are "retired", properties within the sending area are protected through permanent open space easements. This provides the City with recreation space and a natural buffer against coastal hazards.[4]



THE SANTA MONICA MOUNTAIN COASTAL ZONE (INDICATED IN GREY) HAS BEEN DESIGNATED A "SENDING" AREA. (IMAGE SOURCE: LA COUNTY DEPARTMENT OF REGIONAL PLANNING[5])

Recommended resources

Canadian experience with transfer of development credits report:

http://www.rockies.ca/downloads/Cdn_experience_with_TDC.pdf

City of Malibu Local Coastal Program:

Local Implementation Plan (Chapter 7: Transfer of Development Credits):

www.coastal.ca.gov/ventura/malibu-lip-final.pdf

Adaptation tool kit: How governments can use land use practices to adapt to sea-level rise:

http://www.georgetownclimate.org/sites/default/files/Adaptation_Tool_Kit_SLR.pdf

[1] Grannis, J. (2011). Adaptation toolkit: sea level rise and coastal land use. How governments can use land-use practices to adapt to sea-level rise. *Georgetown Climate Centre.* Retrieved from www.southernclimate.org/documents/.../Adaptation_Tool_Kit_SLR.pdf

[2] Greenaway, G. & Good, K. (2008). *Canadian experience with transfer of development credits and their potential application to agri-environmental policy*. Retrieved from http://www.rockies.ca/downloads/Cdn_experience_with_TDC.pdf

[3] Huron River Watershed Council. (2013). *Market approach to watershed protection. Transfer of development rights* [image]. Retrieved from http://www.hrwc.org/publications/smart-growth-publications/transfer-of-development-rights/

[4] City of Malibu. (1991). Malibu local coastal program local implementation plan. Retrieved from www.coastal.ca.gov/ventura/malibu-lip-final.pdf

[5] Los Angeles County. (2013). Zoning (west) map [image]. Retrieved from http://planning.lacounty.gov/assets/upl/project/coastal_submitted-zoning-map-west.pdf

3.3.8 Land Swap

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: Medium- to long-term

Planning level: Provincial, regional, municipal

Planning process and plan type: Formal and semi-formal; professional; community planning

Adapting to climate change: Identify public lands, or build an inventory of lands, for coastal land exchange. Prioritize locations based on climate change assessments

A land swap is an exchange of land between governing bodies or between a governing body and a landowner. The exchange of property rights for the land parcels must be beneficial to both parties. This tool can be used to achieve the goals and objectives set out in a community's statutory community plan or guidance, action, and management plans.

In the context of coastal planning and climate change adaptation planning, communities could agree to a land swap with landowners of coastal properties for another parcel of land, inland from the coast. The local jurisdiction could use the coastal property for the public good. Properties that are at risk of coastal hazards or that contain valued coastal habitats or features can be targeted by a community to prevent development of these areas.

The land swap tool can also be used to reduce jurisdictional conflicts where infrastructure owned by one level of government is located on land owned by another level of government. The land can be swapped to the government that owns the infrastructure to simplify infrastructure adaptation.

Example of lands swapped between the City of Victoria, BC and the Province of British Columbia. (Image Source: Times Colonist[1])

OPPORTUNITIES	CONSTRAINTS
• Can be used to remove people and structures from at-risk areas. • Can increase public access to the coast. • Can simplify infrastructure management.	• Requires the agreement of a second party (landowner or other governing body).

Getting started and first steps – Any interested party can initiate a land swap. A community could use land swap as a strategy within a **land acquisition strategy**, **statutory community plan**, or **guidance, action, and management plan.** Here are first steps toward using this tool for climate change adaptation:

- Identify public lands that could be offered up in a swap and private coastal lands that would benefit the community and that could further climate change adaptation objectives.
- Develop a **community engagement** strategy for approaching landowners or other governing bodies about land swaps.

Land Swap Example (Regional)

Basin Head, Kings County, Prince Edward Island

Profile	
Coast	Atlantic
Region	Northumberland Strait
Impact Concerns	Loss of beach and environmentally sensitive land
Community Type	Province
Year	2007
Funding	The Nature Conservancy of Canada and the Government of Prince Edward Island
Coast	Atlantic

Summary – A land swap between the province of Prince Edward Island and the Waterworth family allowed the Province to acquire 142 acres of land at Basin Head in Kings County. The Province exchanged 28 acres of land and cash to acquire the land. The Nature Trust of Canada also contributed money towards the land exchange. Partnership with the Nature Trust and the work of dedicated provincial staff made this deal possible.

Now that the land is held by the Province, it will be protected as a provincial park and its biodiversity will be preserved for future generations. The Provincial Wildlife Federation has developed a *Basin Head Watershed Management Plan* for the area.[2]

Basin Head coastline is a popular beach destination. Prince Edward Island obtained the land behind the beach through a land swap with a landowner. (Image Source: John Sylvester, PEI Government)

Recommended resources

Provincial news release of the Basin Head land exchange:

http://www.gov.pe.ca/tir/index.php3?number=news&newsnumber=5442&lang=E

[1] Times Colonist. (2014). *Land swap gives Victoria ownership of Crystal Garden* [image]. Retrieved from http://www.timescolonist.com/news/local/land-swap-gives-victoria-ownership-of-crystal-garden-1.867026

[2] Government of Prince Edward Island. (2007). *Province acquires deed to Basin Head Beach news release*. Retrieved from http://www.gov.pe.ca/immigration/index.php3?number=news&lang=E&newsnumber=5442

3.3.9 Land Use Conversion and Redevelopment

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: Medium- to long-term

Planning level: Provincial, regional, municipal

Planning process and plan type: Formal and semi-formal; professional to semi-professional; community planning

Adapting to climate change: Identify potential land for conversion using climate change impact assessments; update land use zoning with new climate change and environment and land use change information during plan reviews

Land use conversion and redevelopment can be used to remove unsuitable land uses and structures from coastal areas. Land use conversion is usually a strategy for publicly owned land but private landowners can change land uses as well (within the constraints of the land-use by-law). Land uses can be changed through land use planning and zoning, through land acquisition or land swaps, and by redeveloping public land by, for example, converting developed land into a park or agricultural lands back to their natural wetland habitat. Land use conversion can be used in conjunction land acquisition and land swaps. Converting land to less intensive uses is a powerful tool for coastal climate change adaptation. It removes uses that can be damaged through coastal hazards but can still keep the land available for lower-risk productive use (like agriculture or aquaculture). It can also encourage re-generation of coastal habitat or make more land available for public uses.

The Veta de la Palma Estate in Spain converted agricultural land into a marshland habitat that supports a natural aquaculture system. The land is still used for food production but has been restored to its natural habitat. (Image Source: Agroatlantica [1])

OPPORTUNITIES	CONSTRAINTS
• Can remove at risk structures or uses away from the coast. • Can be used to increase public access to the coast. • Can re-establish coastal habitats.	• May be costly to redevelop land. • May be controversial if implemented through legislation.

Getting started and first steps – Any incorporated community has the authority to redevelop its community owned public lands or to acquire land for redevelopment. Communities with land use planning authority can amend their **land use by-laws and zoning** to change the land uses permitted in a coastal area:

- Establish a **committee** to make recommendations on land use changes and redevelopment.
- Identify lands that require a land use change through **data gathering and mapping**.
- Acquire suitable land if it is privately owned.
- Develop a strategy for conversion or redevelopment.

Land Use Conversion and Redevelopment Example (International)

Blackwater Estuary, Essex, United Kingdom

Profile	
Coast	Atlantic
Region	North Sea
Impact Concerns	Storm surge, increased wave action
Community Type	Region
Area	20 km long estuary
Year	2002
Funding	RSPB

Summary – Blackwater Estuary comprises 20 kilometres of shoreline of the River Blackwater in Essex on England's southeast coast. Centuries of development and agriculture destroyed the salt marshes; seawalls now protect the towns and farmland. The coast experiences storm surges. The shoreline defenses of the Estuary create turbulence as waves bounce off of the seawalls, eroding them at their base and damaging the structures. Over time the cost of maintaining the seawalls became more than the value of land behind them.[2]

The Royal Society for the Protection of Birds (RSPB) and Natural England, two nature conservation organizations, proposed that the area be returned to marshland; a conversion would also serve to restore rare wetland habitats. The two groups set up an experimental project in a section of the Estuary, the Blackwater National Reserve and Saint Lawrence Bay. The areas of land used for the project were already owned by RSPB and were being rented to farmers or were bought by RSPB for the project. Some seawalls in the area were removed and others were abandoned to breach naturally over time. The two organizations worked with local area residents and land owners who were concerned about the loss of farmland. Sheep and cattle are still able to graze along the fringe of the saltmarshes.[3]

BREACHED SEAWALLS IN AN AGRICULTURAL AREA OF ESSEX. SEAWALLS WERE REMOVED OR LEFT TO DETERIORATE NATURALLY, RECREATING THE FORMER NATURAL SALT MARSH OF THE AREA. (IMAGE SOURCE: CHARLIE OLIVER)

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[1] Agroatlantica. (n.d.). Unique quality sustainable sea bass. Veta la Palma map [image]. Retrieved from http://www.agroatlantica.com/2012_11_23_archive.html

[2] Coastal Features. (n.d.). *Managed realignment case studies*. Retrieved from http://www.coastalfutures.org.uk/benefits.html

[3] Ibid.

3.3.10 VARIANCES

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

INFLUENCE TIME FRAME: SHORT- TO LONG-TERM

IMPLEMENTATION TIME-FRAME: SHORT-TERM

PLANNING LEVEL: REGIONAL, MUNICIPAL

PLANNING PROCESS AND PLAN TYPE: FORMAL; PROFESSIONAL; COMMUNITY PLANNING

ADAPTING TO CLIMATE CHANGE: UPDATE WITH NEW CLIMATE CHANGE INFORMATION AND ENVIRONMENT AND LAND USE CHANGES AND BEST PRACTICE STANDARDS DURING MANDATORY PLAN REVIEWS.

Variances allow for flexibility with land use restriction tools such as setbacks in a land use by-law. A variance allows developers to build in a way that does not comply with the current by-law, providing they can prove that a development is suitable for a site. A variance provision in a land use by-law can simplify the variance decisions without compromising the development restrictions within the by-law. A variance provision may require a developer to provide information on features of the site such as soil and shoreline type and to prove that the new development is still in-line with the objectives of the community. The variance can allow for leniency in areas of complex coastlines, for example, where some areas might be prone to flooding or erosion while other areas are not. A variance allows for adjustments at the site level. Development that uses a variance must be approved through a development agreement.

OPPORTUNITIES	CONSTRAINTS
• Allows for flexibility within by-laws. • Allows for good and innovative developments to be approved even if they do not comply with certain restrictions. • Allows for adjusting to variable conditions along complicated coasts.	• Can result in poor development decisions in coastal areas if information is inadequate or if over-used or misused.

Getting started and first steps – Any community with land use planning authority can use variances within an existing **land use by-law**:

- Develop strategies for variances in a **statutory community plan** or **guidance, action, and management plans**. This simplifies decision-making when variances are brought forward by developers and prevents poor development decisions when approving a variance for development that deviates from the by-law.

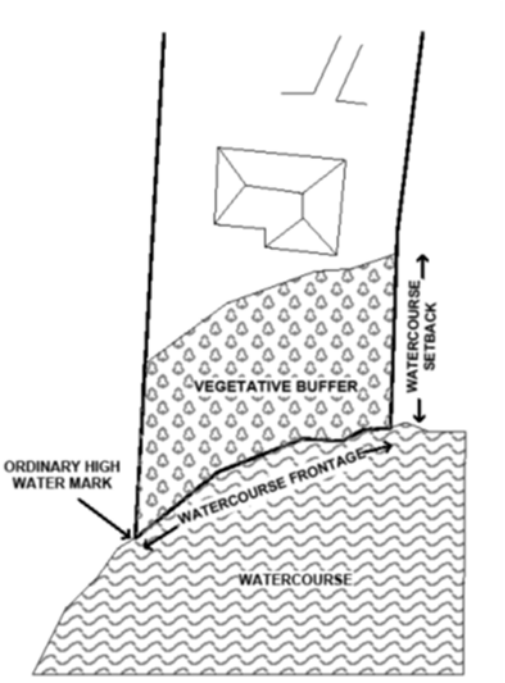
VARIANCES EXAMPLE (REGIONAL)

REGION OF QUEENS MUNICIPALITY, NOVA SCOTIA

Profile	
Coast	Atlantic
Region	South Shore
Impact Concerns	Erosion and Flooding
Population	10,917 (2011 Census)
Community Type	District Municipality
Area	2,392 km^2
Year	2009
Funding	Part of the normal planning process

Summary – The region of Queens Municipality has put in place a regulation for horizontal setbacks of 15.24 metres with a vegetated buffer (maintaining at least 75% of natural vegetation). The Municipality's land use by-law allows for a variance to this regulation if the elevation of the site is higher than 7.44 metres. If this is the case then the horizontal setback can be reduced to 7.62 metres from the ordinary high water mark. The development must not increase coastal erosion and the land must not be subject to seasonal flooding.

These regulations and permitted variance were put in place to achieve the Municipality's goal in its *Regional Municipal Planning Strategy* to "encourage land development within the Region of Queens Municipality that protects the quality of the natural environment and the safety of all residents." [1]



Required setback for development in the Region of Queens Municipality Land Use Bylaw. The By-law includes a variance for setbacks that allows for developments on higher ground to be built closer to the shoreline. The definition for watercourses in the By-law includes "ocean" (Image Source: Region of Queens Municipality[2])

[1] Region of Queens Municipality. (2009). *Municipal Planning Strategy, 2009.* Section 1.6.3: General goals for a sustainable future, 15. Retrieved from http://www.regionofqueens.com/planning/land-use/mps-process

[2] Region of Queens Municipality. (2009). *Land Use Bylaw.* Section 6.36: Watercourse setback and vegetative buffer [image], 47. Retrieved from http://www.regionofqueens.com/planning/land-use/mps-process

3.3.11 WAIVER

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

INFLUENCE TIME FRAME: SHORT-TERM

IMPLEMENTATION TIME-FRAME: SHORT -TERM

PLANNING LEVEL: MUNICIPAL

PLANNING PROCESS AND PLAN TYPE: FORMAL; PROFESSIONAL; COMMUNITY PLANNING

ADAPTING TO CLIMATE CHANGE: UPDATE WITH NEW CLIMATE CHANGE INFORMATION AND ENVIRONMENT AND LAND USE CHANGES AND BEST PRACTICE STANDARDS DURING MANDATORY PLAN REVIEW

Waivers can be used as a short-term measure to accommodate coastal developments for climate change while a community develops long-term adaptation strategies. A community should not rely on waivers for a long-term adaptation approach. Waivers should only be used as a bridge to putting new regulations in place, once a community decides to restrict or more tightly regulate development in at-risk areas. It is during this time that existing regulations are still in effect and a land owner can apply for approvals under the regulations. A waiver aims to limit a municipality's liability for structures built in at-risk areas by having the developer acknowledge and take responsibility for risks to their development. A municipality can require a developer to sign a waiver as part of the application process. A waiver can be a useful education tool in that it can inform developers and landowners who may not be aware of the risks involved with their proposed development.

OPPORTUNITIES	CONSTRAINTS
• Can be implemented in a short timeframe. • Educates developers and landowners of risks involved with coastal developments.	• Does not restrict inappropriate development in coastal areas.

Getting started and first steps – Waivers can only be used by communities with land use planning authority because they are part of the development approval process:

- Use waivers as a short-term approach to dealing with coastal development while working towards long-term solutions.
- Include requirements for a waiver in a **land use zone**.
- Establish a waiver that can be used with individual developments, as a condition on a **variance** or through a **development agreement**.
- Seek legal expertise for developing a waiver.

Waiver Example (Regional)

Municipality of the County of Kings, Nova Scotia

Profile	
Coast	Atlantic
Region	Bay of Fundy
Impact Concerns	Storm Surge
Population	60,589 (2011 Census)
Community Type	County
Area	2,122 km^2
Year	2014
Funding	Part of the normal planning process

Summary – The *County of Kings Land Use Bylaw* includes two overlay zones to deal with coastal flooding: the Urban Floodplain Zone and the Urban Floodplain Warning Zone. Within the Urban Floodplain Zone, new buildings and additions must be flood-proofed to withstand a storm surge of 28.2 feet above mean sea level.[1]

Within both floodplain zones, developers and landowners must sign a waiver. The Bylaw states that "prior to any development taking place, regardless of the scale, the property owner must provide written acknowledgement indicating that the development is located within an area identified as being vulnerable to the predicted worst case storm surge and sea level rise scenario of 34 feet above mean sea level, representing the estimated extent of the 1869 Saxby Gale plus a sea level rise of 25 inches."[2] (Sections 3.17.1.2 and 3.17.2.1)

Recommended resources

County of Kings Municipality Land Use Bylaw:

http://www.countyofkings.ca/upload/All_Uploads/RESIDENTS/Planning/lub/sections/section3.pdf

[1]County of Kings. (2014). County of Kings Land Use Bylaw. Retrieved from http://www.countyofkings.ca/upload/All_Uploads/RESIDENTS/Planning/lub/sections/section3.pdf

[2] Ibid.

3.3.12 Land Trust

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: Medium- to long-term

Planning level: Provincial, regional, municipal

Planning process and plan type: Formal and semi-formal; professional to semi-professional; community planning; natural areas planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards when assessing land acquisition programs

A land trust is a non-profit organization that acquires and manages land and negotiates easements for non-development purposes such as conservation of significant habitats. Land trusts acquire land through purchase, donation, easements, and covenants. They are usually able to offer incentives such as tax deduction charitable receipts for the donation of land and money. Nature Conservancy Canada is a land trust that holds land in all four Atlantic Provinces. The Trust has more than thirty project areas in New Brunswick,[1] twenty-six in Newfoundland and Labrador[2], twenty-five in Prince Edward Island,[3] and forty-six in Nova Scotia.[4] The projects add up to more than 23,500 hectares of conservation land in Atlantic Canada.[5] There are provincial sections of the Nature Conservancy in each of the four provinces. There are also provincial land trust organizations:

- Island Nature Trust, Prince Edward Island[6]
- Nova Scotia Nature Trust[7]
- Nature Trust of New Brunswick[8]

OPPORTUNITIES	CONSTRAINTS
• Financing and management of land is covered by the land trust. • Can increase public access to the coast. • Can partner with a land trust to identify areas of land that are appropriate for coastal habitat protection.	• Acquiring land can be costly. • Relies on property owners deciding to donate land or enter into an easement. • Can only accept land that has enough area to provide a large habitat reserve.

Getting started and first steps – Any community can enter into a **partnership** with a land trust to enable land acquisition and **conservation easements** in a community for environmental protection. Here are some first steps toward partnering with a land trust:

- Identify land trusts active in the local area.
- Promote land trusts to residents through **community engagement**. Engagement educates landowners about land trusts and can encourage the donation of coastal lands or of **conservation easements** on private land.

Land Trust Example (International)

Worchester County, Maryland

Profile	
Coast	Atlantic
Region	East
Impact Concerns	Sea level rise
Population	51,454 (2011 Census)
Community Type	County
Year	1997
Funding	State of Maryland

Summary – Worcester County, Maryland, created a plan which established a Worcester County Coastal Bays Rural Legacy Area. The County sought to protect their highly valued waterbody, Chincoteague Bay. The County was concerned about the loss of wetlands and agricultural land due to increased development. The County was also worried that coastal armouring and development would restrict wetlands from migrating inland with sea level rise.

Historical records show that the average sea level rise for the County has been 3.1 mm/year since 1920. Using IPCC projections, the County is planning for a worst case scenario of a 1.47 metre sea level rise by 2100. The County has an extensive coastline that includes numerous bays, sand beaches, and salt marshes. The land is at low elevation with a gradual slope. Projections of future inundation show that many large rural properties and hundreds to thousands of developed parcels will be lost by 2100.

The County worked with a local land trust to educate landowners, and as a result many landowners were interested in the program. Over $7.25 million was contributed to securing land through the Maryland Rural Legacy Program, a state run program, and $400,000 was contributed by Worcester County.

Through this program 6,000 acres of land and eight miles of coastline have been secured around the bay. The County continues to reach out to landowners that are not involved with the program offering information about programs for protection. The County has also developed a brochure to promote the program and conservation easements.[9]

Land Trust Example (International)

Waihe'e Coastal Dunes and Wetlands Refuge, Hawaii, United States of America

Profile	
Coast	Pacific
Region	Maui
Impact Concerns	Sea level rise, loss of sand dunes
Community Type	Wetland refuge
Area	277 acres
Year	2004
Funding	Multiple partners (see below)

Summary – Waihe'e Coastal Dunes and Wetland Refuge is owned and managed by the Hawaiian Island Land Trust. The property is located in the county of Maui, Hawaii. It was overrun by non-native plant species and slated for developed as a golf course before the trust took ownership. The Refuge includes coastal and freshwater wetlands, sand dunes, and shoreline that are critical for native wildlife habitat. The Refuge also contains historical sites, including an old village and burial sites: it is an important site in Hawaiian legends. Sheep ranging and taro patches, a native root vegetable, are located within the Refuge. Protecting agricultural land is also a conservation priority for the Hawaiian Island Land Trust.

The Trust is worried about sea level rise and the loss of previously disturbed sand dunes. It is working to restore native vegetation and shoreline resilience against sea level rise. This is an expensive undertaking but the Trust has gained support from multiple partners; approximately $80,000-$120,000 are invested annually into the maintenance of the Refuge.[10]

Partners – Funds to purchase the land for the Waihe'e Coastal Dunes and Wetland Refuge came from the

county of Maui, the United States Fish and Wildlife Service (USFWS), and the National Oceanic and Atmospheric Administration (NOAA). The United States Fish and Wildlife Service and Natural Resource Conservation Service's Wetlands Reserve Program and other donors provide the funding for the ongoing management of the Refuge.

ACQUIRED COASTLINE IN THE WAIHE'E COASTAL DUNES AND WETLAND REFUGE IS BEING RESTORED BY THE HAWAIIAN ISLAND LAND TRUST. (IMAGE SOURCE: HAWAIIAN ISLANDS LAND TRUST[11])

Recommended resources

Waihe'e Coastal Dunes and Wetland Refuge information:

http://www.landtrustalliance.org/climate-change-toolkit/inspire/case-studies/hawaiian-islands-land-trust-waihe2019e-coastal-dunes-and-wetlands-refuge

[1] Nature Conservancy Canada. (2015). New Brunswick. Retrieved from http://www.natureconservancy.ca/en/where-we-work/new-brunswick/

[2] Nature Conservancy Canada. (2015). Newfoundland and Labrador. Retrieved from http://www.natureconservancy.ca/en/where-we-work/newfoundland-and-labrador/

[3] Nature Conservancy Canada. (2015). Prince Edward Island. Retrieved from http://www.natureconservancy.ca/en/where-we-work/prince-edward-island/

[4] Nature Conservancy Canada. (2015). Nova Scotia. Retrieved from http://www.natureconservancy.ca/en/where-we-work/nova-scotia/

[5] Nature Conservancy Canada. (2015). New Brunswick. Retrieved from http://www.natureconservancy.ca/en/where-we-work/new-brunswick/

[6] Island Nature Trust (2015). Retrieved from http://www.islandnaturetrust.ca/

[7] Nova Scotia Nature Trust. (2015). Retrieved from http://www.nsnt.ca/

[8] Nature Trust of New Brunswick (2015) Retrieved from http://www.naturetrust.nb.ca/wp/

[9] Worchester County. (2014). Worcester Counties Rural Legacy Program. Retrieved from http://co.worcester.md.us/RLpage.aspx

[10] Land Trust Alliance. (2014). The Waihe'e Coastal Dunes and Wetlands Refuge: full case study. Retrieved from http://www.landtrustalliance.org/climate-change-toolkit/inspire/case-studies/hawaiian-islands-land-trust-waihe2019e-coastal-dunes-and-wetlands-refuge

[11] Hawaiian Islands Land Trust. (2011). Waihe'e Coastal Dunes and Wildlife Refuge [image]. Retrieved from http://www.hilt.org/saturday-85-free-guided-walk-at-the-waihe%E2%80%98e-coastal-dunes-wetlands-refuge/

3.3.13 Rolling Easements

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: Medium-term

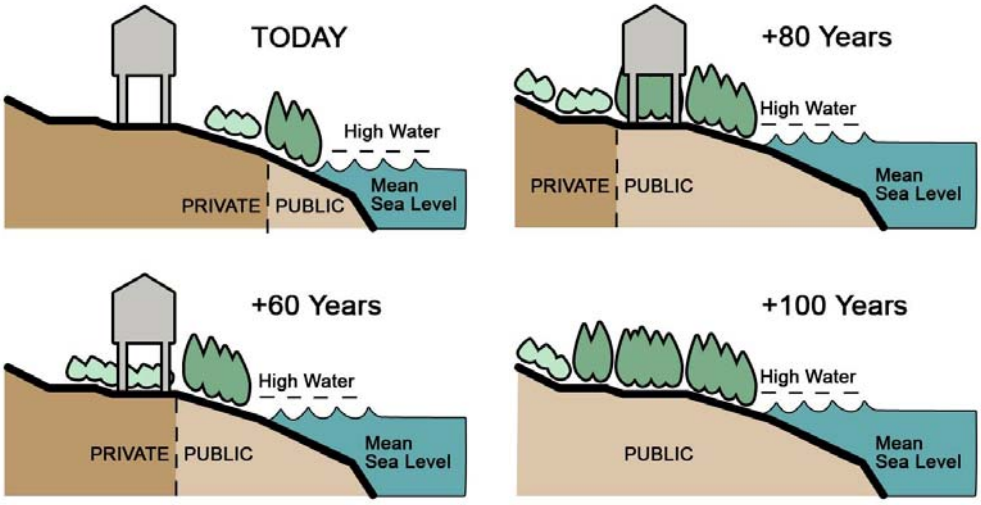
Planning level: Provincial, regional, municipal

Planning process and plan type: Formal; professional; community, environmental and site planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during program reviews

Rolling easements respond to natural coastal changes including erosion, deposition, or sea level change without restricting development. They prohibit hard armouring along the coast allowing for the natural processes of erosion and deposition. Landowners are permitted to develop anywhere on their property as long as no armouring is used and public access to the coast remains open. The easement moves with the coastline as it changes through time.

A rolling easement requires a clear definition of the coastal boundary and where the boundary between public and private land lies. The boundary is determined by the natural state of the land and moves with changing coastal conditions such as rising sea levels. The boundary can be determined by the line of vegetation or the mean high tide. Coastal roads can be moved inland with rolling easements to ensure that access to private properties is not cut-off. Roads can be rebuilt over private properties if properties become damaged from coastal flooding and erosion as determined by the State. Erosion also brings the shoreline (and boundary) inland. Any structures that become vulnerable to flooding or erosion, threaten human health and safety, or that change ownership because the change in boundary position means that the structures ends up on public land must eventually be relocated. If the structure is still habitable but is located on public land, the State can choose to charge the inhabitants rent until the State determines that the structure is no longer safe. Rolling easements encourage coastal landowners to build smaller, moveable structures.[1]



EXAMPLE OF ROLLING EASEMENT. (IMAGE SOURCE: YVONNE REEVES, DALHOUSIE UNIVERSITY, MODIFIED FROM IMAGE BY J.G. TITUS[2])

OPPORTUNITIES	CONSTRAINTS
• Promotes the development of smaller, moveable structures. • Preserves public access along the shore. • Does not require a line to be drawn on a map; ownership is based on vegetation, dunes, or roads on the ground. • Can be used to allow landward relocation of public infrastructure. • Allows wetlands to migrate inland.	• Can be unpopular with residents if it is imposed rather than voluntary. • Can be costly to obtain ownership of and manage acquired land and structures over time. • Litigation costs arise when landowners don't comply with the terms of the regulations and acquisition of land.

Getting started and first steps – Rolling easements have been enforced at the state level in the United States. No examples of this tool have been identified in Canada but it could be implemented at the provincial level: there is already familiarity with the principle in the Atlantic region. The high tide line is the boundary between private and public land in Canada and this line will move landward (or seaward) with changing sea level. Rolling easements reflect coastal boundary changes with other landscape markers such as coastal vegetation.

Here are some first steps towards implementing this tool:

- Advocate to the province for rolling easements. See the Legislative Section of this document to determine the provincial department responsible for Crown lands.
- For communities with land use planning authority, identify opportunity for coastal protection measures using rolling easements on land subject to the local land use planning authority.

Rolling Easements Example (International)

State of Texas, United States of America

Profile	
Coast	Gulf of Mexico
Region	Texas
Impact Concerns	Loss of public access and beach loss
Community Type	State
Funding	State of Texas

Summary – Texas has rolling easements incorporated into its *Open Beaches Act*. This Act requires that any home or structure that is located on a public beach must be removed. A public beach is defined as the area between the low water mark and the line of vegetation. The *Open Beaches Act* defines the line of vegetation as "the extreme seaward boundary of natural vegetation which spreads continuously inland" (61.001[5]). The State has had to defend this regulation in court many times.

Surfside is a small village located on a sand barrier on the Texas Gulf of Mexico coast. In September 2008 Hurricane Ike changed the community's boundaries. Coastal erosion from the storm pushed the vegetation line back in the Village. Homes that had been built in the 1960s and were on the land side of the vegetation line at that time ended up on the water side of the vegetation line. The easement boundary had moved and the houses were now on the wrong side of the line. The State denied permits to repair homes and shut off the water supply. When property owners filed a lawsuit to maintain their homes the State responded by threatening to remove the homes. The State won the court case because it was deemed that the land was historically dedicated for public use and the purpose of the *Open Beaches Act* is to protect the public's access and use of public beaches.[3]

Coastal homes in the village of Surfside where damaged and destroyed by Hurricane Ike (homes are the orange features in the top image). The image shows the extent of erosion along a portion of Surfside's coast. Coastal erosion from one storm event moved the vegetation line landward resulting in homes becoming located on public land. Public land is defined in Texas as the area between the low water mark and the line of vegetation. (Image Source: USGS[4])

Recommended resources

Rolling easements – A Primer for Coastal Managers:

http://papers.risingsea.net/rolling-easements.html

Evaluation of the court case between the state and property owners in Surfside:

http://masglp.olemiss.edu/Water%20Log/WL30/30.1rollingeasements.htm

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[1] Titus, J.G. (2011). Rolling easements: a primer for coastal managers. *Environmental Protection Agency.* Retrieved from http://papers.risingsea.net/rolling-easements.html

[2] Titus, J.G. (2011). Rolling easements: a primer for coastal managers. Rolling easements diagram [image]. *Environmental Protection Agency*. Retrieved from http://papers.risingsea.net/rolling-easements.html

[3] McCauley, M. (2011). Texas Court upholds "rolling easements" on beachfront property. *University of Mississippi, School of Law*. Retrieved from http://masglp.olemiss.edu/Water%20Log/WL30/30.1rollingeasements.htm

[4] U.S. Geological Survey St. Petersburg Coastal and Marine Science Center. (2014). *Coastal Change Hazards: Hurricanes and Extreme Storms: Hurricane Ike* [image]. http://coastal.er.usgs.gov/hurricanes/ike/photo-comparisons/surfside.html

3.3.14 Conservation Easements

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: Medium- to long-term

Planning level: Provincial, regional, municipal

Planning process and plan type: Formal and semi-formal; professional to semi-professional; community planning, natural areas planning

Adapting to climate change: Set targets for coastal land conservation; identify coastal land with high conservation value; update targets with new climate change information and environment and land use changes and best practice standards when assessing land acquisition programs

An easement is a written agreement and partnership, with flexible arrangements between a government or organization and a landowner, to conserve land without changing ownership of the land. A private landowner enters into a written agreement that protects areas of land that are sensitive to human activity. Easements are registered to the deed of the land and land use restrictions are agreed upon by both parties. Restrictions can range from very restrictive, such as prohibiting any new land use activity, including passive recreation, to less restrictive, such as prohibiting the removal of riparian vegetation, disturbing the soil, or prohibiting subdivision of the land.[1] Governments can prioritize acquiring easements in coastal areas that are vulnerable to erosion and flooding. Easements are already used to protect coastal areas in Atlantic Canada. One example is an agreement in 2014 to protect a group of islands on the Eastern Shore of Nova Scotia referred to by the Nova Scotia Nature Trust as the 100 Wild Islands area. The Nova Scotia Nature Trust has been engaging with private land owners and partnering with the Province of Nova Scotia to conserve this island wilderness. In 2015, the Province designated all Crown lands in the area as Wilderness Area. Together the NS Nature Trust and Province have protected over 5,000 acres in the Wild Islands area.[2]

Conservation easement sign identifying easement property. (Image source: Natural Heritage Land Trust[3])

OPPORTUNITIES	CONSTRAINTS
• Incentives, as tax benefits, are in place for landowners who enter into an agreement. • Land ownership does not change. • Can make agreements in perpetuity and to carry forward with new landowners. • Can tailor agreements to the landowner's requests and desired level of land protection. • Can be affordable for a community with limited resources to purchase land.	• Landowners are often unaware of, or misinformed about, conservation easements. • Can be difficult to recruit land owners. • Can reduce the value of a property. • Difficult to implement in developed areas.

Getting started and first steps – All levels of government and recognized organizations can use this tool. New Brunswick, Nova Scotia and Prince Edward Island have enabling legislation through the *Conservation Easements Act* (NS and NB) and the *Wildlife Conservation Act (PE)*. Newfoundland and Labrador does not have enabling legislation for conservation easements. Communities in Newfoundland and Labrador must partner with a land trust to use this tool.

Conservation easements are initiated by either of the two parties involved; landowners can contact a governmental agency or vice versa. An agreement applies to a specific area of land. An agreement begins with a negotiation between **partners** and may require a survey and/or environmental audit of the land. Regular communication and monitoring of the land is required over the course of an agreement to ensure compliance.[4] Here are some first steps towards establishing conservation easements:

- Identify land trusts that are active in the local area.
- Promote conservation easements to residents through **community engagement**. Engagement educates landowners about conservation easements and can encourage the donation of coastal lands or of conservation easements on private land.
- Place conservation easements on land at risk to climate change.

Conservation Easements Example (Regional)

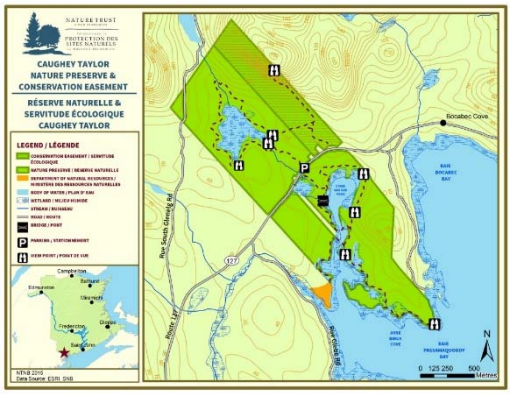
Charlotte County, New Brunswick

Profile	
Coast	Atlantic
Region	Bay of Fundy
Impact Concerns	Habitat loss
Population	26,549 (2011 census)
Community Type	County
Year	2012
Funding	Multiple sources

Summary – The Nature Trust of New Brunswick completed a Campaign for Coastal Land in 2012. The Trust set goals for fundraising and conservation in 2007 to protect coastal land in Charlotte County. Overall, 379 acres of coastal habitat and three kilometres of coastline have been preserved through purchase and donation of land, conservation easements, and voluntary stewardship agreements. Through this project, the Nature Trust of New Brunswick established the Navy Island Nature Preserve in St. Andrews and expanded the Caughey-Taylor Nature Preserve in Bocabec.

The fundraising goal for the Campaign was $950,000. Sponsorship came from 18 government agencies, private industries, organizations, and individuals including the Nature Conservancy of Canada. Donated lands and easements from landowners totalled 64 acres of land at a value of $450,000. The Trust also received funding for related projects: printing a newspaper flier, producing a video, and writing a book about the architecture of St. Andrews.

The project also generated additional coastal land protection, above the Trust's conservation goals, in Charlotte County. Additional land was donated by the Connors Bros. Clover Leaf Seafood Company. South Wolf Island Nature Preserve and Connors Bros. Nature Preserve have also been established for protection in the County.[5]



MAP OF THE CAUGHEY-TAYLOR NATURE PRESERVE IN BOCABEC. THE IMAGE SHOWS LAND ACQUIRED BY THE NATURE TRUST OF NEW BRUNSWICK THROUGH A VOLUNTARY CONSERVATION EASEMENT FROM A LANDOWNER. (IMAGE SOURCE: NTNB[6])

Recommended resources

Canadian easements guidebook:

http://publications.gc.ca/collections/collection_2011/agr/A125-17-2011-eng.pdf

Nature Trust of New Brunswick Campaign for Coastal Land Project Description:

http://www.naturetrust.nb.ca/wp/blog/the-campaign-for-coastal-land/

Also see Land Trusts

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[1] Good, K. & Michalsky, S. (2008). Summary of Canadian experience with conservation easements and their potential application to agri-environmental policy. *Agriculture and Agri-Food Canada.* Retrieved from http://publications.gc.ca/collections/collection_2011/agr/A125-17-2011-eng.pdf

[2] Nova Scotia Nature Trust. (2015). *The 100 Wild Islands campaign takes major step forward*. Retrieved from http://www.100wildislands.ca/news/2015/6/19/the-100-wild-islands

[3] Natural Heritage Land Trust. (n.d.). *How we protect land.* [image]. Retrieved from http://www.nhlt.org/page.asp?page=protectland

[4] Good, K. & Michalsky, S. (2008). Summary of Canadian experience with conservation easements and their potential application to agri-environmental policy. *Agriculture and Agri-Food Canada.* Retrieved from http://publications.gc.ca/collections/collection_2011/agr/A125-17-2011-eng.pdf

[5] Nature Trust of New Brunswick. (2012). *The campaign for coastal land*. Retrieved from http://www.naturetrust.nb.ca/wp/blog/the-campaign-for-coastal-land/

[6] Nature Trust of New Brunswick. (2012). *Caughey-Taylor Nature Preserve* [map]. Retrieved from http://www.naturetrust.nb.ca/wp/wp-content/uploads/2012/08/Caughey_Taylor_portrait_sm.pdf

3.3.15 Managed Retreat and Managed Abandonment

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Long-term

Implementation time-frame: Medium- to long-term

Planning level: Provincial, municipal

Planning process and plan type: Formal and semi-formal; professional to semi-professional; community planning and environmental planning

Adapting to climate change: Identify locations at high risk or uses becoming obsolete; plan to obtain land or shift land use with regulation; update with land planning for abandoned lands during program and mandatory plan reviews

Managed retreat or managed abandonment involves moving back from the coast or land use conversion and redevelopment. This tool provides a long-term solution for high-risk areas along the coast. It can be used to restore coastal habitats, allow natural coastal processes to occur, prevent damage, and increase public safety for the long-term.

Managed retreat is an effective tool for addressing coastal hazards that are increasing with climate change impacts, such as erosion where protection measures will be too costly over time and flooding where structures are increasingly at risk of inundation or storm surges. The strategy has been used to relocate a few at-risk homes and businesses, up to entire towns. The image below shows a managed retreat project to restore a portion of a beach in California (by removing a seawall). On a larger scale, the town of Newtok, Alaska has a managed retreat plan and is in the process of moving the entire Town away from its current location, where melting permafrost is a major hazard.[1]

Managed retreat at Surfer's Point California. A damaged bike path and parking lot were removed to restore the beach. (Image Source: P. Jenkin[2])

OPPORTUNITIES	CONSTRAINTS
• Long-term solution in high-risk areas. • Removes people and structures from high-risk areas. • Restores natural habitats and provides room for them to migrate inland as the coastline recedes.	• Can be difficult to implement in developed areas. • May depreciate property values in coastal areas.

Getting started and first steps – Communities can implement managed retreat. Significant **community engagement** is necessary; in some cases, public concern has initiated managed retreat. **Partnerships** with organizations and provincial governments help in providing resources and funds for managed retreat. Developing a **shoreline plan** will identify areas at high-risk where managed retreat may be the best option for adaptation. Communicating these risks to the community and maintaining transparency about the process is vital for a successful retreat plan. Retreat can be achieved using land acquisitions, regulating the types of allowable structures, and using relocation assistance for property owners.[3]

Managed Retreat and Managed Abandonment Example (International)

City of Pacifica, California

Profile	
Coast	Pacific
Region	California
Impact Concerns	Erosion and flooding
Population	37,000
Community Type	City
Year	1997
Funding	City of Pacifica

Summary – Flooding and erosion had become a problem along the San Pedro Estuary at the City of Pacifica and the Pacifica State Beach. The Army Corps of Engineers originally proposed using hard protection measures to deal with the problems but local surfers were concerned about how the engineering structures would affect the neighbouring beach. They approached the City with their concerns. The California Coastal Conservancy also had concerns about the effect such engineering would have on trout habitat in the Estuary. Instead, the community decided to use a managed retreat approach. The project took 10 years to complete. It cost the community less than the originally proposed hard protection measures and restored 1,900 feet of eroding creek banks. The plan protects the community from a 1-in-100 year flood event. Recreational use of the beach has increased and the wetland habitat is healthy. The American Shore and Beach Preservation Association recognized the undertaking in 2005 with the *Top Restored Beach* award. The project was a success, in part, because the project partners were able to finance the cost of purchasing at-risk structures.[4]

Partnerships – Concerns about hard protection measures were brought up by the surfing community (including the Mayor of Pacifica). The City of Pacifica, California Coastal Conservancy, Pacifica Land Trust, California Department of Fish and Game, Army Corps of Engineers, and the State Water Resources Control Board created a managed retreat plan. The plan uses soft stabilization measures and the removal of vulnerable structures along the coast.

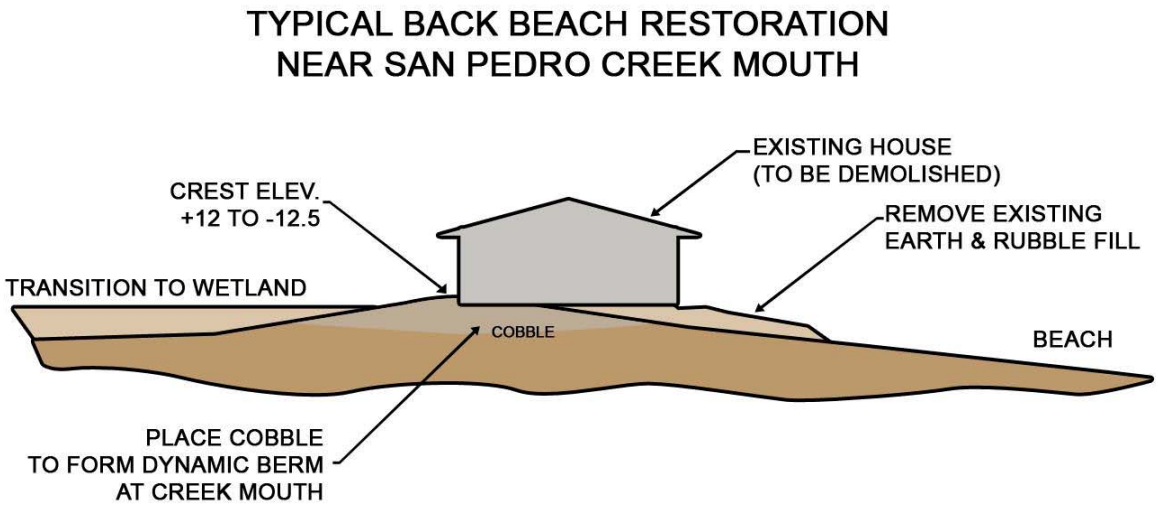
Recommended resources

California managed retreat examples:

http://coastalmanagement.noaa.gov/initiatives/shoreline_ppr_retreat.html

Newtok, Alaska case example information:

http://www.cakex.org/case-studies/relocating-village-newtok-alaska-due-coastal-erosion



DESIGN PLAN FOR ONE OF THE HOUSES IN THE MANAGED RETREAT PLAN IN PACIFICO STATE BEACH, CALIFORNIA. (IMAGE SOURCE: YVONNE REEVES, DALHOUSIE UNIVERSITY, MODIFIED FROM IMAGE BY B. BATTALIO ET AL.[5])

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[1] Feifel, K. & Gregg, R.M. (2013). *Relocating the Village of Newtok, Alaska due to coastal erosion*. Climate Adaptation Knowledge Exchange. Retrieved from http://www.cakex.org/case-studies/relocating-village-newtok-alaska-due-coastal-erosion

[2] Jenkin, P. (2010). *Managed retreat process at Surfer's Point California, pictures* [image]. Retrieved from http://www.venturariver.org/2010/11/managed-retreat-process-at-surfers.html

[3] National Oceanic and Atmospheric Administration. (2007). *Managed retreat strategies: case examples.* Retrieved from http://coastalmanagement.noaa.gov/initiatives/shoreline_ppr_retreat.html

[4] Environmental Science Associates. (2013). *Pacifica State Beach managed retreat, beach and estuary restoration.* Retrieved from http://www.esassoc.com/projects/pacifica-state-beach-managed-retreat-beach-and-estuary-restoration

[5] Battalio, B., Lowe, J., Revell, D., & White, L. (2009). *Managed retreat and realignment in California: presentation to the Headwaters to Oceans '09 H2O* [image]. Retrieved from http://www.coastalconference.org/h20_2009/pdf/2009presentations/2009-10-28-Wednesday/Session%204C-Sea%20Level%20Rise%20II/Battalio_Managed_Retreat_and_Realignment.pdf

3.3.16 Abandonment

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Long-term

Implementation time-frame: Medium- to long-term

Planning level: Provincial; municipal

Planning process and plan type: Informal; non-professional; adaptive

Adapting to climate change: Identify locations where abandonment is occurring or could occur; monitor abandonment; implement controls on abandoned lands and plan for opportunities to secure abandoned land during mandatory plan review.

Abandonment is a type of coastal retreat that may be managed and planned or may result from irreparable storm damage in a place that is prone to such impacts. Managed abandonment of seawalls and coastal structures may be a part of a coastal retreat plan. The use may also become obsolete. Abandonment may occur with no planning at all. Properties or structures are simply left to the sea, or sand, to cover or destroy.

Abandoned coast guard station on Pea Island, North Carolina. (Image Source: Abandoned But Not Forgotten [1])

OPPORTUNITIES	CONSTRAINTS
• Abandoning areas can allow for natural processes to re-establish coastal ecosystems.	• Abandoned structures could pose a danger to the public.

Implementation and First Steps – Abandonment can be carried out as a part of a **managed retreat** plan or it may happen as a reaction to damage caused by storms. Here are some first steps toward planned abandonment of structures at risk to climate change:

- Identify through **data gathering and mapping**, structures and properties that might be best suited for abandonment.
- If a structure is slated for abandonment, ensure that the structure will not pose a risk to public safety. Structures may need to be physically removed from coast.
- Focus on public land at risk first.
- Encourage private landowners to use a managed abandonment approach by entering into **easement agreements** with a municipality or **land trust**.

Abandonment Example (Regional)

Daniel's Harbour, Newfoundland

Profile	
Coast	Gulf of St. Lawrence
Region	West Coast of Newfoundland
Impact Concerns	Landslides
Population	265 (2011 census)
Community Type	Town
Year	2006-2008
Funding	Province of Newfoundland and Labrador

Summary – Daniel's Harbour carried out an abandonment of part of the Town in 2007. The Town had a small landslide in 2006 that raised concern in the community. An engineering consultant was hired to analyse the risk of a larger landslide in the area. No evidence was found at the time to suggest that a larger event may occur. A large landslide did occur the next year, however, in 2007. One home, and several other buildings, where swept away by the landslide but no one was injured.

After the large landslide, Fire and Emergency Services – Newfoundland and Labrador consulted with an engineer and other government departments about immediate risks to the area; the government decided to evacuate seven homes and a business.[2] The landslide also threatened Highway 403 that passed through the Town and which connected communities along the Great Northern Peninsula. A temporary road was constructed inland while a long term plan was developed.

A number of people were brought into the discussion including representatives from Fire and Emergency Services, the Department of Municipal and Intergovernmental Affairs, the Department of Natural Resources, the engineering consultant, local decision makers, and community members. They determined that storm events and excess moisture in the ground were triggering the landslides, thereby posing future risk to some of the homes and the highway. Rather than continuing the geotechnical assessment of the area the Province decided to purchase the properties at risk, establish a hazard zone, and move residents out of the area. The people who moved from the area were educated about the risks to their property before a final decision was made. Because of this communication, property owners who were bought out accepted the decision. A new subdivision was built in a safe area of the Town. The evacuated homes were removed and the highway was reconstructed inland. The former highway, and the area adjacent to the landslide, was fenced off. More landslides occurred in the abandoned area in 2013; the slides also reached the former highway. No lives or property were at risk because the area had been abandoned, although a water line had to be relocated as a result.[3]

The Town of Daniel's Harbour after the landslide in 2007. The landslide area can be seen in the top left of the photo. The road was abandoned and the houses to the left of the road were removed. The construction of a new road can be seen to the right of the houses. (Image source: Government of Newfoundland and Labrador)

[1] Abandoned but Not Forgotten. (n.d.). *Abandoned coast guard station in NC* [image]. Retrieved from http://abnf.co/NC-coast_guard_station_nc.htm

[2] Lynch, R. (2007). Landslide on The Rock: Newfoundland community on edge as town crumbles away. *Canadian Firefighter*. Retrieved from http://www.firefightingincanada.com/incident-reports/july-2007-cff-1568

[3] Batterson, M., personal communication, September 18, 2015.

3.3.17 Foreshore Lease

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: medium-term

Planning level: Provincial and municipal

Planning process and plan type: Formal; professional; community planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during mandatory plan reviews and lease review

A foreshore lease is the lease of the land between the high and low water marks from the province to a municipality. Provinces own the land between the high and low water marks: coastal communities do not have authority over that land. Communities usually require approval from the province to implement tools that involve alterations to that area of land. A foreshore lease allows a community to make changes to that land without approval from the province, which can be beneficial if a community needs to maintain coastal infrastructure on that land. A foreshore lease is typically signed for 10–30 years and requires a survey of the boundaries of land to be leased.

In the Atlantic Provinces the following acts allow for the granting of a foreshore lease:

- New Brunswick: *Common Law Act* (for oyster fishing),
- Newfoundland and Labrador: *Lands Act,*
- Prince Edward Island: *Fisheries Act,* and
- Nova Scotia: *Beaches Act.*

Lease agreements are often obtained for the construction of wharves and marinas. They could also be used for engineering adaptation measures which involve alterations to provincially owned land along the shoreline.[1]

OPPORTUNITIES	CONSTRAINTS
• Enables management of coastal areas as a complete system by one governing body. • Enables soft protection measures such as planting vegetation in the foreshore. • Enables a local government to explore a range of management and engineering tools. Natural wetland services can replace more costly build infrastructure.	• Leasing the foreshore involves ongoing costs that add to the costs of implementing protection measures on the shoreline.

Getting started and first steps – Foreshore leases are worth pursuing if control over the foreshore is important for establishing and maintaining a protection measure. Here are some first steps towards obtaining a foreshore lease:

- Identify if the area and protection method require having control over the foreshore.
- Approach the province regarding a foreshore lease.
- If the province agrees to a lease, the lease will require a land survey.[2]

[1] Arlington Group Planning + Architecture, EBA, a Tetra Tech Company, and DE Jardine Consulting Sustainability Solutions Group. (2013). Sea level rise adaptation primer: A toolkit to build adaptive capacity on Canada's south coasts. *British Columbia Ministry of Environment*. Retrieved from http://www2.gov.bc.ca/gov/topic.page?id=F09F1EC7576643CEB5FB1536913730BA

[2] Ibid.

3.4 Site Design Tools

3.4.1 Urban Design Standards

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: Short-term

Planning level: Municipal, neighbourhood, site

Planning process and plan type: Formal; professional; community planning and urban planning and design

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during mandatory plan reviews.

Municipalities use urban design standards for a variety of purposes including preserving the character of an area, ensuring that certain building standards are met, regulating street design, and promoting environmental protection. Design standards include both guidelines and mandatory standards for development. In coastal municipalities this tool could be used to encourage, or require, setbacks and to prevent out-of-place developments at the coast. Waterfront development or re-development commonly use urban design standards.

The cover of the City of Nanaimo's Urban Design Plan. (Image Source: D'Ambrosio Architecture + Urbanism[1])

OPPORTUNITIES	CONSTRAINTS
• Uses a positive approach to coastal planning that also preserves the character of a place.	• May be controversial with developers and residents if they disagree with design standards.

Getting started and first steps – Any community with land use planning authority can develop design guidelines for the municipality or for a part of the municipality. Council must approve the guidelines. Here are some first steps toward using design guidelines for climate change adaptation:

- Establish a committee. A **local committee** typically has the responsibility to develop design guidelines and to engage with the public for local input.
- Identify areas at risk to climate change through **data gathering and mapping**.
- Determine appropriate **setbacks** and other building restrictions that can be included in the guidelines for adaptation.
- Engage with the community while developing the guidelines. **Community engagement** will help gain public support for the guidelines when they come to council for approval.

URBAN DESIGN STANDARDS EXAMPLE (INTERNATIONAL)

NEW SOUTH WALES, AUSTRALIA

Profile	
Coast	Tasman Sea
Region	Eastern Australia
Impact Concerns	Sea level rise and increased development
Community Type	State
Area	809,444 km^2
Year	2003
Funding	Part of the normal planning process

Summary – The state of New South Wales developed a *Coastal Design Guidelines* manual to ensure harmonization of future coastal developments with the natural environment and established urban places. Local councils are required to keep planning documents, including local environmental plans, consistent with the guidelines set out in the *Coastal Design Guidelines*. An advisory committee on coastal planning and management produced this document.

The Guidelines include a map of what the state considers to be the coastal zone, including the landward coastal zone and seaward coastal zone. These zones are defined as lands affected by coastal processes. The Guidelines are based on the principals of ecologically sustainable development. Guidelines are tailored to the different communities within the State, including coastal cities, towns, villages, hamlets, new settlements, and isolated dwellings. Aspects of design in the Guidelines include open spaces, natural edges, street patterns, and appropriate building design.

The State developed these Guidelines to ensure protection of the cultural, ecological, and visual characteristics of coastal communities. The Guidelines also limit coastal sprawl and integrate new development with the surrounding land uses and current transportation infrastructure. The Guidelines establish greenbelts between settlements and encourage appropriately located settlements, which includes creating neighbourhoods centred on existing services. The Guidelines acknowledge sea level rise but do not address the issue directly.[2]

Recommended resources

Downtown Nanaimo Urban Design Plan:

https://www.nanaimo.ca/assets/Departments/Community~Planning/Publications~and~Forms/DDGWeb.pdf

State of New South Wales Coastal Design Guidelines:

http://www.planning.nsw.gov.au/coastal-design-guidelines

[1] D'Ambrosio architecture + Urbanism, Citizen Plan, City of Nanaimo. (2008). Downtown Urban Design and Guidelines [image]. Retrieved from http://www.nanaimo.ca/EN/main/departments/CommunityPlanning/DowntownNanaimo.html

[2] State of New South Wales. (2003). *Coastal design guidelines for New South Wales*. Retrieved from http://www.planning.nsw.gov.au/coastal-design-guidelines

3.4.2 Conservation Subdivision Design

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term

Implementation time-frame: Short- to medium-term

Planning level: Municipal, neighbourhood, site

Planning process and plan type: Formal; professional; community planning, physical, environmental and site planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during mandatory plan reviews.

Conservation subdivision design (CSD) is a residential development model that accounts for the ability of the land to support development and the need to retain rural or natural landscapes. CSD clusters development to ensure that a large percentage of a subdivision area is kept as open space, typically 40% or more of the property. This is a subdivision design tool that avoids risks from flooding and erosion and protects green space and natural processes by retaining many natural landscape features and providing natural buffers. This type of subdivision design also reduces the need for infrastructure and manages stormwater by working with the natural flow of water through an area. Conservation subdivision design can help to manage the impacts of climate change where it is used for land subdivision.

Example of site design differences between traditional subdivision design and conservation subdivision design. (Image Source: Daniel Savard, New Brunswick)

Conservation subdivision designs often require far less infrastructure, resulting in reduced costs for developers. By locating development clusters in upland areas while maintaining open space buffers along shorelines, CSD can be a useful tool in the context of climate change adaptation planning for coastal areas. Regional examples of CSD include Le Village en haut du ruisseau in Dieppe, New Brunswick[1] and the Villages of Seven Lakes in Halifax, Nova Scotia.[2]

OPPORTUNITIES	CONSTRAINTS
• Costs of infrastructure can be less than half that of conventional subdivisions. • Protects valued natural and cultural features. • Avoids development in hazardous areas and provides natural protective buffers between structures and the coast. • Increases recreational areas for residents.	• Relatively uncommon in Canadian communities and unfamiliar to developers.

Getting started and first steps – Conservation subdivision design can be required by communities with land use planning authority through **land use by-laws and zoning**, **subdivision by-laws**, **development standards**, **development agreements**, **variances**, and **urban design standards**. Communities without land use planning authority can use **education** and **community engagement** to encourage developers to use this design method for new developments. Here are some first steps towards using this tool for climate change adaptation:

- Determine through **data gathering and mapping** where conservation subdivision design would be suitable for new developments
- Encourage the provincial government to develop provincial CSD policies and by-laws.

Conservation Subdivision Design Example (Regional)

Seven Lakes Development, Halifax, Nova Scotia

Profile	
Coast	Atlantic
Region	Eastern Shore
Impact Concerns	Quantity and quality of water resources
Population	634 units
Community Type	Subdivision development
Area	256 hectares
Year	2014

Summary – The Villages of Seven Lakes is located on Nova Scotia's Eastern Shore in Planning Districts 8 and 9 of Halifax Regional Municipality. This rural area close to urban Halifax has a growing population. Seven Lakes will develop according to the conservation subdivision design approach approved through a development agreement between Seven Lakes Developments (a division of The Penney Group Incorporated) and the Municipality. When complete there will be 634 homes in the subdivision.

Villages of Seven Lakes site plan through a development agreement with Halifax Regional Municipality. (Image Source: Villages of Seven Lakes Development[3])

The development of The Villages of Seven Lakes is enabled by Sections 15 and 16 of the *Halifax Regional Municipal Planning Strategy*. These sections state that the Municipality may enter into a development agreement for Lower Density Classic Conservation Design and Hybrid Conservation Design developments in specified areas of the Municipality.[4]

The subdivision design works with the hydrology of the property and surrounding area. Homes and structures are grouped, or clustered, together. Clustering has the following benefits: it maintains the natural flow of water through the area; conserves the natural features of the land; provides recreational space; and encourages social interactions. Environmental protection measures for the design include a site disturbance plan, erosion and sedimentation control plan, stormwater management plan, nutrient management plan, and a water-quality monitoring program.[5]

Recommended resources

Online seminar on conservation subdivision design:

http://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/sustainable_communitydesign.html

[1] Federation of Canadian Municipalities. (2014). *2014 Neighbourhood development – honourable mention: City of Dieppe, New Brunswick*. Retrieved from http://www.fcm.ca/home/awards/fcm-sustainable-communities-awards/2014-winners/2014-neighbourhood-development-honourable-mention.htm

[2] Villages of Seven Lakes - The Penney Group Inc. (2014). *Seven Lakes.* Retrieved from http://sevenlakescommunity.com/

[3] Villages of Seven Lakes - The Penney Group Inc. (2014). *Seven Lakes: site map* [image]. Retrieved from http://sevenlakescommunity.com/sitemap.html

[4]Halifax. (2014). Regional municipal planning strategy: Policies S-15 and S-16. Retrieved from http://www.halifax.ca/regionalplanning/documents/RMPS2014.pdf

[5] Villages of Seven Lakes - The Penney Group Inc. (2014). *Seven Lakes.* Retrieved from http://sevenlakescommunity.com/

3.4.3 Coastal Development Rating System

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term.

Implementation time-frame: Short-term

Planning level: Provincial, regional, municipal

Planning process and plan type: Formal and semi-formal; professional; site planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during program reviews.

The Stewardship Centre for British Columbia developed a coastal development rating system and assessment tool through a *Green Shores* program. The rating tool is based on green building rating models such as LEED. Properties are rated Bronze, Silver, or Gold based on a set of design criteria, and landowners receive a certificate of the rating for a property.

The aim of the coastal development rating system is to promote sustainable use of coastal areas through planning and design. The design ratings discourage the use of rip-rap, seawalls and other shoreline engineering measures. The principles of *Green Shores* are to preserve coastal processes, maintain habitat functions, minimize pollutants, and reduce cumulative coastal impacts.[1]

(Image Source: Stewardship Centre for BC[2])

OPPORTUNITIES	CONSTRAINTS
• Promotes sustainable shoreline management by landowners. • Can raise the value of highly rated properties. • Recognizes cost effective solutions to coastal issues for landowners. • Is a voluntary, non-regulatory tool.	• May be difficult to obtain voluntary participation. • Tool must be recognized and well known within a community to benefit coastal property owners who participate.

Getting started and first steps – Any government, organization, or private landowner can use this tool. The developers of the rating system in British Columbia indicate that the rating system is applicable to all coastal systems and can be used across the country.[3]

- Contact the *Stewardship Centre for British Columbia* about using this tool in Atlantic Canada.

Coastal Development Rating System Example (National)

Deep Bay Field Station, Bowser, British Columbia

Profile	
Coast	Pacific
Region	Vancouver Island
Impact Concerns	Shoreline degradation
Community Type	Field Station (Site)
Year	2013
Funding	Province of BC and federal government

Summary – The Deep Bay Field Station, a research facility of Vancouver Island University's Centre for Shellfish Research, was a test site for the *Green Shores* coastal development rating system. The research field station building was certified as LEED Platinum in 2013. The station property was then restored to meet the *Green Shores* rating criteria.

The property has many archaeological features which complicated restoration efforts. The redesign of the property included preserving 80% of the shoreline and its native vegetation. It also included preserving the natural sediment transfer processes along the coastline. Freshwater flow into the ocean was also preserved during property redesign. The building setback and standard of construction of the building were also considered for rating the coastal development.[4]

The Deep Bay Field Station in Bowser, BC, participated in developing the Green Shore coastal development rating system by undergoing a restoration project with Green Shores. (Image Source: K. Walker[5])

Recommended resources

Green Shores project description:

http://stewardshipcentrebc.ca/Green_shores/

Deep Bay Field Station in Bowser information:

http://stewardshipcentrebc.ca/Green_shores/listings/centre-for-shellfish-research-deep-bay-field-station/

Coastal Shore Stewardship: A Guide for Planners, Builders and Developers on Canada's Pacific Coast:

http://www.llbc.leg.bc.ca/public/pubdocs/bcdocs/368207/index.html

[1] Stewardship Centre for British Columbia. (n.d.). About Green Shores. *Stewardship Centre for BritishColumbia.* Retrieved from http://stewardshipcentrebc.ca/Green_shores/about-green-shores/

[2] Ibid.

[3] Stewardship Centre for British Columbia. (n.d.). Coastal development rating system. *Stewardship Centre for British Columbia.* Retrieved from http://stewardshipcentrebc.ca/Green_shores/cdrs/

[4] Stewardship Centre for British Columbia. (n.d.). Centre for shellfish research, Deep Bay Field Station, Bowser B.C. *Stewardship Centre for British Columbia.* Retrieved from http://stewardshipcentrebc.ca/Green_shores/listings/centre-for-shellfish-research-deep-bay-field-station/

[5] Walker, K. (2011). *Deep Bay Field Station* [image]. Retrieved from http://commons.wikimedia.org/wiki/File:Deep_Bay_Field_Station_02.jpg

3.4.4 Site Monitoring

Adaptive response				
Avoid	Retreat	Accommodate	Protect	Procedural Approach

Influence time frame: Medium- to long-term.

Implementation time-frame: Short- term

Planning level: Provincial; regional; community

Planning process and plan type: Formal to semi-formal; professional to informed volunteer; site, physical and environmental planning

Adapting to climate change: Update with new climate change information and environment and land use changes and best practice standards during program reviews.

Site monitoring of the shoreline can be an important step in understanding risks of coastal flooding and erosion, coastal habitat health, and how the coast is changing through natural processes. Monitoring an area before and after making changes along the coast can inform a community of how their actions are affecting the coast, for better or for worse; knowledge that is important for making decisions about future coastal adaptation.

Example of how monitoring with images can inform decision-makers on coastal changes such as erosion. The above image was taken in Shishmaref, Alaska where melting permafrost has increased coastal erosion. (Image Source: T. Weyiouanna[1])

OPPORTUNITIES	CONSTRAINTS
• Informs future decision-making. • Establishes a baseline of the current coastal conditions. • Informs how adaptation measures are working so far.	• Does not directly address coastal issues.

Getting started and first steps – Any community can establish a monitoring program. Monitoring is a good opportunity to build partnerships with volunteer organizations and with educational institutions. Here are some first steps toward using this tool:

- Establish a **partnership** with experts. Scientific expertise may be needed to monitor the shoreline for erosion, sedimentation processes, and ecosystem health.
- **Engage** with citizens about climate change issues at the coast. Citizen science can be used to monitor erosion and flooding. For example, photographs of the shoreline are often useful for understanding changes. Residents and others can provide this information which also enhances the participatory approach to monitoring.

Site Monitoring Example (Regional)

Coastal Erosion Monitoring and Awareness Project, Southern Gulf of St. Lawrence Coalition on Sustainability

Profile	
Coast	Atlantic
Region	Gulf of St. Lawrence
Impact Concerns	Erosion
Community Type	Organization
Year	2009 - present
Funding	Environment Canada and Shell Canada

Summary – The Southern Gulf of St. Lawrence Coalition on Sustainability is a non-profit organization, formed in 1999. The organization's Coastal Erosion Working Group began a coastal erosion monitoring and awareness project in 2009. Coastal zone experts from the Geological Survey of Canada and New Brunswick Department of Natural Resources put together a toolkit for use in classifying and monitoring the shoreline.

Community groups use the tool kit to monitor sites that they have chosen. The Coalition has mapped the monitoring sites using a Global Positioning System (GPS) and recorded the sites on the Regional Sustainability Atlas through Google Earth.[2] Each toolkit includes surveying equipment, walkie-talkies, and safety vests. An online guide describes how to use the equipment for monitoring erosion. All materials are in French and English.[3]

In addition to the monitoring kits, the Coastal Erosion Working Group provides resources to the public on understanding erosion, living with and monitoring erosion, climate change at the coast, and resiliency to climate change.[4]

Equipment in each of the coastal erosion monitoring toolkits. (Image source: Coalition-SGSL[5])

Site Monitoring Example (International)

Wetlands Monitoring and Assessment Kit, National Wetland Trust of New Zealand

Profile	
Coast	South Pacific
Region	New Zealand
Impact Concerns	Wetland loss
Community Type	Organization
Year	2013
Funding	Donations

Summary – The National Wetland Trust of New Zealand is a non-profit organization that aims to increase the appreciation of wetlands in New Zealand. The Trust provides a range of material to support conservation activities and research, including land management guides and monitoring toolkits.

The Trust developed a *Wetland Monitoring and Assessment Kit* for community groups working on restoration projects throughout the country. The Kit is available for free online and contains modules for monitoring wetland restoration projects. Resources include blank datasheets and report templates that can be taken into the field to record wetland health. The modules cover topics of skills and equipment needs, creating a wetland management map, photographing changes, broad indicators of wetland health, mapping vegetation, weed surveying, vegetation plotting, and pest monitoring. The Trust also has a "wetland monitoring hub" online where users can find support and information on monitoring their restoration project.[6]

WETMAK WETLANDS MONITORING AND ASSESSMENT KIT. (IMAGE SOURCE: NZ LANDCARE TRUST'S WETMAK[7])

Recommended resources

Coastal erosion monitoring and awareness program:

http://coalition-sgsl.ca/webcura/files/237120_cemep_guide.pdf

Wetlands monitoring and assessment toolkit:

http://www.landcare.org.nz/w

[1] Weyiouanna, T. (2014). Permafrost. Shishmaref, Alaska erosion [image]. *Weather Underground.* Retrieved from http://www.wunderground.com/climate/permafrost.asp

[2] Southern Gulf of St. Lawrence Coalition on Sustainability. (2015). *Coastal erosion monitoring and education.* Retrieved from http://coalition-sgsl.ca/CEMEP.php

[3] Southern Gulf of St. Lawrence Coalition on Sustainability. (n.d.). *Tool Kit: Coastal erosion monitoring and awareness program.* Retrieved from http://coalition-sgsl.ca/webcura/files/237120_cemep_guide.pdf

[4] Southern Gulf of St. Lawrence Coalition on Sustainability. (2015). *Coastal erosion literature and resource materials*. Retrieved from http://coalition-sgsl.ca/Erosion_Resources.php

[5] Southern Gulf of St. Lawrence Coalition on Sustainability – SGSL. (n.d.). *Tool Kit: Coastal erosion monitoring and awareness program* [image]. Retrieved from http://coalition-sgsl.ca/webcura/files/237120_cemep_guide.pdf

[6] New Zealand Landcare Trust. (2014). *WETMAK – Wetlands Monitoring and Assessment Kit.* Retrieved from http://www.landcare.org.nz/wetmak

[7] Ibid.