2013 ADAPTool Application

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Adaptive Policy Analysis of Nova Scotia: Selected policies and programs of Nova Scotia Environment

Prepared by:
International Institute for Sustainable Development

Prepared for:
Climate Change Directorate - Nova Scotia Environment

International Institute for Sustainable Development

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Exceutive Summary

Introduction

Policy-makers and the public are increasingly aware of the potential impacts of climate change, vulnerability to climate change and adaptation needs. *Adaptation* in this context is defined as an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, in order to reduce harm or take advantage of opportunities (Intergovernmental Panel on Climate Change, 2007). There is also a growing body of literature on the role of policies and strategies in adapting to climate change, including assessing the ability of current policies to address adaptation.

In 2013 Nova Scotia Environment (NSE) partnered with other provinces and the International Institute for Sustainable Development (IISD) and, under the leadership of the Water Security Agency (Saskatchewan), acquired Natural Resources Canada (NRCan) funding to analyze diverse sectorial policies to assess their ability to contribute to both anticipated and unanticipated adaptation needs. A version of the Adaptive Design and Assessment Policy Tool (ADAPTool) developed by IISD, in collaboration with the Prairie Regional Adaptation Collaborative, was used to undertake the analysis. The objective of the analysis, performed by IISD and the Government of Nova Scotia (Climate Change Directorate of Nova Scotia Environment), was to provide the government with a systematic assessment and understanding of the potential for its policies and programs to support climate change adaptation in the key aspects of environmental management, and to raise awareness and "mainstream" consideration of adaptation.

Policy Selection and Identification of Adaptation Actions

The following four policies/programs were analyzed:

- *Guide to Surface Water Withdrawal Approvals:* The purpose of this guide is to describe the recommended submission requirements, supporting documentation and the criteria to evaluate surface water withdrawal applications (Nova Scotia Environment and Labour, 2004).

- *Guide to Groundwater Withdrawal Approvals:* The purpose of this guide is to describe the minimum submission requirements, supporting documentation and the criteria used by NSE to evaluate groundwater withdrawal applications (NSE, 2010).

- *Our Parks and Protected Areas:* This document is the province's proposed plan to ensure that these areas continue to thrive. It delivers on two important government commitments, including updating Nova Scotia's park system to secure and strengthen its long-term success and increasing Nova Scotia's legally protected landmass to at least 12 per cent by 2015. This plan proposes to protect more than 13 per cent of Nova Scotia's outstanding lands (Government of Nova Scotia, 2013).

As a basis for gauging the ability of the suite of policies to support anticipated actions, a rapid expert-based assessment was undertaken that included key policy-makers of the government agency. Four vulnerabilities were identified for the environmental management sector, along with 31 adaptation actions to address them (see Appendix A for details).

Key Findings

Of the 31 adaptation actions considered, 24 were supported by at least one policy in the suite. The following key trends can be identified for the analyzed policies:

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- The policies focused on guides for surface and groundwater withdrawals performed well in terms of mapping water withdrawals, monitoring water availability and assisting in developing plans to address challenges in water availability. The policies performed less successfully in addressing adaptation needs such as reviewing and updating guiding documents to surface and groundwater withdrawals, guiding allocation of wells and evaluating proponents' requests for water withdrawals in light of climate change impacts.

- The policies addressed adaptation needs that focus on protected areas, including climate scenarios and awareness raising about climate change impacts, as well as managing trail and bridge applications and research licenses. The plan performed less successfully in terms of monitoring and addressing impacts of climate change on wetlands and natural habitat, exploring the potential roles of wetlands in promoting adaptation to climate change and taking these issues into account when planning for infrastructure with potential consequences on natural habitat.

An overview of the scoring of the analyzed policies is presented in Box 1. The analyzed policies performed well in terms of formally ensuring stakeholder consultations during the development and implementation of the policy and enabling self-organizing and networking. The policies addressed the need for the formal review processes and decentralization somewhat well. In these areas, there are often informal practices to ensure reviews and provide decision-making powers at the vertical level, but these procedures are not adequately formalized and/or the attempt to formalize these interactions could lead to unintended consequences undermining decentralization.

Finally, the analysis identified additional needs in adaptation, actors' capacities and overall diversity in economic, institutional and expenditure policies in order to create a robust set of policies that capture diverse adaptation stakeholders' needs. In the future, the subsectors in question would need to be assessed for their ability to meet these needs.

TABLE 1. OVERVIEW OF THE OVERALL SCORING ACROSS THE ANALYZED SUITE OF POLICIES

Adaptive Policy Questions	Overall Synthesis	Guide to Surface Water Withdrawal Approvals	Guide to Groundwater Withdrawal Approvals	Our Parks and Protected Areas
Ability to Support Anticipated Adaptation Needs (score out of 10)	**5**	**3**	**5**	**6**
Are anticipated adaptation actions supported by the policies?	1	1	1	1
Is the policy itself vulnerable to the stressor?	1	1	1	1
Can the existing suite of policies enhance the capacity of actors within each sector to undertake the anticipated adaptation actions?	1	1	1	2
Was multistakeholder deliberation used in the design of the policies?	1	0	2	2
Ability to Respond to Unanticipated Events (score out of 10)	**6**	**3**	**5**	**8**
Is multistakeholder deliberation used in the implementation of the policy?	1	0	2	2
Does the policy enable self-organization and social networking?	2	1	2	2
Is decision making for policy implementation adequately decentralized?	1	1	0	1
Is there adequate variety in the suite of policies and programs directed at the policy issue?	1	1	1	1
Do the policies have a regular formal policy review?	1	0	0	2
Overall Adaptive Policy	**1**	**1**	**1**	**2**

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Key Conclusions and Recommendations

The overall conclusions and recommendations of the adaptive policy analysis for the suite of policies considered include:

- **Support to Anticipated Adaptation Needs** (planned adaptability). From the identified 31 adaptation needs, 24 were applicable/relevant for the three analyzed policies. From this number of applicable anticipated adaptation actions, half (12) are supported by the analyzed policies and half (12) are not supported by the chosen three policies. *For the next steps, it would be beneficial to review currently used policies that focus on adaptation needs that were non-applicable for currently assessed policies—for example: the Wetland Conservation Policy, Non-Essential Pesticide Act, New Public Drinking Water Supply Program and Public Drinking Water Supplies Regulations.*

- **Policy Stress** (planned adaptability). The policies are vulnerable to climate change impacts, especially those focusing on water. Assessment of the impacts of climate change on water and its management is uncertain and regular review of the policies is needed to ensure their ability to respond to changes on the ground for surface and groundwater withdrawals due to climate change. *In the future, more efforts need to be devoted to exploring feasible levels of water withdrawals under diverse climate change scenarios to reduce the vulnerability of the policies and managed water resources.*

- **Support to Stakeholder Adaptive Capacity** (planned adaptability). The six determinants of adaptive capacity (access to economic resources, technology, infrastructure, information/skills, institutions/networks and equitable access to resources) were assessed for the analyzed policies. The policies performed well in teams of assuring actors have access to relevant information and skills, information and networks, and maintaining equitable access to the resources. The analyzed documents provide necessary information, data and data processing support on water withdrawals as well as awareness raising and information about the value of protected areas. The policies fall short in supporting other capacities, such as access to financial resources, technology and infrastructure. This is because the analyzed documents are not focusing on these areas and they provide only limited advice on potential technology available to monitor water withdrawals. *For the next steps, it is important to identify policies that target these areas to make sure that the stakeholder capacities are supported by diverse options.*

- **Use of Multistakeholder Deliberation** (planned and autonomous adaptability). The policies performed relatively well in terms of ensuring stakeholder involvement during the planning phase, due to the fact that most of the policies are fairly recent and stakeholder deliberation became a standard practice in policy design. In terms of implementation, deliberation is not mandated, but when the policies are reassessed, stakeholders' consultations are often used. *In the future, creating formalized procedures and guidelines on consultation processes during implementation is recommended.*

- **Enabling Self-Organization and Networking** (autonomous adaptability). The policies perform well in this aspect, especially due to extensive efforts to provide information and reach out to potential users. However, the policies lack specific guidelines about how to prioritize among different approval seekers when water shortages are expected because of climate change impacts/variability. *Experience with supporting self-organization and networking could be used to inform other policies in this sector and others.*

- **Decentralization** (autonomous adaptability). The suite of policies seems to be well decentralized. Staff at the regional and local offices are regularly consulted and have decision-making authority. However, recently

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more formal procedures were introduced that require stronger supervision by the head offices, which limits the decentralization. *In the future, a detailed review of these procedures would be recommended to make sure that they do not lead to unintended consequences—for example, limiting the choices and abilities of local actors to make decisions.*

- **Variation in Policy Instruments Employed** (autonomous adaptability). Variation in the policy instruments was limited, as they are mostly regulatory instruments. *For the next steps, it is important to look at other types of policies, especially economic instruments and expenditures, that could help address adaptation needs focused on economic measures such as insurance, as well as financial resources, technology and infrastructure.*

- **Formal Policy Review and Improvement** (planned and autonomous adaptability). The policies are using informal review mechanisms; however, these are often complemented by pilot projects/initiatives that could provide additional information about the performance of the policies and can trigger adjustments. *In the future, it would be beneficial to build on these informal procedures and formalize them to ensure consistent review procedures across all policies.*

- **Additional adaptation needs, needs for more actors' capacities and for diversity** in types of policies, such as economic, institutional and expenditures, were listed during the application. In the future, it would be beneficial to include additional policies and programs that address these needs and evaluate them by using the ADAPTool to make sure that areas of anticipated and unanticipated adaptation needs are addressed in the subsectors.

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1.0   What Is Adaptive Policy/Programming?

Over the past several decades, there has been recognition that public policies and programs intended to achieve stated objectives can, even if well-designed, lead to unintended consequences as conditions change. Public policy[1] operates in a dynamic and complex environment. Actors in the policy domain interact with new external factors, changing economic and market conditions, new information, changing technology and evolving networks of exchange. With increased global interconnection, dynamic economic conditions, shifting climate and rapid changes in technologies, the resulting complexity and pace of change make outcomes difficult to predict. As conditions change, policies and programs may become less effective, or even counterproductive. Adaptive policies and programs are designed to increase their adaptability and help avoid these kinds of failures.

In a four-year research project, IISD collaborated with The Energy Research Institute (TERI) to explore policy case studies in the agriculture and natural resource management sectors in Canada and India and identified characteristics of adaptive policies based on evidence of their actual performance. The results are described in the 2009 book *Creating Adaptive Policies: A Guide for Policy-Making in an Uncertain World* (Swanson & Bhadwal, 2009).

This research identified seven characteristics of policies that were adaptable to changing conditions. Some of these characteristics were designed to build in adaptability to anticipated change and projected future conditions, while others are useful in helping policies adapt to unanticipated conditions. The ADAPTool version used in this project is structured around these seven characteristics. Different questions in the tool are used to assess and score policies in relation to these factors.

The characteristics of adaptive policies are: 1) integrated and forward-looking analysis, 2) multistakeholder deliberation, 3) automatic policy adjustment, 4) self-organization and social networking, 5) decentralization of decision making, 6) promoting variation and 7) formal policy review and continuous learning.

These characteristics of adaptive policies are summarized below, and described in more detail, with case studies, in Swanson and Bhadwal (2009).

1.1   Integrated and Forward-Looking Analysis

Integrated and forward-looking analysis can identify key factors that affect policy performance and scenarios for how these factors might evolve in the future, so that policies can be made robust to a range of anticipated conditions. These tools can also be used to develop indicators that will trigger adjustments when needed. Modelling tools of varying sophistication can be used to support this kind of analysis, which is often integrated through scenario planning.

1.2   Multistakeholder Deliberation

Multistakeholder deliberation is a collective and collaborative public effort to examine an issue from different points of view as part of a decision-making process. Deliberative processes strengthen policy design by building recognition of common values, shared commitment and emerging issues, and by providing a comprehensive understanding of causal relationships. The key aspects of this process are that it involves participants in sharing multiple perspectives in an attempt to reach consensus on a relevant decision. This approach goes beyond stakeholder consultation.

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[1] In the context of this study, the term "policies" may refer also to programs, legislation and other policy instruments.

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1.3   Automatic Policy Adjustment

Automatic adjustment mechanisms can speed up the response to conditions that are more or less anticipated. They can be used in complicated policy environments by separating the various issues into units in which the understanding of the system is high, allowing for fine-tuning of the system and making adjustments that help reduce risks and maintain performance. Adjustment can be both fully and semi-automatic.

1.4   Enabling Self-Organization and Social Networking

The intent of this characteristic is to ensure that policies do not undermine existing social capital, but instead create forums that enable social networking, facilitate the sharing of good practices and remove barriers to local self-organization. Local responses, self-organization and shared learning all strengthen the ability of stakeholders to respond to unanticipated events through innovation.

These practices take advantage of the capacity of complex adaptive systems to generate solutions without external input or formally organized interventions. The ability of individuals and groups to self-organize in response to stresses, crises or unexpected problems is well documented in social and ecological literature, and a key aspect of healthy adaptation. For policy-makers and program managers, the idea is to foster self-organized responses to unexpected conditions by enabling and supporting interaction, learning and networking without trying to control or dictate outcomes. This includes facilitating sharing and copying of best practices, providing resources to reduce barriers to self-organization and creating spaces for adaptive collaboration.

1.5   Decentralization of Decision Making

In governance terms, the principle of "subsidiarity" means decentralizing decision making to the lowest effective and accountable unit of governance. This has adaptive advantages because there are better opportunities for feedback and information sharing to ensure that decision-makers are aware of unexpected problems and the effects of proposed interventions, as well as the nature of different interests. For policies directly concerning natural resources and ecosystems, field staff typically notice significant change earlier and can mobilize affected local interests to address these changes more simply. Because local conditions vary widely, decentralization provides a way to implement policies more flexibly, to ensure effectiveness and to adapt to change. The potential for decentralization in any particular policy or program area will depend on the scale of intervention needed, the extent of local knowledge and capacity, and the structure of governance mechanisms for accountability and coordination.

1.6   Promoting Variation

Given the complexity of most policy settings, implementing a variety of policies to address the same issue increases the likelihood of achieving desired outcomes. Diverse responses also form a common risk-management approach, facilitating the ability to perform efficiently in the face of unanticipated conditions. Variation may be actively designed, as when a range of alternative options is provided to meet the diverse needs of different stakeholders. This can be facilitated by:

- Using a mix of policy instruments
- Exploring synergies with other policies
- Providing opportunities for risk-spreading

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Another approach is to use policy tools to facilitate variation by removing barriers to alternative solutions and providing information to support exploration of options.

1.7   Formal Policy Review and Continuous Learning

Even when a policy is performing well and well-designed pilots are used throughout the life of the policy to test assumptions related to performance, regular review can help address emerging issues and trigger value-added policy adjustments. Formal review is different than automatic adjustment, where triggers and responses may be determined in advance. Formal review is a mechanism for identifying and responding to unanticipated circumstances and emerging issues. This assessment process can be very useful in detecting emerging issues that can affect the policy's performance. A formal review mechanism includes triggers for review, definition of the nature of the review and a learning process, including who needs to be involved in the review, who will take action on the results and what kinds of actions are to be considered.

Together, these seven characteristics of adaptive policies are relevant in the planning and design of policies, as well as in their implementation and evaluation. The ADAPTool is intended to encourage assessment and discussion of these characteristics in various phases of the policy cycle.

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2.0 The Adaptive Design and Assessment Policy Tool (ADAPTool)

The Adaptive Design and Assessment Policy Tool (ADAPTool) is a Microsoft Excel-based workbook designed to evaluate a suite of public policies for their ability to contribute to the capacity of key economic sectors (e.g., mining, agriculture, forestry) to adapt to a specific socioeconomic or ecologic stress, such as climate change or market price volatility. A policy's ability to help stakeholders adapt to the stress and its ability to adapt to the stress is assessed by answering 15 questions across three worksheets, with a fourth worksheet aggregating results. The ADAPTool is based on the book *Creating Adaptive Policies: A Guide for Policy-Making in an Uncertain World* (Swanson & Bhadwal, 2009).

The spreadsheet workbook serves as the basis for scoring each of the programs in response to the assessment questions identified in Box 1. The questions cover both planned adaptability (i.e., how well the policy anticipates the likely impacts of the stressor) and autonomous adaptability (or adaptability to unanticipated impacts of the stressor).

BOX 1. ADAPTOOL QUESTIONS AND WORKSHEET STRUCTURE

I. Scope of Evaluation Worksheet:

1) What is the geographic scope of the analysis (e.g., watershed, conservation district, municipality, region, province)?
2) What is the stressor of concern (i.e., climate change, market price instability)?
3) What are the policies/programs to be assessed?

II. Vulnerability & Adaptation Analysis Worksheet (for planned adaptability):

4) What are the main sectors active in the geographic area?
5) In what ways are the sectors vulnerable to the stressor?
6) What adaptation actions might be necessary if this stressor becomes more severe in the future?
7) Are the identified adaptation actions supported by the policies/programs?

III. Adaptive Capacity Analysis Worksheet (for both planned and autonomous adaptability):

8) Is the policy itself vulnerable to the stressor identified?
9) Does the policy enhance the capacity of actors within each sector to adapt (with respect to access to finances, technology, infrastructure, information and skills, institutions and networks and equitable access)*?
10) Were foresight methods and multistakeholder deliberation used in the scoping and design of the policy?
11) Are foresight methods and multistakeholder deliberation used in the implementation of the policy?
12) Does the policy enable self-organization and social networking among affected stakeholders? (Does the policy provide mechanisms for the sharing and copying of best practices and lessons learned?)
13) Is decision making for policy implementation adequately decentralized?
14) Is there adequate variety in the suite of policies and programs directed at the policy issue (e.g., economic, regulatory, expenditure, institutional policy instruments)?
15) Does the policy have a regular formal review process in place that can detect emerging issues?

IV. Synthesis Worksheet

An aggregate ranking of planned adaptability and autonomous adaptability is provided for the overall suite of policies, as well as for each individual policy.

* Based on Smit and Pilifosova (2001).

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3.0 Policy Analyses

3.1 NRCan Project Process Overview

This application of the ADAPTool in Nova Scotia is part of a national project funded in part by NRCan's Climate Change Impacts and Adaptation Division. The national project includes similar pilots in British Columbia, Saskatchewan, Nova Scotia and Manitoba, with support from the Province of Manitoba. In Nova Scotia, the project delivery team, consisting of Livia Bizikova, Dimple Roy and Daniella Echeverria (IISD) worked together with the team in Nova Scotia (see Appendix C for a list of Nova Scotia team members) to plan and implement the project. This process involved several steps, described in more detail in subsequent sections of this report: initial project scoping and selection of agriculture sector policies to be assessed, staff training in the use of the ADAPTool, adaptability assessment of selected policies and reporting. The scoping process involved determining which climate change stressors to focus on, sectorial and subsectorial vulnerabilities to climate change, and potential adaptation actions in response to these vulnerabilities. The team also determined which programs and policies would be assessed. The scoping of vulnerabilities, adaptation actions and programs to assess was an iterative process that occurred through phone and in-person meetings.

Diverse capacity-building, participatory sessions and consultations used the ADAPTool application, following these steps:

- A one-day capacity-building session led by IISD provided an overview of the ADAPTool, its key elements and experiences with applications. During this session Ramon Sales shared the Government of Manitoba's experiences with previous application of the tool in Manitoba.

- Small group discussions identified specific ways of implementing the ADAPTool, including choosing the policies, identifying adaptation needs and sharing examples of ranking policies according to their ability to meet the identified adaptation needs.

- IISD gave a brief review and feedback to the Nova Scotia partners on partially completed policy assessments on issues such as the level of detail and types of responses to the questions, clarification on the ranking/scoring of policies and examples of responses from other applications.

- The ADAPTool assessments for each policy were then consolidated into a master workbook synthesizing results. IISD experts analyzed this synthesis and initial findings were checked and reviewed by the leads in Nova Scotia.

This process was effective, as it provided opportunities for repeated interaction and created a process of ongoing communication between the teams in IISD and Nova Scotia.

3.2 Policy Selection

The primary stressor of interest in this analysis is climate change. More specifically, it focused on the increased variability of precipitation leading to lack of water causing droughts and excessive moisture (flooding). The geographic scope of this policy analysis is Nova Scotia. In the application of the ADAPTool in Nova Scotia, the focus was on a set of policies that are of key interest for the NSE. These policies included a set of policies, including:

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- **Policy 1:** *Guide to Surface Water Withdrawal Approvals*: The purpose of this guide is to describe the recommended submission requirements, supporting documentation and the criteria to evaluate surface water withdrawal applications (Nova Scotia Environment and Labour, 2004).

- **Policy 2:** *Guide to Groundwater Withdrawal Approvals*: The purpose of this guide is to describe the minimum submission requirements, supporting documentation and the criteria used by NSE to evaluate groundwater withdrawal applications (NSE, 2010).

- **Policy 3:** *Our Parks and Protected Areas*: This document is the province's proposed plan to ensure that these areas continue to thrive. It delivers on two important government commitments: updating Nova Scotia's park system to secure and strengthen its long-term success and increasing Nova Scotia's legally protected landmass to at least 12 per cent by 2015. This plan proposes to protect more than 13 per cent of Nova Scotia's outstanding lands (Government of Nova Scotia, 2013).

The NSE considered these policies important for their ability to respond to adaptation needs and to be able to adapt to potential yet unknown challenges.

3.3   Identification of Vulnerabilities and Adaptation Actions

The project team identified three broad subsectors of key interest to NSE: water and wastewater, protected areas and wetlands, and air. After discussion with the team in Nova Scotia, the air subsector was removed from the analysis, as it was challenging to link the studied stressor with the potential vulnerability and adaptation needs in this subsector. Overview of the selected subsectors and the identified vulnerabilities are listed in Table 2.

TABLE 2. IDENTIFIED VULNERABILITIES IN THE CONTEXT OF SELECTED SUBSECTORS

WHAT ARE THE MAIN SECTORS ?	IN WHAT WAYS IS THE SECTOR VULNERABLE TO PRECIPITATION?
Water and wastewater	Drought/less precipitation affecting water (surface and groundwater) and water availability for industry.
	Increase in algae blooms due to warmer waters, increase of floods, saltwater intrusion and movement of sedimentation into drinking and recreational water has negative impact on water supply (including a foul smell).
	Structural damage or premature failure to bridge crossings (temporary or permanent), cofferdams and rip-raps is occurring due to extreme weather conditions.
Protected areas and wildlife	Wetlands have potential to be infilled during extreme precipitation or flooding.
	The population, functionality and migration of species (animals, birds, insects) within ecosystems of protected and wilderness areas (and Nova Scotia, overall) may change or be threatened by precipitation and other climate change stressors.

The rapid assessment also identified a list of anticipated necessary adaptation actions for each of the vulnerabilities listed above; these results are detailed in Appendix A. The list of adaptation actions is not meant to be definitive, but to provide examples of the types of actions that would be constructive in response to climate impacts identified.

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During the assessment, the following documents were referenced to help identify potential adaptation actions:

- *A Guide to the Approval Process for Industrial Activities Under the Environment Act and Regulations*
- *Activities Designation Regulations (Environment Act)*
- *Canada's Dam Safety Guidelines*
- *Guide to Considering Climate Change in Project Development in Nova Scotia*
- *Guidelines for Management of Contaminated Sites in Nova Scotia*
- *Guidelines for Monitoring Public Drinking Water Supplies*
- *Municipal Solid Waste Landfill Guidelines*
- *Nova Scotia Watercourse Alteration Activity Standards (2006)*
  - Temporary Bridge Specifications
  - Pipe Culverts
- *Nova Scotia Watercourse Alteration Specifications (2009)*
  - Clear Span Permanent Bridges
  - Submission Checklist for Watercourse Alteration
- *On-site Sewage Disposal Systems: Technical Guidelines*
- *Our Parks and Protected Areas: A Plan for Nova Scotia*
- *Storm Drainage Works Approval Policy*
- *TECHNICAL GUIDE: Development, Interpretation and Use of Rainfall Intensity-Duration-Frequency (IDF) Information: Guideline for Canadian Water Resources Practitioners*
- *Water for Life: Nova Scotia's Water Resource Management Strategy*
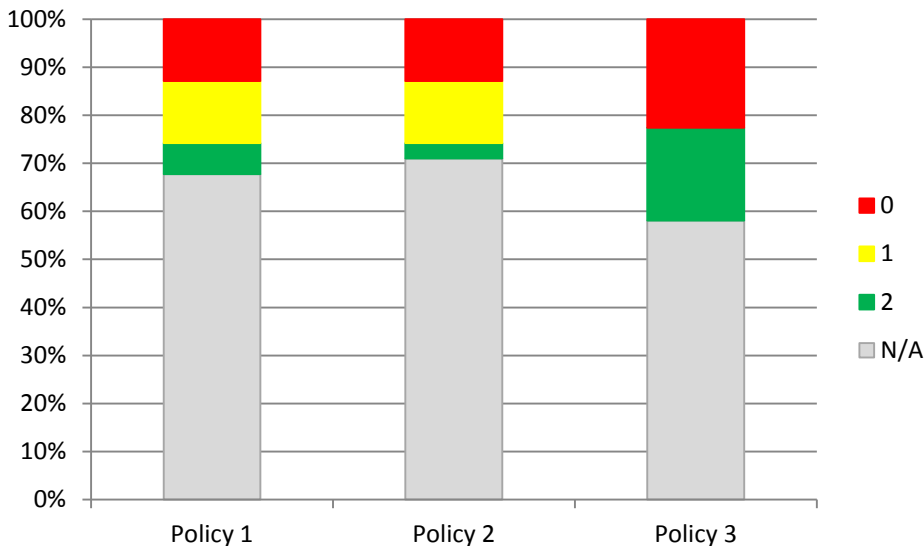
The key challenge that arose while reviewing these and various other Province of Nova Scotia guidelines was that the policies were built using old data, which raised concern for the safety of infrastructure based on today's climatic conditions (e.g., increase in severity of rainfall amounts creates a challenge with culverts). Various policies must incorporate more recent data to enable accurate assessment and planning.

3.4   Analysis Process

Once the vulnerabilities and potential adaptation actions were identified, the project team reviewed each of the three identified policies using the ADAPTool workbook. This review was then shared with representatives from government who are well versed in the day-to-day workings of the policy, and who provided feedback on the analysis, through in-person or telephone discussions and via email.

Assessing the Ability of Policies to Address Adaptation Needs

When assessing the ability of policies to address adaptation needs, we ranked the levels of support that the policy provides for the adaptation and indicated cases in which the adaptation need is not applicable to the scope of the specific policy. An overview of the vulnerabilities, adaptations and their relevance for the studied policies is presented in Appendix A. A summary of the findings is presented in Figure 1.

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FIGURE 1. OVERVIEW OF THE OUTCOMES OF VULNERABILITY ANALYSES FOR THE THREE ANALYZED POLICIES

Note: As a percentage from n; n=31 identified adaptation options. Policy names coordinate with those listed on page 10.

Of the 31 adaptation actions considered, 24 were supported by at least one policy in the suite. The assessed policies performed well in terms of adaptation measures involving stakeholder collaborations and awareness raising, permit issuing in protected areas and mapping current water withdrawals. Specifically, support for adaptation actions was strong in the water and wastewater sectors, especially those addressing the impacts of precipitation changes due to climate change on water, mapping of water withdrawals and support for the development plans for different stakeholder groups to address climate change impacts (especially droughts).

The two policies focusing on water management performed less successfully in addressing adaptation needs such as ensuring reviews, updating guiding documents for surface and groundwater withdrawals, making decisions on the allocation of wells and evaluating proponents' requests for water withdrawals in light of climate change impacts.

Adaptation needs addressed in the plan on protected areas and wildlife included those focusing on incorporating climate scenarios into planning processes, awareness raising about climate change impacts on potential species movements and accounting for potential climate change impacts in research licences, trail development and bridges. The plan performed less successfully in monitoring and addressing impacts of climate change on wetlands/other types of natural habitat, exploring the potential roles of wetlands in promoting adaptation to climate change and taking into account these issues when planning for infrastructure with potential consequences on wetlands and other types of natural habitat.

Finally, there were additional adaptation needs identified, including issues such as human and infrastructure safety and insurance needs in the context of climate change that were not directly relevant for any of the analyzed policies. In the future, we would recommend including additional policies in this assessment to explore if these adaptation needs are supported with other policies in place.

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Assessing the Ability of Policies to Support Unanticipated Adaptations

Overall, the three assessed policies performed very well in the series of questions on adaptive capacity. Overall, the policy performed well in terms multistakeholder deliberation during policy development and implementation, promoting self-organization and social networking, and promoting a suite of instruments to achieve the policy goals.

The analyzed policies, however, presented only a narrow spectrum of potential instruments mostly focused on regulation, which made it challenging to ensure diversity in terms of supported actors' capacities. Actors' capacities that focused on economic resources, technology and infrastructure were not well captured and thus for the future we would recommend considering a broader and more diverse set of policies.

Finally, for all the analyzed policies there are good practices emerging in terms of stakeholder consultations, informal reviews and approaches to decentralization; however, many of these processes, even when applied successfully, are not well documented, which limits their ability to be taken up by other policies and plans in the province and elsewhere. We would recommend developing standardized guidelines on these processes and, if needed, formalize the procedures so they can be applied and results reviewed regardless of staff movement, and structural and organizational changes.

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4.0   Adaptive Policy Conclusions and Recommendations

The overall conclusions and recommendations of the adaptive policy analysis for the suite of policies considered are outlined in the table below. An overview of the analyses and specific conclusions and recommendations for each policy are provided in Appendix B.

The policies address half of the relevant anticipated adaption needs; they also performed well in terms of ensuring formal stakeholder consultations during the development and implementation of the policy, and in enabling self-organizing and networking. The policies addressed somewhat well the need for the formal review processes and decentralization. In these areas, there are often informal practices to ensure reviews and provide decision-making powers at the vertical level.

Specific recommendations:

- **Support to Anticipated Adaptation Needs** (planned adaptability). For the next steps, it would be beneficial to review current policies that are focused on adaptation needs that were non-applicable—for example, the Wetland Conservation Policy, Non-Essential Pesticide Act, New Public Drinking Water Supply Program and Public Drinking Water Supplies Regulations.

- **Policy Stress** (planned adaptability). In the future, more efforts should be devoted to exploring feasible levels of water withdrawals under diverse climate change scenarios to reduce the vulnerability of the policies and manage water resources.

- **Support to Stakeholder Adaptive Capacity** (planned adaptability). For the next steps, it is important to identify policies that target areas such as technology, economic resources and infrastructure to make sure that stakeholder capacities are supported by diverse options.

- **Use of Multistakeholder Deliberation** (planned and autonomous adaptability). Formalizing consultation efforts that tend to occur informally during implementation could be beneficial for these sectorial policies and others.

- **Enabling Self-Organization and Networking** (autonomous adaptability). Experiences with supporting self-organization and networking applied in the analyzed policies could be used to inform other policies in these sectors and others.

- **Decentralization** (autonomous adaptability). In the future, a detailed review of these procedures on decentralization and vertical decision making would be recommended to make sure that they do not lead to unintended consequences—for example, by limiting choices and abilities of local actors to make decisions.

- **Variation in Policy Instruments Employed** (autonomous adaptability). For the next steps, it is important to look at other types of policies, especially economic instruments and expenditures, that could help address adaptation needs focused on economic measures such as insurance, as well as financial resources, technology and infrastructure.

- **Formal Policy Review and Improvement** (planned and autonomous adaptability). The policies are using informal review mechanisms and pilot projects/initiatives to gather additional information about performance to trigger adjustments. Formalizing these processes and applying them across these sectors and perhaps others are recommended.

- **Additional adaptation needs, needs for more actors' capacities and for diversity in types of policies**, such as economic, institutional and expenditures, were listed during the application. In the future, it would be beneficial to include additional policies and programs that address these needs and evaluate them by using the ADAPTool to make sure that areas of anticipated and unanticipated adaptation needs are addressed in the subsectors.

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5.0 Reference List

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Appendix A: Results of Vulnerability and Adaptation Action Analysis

- **Policy 1:** *Guide to Surface Water Withdrawal Approvals* (Nova Scotia Environment and Labour, 2004)
- **Policy 2:** *Guide to Groundwater Withdrawal Approvals* (NSE, 2010)
- **Policy 3:** *Our Parks and Protected Areas* (Government of Nova Scotia, 2013)

Identified vulnerabilities	Adaptation needs	Policy 1	Policy 2	Policy 3
Drought/less precipitation affecting water (surface and groundwater) and water availability for industry	Monitor and understand how much water is available	2	1	N/A
	Contingency plans for people who withdraw water (alternative sources of water dams, tanks, limit withdrawal)	1	1	N/A
	Farmers' drought plans	1	1	N/A
	Insurance for drought-related losses	N/A	N/A	N/A
	Government recovery program to respond to flooding (for farmers, communities)	N/A	N/A	N/A
	Alternative energy plans	N/A	N/A	N/A
	Mapping current water withdrawals and the rate of withdrawals	2	2	N/A
	Incorporate climate conditions into approvals (e.g., include climate co-efficient values) to reflect water demand and anticipated emergencies (flood, drought)	1	1	N/A
	Review/update *Guide to Surface Water Withdrawal Approvals* and *Guide to Ground Water Withdrawal Approvals* documents, based on changes in climate and potential reduction of water availability	0	0	N/A
Increase in algae blooms due to warmer waters, increase in flooding, saltwater intrusion and movement of sedimentation into drinking and recreational water	NSE to assess if they are fully prepared for these conditions	N/A	0	N/A
	Review current guidance documents (*New Public Drinking Water Supply Program, Guidelines for Monitoring Public Drinking Water Supplies, Water and Wastewater Facilities* and *Public Drinking Water Supplies Regulations*)	N/A	N/A	N/A
	Reassess decision-making process on location placement of wells	N/A	0	N/A
	Assess how proponents are chosen and approved (keeping rising water deficit in mind)	0	N/A	N/A
Structural damage or premature failure to bridge crossings (temporary or permanent), cofferdams, rip-raps occurring due to extreme weather conditions	Alter standards and approvals of Regulation Requirements (Act 5.4, e.g., change in application of 1:100 year return period) to withstand current and projected climate conditions (e.g., frequency of rainfall events	0	0	N/a
	Extra maintenance (clearing debris, changing the height and length of bridge abutment)	N/A	N/A	N/A
	Damage to the environment (on the watercourse)	0	N/A	N/A
	Liability of the institutions	N/A	N/A	N/A
	Incorporate human safety into development and maintenance (NSE currently only focuses on environmental considerations)	N/A	N/A	N/A
	Conduct and implement watershed threshold analyses	1	N/A	0
Wetlands have potential to be infilled during extreme precipitation or flooding	Monitor wetlands on the local watershed levels and inform provincial agencies	N/A	N/A	0
	Mitigate the loss of wetlands (avoid infilling wherever possible) which requires educating applicants (discussions & guidebook)	N/A	N/A	0
	Assess lifespan and safety of existing infrastructure close to coastline	N/A	N/A	0
	Carefully plan location of new infrastructure	N/A	N/A	0
	Review the Wetlands Conservation Policy	N/A	N/A	0
	Conduct proactive management by integrating climate change scenarios into maintenance or development of protected areas (e.g., integrate into development of Parks and Protected Areas Plan or develop a new policy)	N/A	N/A	2
The population, functionality and migration of species (animals, birds, insects) within ecosystems of protected and wilderness areas (and Nova Scotia, overall) may change or be threatened by precipitation and other climate change stressors	Review Non-Essential Pesticides Control Act to determine best management practises	N/A	N/A	0
	Construct trails and bridges that can withstand today's climate conditions and extreme weather events	N/A	N/A	2
	Manage the biodiversity of species	N/A	N/A	2
	Increase safety of humans (to human injury)	N/A	N/A	2
	Review application process and approval of (1) trail development permits (in protected areas) and (2) research licenses (in wilderness areas)	N/A	N/A	2
	Increase stakeholder awareness of climate change and potential effects to help facilitate movement of species	N/A	N/A	2

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Appendix B: Conclusions and Recommendations for Specific Policies

		1. *Guide to Surface Water Withdrawal Approvals*
Adaptive Policy Questions	Score	Recommendation
Program's Ability to Support Anticipated Adaptation Needs (Planned Adaptability, score out of 10)	3	
Are anticipated adaptation actions supported by the policies?	1	Review the current guidelines to account for different climate scenarios and potential socioeconomic and environmental needs.
Is the policy itself vulnerable to the stressor?	1	Impacts of climate change on water are challenging to estimate; however, risk assessments under different climate scenarios would help to establish thresholds for water withdrawals to reduce vulnerability.
Can the existing suite of programs enhance the capacity of actors within each sector to undertake the anticipated adaptation actions?	1	It would beneficial to include policies that focus on improving infrastructure and access to technology for users in the assessments to make sure that these actor capacities are supported by other instruments.
Was multistakeholder deliberation used in the design of the policies?	0	The information is not available, but consider using standardized approaches to stakeholders' consultation so the process is documented regardless of staff turnover.
Program's Ability to Enable Sector Responses to Unanticipated Events (Autonomous Adaptability, score out of 10)	3	
Is multistakeholder deliberation used in the implementation of the policy?	0	The information is not available, but consider using standardized approaches to stakeholders' consultation so the process is documented regardless of staff turnover.
Does the policy enable self-organization and social networking?	1	There are good experiences with self-organization and networking for addressing current challenges, but this is yet to be transformed to issues focused on climate change.
Is decision making for policy implementation adequately decentralized?	1	Currently, there are some established informal decentralized procedures; however, they may not be maintained when more formalized procedures are introduced and thus new approaches would need to be assessed for their impacts on decentralization.
Is there adequate variety in the suite of policies and programs directed at the policy issue?	1	Additional types of policies, such as expenditures, economic instruments and other institutional measures, would need to be explored to achieve the adaptation needs.
Do the policies have a regular formal policy review?	0	It would be important to include at least a basic review.
Overall Adaptive Policy	1	

		2. *Guide to Groundwater Withdrawal Approvals*
Adaptive Policy Questions	Score	Recommendation
Program's Ability to Support Anticipated Adaptation Needs (Planned Adaptability, score out of 10)	5	
Are anticipated adaptation actions supported by the policies?	1	Review the current guidelines and regulations incl. wells approvals to account for different climate scenarios and potential socioeconomic and environmental needs.
Is the policy itself vulnerable to the stressor?	1	Impacts of climate change on water are challenging to estimate; however, risk assessments under different climate scenarios would help to established thresholds for water withdrawals to reduce vulnerability.
Can the existing suite of programs enhance the capacity of actors within each sector to undertake the anticipated adaptation actions?	1	It would beneficial to include policies that focus on improving infrastructure and access to technology for users in the assessments to make sure that these actor capacities are supported by other instruments.
Was multistakeholder deliberation used in the design of the policies?	2	It would be beneficial to document outcomes and processes used in consultations even when the process is well run and provides relevant outcomes.
Program's Ability to Enable Sector Responses to Unanticipated Events (Autonomous Adaptability, score out of 10)	5	
Is multistakeholder deliberation used in the implementation of the policy?	2	Informal processes were used to reassess the guide; formalized processes would be suggested.
Does the policy enable self-organization and social networking?	2	Yes, especially when applicants and enforcement officers interact regularly.
Is decision making for policy implementation adequately decentralized?	0	Level of sharing information and decentralized implementation eroded over time, so explicitly outlining specific levels of decision-making powers would be beneficial.
Is there adequate variety in the suite of policies and programs directed at the policy issue?	1	Additional types of policies, such as expenditures, economic instruments and other institutional measures, would need to be explored to achieve the adaptation needs.
Do the policies have a regular formal policy review?	0	Not yet, as the guide was realized just in 2010. Since demands were raised for a review in 5 years, it would be beneficial to follow through on this action.
Overall Adaptive Policy	1	

		3. *Our Parks and Protected Areas*
Adaptive Policy Questions	Score	Recommendations
Program's Ability to Support Anticipated Adaptation Needs (Planned Adaptability, score out of 10)	4	
Are anticipated adaptation actions supported by the policies?	1	The plan performs well in terms of actions on stakeholder participation, awareness raising and inclusion of climate change in planning. The plan fails to address interaction of parks and wildlife with other sectors, such as infrastructure development.
Is the policy itself vulnerable to the stressor?	1	There is limited analysis within the plan, which can constrain policy performance for uncertainty, including climate impacts in the future.
Can the existing suite of programs enhance the capacity of actors within each sector to undertake the anticipated adaptation actions?	2	It would beneficial to include policies that focus on improving infrastructure and access to technology for users in the assessments to make sure that these actor capacities are supported by other instruments.
Was multistakeholder deliberation used in the design of the policies?	2	
Program's Ability to Enable Sector Responses to Unanticipated Events (Autonomous Adaptability, score out of 10)	8	
Is multistakeholder deliberation used in the implementation of the policy?	2	It uses advisory groups comprised of stakeholders representing different groups to discuss key decisions/actions.
Does the policy enable self-organization and social networking?	2	Targeted measures and communication tools are used to network with the public internally, within the organization. Both types of networking will be monitored for their efficiency and effectiveness.
Is decision making for policy implementation adequately decentralized?	1	The policy is highly decentralized, recognizing the importance of decision making at the lower levels.
Is there adequate variety in the suite of policies and programs directed at the policy issue?	1	Additional types of policies, such as expenditures, economic instruments and other institutional measures, would need to be explored to achieve the adaptation needs.
Do the policies have a regular formal policy review?	2	It is also important to document the results from these pilot programs and use them during the policy review.
Overall Adaptive Policy	2	

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