

An assessment of community-based climate change planning
practice in Nova Scotia

by

Catherine MacKinnon

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Climate change poses serious threats to Canadian communities. Are communities prepared to manage the impacts of climate change? Are they ready? This research set out to explore and analyze how communities in Nova Scotia are planning for climate change. The Province has mandated the creation of individual municipal climate change action plans (MCCAP). This research examines and evaluates MCCAPs to assess plan strengths and weaknesses with regard to municipal climate change planning best practices. The plans were evaluated using a plan quality framework consisting of eight plan quality characteristics: fact base, goals/objectives, policies, implementation, monitoring and evaluation, coordination, participation, and organization. A qualitative research approach was taken to create a content and thematic analysis to interpret these findings.

Key results from the evaluation pointed to areas that often were lacking in MCCAPs. The elements that were overlooked included dedicated implementation sections/chapters, monitoring and evaluation strategies, and an explanation of public participation strategies. On the basis of this evaluation process, evidence-based recommendations were proposed that demonstrate how municipal climate change plans could better incorporate best practices. The recommendation areas were as follows: Implementation, Monitoring and Evaluation, Public Participation, and Climate Change Training and Education for Planners. The findings provide an in-depth look at the planning processes taking place in Nova Scotia's municipalities, and suggest how planners and decision-makers in these municipalities could improve their climate change planning approaches and strategies.

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I am grateful to have received such an outstanding education from the University of Waterloo and School of Planning. Through this, I feel prepared to make a positive contribution to the planning world and future career endeavors. I hope to incorporate my knowledge of climate change planning into future opportunities. I wish to thank my family for their unconditional love and encouragement. I wish to also thank my supervisor, Professor Mark Seasons, for the continuous guidance and inspiration. I would also like to thank my committee members and the entire School of Planning faculty for their support.

Dedication

This thesis is dedicated to all those working tirelessly to expand climate change knowledge and climate change advocacy. Through this, we can make our communities resilient and a better place for all.

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Chapter 1

Introduction

Climate change poses serious threats to communities around the world. Climate change has impacted urban, rural, and coastal communities. Climate change is responsible for the increase in global temperatures, atmospheric water vapour, and ocean heat levels (Bush, 2019). Climate change has caused challenges such as rising sea levels, increased temperatures, and more frequent extreme weather events. It has also been a contributing factor to the increase in natural disasters such as wildfires, flooding events, landslides, and droughts (Fawzy et al., 2020). Human activity is largely to blame for climate change, as the excess of greenhouse gas emissions has been a contributing factor. Anthropogenic sectors such as energy, agriculture, transportation, and urban development have been significant contributors to the excess of emissions. Concerns attributed to climate change are human and environmental health, as well as inequities being exacerbated by climate change. These inequities include experiencing poverty, physical and mental health, often felt more by marginalized populations (Benevolenza & DeRigne, 2018). The direct and indirect impacts of climate change make it of utmost importance to address.

Governments and organizations have made firm commitments to address climate change. There is an abundance of legislation and policy that looks to address climate change impacts, and provide strategies for adaptation and mitigation opportunities. The existence of climate change legislation and planning can better prepare communities and enhance resiliency. Policy and interventions can help to address areas that are being impacted significantly, such as transportation, land-use, infrastructure, and community planning (Canadian Institute of Planners, 2018). The Canadian Institute of Planners (CIP) has created a policy goal to develop communities to be resilient to climate change.

Climate change is presenting serious threats to Canadian municipalities. These threats will impact environmental, social, and economic areas of communities. The coastal regions of Canada will experience a significant brunt of these impacts. With specific focus on the

Province of Nova Scotia, local climate change planning practices will be explored and analyzed. Nova Scotia is expected to experience rising sea levels, increases in coastal erosion, and more extreme weather events. These impacts can affect a wide range of municipal responsibilities, such as: damaging infrastructure, water quality, wastewater and stormwater management, public safety and more (Fisher, 2011). Bringing attention to this area of planning is important as preparation for climate change is critical for municipalities.

Climate change planning is at the forefront of Provincial initiatives. Nova Scotia is Canada's second smallest province, however is a leader in climate change planning. The Province has made a firm effort to address climate change through adaptation measures. In 2019, Nova Scotia and the federal government announced a \$114 million plan that looks to address climate change threats (Gorman, 2019). This will focus primarily on rising sea levels and storm surge, and creating adaptive strategies to address these issues. The Province has made considerable effort to reduce future outputs of greenhouse gas emissions (Philp, 2019). There are many programs installed to address climate change - i.e., Green Fund, and many energy efficient programs. Two important pieces of climate-related provincial legislation are the Sustainable Development Goals Act, and the Coastal Protection Act, both introduced in 2019 (Department of Environment, 2019). These legislative pieces can improve the approach to mitigation and adaptation.

Nova Scotia was the first province to mandate the creation of Municipal Climate Change Action Plans (MCCAP). By each municipality creating a MCCAP, this ensured their continued access to Provincial Gas Tax Funds. The creation of each MCCAP was directed by Provincial Guidelines that describe mandatory content and inclusions. Nova Scotia will benefit from local-scale planning strategies as municipalities are diversely populated. Nova Scotia is home to 22 towns with populations under 5,000 residents (Philp, 2019). Municipal planning can lead to better greenhouse gas reduction strategies, as municipalities both directly and indirectly control 44% of Canada's emissions (Philp, 2019).

For the purpose of this research, Nova Scotia is the focus as it is a coastal province being posed with significant climate change threats. This study examines planning for climate

change in Nova Scotia and the quality of climate change documents. This research evaluated current MCCAPs to assess areas where plans are strong, and point out areas where attention could be required. The evaluation criteria followed a plan quality framework provided by Guyadeen et al. (2019) that establishes 8 plan quality characteristics supported by 46 indicators (Guyadeen et al., 2019).

This research is looking to explore and evaluate climate change plans in Nova Scotia. This research will address the primary research question: *how are municipalities in Nova Scotia planning for climate change?* This research addressed that question by:

1. Identifying municipal climate change action plans (MCCAP) and their mandated contents
2. Comparing MCCAPs to a best practices framework for evaluation
3. Evaluate and identify commonly present/absent characteristics of MCCAPs
4. Create a set of evidence-based recommendations to support municipalities in improving current planning processes based on best practices framework and evaluation

Subsequent and supportive research questions that will be addressed are:

- *What are the common content elements of municipal climate change plans?*
- *What areas of MCCAPs can be improved to enhance plan quality?*
- *How can climate change be better incorporated in municipal planning?*

This study addresses the research questions by looking critically at the climate change plans being utilized by Nova Scotia, as well as the entire provincial framework. Recommendations will stem from evaluation results and supporting academic literature.

This paper comprises 5 Chapters – Introduction, Literature Review, Methods and Methodology, Findings, and Conclusions and Recommendations. The subsequent chapter, Chapter 2 – “Literature Review”, synthesized literature surrounding climate change and Nova Scotia’s climate change initiatives. This also included exploring research relating to plan quality and climate change planning best practices. The literature review chapter covered topics such as: the climate change phenomenon, climate literature at an international

perspective and Canadian perspective, the role of climate change and planning, and barriers to climate change planning. The literature then became more geographically narrow, looking at Atlantic Canada and the Province of Nova Scotia. This provides important demographic information and describes local level climate change impacts. The literature review chapter will act as a base for contributing to evidence-based recommendations.

Upon creating a well-versed literature review, the following chapter, Chapter 3 – “Methods and Methodology”, describes methods and methodology utilized. A sample of Municipal Climate Change Action Plans (MCCAP) will be evaluated using a plan quality framework. The framework used comes from the journal article “Evaluating the quality of municipal climate change plans in Canada” prepared by Guyadeen et al. (2019). The framework has identified key elements to a good municipal climate change plan. These include 8 characteristics: fact base, goals/objectives, policies, implementation, monitoring and evaluation, coordination, participation, and organization (Guyadeen, 2019). This framework will be compared and contrasted to elements of MCCAPs. The research will take a pragmatic viewpoint as it is “real-world orientated” and problem-centred (Creswell & Creswell, 2018). It will also be taking a qualitative approach as it is informed by existing planning documents. A sample of MCCAPs will be used in this research. This sample will provide a representation of the diversity of municipalities; choosing both urban and rural communities to include in the sample.

The following chapter, Chapter 4 – “Findings”, provides an evaluation of MCCAPs which will be completed using the plan quality framework created by Guyadeen et al. (2019). A content and thematic analysis will be informed from findings to illustrate patterns and themes of MCCAP contents. These patterns will examine what is often present and absent in plans to determine strengths and weaknesses. The evaluation of MCCAPS will inform where plans are excelling in regard to best practices, and where more attention could be required.

Upon evaluating sample MCCAPs, this will inform evidence-based recommendations. Chapter 5 – “Recommendations” will stem from areas that often lacked in the sample MCCAP evaluation. The content analysis will point to themes of content inclusions and absences.

When comparing to the evaluation framework, this will indicate where Nova Scotia's municipalities can direct their resources and planning initiatives. Often, smaller municipalities will have limited resource capacities, therefore it is important to offer up feasible recommendations that municipalities can consider and execute. This research will lead to contributive findings as it will offer an in depth look at Nova Scotia's municipal climate change planning approach. Recommendations will be supported by academic literature and research. The recommendations can be viewed as an opportunity to accentuate areas of MCCAPs so that goals and policies set out in plans are achieved. With the inclusions of the proposed recommendations from the research, this can propel MCCAPs to incorporate climate change planning best practices.

This research will contribute to the greater knowledge on municipal climate change planning in Canada. Incoming climate change impacts will require proper planning and anticipation. The requirement of municipalities to adapt to these impacts cannot be understated. It is important to support planners and planning departments with accessible information on best practices so that the most effective climate change strategies are implemented. The existence of feasible municipal adaptation and mitigation measures will direct communities to become resilient to climate change impacts.

I wanted to pursue this topic as climate change is emerging one of the most pressing issues of this generation. Climate change is presenting devastating impacts to communities that many individuals call home. Recent climate disasters, such as Canadian wildfires or flooding events have shaken the nation towards a direction where action is not only wanted, but required. Climate change and community planning intersect as resilient planning cannot occur without incorporating climate impacts. The creation of climate-resilient communities will improve the social, economic, and environmental realms of communities. A top-down approach to climate change planning can start from government and planning departments. The legislation and climate change plans that governments use must be of top quality and present feasible options for municipalities to implement. Through innovative climate change planning, direct and indirect climate-impacts can be addressed.

Chapter 2

Literature Review

2.1 Search Strategy:

This paper required extensive research and information accumulation as it follows a qualitative approach. Databases such as Google Scholar and University of Waterloo online library were used to acquire information. Databases such as SAGE Journals, SCOPUS and more were scanned to find relevant academic literature. In addition, the reference lists of relevant journals were used to acquire more sources.

Examples of key search terms to accumulate academic literature were:

- “Climate change planning best practices”
- “Coastal planning and Nova Scotia”
- “Climate change in Nova Scotia”
- “Municipal climate change action plans”
- “Impacts of climate change on coastal communities”
- “Climate change in Canada”
- “Local-level climate change plans”

2.2 Main Themes – Synthesis of Literature

2.2.1 The Climate Change Phenomenon

The world’s climate is changing. The phenomenon of climate change will present drastic changes to our communities. Climate change is no longer considered a potential unknown to happen in the future, but instead its impacts are being felt by communities now. By being irrefutable and scientifically-backed, climate change is one of the most pressing issues of this generation. The effects of climate change are projected to increase and intensify over time. Climate change is presenting drastic impacts to the global stage. In 2018, the world

experienced 315 global natural disasters attributed to climate (Fawzy et al., 2020). These included wildfires, droughts, flooding events, landslides and more. Climate change has been observed globally through warming temperatures and rising sea levels (Baker, 2012; Cohen et al., 2019; Department of Environment, 2019). Thorough evidence has displayed a continuous increase in temperature, especially occurring during the Industrial Era and onwards (Bush, 2019; Lemmen, 2016). In addition to increases in global average temperature, there have been also documented increases in rates of atmospheric water vapour and ocean heat levels (Bush, 2019; Cohen et al., 2019).

To simplify, climate change can be described as “a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable periods” (UN-Habitat, 2014). Climate change is a shift in climate patterns attributed to increases in greenhouse gas emissions (Fawzy et al., 2020). Human activity is largely responsible for a significant amount of greenhouse gases being emitted into the atmosphere. Anthropogenic sectors largely to blame for the excess of emissions are the energy sectors, agriculture sector, urban development, and transportation (Tang, 2019). The impacts of climate change vary such as creating environmental, economic and social affects. Often, the distribution of challenges is uneven, with marginalized populations bearing a greater burden of impacts (Seasons, 2020). *Figure 1* depicts the greenhouse effect which explains the warming of Earth’s surface. With the excess of greenhouse gases in the atmosphere, this is leading to more heat being trapped (Greenhouse Effect, 2019; Shaftel, 2020).

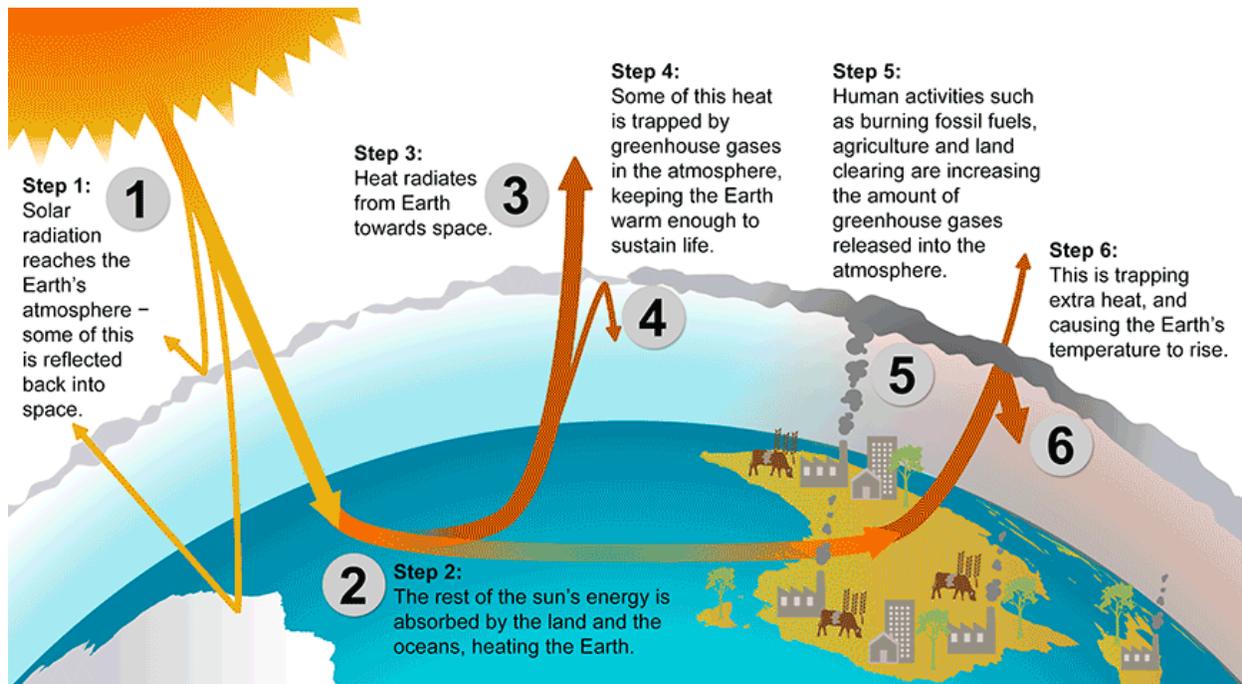


Figure 1. The Greenhouse Effect. Retrieved from:

<https://www.environment.gov.au/climate-change/climate-science-data/climate-science/greenhouse-effect>

The last three full decades have experienced successive record-breaking averages for 10-year temperatures levels. As a result of the average temperatures rising globally, land ice levels have experienced higher rates of melting and thinning (Bush, 2019; Lemmen, 2016). This has led to further sea level rise and the reduction of sea ice levels (Council of Canadian Academies, 2019; Fawzy et al., 2020). Globally, it is estimated that sea levels have risen 0.19m during the time period between 1901-2010 (Bush, 2019). This observed increase can further be attributed to expansion of ocean water particles and the increased level in inputted meltwater from warming. It has been observed that upper ocean levels have significantly increased in temperature to a depth of 700m (Bush, 2019). Anthropogenic activities are largely to blame for these climate change impacts, as greenhouse gas emissions are a primary cause of observed warming. The IPCC is responsible for determining the science regarding climate change (Bush, 2019). The IPCC has stated that it is their estimate that human activities

are responsible for causing a 1.0 °C increase in global temperatures above pre-industrial levels (IPCC, 2018).

2.2.2 Literature at an International Perspective

Climate change is a global issue. Climate change will not spare any country as its impacts are being felt at a global scale. It is not enough to address climate change solely at national levels, as climate change impacts are an international concern. The preparation of adaptation measures is imperative for national resilience to climate change. When it comes to measures put in place to reach the goals set out in the Paris Accord, true effectiveness will only occur when measures are done in every country (Akpan, 2019; Stavins, 2014).

Common international goals are the stabilization of rising temperatures, and reduction of greenhouse gas emissions (Akpan, 2019). Leaders in climate change planning and moving towards effective environmental practices are countries such as Denmark, Finland, Norway, New Zealand, and Australia (Kolb, 2019). Countries have adopted various measures to address climate change that range from policy creation to investment in innovative green adaptation measures. When it comes to influencing a nation's direction in climate change preparation and adaptation, policy makers have an important role (Akpan, 2019; Markkanen, 2019). An example being Norway, leading in implementing effective policy in the renewable energy sectors and setting ambitious goals to reach carbon neutrality (Kolb, 2019). Another example of ambitious action is from the Netherlands, where the aim is to be carbon neutral by 2050 (OECD, 2021; Reckien, 2013). This would be a 100% reduction target.

Europe is home to many countries leading the path of effective climate change planning. However, there are still areas which can be strengthened. Research has been conducted to examine the broad climate change planning framework within the European context. This research considered the adaptation and mitigation plans, and the planned greenhouse gas emissions targets. A 2013 study looked at 200 cities in 11 countries and concluded that 35% of the cities did not have a mitigation plan, and 72% of cities did not have

an adaptation plan (Reckien et al., 2013). These actions would lead to a 37% reduction in greenhouse gas emissions by 2050. Although this is promising, studies have pointed out that these actions will still fall short of reaching national targets (Reckien, 2013). In 2021, the EU has made even more firm targets to address climate change and emissions. One of the ambitious goals is to cut carbon emissions by 55% by 2030 (BBC, 2021).

Aside from policy, many countries have enacted local climate change plans. There has been a push to move attention from broad plans to addressing local impacts of climate change (Baker, 2012; Richardson, 2012). For instance, Australia established the National Climate Adaptation Framework, which has the Local Adaptation Pathways Programme (LAPP). The LAPP looks to provide grants for local governments in their initiative to create local adaptation plans (Ramm et al., 2017). Australian regions such as Southeast Queensland are particularly susceptible to climate change risks due to population growth and increased coastal development (Baker, 2012). Similarly, the United States incentivizes the development of climate change and mitigation plans by offering up grants (Baker, 2012; Philp, 2019; Stavins, 2014). These grants are offered to sub-national bodies so that inventory emissions can be created and associated mitigative strategies are implemented. Government incentives towards action can strengthen motivation for climate change responses at a local level (Baynham & Stevens, 2013; Philp, 2019; Tozer, 2017).

Common climate change planning practices and national strategies that have proved to be effective are investing in renewable energy sources and moving away from fossil fuels, accompanied by vigorous green policies and environmental goals. Traditionally, these climate change responses have been derived from international actions to reduce greenhouse gas emissions, being influenced by the United Nations Framework Convention on Climate Change (Baker, 2012; Bush & Lemmen, 2019). Many countries that have signed the Paris Accord have made inadequate preparations for fulfilling the expected goals (Akpan, 2019; Reckien, 2013). By not being on track to reach these critical goals, attention has been placed on leaders and government to move nations in a more resilient direction.

2.2.3 Climate Change in Canada

Climate change and variability occurring in Canada can be considered a manifestation of climate change at the global scale (Bush, 2019). Canada has experienced various impacts attributed to climate change, ranging from physical and ecological impacts, to economic impacts. Since 1948, Canada's annual average temperature over land has been about double when comparing to the global average, increasing by roughly 1.7°C (Bush, 2019). In northern Canada, recorded temperatures have been even more alarming, rising roughly 2.3°C since 1948. This pattern of recorded higher temperatures has been accompanied by altering precipitation patterns, an increased number of heatwaves, reduced and shrinking ice cover, all resulting in shifts in natural and human systems (Council of Canadian Academies, 2019; Fawzy et al, 2020). These changes will further alter aspects of Canadian climate such as levels of freshwater availability, creating weather more conducive to severe fire seasons, and the duration of snow and ice cover (Bush, 2019; Cohen et al., 2019). Climate change impacts have led to more than 400 municipalities in Canada declaring climate emergencies (Woods, 2019). An Expert Panel created by the Council of Canadian Academies determined that the Top 6 risk areas in Canada as a result of climate change are coastal communities, physical infrastructure, Northern communities, human health, ecosystems and fisheries (Council of Canadian Academies, 2019). These areas will require measures for further adaptation and planning due to these threats.

In a Canadian context, there has been firm commitments made to address and adapt to climate change (Feltmate, 2018). At a federal level, Canada has presented a stance to address climate change and prioritize adaptation efforts to support resilient communities. Throughout the past two decades, the federal government has produced three national climate assessments (Bush, 2019). These are accompanied by sector-specific assessments ranging from transportation to marine coasts (Bush, 2019). Canada signed the Paris Agreement in a firm attempt to commit to addressing climate change (Akpan, 2019). The Agreement puts an emphasis on limiting the global rise in temperature.

The Canadian Government has committed to the reduction of greenhouse gas emission levels by the year 2030 and further pursue harnessing renewable energy (Cullen, 2016). Reports have concluded emissions will have to be reduced by 208 million tons to meet Canada's international goal of a 30% reduction by 2030 (Cullen, 2016). Other notable federal plans that aim to address climate change is the Pan-Canadian Framework on Clean Growth and Climate Change, a climate plan created to address emission targets and promote clean economic growth through various policies (Environment and Climate Change Canada, 2016). This was created by the Federal Government to facilitate working alongside provinces and territories to reach the goals expected of the Paris Agreement. This is Canada's first national climate plan. More recently, in December 2020, the Canadian Government introduced "A Healthy Environment and a Healthy Economy" (Environment and Climate Change Canada, 2020). This can be considered an updated climate plan, and contributes to efforts already underway by the Pan-Canadian Framework (Government of Canada, 2021).

Although all of Canada will experience various climate-related threats, coastal regions will bear a significant burden of impacts from climate change. Coasts are typically dynamic environments, yet climate change is presenting drastic changes and threats to this sensitive region. Canada is home to over 243,000 km of coastline, which is more than any other country. This vast coastline is inhabited by 6.5 million people (Council of Canadian Academies, 2019). The most serious threats to coastal communities are rising sea levels and more frequent extreme weather events (OECD, 2019). This can lead to severe flooding and inundation occurring in these coastal regions. Coastal flooding is expected to increase in Canada due to sea level rise (Bush, 2019). In addition, the further reduction in sea ice levels in Northern and Atlantic Canada is leading to risks of coastal infrastructure and ecosystem damage (Department of Environment, 2019). This is due to more frequent storm surges occurring in these areas (Bush, 2019).

In addition to all other impacts, climate change will present a significant economic burden in the coming years. An expert report commissioned by the Government of Canada in 2019 predicted that the cost attributed by sea level rise and storm surges could be in the

billions for damages (Auld, 2019). A report conducted in 2016 estimated that costs associated with sea level rise and storm surges could surpass \$50 billion (Auld, 2019). Recent modeling projects that in the scenario of higher-end sea level rise, damage costs could be between the range of USD \$1.7-5.5 trillion over the 21st century (OECD, 2019). In the case of maladaptation to climate change risks, the costs adhered could be catastrophic for government economies.

Globally, coastal flooding alone could be responsible for displacing hundreds of millions of people. The annual cost for coastal flooding adaptation measures is estimated to be in the range of \$25-270 billion, which accounts for dike construction, maintenance, and attending and replenishing beaches (Lemmen, 2016). Canadian coasts contribute significantly to National GDP generation. Canadian ports annually ship more than \$400 billion worth of goods (Association of Canadian Port Authorities, 2013). The continuation of the ports functionality is imperative. Canadian coastal communities will bear a significant economic burden, as a report concludes that a sea level rise over 50 cm would lead to the inundation of bridges and other municipal infrastructure, with repair and replacement costing hundreds of millions of dollars (Council of Canadian Academies, 2019). Insurance losses have experienced an exponential increase attributed to climate change and weather events. Between the years 2009 and 2017, insured losses accounted for an average of \$1.8 billion per year, in comparison to the \$405 million per year of losses incurred during the years 1983 to 2008 (Feltman, 2018).

2.2.4 The Role of Climate Change and Planning

Adaptation and mitigation are important components to climate change planning. Climate change policy responses tend to fall into two categories – adaptation or mitigation responses (Janetos, 2020). Adaptation can be defined as referring to “actions that reduce the negative impact of climate change, while taking advantage of potential new opportunities” (Natural Resources Canada, 2015). This involves reducing vulnerability to climate change impacts and anticipating challenges (Janetos, 2020; Shaftel, 2020). Effectiveness of

adaptation strategies can depend on available resources or technology (Janetos, 2020). Mitigation seeks to provide methods that reduce the risk of future challenges and change (Janetos, 2020). This differs from adaptation as it is “human intervention to reduce the sources, or enhance the sinks, of greenhouse gases” (IPCC, 2014). Intentional adaptation and mitigation can lead to more resilient communities. This is done by anticipating challenges and providing practical strategies to address these challenges.

Climate change can now be considered a determinant of public health (Benevolenza & DeRigne, 2018). Climate change presents various impacts to human health and food security (Fawzy et al., 2020). As discussed earlier, marginalized populations will experience a greater burden of these impacts. Research has shown that the physical and mental health of marginalized populations were exacerbated in comparison to other demographic groups during weather events (Benevolenza & DeRigne, 2018). Poverty is a significant concern when it comes to climate change impacts as it is projected to be exacerbated as well (Hallegatte et al., 2018). Developing countries are projected to experience poorer health, increased instances of natural disasters, and decreased agricultural output (Das Gupta, 2014). These inequities make climate change even more critical to address and mitigate through a thoughtful policy approach (Markkanen & Anger-Kraavi, 2019).

The existence of legislation and proper planning for climate change is imperative for Canadian communities. Action at every level of government will position communities to establish and achieve aggressive targets. This can lead to better prepared and more resilient municipalities (Sciarpelletti, 2019). Climate change impacts every realm of planning, such as land-use, transportation, community, and infrastructure planning. Climate change planning touches upon many areas such as the reduction of emissions, adaptation strategies to environmental variations, and measures for disaster risk aversions (Canadian Institute of Planners, 2018). Policy and interventions must be created with an intentional approach so that they do not burden vulnerable populations, such as Indigenous, elderly or remote communities (Canadian Institute of Planners, 2018). This approach to planning requires a collaborative approach, and the balance of considerations.

The Canadian Institute of Planners (CIP) has established a policy goal to plan and develop communities to be sustainable and resilient to climate change, which can create equitable and flourishing communities. Objectives related to this policy revolve around the built environment, natural environment, and social environment (Canadian Institute of Planners, 2018). The CIP believes that addressing climate change is a key part to planning for the wellbeing of the community and public (Canadian Institute of Planners, 2018).

Planners have a key role in climate change planning. Planners have the ability and position to collaborate with government and key stakeholders. Planners have many responsibilities and professional obligations. In relation to climate change planning, a non-exhaustive list is: acting in the public interest, introducing climate change mitigation and adaptation strategies, address emission targets, plan for climate change related-risks, and advancing policies to reach objectives. In addition, planners have the obligation to incorporate transparency towards the public engagement process.

Local climate action plans have rose to prominence with their ability to address climate change impacts at a local and specific level. Local climate change plans are key to directing regions and municipalities towards becoming more resilient and building adaptive capacity (Philp, 2019). Nova Scotia introduced mandating municipal climate change action plans, making it the first province to do so. (These plans will be discussed in further detail in subsequent sections). The Province of British Columbia mandated that official community plans now include targets and policies that address the reduction of emissions (Baynham & Stevens, 2013). This is not a specific municipal climate plan, but rather incorporating reducing greenhouse gas emissions in community plans. An evaluation of the plans created recommendations for strengthening these plans and municipal climate change planning in general. One recommendation area is as follows: to strengthen municipal climate planning by better connecting policies and actions, incorporating a thorough implementation framework, and providing rationale for action. Another recommendation area looks to strengthen provincial mandate by creating standardized targets for greenhouse gas emissions, providing incentives for action, and provide more financial assistance for action

(Baynham, 2013; Philp, 2019; Stone et al., 2012). These recommendations can be used towards all forms of local climate action planning.

Alternate studies of local climate change action plans have looked at evaluating contents and effectiveness. Results from a study that looked at local climate change in the United States concluded that plan strengths were climate change awareness and “analysis capabilities” when it comes to climate change impacts (Tang et al., 2010). The results also pointed to plan deficiencies in the area of action for climate change mitigation (Tang et al., 2010). It is critical that local plans identify feasible options and constraints when offering up interventions.

Studies revolving around local climate change action plans have established best practices to guide municipalities. Many of these best practices look at adaptation and mitigation planning. Best practices in adaptation planning looks to include urban initiatives such as anticipating extreme weather events, updates to infrastructure services, stormwater management, and incorporating land use planning into adaptation strategies (Zimmerman, 2011). For instance, a best practice is New York City introduced adaptation strategies in PlaNYC, which included these areas and associated targets (Zimmerman, 2011). Many best practices for mitigation look to include greenhouse gas emissions targets, energy efficiency targets, and renewable energy strategies (Tozer, 2017; Zimmerman, 2011). The inclusions of these areas in local climate change plans can propel them to include best practices.

Drawing upon a critical review of what constitutes important elements in a climate change plan, it was determined that their existence is critical to demonstrating climate change as a local priority (Guyadeen, 2019). It was observed that planning for climate change across Canada is unequal, due to the absence of legal and legislative obligations to jurisdictions (Guyadeen, 2019). A national approach would be better suited to help in comparing the quality of plans, as well as to help policy makers focus on the strengths and weaknesses of plans in jurisdictions (Guyadeen, 2019). In terms of planning measures that can promote climate change adaptation and resilience, cities have many effective options at their disposal. These options range from land use policies to zoning regulations (Guyadeen,

2019). The use of goals and strategies can prove to be effective with climate change planning. The introduction of Municipal Climate Change Action Plans by Nova Scotia made them the first province to mandate such a plan (OECD, 2019).

Plan quality is critical to consider for climate change plans. Plan quality is a measure of key components of a plan, looking specifically at the presence or absence of these components (Guyadeen, 2019). Research regarding plan quality has expanded due to the overarching consensus of key elements that constitute an excellent plan. Clear goals related to adaptation are important to have outlined in a high-quality climate change plan, accompanied by implementation and evaluation methods (Guyadeen, 2019). Frameworks such as the one created by Guyadeen et al. (2019) can be utilized to assess plan quality. Top plan characteristics used to evaluate plans are goals and policies, factual base, implementation and evaluation methods, inter-organizational coordination, and participation of different groups (Guyadeen, 2019). In addition, research conducted by Stevens points out attributes of a high-quality plan, which include: strong fact base, relevant policies to support plan goals, appropriate monitoring and evaluation strategies, public participation, intergovernmental coordination (Stevens, 2013). The inclusion of relevant indicators to assess plan progress is crucial (Seasons, 2021). These can include environmental, quality-of life, or social indicators.

2.2.5 Barriers to Climate Change Planning

With the push to create climate change plans at the local-level, there are associated challenges with this task. Research conducted in developed countries has suggested that resources and local capacity hinder the implementation of local plans (Baker, 2012). This can be due to municipal constraints and financial limitations. The most commonly reported barriers to implementing local climate change plans are lack of information and expertise, political support, and available financial resources (Baker, 2012; Viswanathan, 2020). Other research points to the absence of clear roles and responsibilities in local government

structures, as well as the lack of mandated obligations in climate change planning (Amundsen et al., 2010). Another barrier can be the complexity of climate change impacts, many local jurisdictions deem climate change as more of a global issue, rather than regional (Tang, 2010). Many of these barriers have led to the lack in preparedness of local governments to implement actions to address climate change challenges (Baker, 2012).

2.3 Background Literature on Climate Change in the Study Area

2.3.1 Climate Change at a Canadian Regional and Provincial Scale – Atlantic Canada

In Canada, certain authorities are decentralized and power for decision-making is given towards Provincial governments. Canadian provinces have complete legal jurisdiction over their municipalities, thus they are responsible for setting guidelines for set municipalities to follow. Provincial governments determine municipal powers, access to operating revenues, and associated responsibilities (Guyadeen, 2019). Local governments also act as agents to conduct provincial policy directives (Guyadeen, 2019). With a specific focus on the province of Nova Scotia, it is unique as it is the only Canadian province to mandate its municipalities to have climate change plans. Each local government is obliged to create a “Municipal Climate Change Action Plan” that demonstrates climate change adaptation priorities (Guyadeen, 2019). This directive ensures municipalities will continue to receive Gas Tax Funds. Nova Scotia will experience many issues attributed to climate change, such as rising sea levels and coastal erosion (Philp, 2019). A considerable number of Nova Scotia communities located on the coast will experience the impacts of climate change (Gorman, 2019).

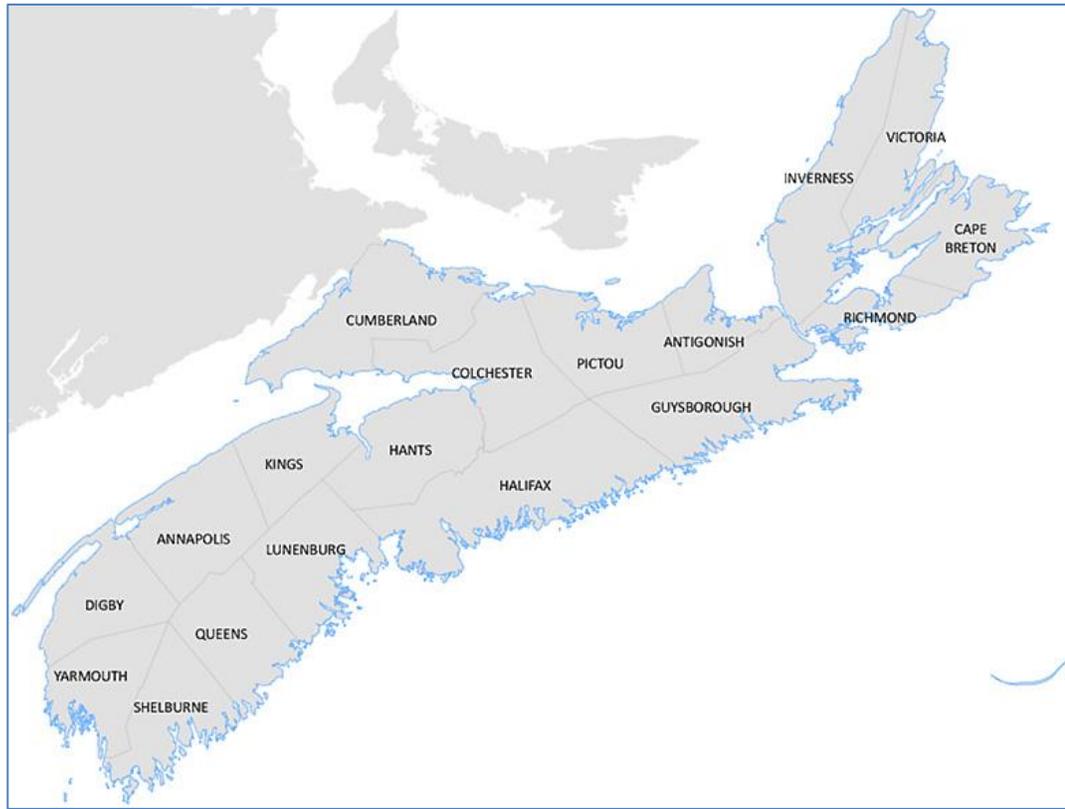


Figure 2. County Map of Nova Scotia. Retrieved from:
<https://archives.novascotia.ca/maps/county/>

Atlantic Canada is predicted to experience significant sea level rise over this century, that will outpace the expected global average (Council of Canadian Academies, 2019; Department of Environment, 2019). This rate of sea level rise was 2.5 times faster during the time period between 2006 to 2016, in comparison to the rate experienced during the entire 20th century (Auld, 2019). Due to land subsistence, the Atlantic coast is projected to experience higher increases of sea levels. This leads to greater risk of flooding and associated damage. Nova Scotia has made a considerable effort to combat climate change impacts through planning and investing in adaptation measures. The federal government and Province of Nova Scotia jointly announced in 2019 a \$114 million plan to address the threats posed by climate change (Gorman, 2019). The primary threats are rising sea levels and storm

surge to the province's coastal communities. The proposed plan is to reconstruct 64 kilometres of dike land, which can help prevent the flooding of historical sites, agricultural land, and Indigenous communities (Gorman, 2019). The province has over 241 kilometers of dikes. However, as much as up to 70% of these dikes may become susceptible to tidal surge and overtopped (Gorman, 2019).

Other Canadian provinces have made considerable efforts to address climate change impacts effecting their coastal communities. The Partners for Climate Change (PCP) program was a significant leader in initiating a push towards creating more municipal climate change plans (Guyadeen, 2019). The program promotes how municipalities must focus on adaptation and greenhouse reduction strategies. Municipal climate change plans have been mandated by many provinces and territories.

2.3.2 Background Information – Nova Scotia Demographics

Nova Scotia is Canada's second smallest province, and is home to over 900,000 residents (Statistics Canada, 2017). Based on census data collected between the years 2011 and 2016, it displays a small growth in population. However, this growth is distributed unevenly between urban and rural regions. Halifax, Nova Scotia's capital city, has experienced growth in population, whereas the Northern, Southern, and Cape Breton regions have experienced declines in population as displayed in *Figure 4* (Department of Municipal Affairs, 2018). Halifax can be considered the economic hub of the Maritimes and is where 44% of the province's population resides (Philp, 2019). Many of Nova Scotia's towns have small populations, with 22 having under 5,000 residents (Philp, 2019). The province comprises three types of municipalities: regional municipalities, towns, and county/district municipalities (Department of Municipal Affairs, 2018). The three regional municipalities are: Halifax Regional Municipality, Cape Breton Regional Municipality, and Region of Queens.

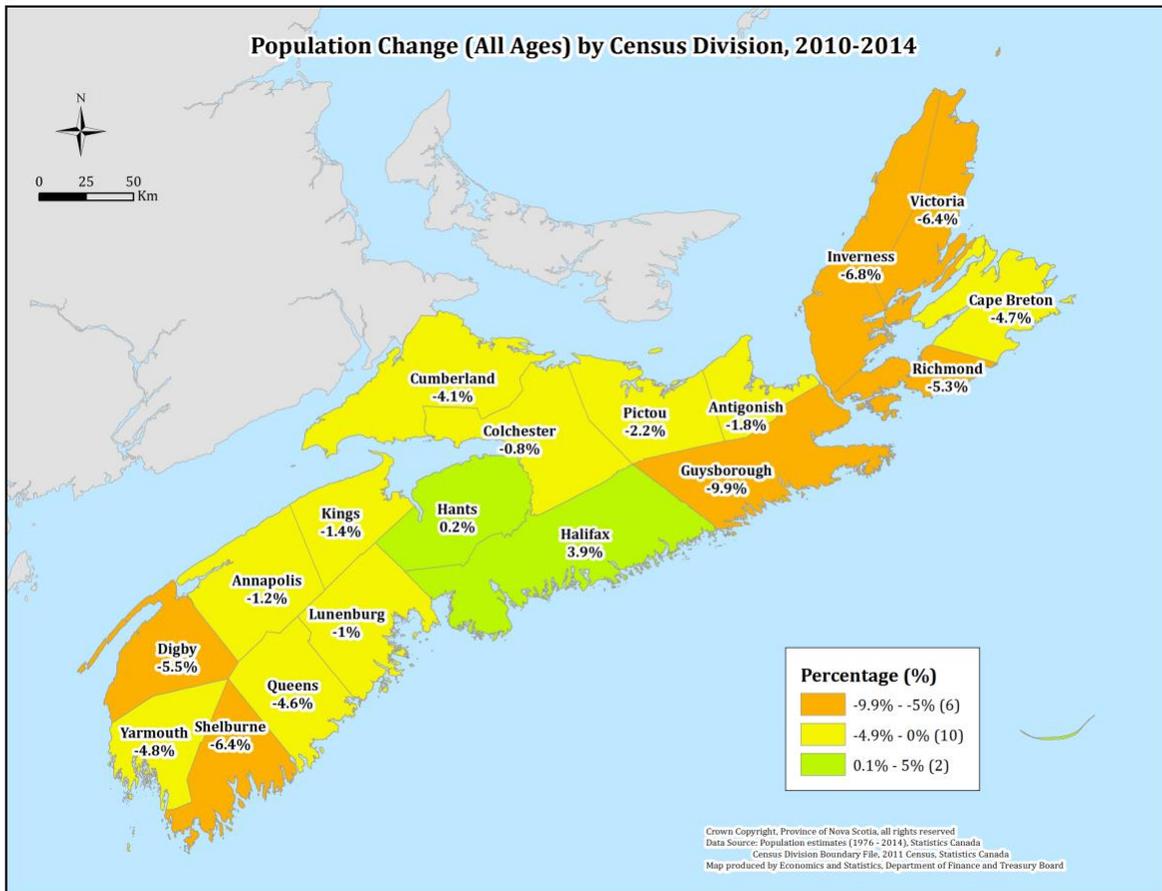
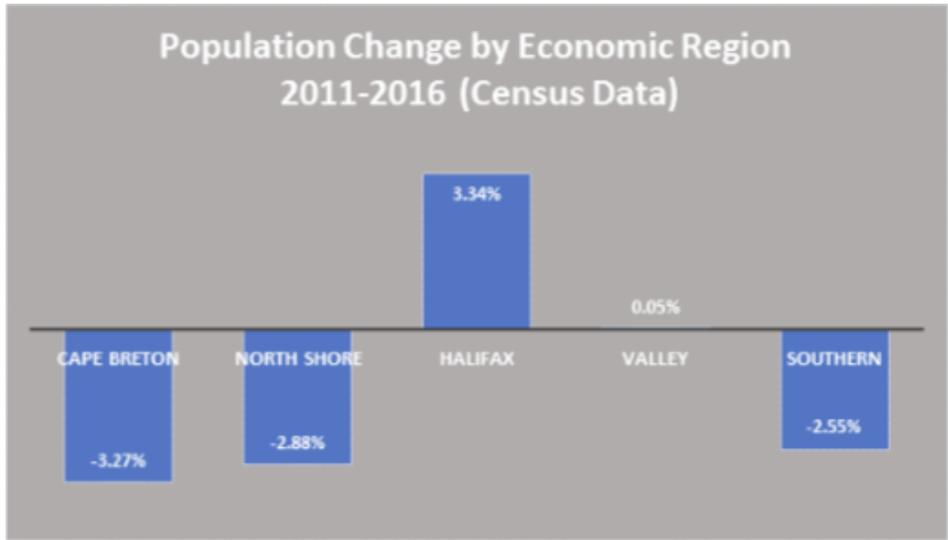
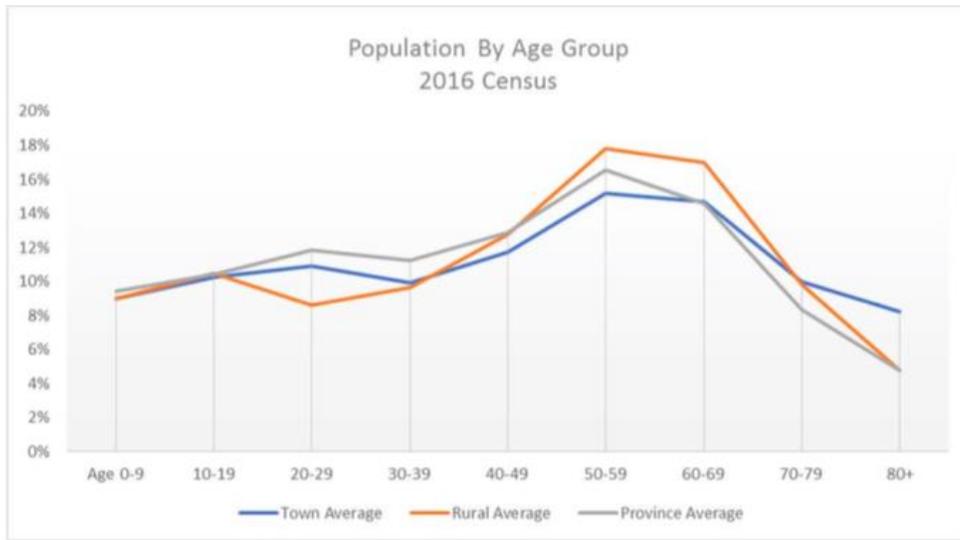


Figure 3. Population Change by Census Division (2010-2014). Retrieved from: https://novascotia.ca/finance/statistics/media/20150311Popchange_14.png



Source: Statistics Canada 2011 & 2016 Census

Figure 4. Population Change by Economic Region. Retrieved from (Department of Municipal Affairs, 2018).



Source: Statistics Canada 2011 & 2016 Census

Figure 5. Population by Age Group based on 2016 Census. Retrieved from (Department of Municipal Affairs, 2018).

2.3.3 Climate Change in Nova Scotia

Climate change presents serious threats to the Province of Nova Scotia. Many areas of concern span from rising sea levels, coastal erosion, and more frequent extreme weather events. The province has experienced a rise in temperature by 0.7 degrees Celsius, and an 11.3% increase in rainfall (Henderson, 2021). As described in *Chapter 2*, the addition of rising sea levels and extreme weather will lead to coastal erosion. Climate change will undoubtedly bring environmental, social, and economic impacts to the province (Dedekorkut-Howes, 2020). Climate change threatening the province has led to the demand of action.

Due to the inevitable impacts, the government of Nova Scotia has placed more of an emphasis on addressing climate change through adaptation and mitigation strategies (Henderson, 2021). Nova Scotia planning and legislation have put ambitious goals in place to set the tone for addressing climate change. Nova Scotia has made commendable effort in climate mitigation and greenhouse gas emissions strategies (Philp, 2019). To list a few achievements, they range from being the first province to require the use of energy efficient streetlights, or through Provincial efficiency programs, the province's electricity demand has been lowered by 10% (Nova Scotia Environment- Climate Change Unit, 2014).

Notable programs in Nova Scotia addressing climate change (Department of Environment, 2019):

- Green Fund to supply money for climate change initiatives
- Energy Efficient programs to prevent significant emissions
- Addition of 1400 energy efficient jobs
- Establishing Coastal Protection Act

Addressing climate change in Nova Scotia is not only imperative for maintaining coastal communities, but adaptation measures can help to save taxpayers money. Climate-related events such as severe hurricanes have placed a significant financial burden on the province. In 2011, repairs to coastal infrastructure damaged by intense storms cost the

province over \$6 million (Philp, 2019). That same year, the MCCAP mandate was brought in and enacted.

2.3.4 Climate Change Planning in Nova Scotia

The Nova Scotia planning system has prioritized the development of climate change practices and plans at the community level. Nova Scotia was the first province to mandate the creation of Municipal Climate Change Action Plans (MCCAPs) (Philp, 2019). This mandate required that municipalities establish adaptation solutions and further research climate change threats so they can continue to obtain infrastructure funding (Philp, 2019). To date, all but two municipalities have created a MCCAP for the provincial government to review. The Department of Municipal Relations created a guidebook that highlights steps to help municipalities create and compile their plans (Philp, 2019). The guidelines require that municipalities include an inventory of their greenhouse gas emissions (Philp, 2019).

The idea of mandating climate change plans at a municipal-level is productive as municipalities can have a better idea of local impacts and threats. Municipalities are key players in the reduction of greenhouse gas emissions output levels, as they directly and indirectly control 44% of Canada's emissions (Philp, 2019). These MCCAPs can be considered an amendment to Integrated Community Sustainability Plans (ICSP's), which are federally mandated and can showcase concerns attributed from climate change (Philp, 2019). This type of plan can offer a community vision for the most effective planning of a municipality's resources (Municipality of The District of Chester, 2021).

In addition, the existence of climate change policy and legislation cannot be undervalued in planning for climate change impacts. In terms of climate change legislation, Nova Scotia has enacted two key legislative pieces that can help move the province towards increased adaptation and mitigation. Nova Scotia's Sustainable Development Goals Act, enacted in 2019, sets out determined targets to combat climate change occurring in the province. It primarily targets greenhouse gas emissions, with the set goal to reduce emissions

by 53% below 2005 outputs by 2030. The Act also sets out that the province reaches net-zero emissions by 2050 (Nova Scotia Environment - Climate Change Unit, 2014).

Another key piece of legislation put in place to protect Nova Scotia from climate change impacts is the Coastal Protection Act, introduced in 2019. Nova Scotia is the only province that has created legislation explicitly to protect its coastal region (Department of Environment, 2019). The existence of coastal legislation is imperative as the coast is home to many and embodies the province's identity. Nova Scotia has more than 13,000km of coastline (Ecology Action Centre, 2020). The province has more than 70% of its population living within 20km of its coast (Department of Environment, 2019). This Act looks towards protecting ecosystems and safeguard that new development on the coast considers coastal erosion and sea level rise (Department of Environment, 2019). With many threats that span from climate change, it is important that new construction works in conjunction to better adapt to these challenges. The United Nations reports that for every \$1 that is used towards forward-thinking adaptation measures, it is possible to save \$7 in future from recovery and rebuilding efforts (Ecology Action Centre, 2020).

Many universities located in the province are conducting climate change research to provide up-to-date information. St. Francis Xavier University is home to the Institute for Climate and Environment Research. This institute looks at interests such as: adaptation, environment policy and economics, greenhouse gas emissions and more (St. Francis Xavier University, 2021). This research will be used to publish high quality, relevant climate change data, as well as offering solutions to pressing local climate change concerns. In addition, Dalhousie University is conducting relevant research as well in the "Energy and Climate Change" Initiative. This initiative has completed well over 25 projects. Recent campus master plans have incorporated climate change impacts such as including energy and water audits. Many projects have looked to upgrade energy efficiency, water usage, stormwater management strategies and more (Office of Sustainability, 2021).

2.4 What are the research gaps and limitations in literature?

Upon synthesizing literature revolving around climate change impacts in a Canadian and Provincial context, this research seeks to establish best planning practices to which these impacts can be addressed. Climate change planning can lead to more resilient and adaptable communities. The gaps that this research intends to address is how Nova Scotia is planning for climate change, specifically through the use of MCCAPs. This will be achieved by addressing supportive research questions:

- *What are the common content elements of municipal climate change plans?*
- *What areas of MCCAPs can be improved to enhance plan quality?*
- *How can climate change be better incorporated in municipal planning?*

Limitations in literature can be the over emphasis on climate change impacting urban areas, opposed to rural areas (Lipcsei, 2015; Philp, 2019). The composition of Nova Scotia's communities ranges from urban to rural, so including strategies directly feasible for rural communities can contribute to better implementation. Climate change planning is also an evolving research field as more information and evaluation of current practices become apparent.

2.5 Areas of Agreement and Disagreement

The discussion revolving the science of climate change and the impacts being presented to communities is undisputed in literature (IPCC, 2018). However, the most effective route towards properly preparing communities for these impacts is heavily discussed. In the literature, there is no doubt that measures must be undertaken by coastal communities to combat issues such as rising sea levels or coastal erosion (Richardson & Otero, 2012). Whether that may be by stricter policy and being accountable by goals set in official plans, there are many options (Guyadeen, 2019; Seasons, 2021). There are many

options in which to address environmental goals set out in climate change plans. Approaches include increasing fiscal tools, and more sources of revenue for local governments (Tozer, 2017). Other adaptive measures include structural measures such as engineering approaches, and non-structural measures such as mandating policy and legislation (Dedekorkut-Howes, 2020).

A good way to recognize what works well is through plan evaluation and establishing best practices (Seasons, 2021). However, what may work on one coast, may not work as well on the opposite. Creating local planning strategies will benefit communities which will experience specific climate change threats. Best practices may range from being region-specific to community-specific. An example brought up was the challenge of implementing large scale climate change strategies in communities. These challenges range from being logistically difficult and requiring significant municipal or provincial investment.

The IPCC has disclosed in their report on “International Cooperation Agreements and Instruments” that even after research and establishing criteria, there are gaps in knowledge and data. The criteria revolved around evaluating comprehensive climate change policies. The gaps include further understanding the trade-offs between adaptation policies, and understanding factors that impact decision making for national states to join and adopt climate agreements (Stavins, 2014).

2.6 Next Research Steps:

This chapter focused on synthesizing relevant literature in relation to the climate change phenomenon and the role of climate change planning. With specific focus on Atlantic Canada and the Province of Nova Scotia, this has established the information needed to understand the climate change planning processes occurring in the Province. This information will be used towards addressing the research question: *How are municipalities in Nova Scotia planning for climate change?* Subsequent and supportive research questions are:

- *What are the common content elements of municipal climate change plans?*
- *What areas of MCCAPs can be improved to enhance plan quality?*

➤ *How can climate change be better incorporated in municipal planning?*

Key messages gained from this literature review are the main themes surrounding climate change planning and plan quality best practices. Climate change is an evolving and dynamic topic that has an abundance of information on it. Key areas that were discussed in depth were the climate change phenomenon, and climate change literature at an international and Canadian perspective. In addition, literature pertaining to the role of climate change planning was discussed, as well as barriers to effective climate change planning. The literature then became more geographically narrow, looking at Atlantic Canada and Nova Scotia. The province's climate change planning areas were identified and discussed. The literature review will act as a base of information for subsequent chapters to rely on and refer to. The next chapter, *Chapter 3, "Methodology and Methods"* will explore an evaluation framework and protocol that will be used towards evaluating municipal climate change action plans. This will lead to better understanding the province's climate change planning processes.

Chapter 3

Methods and Methodology

3.1 Methodological Approach:

Research design is an imperative part of the entire research process. How research is conducted can illustrate the reliability and validity of results and its contribution to greater knowledge on a subject. Research methodology is an important step to describing how and why research was conducted to better explain results. Explaining the research process can allow for readers to deem it credible and trustworthy (Nowell, 2017). This research investigated and examined climate change planning in Nova Scotia at the municipal level. *Figure 6* depicts the overall methodology process that will further be explained in this chapter.

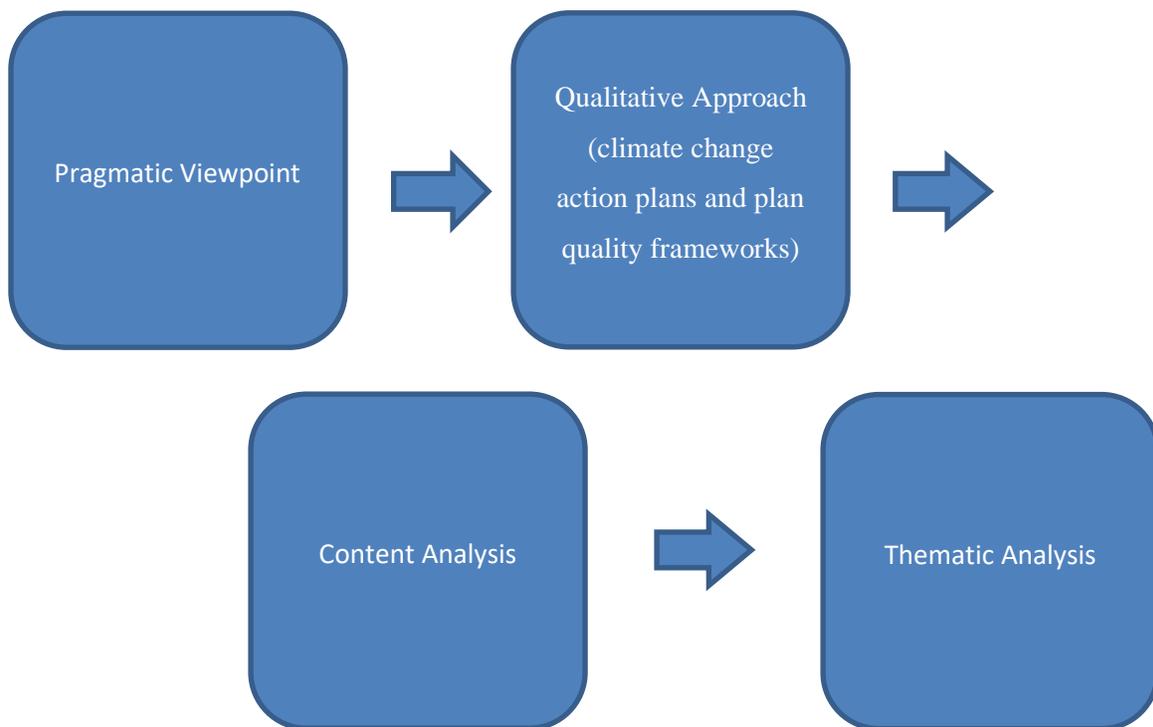


Figure 6. Methodology Flow Chart

The research question is as follows: *How are municipalities in Nova Scotia planning for climate change?* The research question was formed upon an extensive literature review comprising of climate change planning practices and climate change impacts effecting Nova Scotia. In addition, the literature review explored research in plan quality and climate change planning best practices.

Community Municipal Climate Change Action Plans were evaluated to assess plan quality, and compare to best practices literature and past research. The aim of this research was to establish areas where these climate change plans are excelling, and areas where more attention could be required to attain excellent plan quality. The type of data that was needed to achieve this aim was a sample of community climate change action plans, as well as academic plan quality frameworks to compare these plans to. This is important research to conduct as climate change is an urgent issue that must be addressed by planners at every level of government. It is of utmost importance that climate change plans are created and executed, as communities are experiencing various planning-related issues attributed to climate change. As climate change plans may be a new addition to the array of community plans a municipality may have, it is important to be critical of their plan quality and that these individual plans are in line with best practices. This research looks to explore where Nova Scotia's municipalities are focusing their attention on in climate change plans and offer up recommendations for areas where they fall short.

3.2 Research Philosophy:

This research was conducted from a **pragmatic viewpoint**. Pragmatism focuses on practicality and fact, in opposition to being idealistic (Glasgow, 2013). Pragmatic viewpoints are problem-centred and look at consequences. This research followed a pragmatic viewpoint as the research conducted can be considered “real-world practice oriented” (Creswell & Creswell, 2018). In comparison to other research paradigms, pragmatism looks at actions, consequences, and the research problem (Creswell & Creswell, 2018). *Table 1* provides an overview description of the four research paradigms.

The other three - post-positivism, constructivism, and transformative - are discussed to display differences in approach. The postpositivist paradigm looks to challenge the traditional claim of knowledge. The deterministic aspect of it looks at how causes can determine outcomes (Creswell & Creswell, 2018). The constructivist paradigm looks to understand the world of individuals and their subjective meanings (Creswell & Creswell, 2018). The research weighs the views of participants heavily and seeks the meaning of situations. The transformative paradigm looks to include more views of marginalized populations. This paradigm is more oriented to social and justice related issues of research.

Pragmatism was the most appropriate research approach as evaluating municipal climate change action plans in this research looks at how this type of planning is being performed in the “real world” and comparing the findings to best practices. Being practical about climate change planning is integral, as well as offering up feasible solutions that can be undertaken by a municipality’s resources and capacity. Pragmatism looks at feasible practices and the consequences of actions being taken (Creswell & Creswell, 2018). The impending effects and consequences attributed to climate change planning will be examined throughout this research. Often, a significant hurdle for municipalities to address is the lack of funding and resources put towards climate change planning, therefore recommending reasonable solutions can be beneficial.

Table 1. The Four Research Worldviews/Paradigms (Creswell & Creswell, 2018)

<p>Postpositivist Worldview</p> <ul style="list-style-type: none"> • Theory verification • Reductionism • Empirical observation 	<p>Constructivist Worldview</p> <ul style="list-style-type: none"> • Seek understanding of world • Social/historical construction • Views of participants
<p>Transformative Worldview</p> <ul style="list-style-type: none"> • Power-oriented • Political • Change-oriented 	<p>Pragmatic Worldview</p> <ul style="list-style-type: none"> • Problem-Centred • Real-world practice oriented • Consequences of actions

3.3 Research Approach:

This research took a **qualitative approach** as it was informed by existing information and data. This was the logical approach towards this research as information was collected from existing community climate change action plans and plan quality frameworks. Qualitative research ranges from content analyses to conversation analyses, and looks to understand human action (Jackson, 2007). Since the framework by Guyadeen et al. (2019) looked specifically at what was included or absent in plans, a qualitative approach was the most logical. The research question can be considered exploratory since it looks at “how” Nova Scotia is planning for climate change. Qualitative research tends to grow from exploratory questions, opposed to quantitative research that tends to be more conclusive from research questions. Qualitative research typically uses open-ended questions, in comparison to quantitative research that uses closed-ended questions (Creswell & Creswell, 2018). A typical distinction between the two is the use of words/text versus using numbers.

Qualitative research aims to build an insight of phenomena, and make sense and enhance understanding of the research. Qualitative research often leads to inductive analysis, where hypotheses and theories are gathered from the data collected (McGill Qualitative Health Research Group, 2021). Benefits of qualitative research are through explaining the process in conjunction to logical reasoning, reliability and validity can be established without the use of supporting statistics (Libarkin, 2018). Interpretation is based on the data and documents. Limitations of qualitative research are that as the researcher is responsible for directly interpreting the information, individual ideas and judgements can be put forth towards set interpretation. It is important to account and remove bias from the qualitative research process to ensure accuracy (Libarkin, 2018).

3.4 Research Methods:

A **content analysis** of community municipal climate change action plans was performed to assess and evaluate the contents. A content analysis can be defined as conducting a textual analysis and then interpreting and breaking down data to establish patterns (Jackson, 2007). A deductive analysis was performed as an existing framework was used to evaluate municipal climate change action plans and gain insights. Using the framework created by Guyadeen et al. (2019), Municipal Climate Change Action Plans (MCCAP) were analyzed to assess their contents. The framework comprised of 8 characteristics supported by 46 indicators. A content analysis is beneficial as a method towards this research as patterns within the text and plans were analyzed to form conclusions. This method offers a systemic way to describe data and phenomena. Research can be sorted into categories and concepts for analysis (Elo, 2014). This method is logical for this research as by evaluating and analyzing content such as climate change plans, patterns can be identified to form conclusions. Benefits of conducting a content analysis is it can be considered a reliable and unobtrusive source of research and information (Creswell & Creswell, 2018).

This provides written evidence without the need for transcribing. The limitations of a content analysis are that it can be considered rather limited because the researcher relies on applicable documents being made publicly available. Documents that are kept privately accessible by individuals or government cannot be included in the data accumulation (Creswell & Creswell, 2018). In addition, the analysis of documents utilized a **semi-quantitative** approach in analyzing the indicators and contents of plans. Section 3.6 will go in greater detail regarding the binary scale used to determine plan contents. The usage of a semi-quantitative method will strengthen the rationale for determining what is present and not present in plans.

A **thematic analysis** was conducted for this research, stemming from the content analysis. A thematic analysis can be used when working and analyzing qualitative data sets (Nowell, 2017). A clear description of the data analysis process is imperative to the rigour of the research (Nowell, 2017). A thematic analysis can be used for identifying and analyzing themes within qualitative research (Nowell, 2017). This research method can be used broadly for various research questions. Benefits of using a thematic analysis is it can provide credible and discerning findings, while being a flexible approach to research (Nowell, 2017). This approach can be used to identify similarities and differences of a qualitative data set, and summarize these findings. Disadvantages of this approach is as it is so flexible, this can possibly lead to inconsistency within the research process (Nowell, 2017). It is critical to maintain consistency throughout the research process, and explain the empirical claims made (Nowell, 2017). Allowing for the research to be auditable is important, as this means it follows a logical analysis that another researcher could follow if needed be (Nowell, 2017). However, in this research process, the benefits exceeded the limitations of using a thematic analysis. A thematic analysis is beneficial for this research as patterns and themes of the evaluation were identified. The primary purpose of this research is to commend areas of climate change plans that are excelling, and identify areas that could benefit from more attention based on plan quality best practices. An inductive analysis was performed as through the review of plans,

themes emerged and insights were gained. Inductive research looks to develop theories and trends from examined data.

3.5 Data Collection Strategy:

Methods refers to how data is collected. This research used qualitative data in the form of municipal climate change plans. The data utilized was secondary data as all the plans analyzed already existed and were published. In 2011, the Province mandated the creation of Municipal Climate Change Action Plans (MCCAP) (Philp, 2019). Nova Scotia mandated the creation of municipal climate change plans in order to continue receiving infrastructure funding (Philp, 2019). Climate change plans were selected for evaluation based on a specific criterion to create well-rounded findings. All plans selected were climate change plans currently being used in Nova Scotia.

Ten municipal plans selected for evaluation to showcase the broader themes of all municipal climate change plans in the province, as displayed in *Table 2*. In addition, the Provincial Climate Action Plan “Toward a Greener Future: Nova Scotia’s Climate Action Plan” was included in the evaluation process to offer as a comparison to municipal climate change action plans. Municipalities in Nova Scotia are arranged in 3 categories: regional municipalities, towns, and county/district municipalities (Department of Municipal Affairs, 2018). Plans were selected to encompass a diverse range of municipalities based on size and population to provide an accurate sample selection of these plans. This included choosing plans from each of the three types of municipalities. Municipal Climate Change Action Plans were selected for evaluation from these municipalities: Halifax, Cape Breton Regional Municipality, Region of Queens, Town of Shelburne, Municipality of the County of Annapolis, Municipality of the County of Richmond, Town of Mahone Bay, Town of Pictou, and Municipality of Cumberland.

This list is not exhaustive of all the municipalities in the province, however, it represents a general depiction of the diversity of municipalities based on size, population density and geographic location. The plans were gathered through municipal government

websites that allow for these plans to be made publicly accessible. It should be noted that many municipalities did not have their MCCAPs readily accessible online, such as in the case of a municipality not having an up-to-date municipal website or not publicly uploading their MCCAP. Therefore, this constraint led to the sample catering more towards municipalities that made their MCCAP publicly available. The plans selected were all downloaded as PDF files and examined. In addition, the number of MCCAPs were selected to depict an accurate representation of the diversity of the municipalities in the province. The sample reached saturation as common themes were appearing across the ten selected plans. This led to confidence in the sample selection to depict the broad themes found in MCCAPs. Explanations as to why saturation was achieved in a smaller sample could be that each MCCAP followed a vague template provided by the Province called the “Municipal Climate Change Action Plan Guidebook”, as well as many of the MCCAPs were created by the same consulting firm.

Table 2. List of MCCAPs being evaluated by Guyadeen et al. (2019) Framework

Name of Plan	Population this plan has jurisdiction over (2016 Census Profile)	Year of Formation
Toward a Greener Future: Nova Scotia’s Climate Action Plan (Provincial Climate Action Plan)	Population of Nova Scotia – 923,598 (2016)	January 2009
Municipal Climate Change Action Planning Halifax Regional Municipality	403,390 (2016)	September 2013
HalifACT 2050	403,390 (2016)	2020
Municipal Climate Change Action Plan (MCCAP) for the Cape Breton Regional Municipality	94,285 (2016)	April 2014

Region of Queens Municipality – Municipal Climate Change Action Plan	10, 307	April 2014
Climate Change Action Plan – Town of Shelburne	1,743	2014
Municipality of the County of Annapolis – Municipal Climate Change Action Plan	20,591	September 2013
Municipality of the County of Richmond: Municipal Climate Change Action Plan	8,964	November 2013
Municipal Climate Change Action Plan – Town of Mahone Bay	1,036	2013
Municipal Climate Change Action Plan – Town of Pictou	3,186	December 20, 2013
Municipality of Cumberland – Municipal Climate Change Adaptation Plan (MCCAP)	30,005	December 11, 2013

3.6 Data Analysis Process Overview:

A **content analysis** using the framework created by Guyadeen et al. (2019) towards Community Municipal Climate Change Action Plans (MCCAP) was undertaken to evaluate areas of these plans and provide recommendations for improvement. Plan quality analysis is a reliable indicator used to evaluate the strengths and insufficiencies of climate change plans. This can help indicate where climate change plans are effective, and what content areas can be improved based on best practices and prior research. The creation of local climate change plans demonstrates a municipality’s commitment to address climate change impacts that will adversely impact their communities. The critical evaluation of these climate change plans is important as high-quality plans can lead to better implementation and results. Through comprehensive research, many studies have established core components that should be included to create a high-quality climate change plan.

A **thematic analysis** of the contents was undertaken to establish themes and patterns of the contents in municipal climate change plans. This will be following the content analysis of MCCAP's to assess the documents and evaluate their contents through the use of Guyadeen et al.'s (2019) plan quality framework. Once all 10 MCCAP's are read and evaluated, patterns and themes will be established. This includes what is typically present and absent in Nova Scotia's MCCAP's in comparison to the framework provided by Guyadeen et al. (2019). This will lead to insights for recommendations as to where the municipalities can improve plan quality.

This study used the climate change plan evaluation criteria framework presented by Guyadeen et al. (2019), from research conducted in 2019, where the content and quality of municipal climate change plans were reviewed (Guyadeen, 2019). Guyadeen et al. (2019) published this framework in 2019 in the journal article "Evaluating the quality of municipal climate change plans in Canada". This framework is based on plan quality best practices research and consists of 8 characteristics. The framework consists of characteristics: fact base, goals/objectives, policies, implementation, monitoring and evaluation, coordination (internal and external), participation, organization and presentation. The 8 plan quality characteristics are supported by corresponding indicators to further analyze the plan contents. There are 46 indicators, all falling into categories of their related plan quality characteristic (Guyadeen, 2019). *Table 2* displays the evaluation chart being used for evaluation of MCCAP's.

Table 3. Evaluation Framework Table Example (Guyadeen et al., 2019)

Plan Characteristics (8) Score for if Indicator is not present or present (0 or 1)	Indicators (46)
<i>Fact Base (x/11)</i>	Climate Change Awareness
	Base Year Emissions
	Emissions Inventory
	Emissions Inventory Breakdown
	Climate Change Context
	General Climate Change Impacts
	Emission Trends Forecast

	Specific Climate Change Impacts
	Vulnerability Assessment – Industry
	Vulnerability Assessment – Demographics
	Vulnerability Assessment – Geographic Areas
<i>Goals/Objectives (x/6)</i>	Mitigation – Government Emissions
	Mitigation – Short Term GHG Emissions
	Mitigation – Community Emissions
	Adaptation – General
	Mitigation – Long-Term GHG Emissions
	Adaptation – Specific
<i>Policies (x/10)</i>	Energy – Efficiency
	Communication
	Transportation
	Energy – Renewable
	Land Use
	Water Management
	Waste Management
	Natural Resource Management
	Food & Agriculture
	Hazard Reduction
<i>Implementation (x/5)</i>	Plan Priority
	Organization Responsibility
	Timelines
	Financial Tools
	Implementation Section
<i>Monitoring and Evaluation (x/4)</i>	Quantifiable Goals and Policies
	Timeline for Plan Update
	Organization Responsibility
	Monitoring and Evaluation Section
<i>Coordination (Internal/ External) (x/2)</i>	Horizontal Coordination
	Vertical Coordination
<i>Participation (x/4)</i>	Stakeholders (Agencies, etc.)
	Evolution of Plan
	Stakeholders – Public
	Purpose of Participation
<i>Organization and Presentation (x/4)</i>	Illustrations
	Glossary of Terms
	Table of Contents
	Executive Summary

This framework displayed in *Table 3* was then applied to the selected sample of MCCAP's for evaluation. This study will use the climate change plan evaluation criteria presented by Guyadeen et al. (2019), from research conducted in 2019, where the content and quality of municipal climate change plans were reviewed (Guyadeen, 2019). This was the first study to evaluate Canadian Municipal Climate Change Plans based on quality and content. This study used a plan quality framework to evaluate each climate change plan through 8 plan content criteria. These 8 criteria were established as the best to evaluate plan content based on an accumulation of past research and a growing consensus about the essential characteristics that amount to high quality plans.

The research followed the coding protocol used in the Guyadeen et al. (2019) study, to quantitatively evaluate each plan quality characteristic. The coding protocol utilized and interpreted semi-quantitative scoring through indicators based on contents of the plans. This coding protocol follows a binary scale assigned to each indicator in relation to the 8 plan quality characteristic categories. The assessment followed giving the indicator a "0" value if it is not present in the plan, and giving the indicator a "1" if it is present in the plan. This quantitative evaluation method is logical as it demonstrates what is present in the plan, and what areas the plan is insufficient and can be improved. This evaluation framework is also consistent and tested from preceding plan quality studies, which utilized a similar framework (Guyadeen, 2019).

In addition, based on previous plan quality studies and Guyadeen et al.'s (2019) work, the scores from indicators will be used to create an index score for each plan quality characteristic (Guyadeen, 2019). This index score will be calculated by summing the scores of indicators for each of the 8 characteristic categories, and then dividing this number by the total possible score for that characteristic category. Each characteristic has a different number of indicators, but following this method each index will fall between 0.00 and 1.00. An index score that is closer to the value of 1.00 will depict that this plan characteristic is present in the climate change plan being evaluated (Guyadeen, 2019). This quantitative

method can help visualize what areas of the plan are addressed more intently in relation to others. Limitations to this evaluation method can be that as scores are given out based on the presence of indicators in plans, this does not necessarily equate to high quality plans. It is important to consider whether a plan indicator is working or being implemented properly (Guyadeen, 2019). However, exploring whether key plan characteristics are present or absent in climate change plans is an important step to assessing a plan's quality and strength. Following the evaluation criteria presented by Guyadeen et al. (2019), this protocol was used towards examining climate change plans in Nova Scotia. This content analysis will be effective in assessing strengths and weaknesses in the municipal plans, and analyzing the Nova Scotia planning framework. This will be useful to fully appreciate all the aspects that can be included in a plan quality characteristic.

The Guyadeen et al. (2019) framework was selected as it provides a comprehensive criterion towards climate change planning best practices. The article was published relatively recently which is important due to the fact that climate change science and knowledge evolves rapidly. Secondly, the article's information is compiled from best practice research from various sources and academic papers. This provides an in depth look at what the landscape of climate change planning considers to be best practices.

3.7 Summary:

To summarize, this research will address the question: *How are municipalities in Nova Scotia planning for climate change?* The research will take a pragmatic viewpoint as the research is problem-centred and "real-world oriented". The research will also take a qualitative approach as it will be informed by existing planning documents. As qualitative research grows from exploratory questions, this will inform the results of the content and thematic analysis. These results will be identified through the evaluation of MCCAP's by utilizing Guyadeen et al.'s (2019) plan quality framework. This framework is composed of 8 characteristics and 46 indicators and will use a binary scale for scoring each component of the framework. This will indicate where these plans are excelling and areas that could require

more attention to attain excellent plan quality. These results will be used towards forming recommendations. *Figure 7* displays the Evaluation Process of the MCCAPs. The next chapter, *Chapter 4*, will evaluate the MCCAP's using Guyadeen et al.'s (2019) framework and establish strengths and weaknesses of these municipal climate change plans.

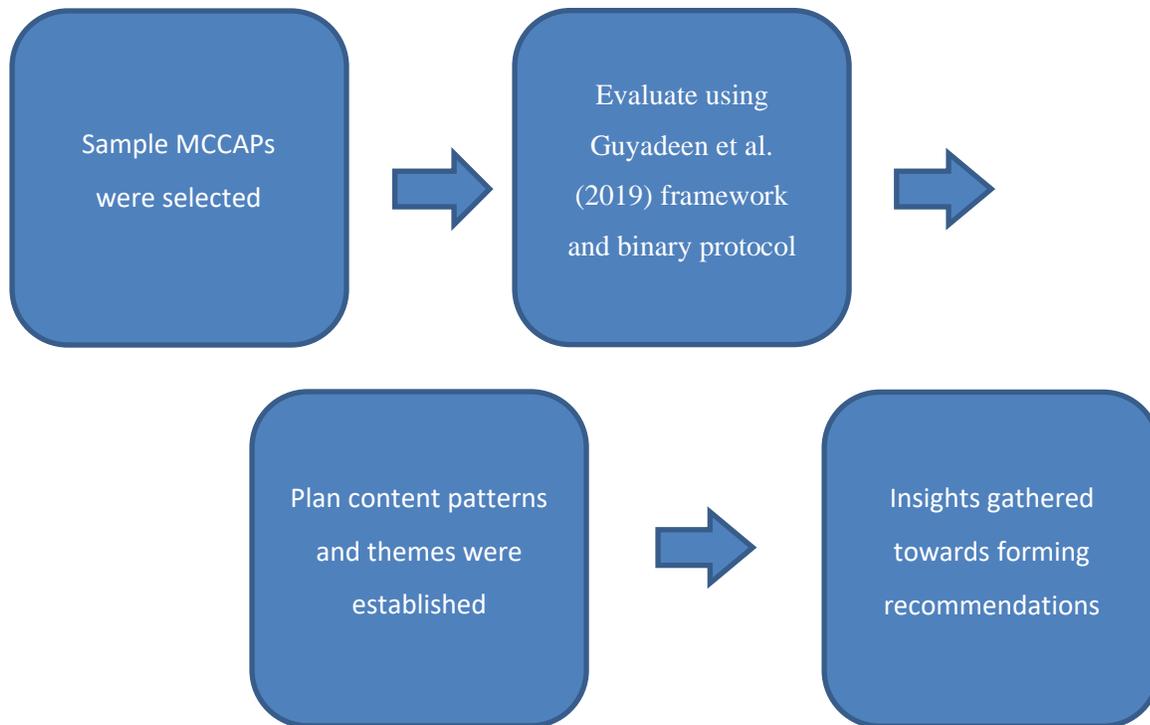


Figure 7. Evaluation Process Flow Chart

Chapter 4

Findings

4.1 Content Analysis – Nova Scotia’s Municipal Climate Change Plans

This chapter evaluates municipal climate change action plans using a plan quality framework. This chapter will note findings based on this evaluation to analyze the areas that are being addressed, and areas often absent based on best practices. This research revolved around addressing the primary research question: *How are municipalities in Nova Scotia planning for climate change?* The content analysis, as well as *Chapter 5* will address the research questions and propose recommendations to areas where climate change planning and MCCAPs can be improved. Subsequent and supportive research questions are:

- *What are the common content elements of municipal climate change plans?*
- *What areas of MCCAPs can be improved to enhance plan quality?*
- *How can climate change be better incorporated in municipal planning?*

A diverse variety of Nova Scotia’s Municipal Climate Change Action Plans (MCCAP) were evaluated using Guyadeen et al.’s (2019) “8 Plan Quality Characteristics”. Each characteristic is accompanied by several indicators to quantitatively assess what is present and not present in the plans. Upon evaluating the plans using this framework, many strengths and weaknesses were identified in the plans. Through commending and critically analyzing components of these plans, it can be made clear where the province is excelling in plan quality, and where more attention could be required.

In *Chapter 3 “Methodology and Methods”*, the sample and evaluation criteria of plans was explained in great detail. Following establishing the evaluation criteria that will be used for this study, a sample of Nova Scotia’s municipal climate change action plans were selected. The selection process selected 3 plans from each municipality type: regional municipalities, towns, and county/district municipalities. This can effectively create a sample of diversely populated communities, ranging from urban to rural. The climate change plans that will be evaluated in this study are described in *Table 3*.

4.2 Plan Evaluation:

As described in *Chapter 3*, Table 2 displays the evaluation criteria framework used in this research. The framework is comprised of 8 characteristics, supported by 46 indicators (Guyadeen, 2019). The chart uses the plan quality framework provided by Guyadeen et al., (2019) from the journal article “Evaluating the quality of municipal climate change plans in Canada”. The completed evaluation of all sample MCCAPs can be found in Appendix C.

Research Findings:

Research findings are based on the evaluation of each sample MCCAP. Findings are divided by each of the 8 characteristics, and supported by a table to display the patterns around indicators inclusions. The findings in relation to each plan quality characteristic will inform key takeaways and themes.

4.2.1 Fact Base:

Beginning with Plan Quality Characteristic #1 “*Fact Base*”, most of the MCCAP’s scored exceptionally well. Fact base can be defined as the empirical base to support the reasoning behind goals and actions set out in plans (Guyadeen, 2019). It was consistent that the plans put significant emphasis on identifying and explaining climate change threats associated with their municipality. This characteristic was comprised of 11 indicators: climate change awareness, base year emissions, emissions inventory, emissions inventory breakdown, climate change context, general climate change impacts, emission trends forecast, specific climate change impacts, vulnerability assessment – industry, vulnerability assessment – demographics, and vulnerability assessment – geographic areas.

The climate change impacts were clearly explained, and often accompanied by a hazard matrix. Vulnerability of geographic areas and economic sectors were generally well explained. The indicators associated with this characteristic range from “general climate

change impacts” and “vulnerability assessment – demographics” to “emissions inventory breakdown”. However, one indicator that was often not present in these plans were “emission trends forecast”, which is the inclusion of emission forecasts for the municipality. This is an important inclusion to consider as with forecasts, this can better inform adaptation priorities and which mitigation areas to address. Table 4 displays the overall pattern of indicators being including in the sample MCCAPs.

Table 4. Evaluation Framework for Characteristic #1: *Fact Base*

Plan Characteristic	Indicator	Overall Pattern (Present in Plans)	Examples in MCCAPs
Fact Base	Climate change awareness	10/10 MCCAPs 1/1 Provincial plan	<ul style="list-style-type: none"> Town of Mahone Bay MCCAP describes awareness as to how climate change is specifically impacting their municipality
	Base Year Emissions	9/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Region of Queens Municipality MCCAP used base year 2009 for providing information
	Emissions Inventory	9/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Town of Mahone Bay created emissions inventory Table 22 in Town of Shelburne MCCAP
	Emissions Inventory Breakdown	7/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Region of Queens included a breakdown by sector – Section 9.2 “Energy & Emissions Inventory Summary Table”
	Climate Change Context	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> HalifACT describes plan in climate change context
	General Climate Change Impacts	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Municipality of the County of Richmond’s MCCAP includes general impacts – sea level rise, flooding, inundation
	Emissions Trends Forecast	3/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> HalifACT plan includes trend information alongside 2018 IPCC report
	Specific Climate Change Impacts	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Cape Breton Regional Municipality states the concern

			for impaired roads from increased flooding events can impact emergency access
	Vulnerability Assessment - Industry	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> HalifACT plan assessed vulnerability of municipal industries i.e. energy sector, infrastructure, etc.
	Vulnerability Assessment - Demographics	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Cape Breton Regional Municipality states concern for aging population from more extreme weather events i.e. leading to power outages
	Vulnerability Assessment – Geographic Areas	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Figure 4.3 in Cape Breton Regional Municipality MCCAP – map showcasing vulnerable areas

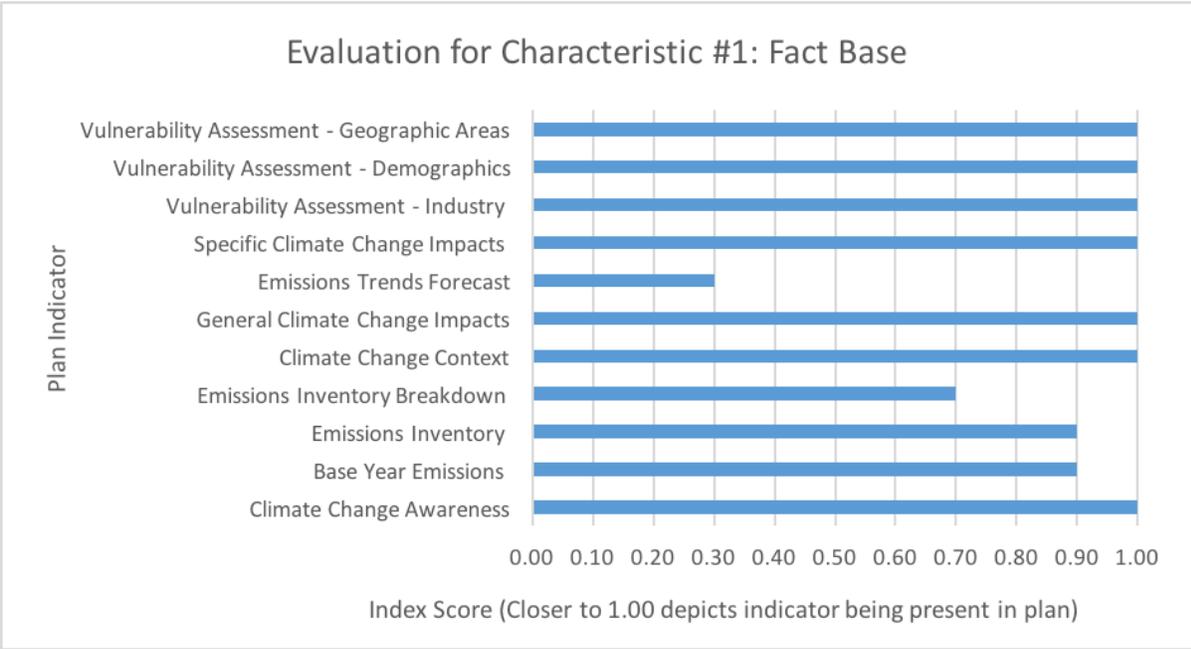


Figure 8. Results of patterns for inclusion of “Characteristic #1: Fact Base” indicators

4.2.2 Goals/Objectives:

Plan Quality Characteristic #2 “Goals/Objectives” also had one of the highest scores of the characteristics. The indicators were typically included in the MCCAP’s. There were 6 indicators in this section looking at goals associated with the mitigation of emissions and adaptation measures. These 6 indicators were as follows: mitigation – government emissions, mitigation – short-term GHG emissions, mitigation – community emissions, adaptation – general, mitigation – long-term GHG emissions, adaptation – specific. Most MCCAPs included emission reduction goals, due to Provincial guidelines requiring this inclusion in all climate action plans. The Provincial guidelines provide a template of requirements related to mitigation inclusions such as emissions information, as well as actions in relation to these emissions (Fisher, 2011). Most of the time, it was clear if the intention of an adaptation goal was to be implemented in the short-term or long-term. Examples of goals ranged from reductions in emissions to reductions in energy consumption.

Table 5. Evaluation Framework for Characteristic #2: Goals/Objectives

Plan Characteristic	Indicator	Overall Pattern	Examples
Goals/Objectives	Mitigation – Government Emissions	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> County of Annapolis included goals to address government emissions
	Mitigation – Short Term GHG Emissions	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Halifax Regional Municipality MCCAP lists emission reduction activities i.e. goal of by 2020, 30% reduction in carbon dioxide emissions below 2008 levels
	Mitigation – Community Emissions	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> County of Annapolis has targeted addressing emissions generated from “municipal operations” via retrofitting buildings and looking at energy demand

	Adaptation – General	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Town of Shelburne MCCAP presented 9 strategies for increasing adaptive capacity
	Mitigation – Long-Term GHG Emissions	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Region of Queens MCCAP included broad long-term goals i.e. “promote sustainable transportation”
	Adaptation – Specific	9/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> County of Richmond identified 37 action priorities for adaptation

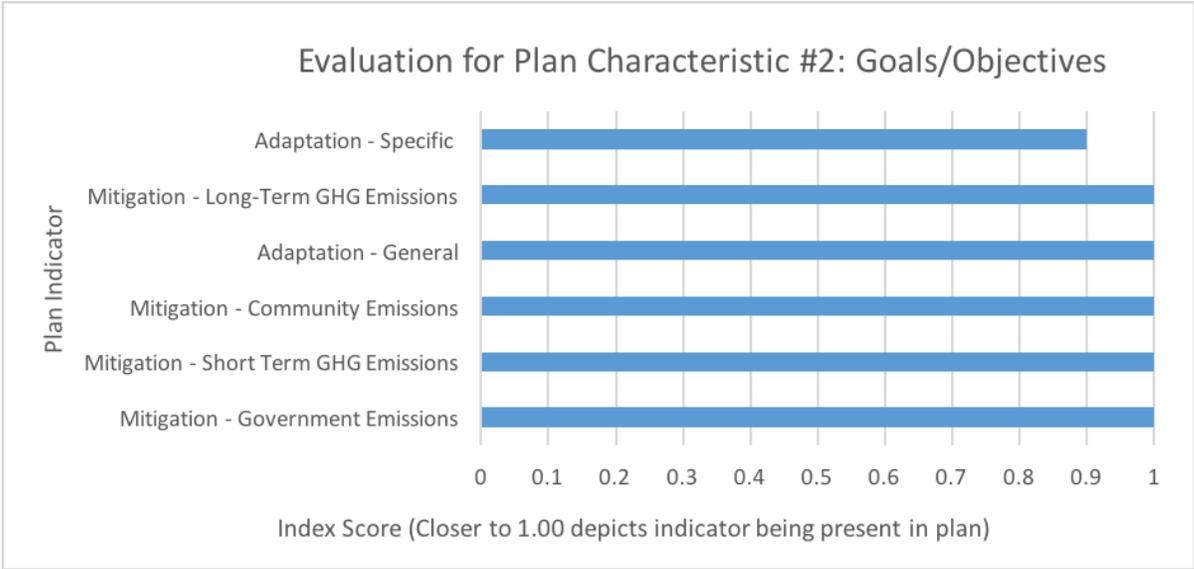


Figure 9. Results of patterns for inclusion of “Characteristic #2: Goals/Objectives” indicators

4.2.3 Policies:

Plan Quality Characteristic #3 “Policies” had one of the lowest scores of all the plan characteristics. Guyadeen et al.’s (2019) framework has 10 indicators associated with this characteristic that each cover a different policy area i.e., energy, transportation, land use, water management etc. The 10 indicators are as follows: energy – efficiency, communication, transportation, energy – renewable, land use, water management, waste management, natural resource management, food & agriculture, hazard reduction. It was rare that any

MCCAP included having policies in place to address all, if most of these areas. There was the inclusion of individual policies in some of the plans, such as land setback requirements, or all new construction required to be LEED certified. Some plans made recommendations on what actions can be taken towards addressing climate change impacts such as the creation of a policy regarding a specific area. The lack of policies addressed in MCCAP’s could be explained as municipalities are using external plans to address these areas, such an example being a stand-alone transportation plan to address transportation needs. Based on plan quality best practices, Guyadeen et al. (2019) deemed that the inclusion of climate change policies enhances a municipal climate change action plan. This is an area where Nova Scotia MCCAP’s can be improved so methods of climate change action are clearly explained. Table 6 displays examples of municipal policies included in MCCAPs.

Table 6. Evaluation Framework for Characteristic #3: Policies

Plan Characteristic	Indicator	Overall Pattern	Examples
Policies	Energy – Efficiency	7/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> • Town of Shelburne suggested creating municipal policy that new construction be LEED certified • Town of Shelburne recommended creating municipal policy towards new building construction being LEED-certified
	Communication	7/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> • HalifACT included Section 5.3.1 which looks to improve emergency management communication
	Transportation	4/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> • HalifACT included Action 5.1 which looks to decarbonize transportation and prepare for electric vehicle growth through policy

Energy – Renewable	5/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> • Municipality of the County of Annapolis has included the goal of the conversion of 50% of municipal buildings to grass-pellet fueled heating
Land Use	9/10 MCCAPs 0/1 Provincial Plan	<ul style="list-style-type: none"> • Region of Queens Municipality included Policy 7.3.15 – land use policy and mapping, as well as Policy 7.3.7 – new setback requirements
Water Management	6/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> • HalifACT included stormwater management standards
Waste Management	6/10 MCCAPs 0/1 Provincial Plan	<ul style="list-style-type: none"> • Municipality of the County of Richmond included a wastewater management section, which directs the municipality to support existing infrastructure
Natural Resource Management	5/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> • Provincial Climate Action Plan included strategy to ensure the sustainability of natural capital
Food & Agriculture	8/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> • HalifACT included the recommendation to create a food action plan
Hazard Reduction	3/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> • Town of Shelburne recommended to look further into the Natural Hazards Analysis, and update policies accordingly

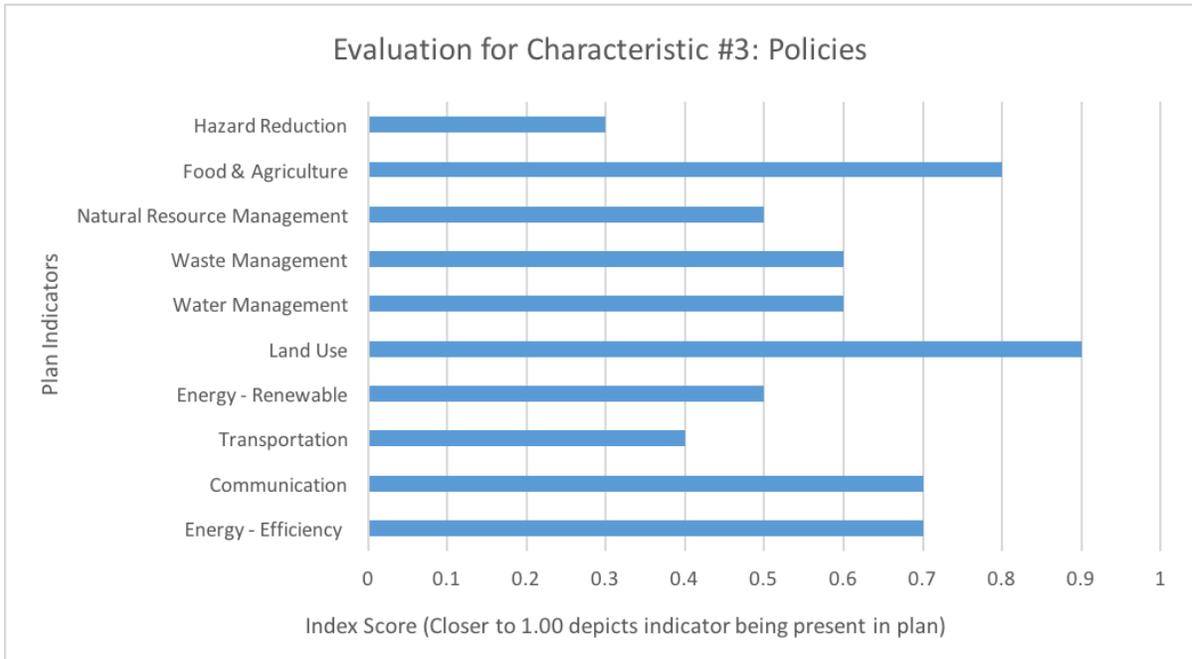


Figure 10. Results of patterns for inclusion of “Characteristic #3: Policies” indicators

4.2.4 Implementation:

Plan Quality Characteristic #4 “Implementation” can be considered an important component to climate change action plans as it provides the steps the achieving plan goals and policies (Guyadeen, 2019). Upon evaluating this characteristic, there are mixed reviews of if it was properly included in the province’s municipal climate change plans. The characteristic consisted of 5 indicators: plan priority, organization responsibility, timelines, financial tools, and implementation section. Indicators often present in the evaluated plans were plan priority, timelines, and organization responsibility. Indicators often not included in plans and areas lacking were financial tools and an implementation section. The Provincial guidelines for MCCAPs state that discussion surrounding implementation of the plans are required. However, implementation of goals set in the MCCAPs were often not heavily discussed or structured with associated timelines and costs. In some plans, capital and operating budgets were mentioned but not in specific detail.

Based on Guyadeen et al.'s (2019) best practices research which deems that an implementation section is important; this is an area where Nova Scotia's municipal climate change action plans can choose to focus more attention on. Without strict implementation tools put in place from the beginning, there is not accountability as to how and when goals are achieved.

Table 7. Evaluation Framework for Characteristic #4: *Implementation*

Plan Characteristic	Indicator	Overall Pattern	Examples
Implementation	Plan priority	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Town of Shelburne has stated in "Implementation section" that it aims to provide frameworks for MCCAP implementation and monitoring"
	Organization Responsibility	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Halifax Regional Municipality states its responsibility for content implementation
	Timelines	9/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Region of Queens MCCAP provided a time frame for each goal included County of Richmond provides time frames for each goal i.e. Goal 1: "Improve the energy efficiency of buildings" Time frame: 2010-2015
	Financial Tools	4/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> County of Richmond
	Implementation Section	5/10 MCCAPs 0/1 Provincial Plan	<ul style="list-style-type: none"> HalifACT includes Section 6: "Acting on Climate Together" which proposes ways to implement the climate plan

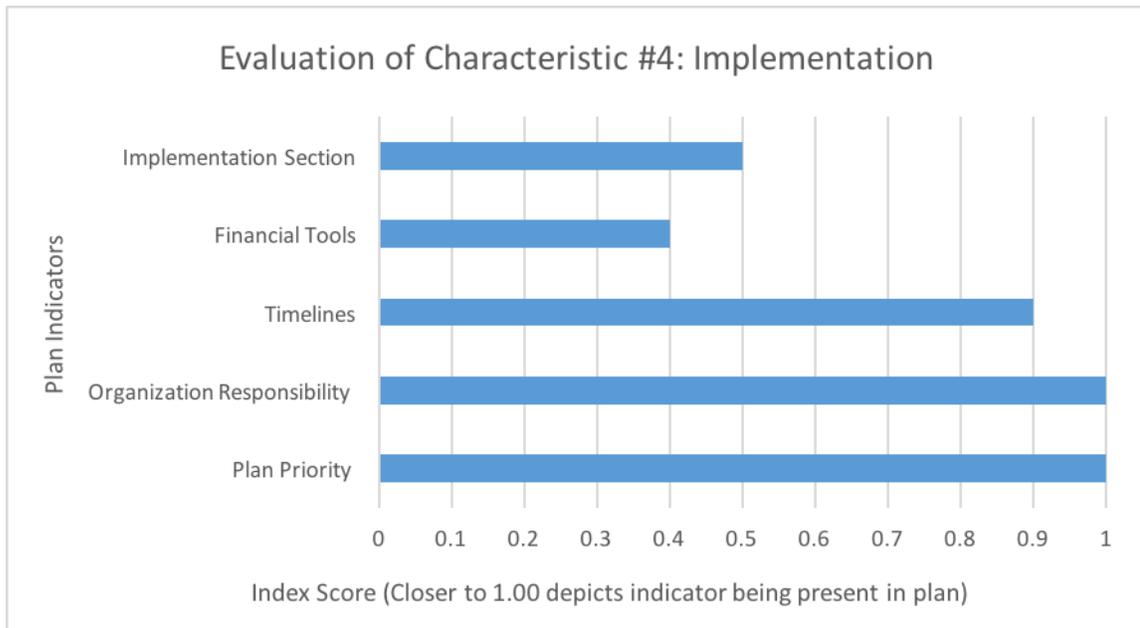


Figure 11. Results of patterns for inclusion of “Characteristic #4: Implementation” indicators

4.2.5 Monitoring and Evaluation:

Plan Quality Characteristic #5 “*Monitoring and Evaluation*” had a similar analysis to the section looking at “Implementation”. Again, the section often lacked in certain indicator areas opposed to others. The characteristic consisted of 4 indicators: quantifiable goals and policies, timeline for plan update, organization responsibility, and monitoring and evaluation section. Commonly, there was mixed scores for if quantifiable goals were present in the plans. There were always goals included, however quantifiable aspects such as associated years or numerical targets were sometimes not included. Plans that would receive a score would have some form of tangible target associated with it, such as found in the Municipality of the County of Richmond’s MCCAP, which has a goal of “by 2015, 25% of its energy will be from renewable sources” (David & Theriault, 2013). Having a quantitative aspect of goals can make it more tangible for eventually achieving it.

The indicator of including a plan update was often not present for many of the plans. Organization responsibility was often included in plans at the municipality that the plan was

made for. The indicator of “monitoring and evaluation section” was often absent and not included in plans. Monitoring and evaluating were relatively absent areas of the MCCAPs as there was little discussion as to how and when the implemented goals were to be monitored. Without proper monitoring strategies, it would be hard to assess the extent to which goals have been achieved.

Table 7. Evaluation Framework for Characteristic #5: *Monitoring and Evaluation*

Plan Characteristic	Indicator	Overall Pattern	Examples
Monitoring and Evaluation	Quantifiable Goals and Policies	5/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> County of Annapolis included quantifiable goals such as “the energy audit targeted a 16.8% reduction in energy consumption costs”
	Timeline for Plan Update	6/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Town of Shelburne includes update to Municipal Planning Strategy as MCCAP priority
	Organization Responsibility	9/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> In Halifax’s Plan, HRM is responsible for monitoring
	Monitoring and Evaluation Section	3/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Halifax Regional Municipality does not have an explicit monitoring and evaluation section, however plan had a milestone “monitoring progress and reporting results”

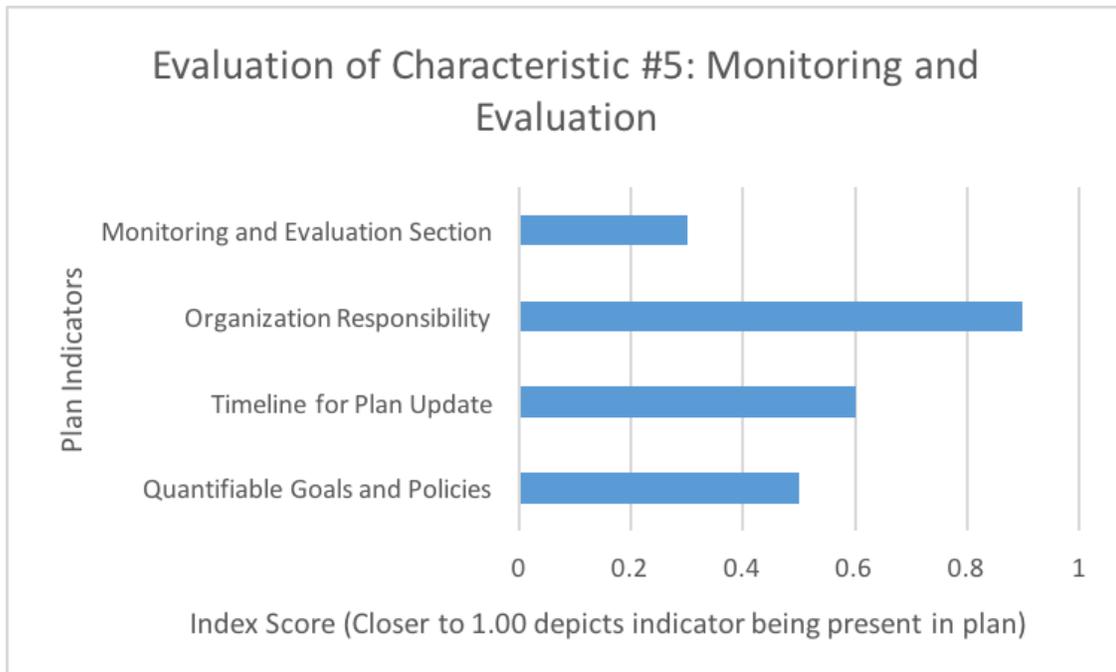


Figure 12. Results of patterns for inclusion of “Characteristic #5: Monitoring and Evaluation” indicators

4.2.6 Coordination (Internal and External):

Plan Quality Characteristic #6 “*Coordination (Internal and External)*” looks at the coordination between parties involved in the plan creation process. This plan quality characteristic consisted of 2 indicators: horizontal coordination and vertical coordination. The characteristic generally scored well, with mention of how municipalities were working alongside agencies and other sectors when creating their plans. Examples of this were with Nova Scotia Power, or municipal sectors. In terms of vertical coordination, all of the municipal plans worked with mandated Provincial guidelines when forming set plans.

Table 8. Evaluation Framework for Characteristic #6: *Coordination*

Plan Characteristic	Indicator	Overall Pattern	Examples
Coordination (Internal and External)	Horizontal Coordination	5/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Region of Queens Municipality worked alongside other industries and sectors i.e. Nova Scotia Transportation
	Vertical Coordination	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Municipality worked along Provincial guidelines in creation of MCCAP

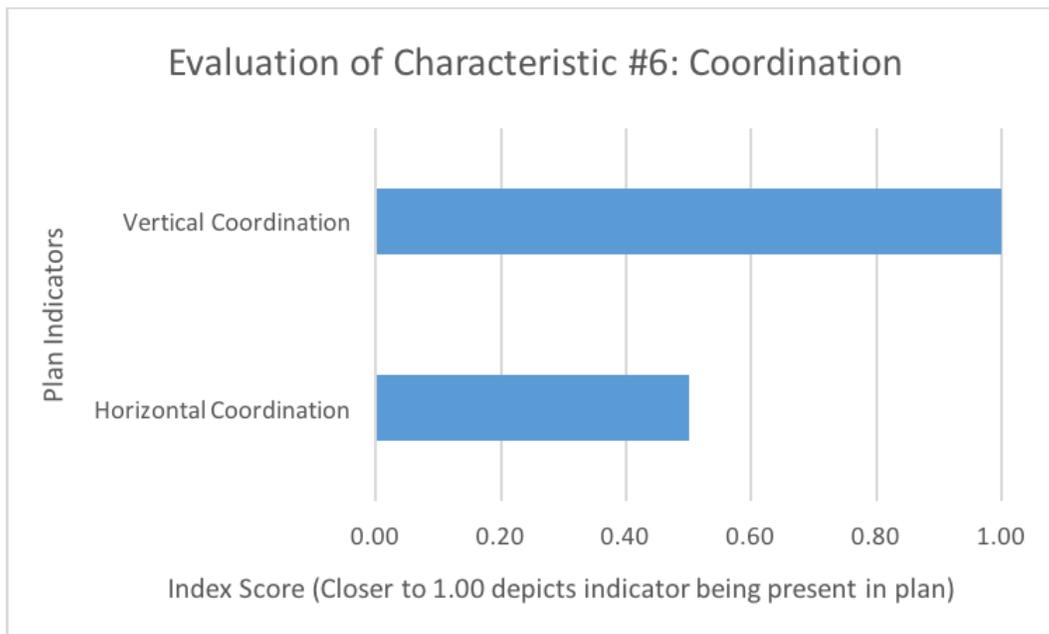


Figure 13. Results of patterns for inclusion of “Characteristic #6: Coordination” indicators

4.2.7 Participation:

Plan Quality Characteristic #7 “*Participation*” assessed the level of stakeholder involvement in plan creation. Stakeholder involvement is recognized as a positive contribution in the planning process to enhance community involvement. This plan quality

characteristic consisted of 4 indicators: stakeholders (agencies, etc.), evolution of plan, stakeholders (public), and purpose of participation. The MCCAPs often had contributions from agencies and government subsidiaries in the formation stages of these plans. Agencies were typically listed in the beginning of the Plan. Typically, there was some discussion as to the role that stakeholders played in the evolution of the plan. The indicator that had more mixed reviews is public participation in the plan creation process. Many of the MCCAPs had no mention of any form public participation, such as general meetings or consultations. Some plans explicitly stated that lack of resources and capacity to hold public meetings as a primary reason for the absence of public participation. Another possibility that could explain the lack in public participation is the fact that the Provincial MCCAP guidelines did not mandate public consultation meetings.

Table 9. Evaluation Framework for Characteristic #7: *Participation*

Plan Characteristic	Indicator	Overall Pattern	Examples
Participation	Stakeholders (Agencies, etc.)	9/10 MCCAPs 0/1 Provincial Plan	<ul style="list-style-type: none"> County of Richmond included academic institutions, hydro companies etc.
	Evolution of Plan	8/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> In HalifACT, variety of stakeholders were included in plan creation – over 250 internal and external stakeholders
	Stakeholders - Public	4/10 MCCAPs 0/1 Provincial Plan	<ul style="list-style-type: none"> Town of Shelburne included two members of the public in their stakeholder consultations
	Purpose of Participation	7/10 MCCAPs 0/1 Provincial Plan	<ul style="list-style-type: none"> In HalifACT, Section 2.2 lists observations from community workshops and sessions

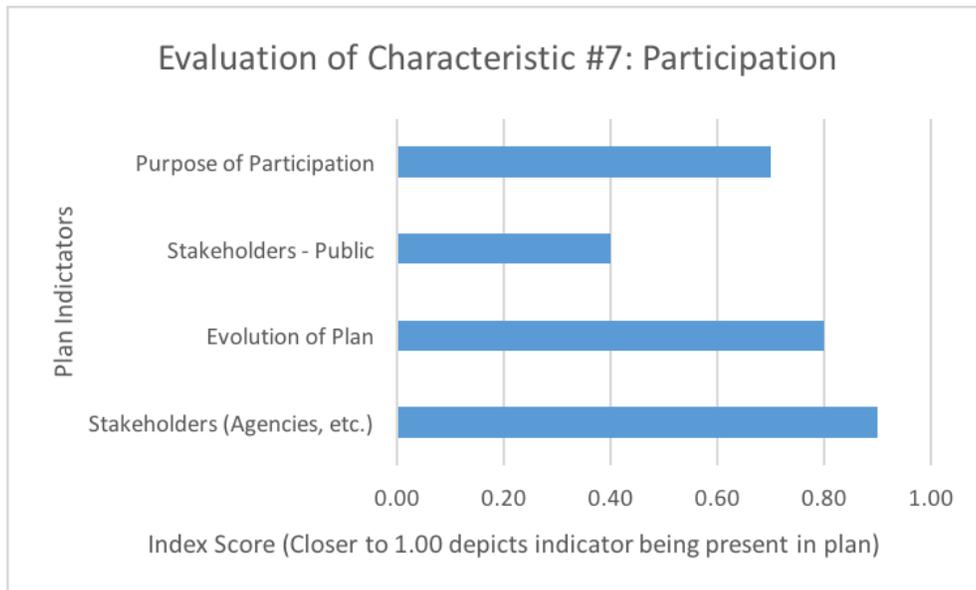


Figure 14. Results of patterns for inclusion of “Characteristic #7: Participation” indicators

4.2.8 Organization and Presentation:

Plan Quality Characteristic #8 “*Organization and Presentation*” looks at the format and inclusions of the plan. Plan presentation is important to consider as it is how goals and information is displayed to the public and professionals. This plan quality characteristic consisted of 4 indicators: illustrations, glossary of terms, table of contents, and executive summary. Generally, most plans included a table of contents and an executive summary. Almost all plans did not include a glossary of terms. All plan included illustrations such as maps or photographs. In addition, tables and charts were typically included to enhance the presentation of data and information.

Table 10. Evaluation Framework for Characteristic #8: *Organization and Presentation*

Plan Characteristic	Indicator	Overall Pattern	Examples
Organization and Presentation	Illustrations	9/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> Halifax Regional Municipality included maps and pictures to enhance plan
	Glossary of Terms	1/10 MCCAPs 0/1 Provincial Plan	<ul style="list-style-type: none"> Town of Shelburne included key concepts
	Table of Contents	10/10 MCCAPs 1/1 Provincial Plan	<ul style="list-style-type: none"> All MCCAPs included descriptive table of contents
	Executive Summary	5/10 MCCAPs 0/1 Provincial Plan	<ul style="list-style-type: none"> Halifax Regional Municipality included an in depth executive summary

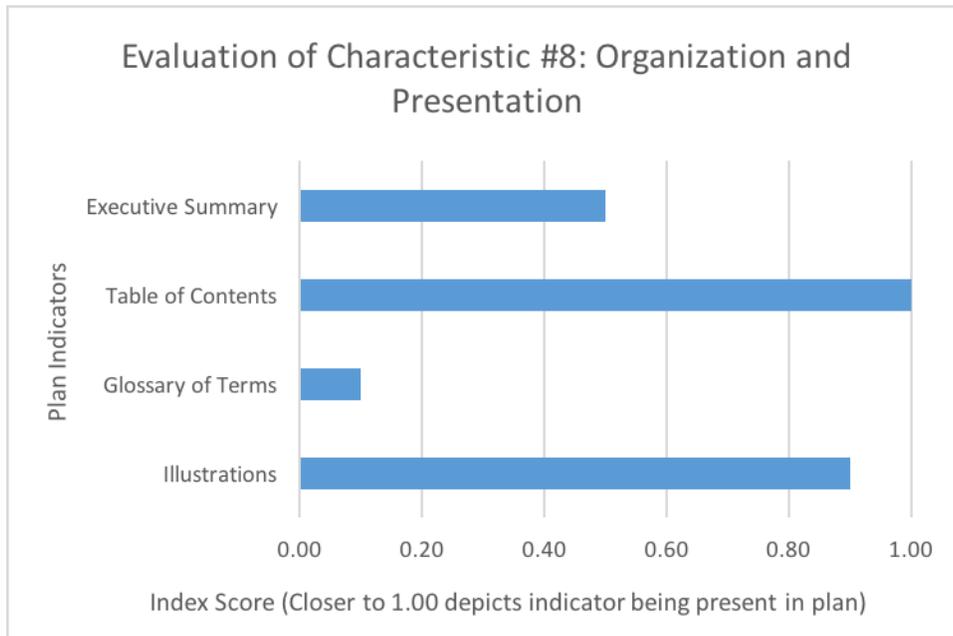


Figure 15. Results of patterns for inclusion of “Characteristic #8: Organization and Presentation” indicators

4.3 Key Findings:

Through the analysis, general findings and themes were observed. Generally, these are areas often *present* in sample MCCAPs:

- Descriptive fact bases and being aware of climate change threats to their municipality and vulnerability of municipal sectors
- Inclusion of mitigation and adaptation goals and strategies to reduce municipal emissions
- Inclusion of agencies as stakeholders in plan
- Inclusion of policies related to land use and energy

Generally, an area that was *not always present* in sample MCCAPs:

- An implementation section and explicit financial tools to support implementation of plan’s goals
- Quantifiable goals and an explicit monitoring and evaluation section
- Inclusion of public participation in the plan-making process

It is interesting to note areas that typically would allow for effective execution of the plan (i.e., inclusion of implementation and monitoring strategies) are often absent. The strongest categories of inclusion are areas that are factually-backed and stating goals. Without including measures to attain goals and implement the plan, the aspect of accountability is lacking. The findings addressed the research question “*How are municipalities in Nova Scotia planning for climate change?*” by breaking down components of municipal climate change plans. This can display what areas are being focused on regularly in MCCAPs. The supporting research question “*What areas of MCCAPs can be improved to enhance plan quality?*” and “*How can climate change be better incorporated in municipal*

planning?” will be explored in Chapter 5, where plan recommendations are proposed to improve MCCAPs.

4.4 Significant Takeaways and Critiques:

The most significant takeaways from this analysis can be considered what is absent rather than what is present in plans. *Chapter 5* will create evidence-based recommendations for municipalities in relation to the content analysis. Key takeaways are the inconsistent inclusion of implementation sections, monitoring and evaluation strategies, and public participation.

However, it is important to be critical of this framework as well. There are areas of this framework that cater to larger municipalities, rather than smaller municipalities. Guyadeen et al. (2019) originally utilized this framework in assessing the top 63 most populous municipalities in Canada. The province of Nova Scotia is home to diversely populated municipalities and towns. Halifax, the Province’s population and economic hub, accounts for 44% of the entire Province’s population. Conversely, the Province is home to many towns, of which 22 have less than 5,000 residents (Philp, 2019).

Also, the contents of the MCCAPs are heavily influenced by the Provincial Guidelines they were mandated to adhere to. The Province established guidelines for MCCAP creation in order for municipalities to continue to receive Gas Tax Funds (CBCL Limited, 2013). This could explain some possible gaps and what was included and what was not included. There are areas in which the MCCAP Guidelines and Guyadeen et al.’s (2019) model conflict. This can be the absence of mandated public participation or monitoring and evaluation. Recommendations presented in *Chapter 5* address directly updating the MCCAP Guidelines to create mandates for plan inclusions. This can help direct municipalities to make sure plan quality best practices are included in every MCCAP.

The research findings were important discoveries as it indicated how many of the sample MCCAPs had each framework indicator. The results of the content analysis provided

an overall indication of typical inclusions of MCCAPs. These results can be utilized to form evidence-based recommendations to improve plan quality. Through analysis of current climate change planning documents, this can point to areas that require more attention and can improve the overall climate change planning. *Chapter 5* provides recommendations that will address the research questions.

Chapter 5

Conclusions and Recommendations

The previous chapter, *Chapter 4*, used the plan quality framework by Guyadeen et al. (2019) to evaluate Nova Scotia's Municipal Climate Change Action Plans. Upon evaluating a sample of MCCAPs, general strengths and weaknesses were identified in these plans when comparing to best practices research. The conducted analysis will inform as to where MCCAPs excel and where more attention could be required to reach excellent plan quality. This chapter will look to create recommendations from the plan quality analyses. Recommendations stem from areas that fell short in the plan evaluation process and will be evidence-based. Upon completing a content analysis and evaluating the community Municipal Climate Change Action Plans, major themes of content inclusions of these plans were identified. In addition, upon the completion of a thematic analysis, major themes were identified to assess common inclusions and exclusions of MCCAPs.

Four distinct recommendations areas were identified and explored in regard to the Province's MCCAPs. Recommendations arose from questions posed such as: What tools can be used to improve monitoring and evaluation aspects of plans? What tools can be used for better implementation strategies? How can public participation be better engaged through limited resources? Through these questions, recommendations were created to accentuate the MCCAPs and fill in gaps that would ensure attainment of excellent plan quality.

5.1 Recommendation Area #1: Implementation

The implementation process of a plan is critical to its success. Plan quality and implementation are linked as effectiveness and efficient implementation exist simultaneously. Guyadeen et al. (2019) depicts implementation as typically a strong section of MCCAPs (Guyadeen, 2019). Upon evaluation, the characteristic "Implementation" was an area that was often absent in MCCAP's and scored relatively low. The characteristic was supported by 5 indicators: plan priority, organization responsibility, timelines, financial tools,

and implementation section. Based on the evaluation of Nova Scotia’s community MCCAPs, it is recommended that this area receives increased attention. A description of timelines, financial tools, and an implementation section were often absent in the community MCCAP’s. These are critical aspects to include for successful implementation. Effective implementation tools can lead to accountability of goals and objectives, as well as how and when these goals are achieved.

It is recommended MCCAPs that do not have an explicit implementation section supported by timelines and financial tools, focus on creating one for better implementation of plan contents. This can be guided by *Recommendation 1.1* and *Recommendation 1.2*. *Recommendation 1.1* suggests the inclusion of more implementation-specific content in the MCCAP guidelines, and *Recommendation 1.2* proposes that MCCAPs include implementation tools.

5.1.1 Recommendation 1.1: Update Provincial MCCAP Guidelines to include more implementation-specific content

As part of the Province’s “Municipal Climate Change Action Plan Guidebook”, there is a mandatory plan content component “Implementation” in each MCCAP. This section requires MCCAPs include some mention of time frames, and estimated costs with actions related to goals (Fisher, 2011). However, even though there is direct mention of an implementation aspect to MCCAPs, it tends to be brief and vague in practice. The addition of specific implementation tools would lead to more effective implementation of the plan and meeting goals. Proper implementation depends on many factors such as: direct responsibilities and roles of plan stakeholders, administrative support, proper funding, budget and resource allocation (Seasons, 2021). In addition, there should be explicit training for individuals in charge of plan implementation. The implementation process cannot be understated as it correlates to seeing direct results originally set out in plans.

It is recommended that the Provincial guidelines are updated to include explicit mention of implementation best practices for municipalities to refer to when implementing various aspects of the MCCAP. These best practices include establishing direct responsibilities, proper funding within budgets, clear role of stakeholders, and support from various levels of government (Seasons, 2021).

5.1.2 Recommendation 1.2: Inclusion of Implementation Tools

It is recommended that Nova Scotia’s municipalities follow Guyadeen et al.’s (2019) plan quality framework and include an explicit implementation section. This section should include implementation tools to better execute the goals and objectives contained in the MCCAP’s. Applicable implementation tools are policy planning, regulatory tools, programs and projects, financial tools, and complementary tools (Seasons, 2021). *Table 11* describes examples that can be used towards implementation sections and the overall implementation process of community MCCAPs. These implementation tools will better ensure that specific goals contained in the MCCAPs are completed.

Table 11. Implementation Tools and Strategies (Seasons, 2021, p. 21)

Implementation Tools	
Implementation Tool	Applicable Examples
Policy Planning	<ul style="list-style-type: none"> • Translation of plan in more tangible terms and objectives • Examples to implement areas of MCCAP: Subdivision plans, area redevelopment plans, neighbourhood plans
Regulatory Tools	<ul style="list-style-type: none"> • Land-use bylaws, zoning bylaws, environmental legislation, building permits, and urban design guidelines can be used to regulate planning actions and legal obligations towards complying to the MCCAP
Programs and Projects	<ul style="list-style-type: none"> • New infrastructure and public works projects should work towards achieving MCCAP’s goals
Financial Tools	<ul style="list-style-type: none"> • Examples for providing funding can be tax increment financing or development charges for implementation of MCCAP

Complementary Tools	<ul style="list-style-type: none"> • Education programs, policies, communication from various departments to contribute to implementation
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The implementation tools highlighted in *Table 11* will help with the implementation process of community MCCAP's. The inclusion of any of these tools in an explicit implementation section will give more options to planners on how and what direction will be taken to achieve implementation goals. It is recommended that Nova Scotia's municipalities create an implementation section for all MCCAPs, supported by discussed implementation tools in Table 11.

5.2 Recommendation Area #2: Monitoring and Evaluation

The "Monitoring and Evaluation" aspect of plans is a critical component and fundamental to plan success. In Guyadeen et al.'s (2019) plan quality framework, one of the characteristics is "Monitoring and Evaluation." The characteristic was supported by 4 indicators: quantifiable goals and policies, timeline for plan update, organization responsibility, and a monitoring and evaluation section. Upon evaluating the MCCAP's, there were areas often absent that could benefit from further attention to improve plan quality. Monitoring looks to continuously track data in order to identify the evolution of the plan and establish trends (Seasons, 2021). Evaluation looks at what has been achieved by the plan, as well as impacts and outputs. Evaluation revolves around effectiveness and achieving set out objectives (Seasons, 2021). Generally, the plan areas that were present were goals, however not always with quantifiable aspects. Very few plans had explicit monitoring and evaluations sections.

When done effectively, monitoring and evaluation can enhance credibility of plans by showcasing accomplishments and making sure goals are being met. It is recommended that MCCAPs which do not have an explicit monitoring and evaluation section, that one be created with guidance from *Recommendation 2.1* and *2.2*. *Recommendation 2.1* looks to utilize appropriate indicators for monitoring and evaluation, and *Recommendation 2.2* looks to

implement the creation of regular monitoring and evaluation reports to showcase changes attributed to MCCAPs.

5.2.1 Recommendation 2.1: It is recommended that MCCAPs be monitored and evaluated using appropriate indicators

Monitoring and evaluation rely on the use of appropriate indicators. Indicators can act as a base for monitoring certain areas of a plan and their rate of attaining set goals. They can be used to demonstrate change occurring from a plan being implemented. An indicator is a “factor or variable that provides a way to measure achievement” (Seasons, 2021, p. 10). Indicators can provide qualitative or quantitative measures for different categories or areas of plans.

It is recommended that Nova Scotia’s municipalities include appropriate indicators in MCCAPs for monitoring and evaluation. This will create a way to measure success attributed to the goals set out in climate change plans. Each MCCAP is different and can utilize various indicators to observe and record progress. *Table 12* describes examples of applicable indicators that municipalities can use.

Table 12. Examples of Indicators used in Plan Monitoring and Evaluation (Seasons, 2021)

<i>Indicator Model</i>	Measure
<i>Environmental</i>	<ul style="list-style-type: none"> • Air quality • Water quality • Soil quality
<i>Economic</i>	<ul style="list-style-type: none"> • Unemployment rate • Income per capita
<i>Sustainable Development</i>	<ul style="list-style-type: none"> • Diversity of employment • Renewable resource usage • Financial resilience
<i>Progress Indicator</i>	<ul style="list-style-type: none"> • Ecological footprint • Health care • Debt levels
<i>Happiness</i>	<ul style="list-style-type: none"> • Community vitality • Living standards • Quality of governance • Diversity and resilience
<i>Social</i>	<ul style="list-style-type: none"> • Level of education

Many municipalities across Canada have built their comprehensive monitoring and evaluation process around relevant indicators. There are many successful examples of cities that have introduced comprehensive monitoring and evaluation processes. The City of Toronto has been creating annual reports. This report utilizes 19 indicators for monitoring that revolve around various themes. A rationale for indicators is provided, as well as a summary of results (Seasons, 2021). The findings from the monitoring and evaluation reports are presented in graphs and diagrams to make them easy to absorb. Another example is the

City of Calgary which has developed a core set of 14 indicators. Each indicator has a baseline to act as a reference point and assess progress. In addition, each indicator has a 60-year target and an associated quantitative goal.

This would be useful to put forth in Nova Scotia's municipalities and MCCAPs. The development of indicators is critical, as well as establishing a baseline for these indicators. These cities have successfully incorporated monitoring strategies that utilize indicators and can act as examples for Nova Scotia's municipalities. Therefore, it is recommended that Nova Scotia's municipalities create a set of indicators that correlate with individual MCCAP goals to assess progress and achievements.

5.2.2 Recommendation 2.2: Implementing regular monitoring and evaluation reports for municipalities

Nova Scotia's MCCAPs would benefit from having explicit monitoring and evaluation sections. Monitoring plan contents can occur in various timeframes, such as being completed monthly or annually. It is recommended that Nova Scotia's municipalities create monitoring and evaluation reports to display achievements in relation to MCCAPs. Monitoring and evaluation reports can form an indication as to if goals set out in MCCAPs are being reached.

There are different approaches to monitoring and evaluation. Many Canadian cities have adopted plan monitoring and evaluation techniques. These techniques can be utilized by MCCAPs so that plan achievements can be better understood. A few cities have enacted a comprehensive plan monitoring and evaluation process (Seasons, 2021). It is common for local governments to prepare annual reviews. An example being the City of Victoria which uses a monitoring and evaluation process that looks to improve plan policies. This "adaptive management approach" uses adjustments from monitoring to anticipate changes and trends in environment (Seasons, 2021). Victoria uses various indicators to analyze performance of the Plan. Reports for monitoring are done in two ways – an annual review, plus a comprehensive review done every 5 years to display plan activity. This allows selected

indicators to showcase plan progress and allow for plan adaptation. Providing time increments for monitoring and evaluation reports will create accountability for monitoring and evaluating plan contents. This will also further transparency of progress attributed to the plan as monitoring will be formally documented.

It is recommended that Nova Scotia’s municipalities create regular monitoring and evaluation reports to assess the progress and achievements of plans.

5.3 Recommendation Area #3: Public Participation

Public participation is an important aspect of the planning process. In Guyadeen et al.’s (2019) plan quality framework, one of the 8 characteristics is “Participation”. This included 4 indicators: stakeholders (agencies, etc.), evolution of plan, stakeholders (public), and purpose of participation. In many of the MCCAPs evaluated, there was an absence of public participation incorporated into these plans. The inclusion of the public into planning processes can result in more decisions that reflect the public’s interests. Including the public in decisions can also help to develop capacity for problem solving at a community-level (EPA, 2018). When done effectively, public participation can enhance the plan-making and implementation process. *Recommendation 3.1* looks to include participation-specific content in the MCCAP Guidelines, and *Recommendation 3.2* looks to consider rural-specific engagement strategies as the composition of the province is made up of a significant amount of rural communities.

5.3.1 Recommendation 3.1: Update Provincial MCCAP Guidelines to include more participation-specific content

Within the Province’s “Municipal Climate Change Action Plan Guidebook”, there is no mandate to include public participation in MCCAPs. The Guidelines suggest reaching out to stakeholders that would be most affected by local climate change issues (Fisher, 2011). This

can be considered vague and indirect. It is recommended that Nova Scotia municipalities mandate opportunities for public participation within the MCCAP process. This can ensure that any future update to climate change action plans will now include some form of public engagement. Plan quality best practices deem public participation as a crucial element to plans, as it can engage and make the public part of the entire “process”. Including a diverse array of stakeholders can accentuate the plan’s reach.

Applicable participation methods that can be included in an update to the guidelines are included in *Table 13*. This covers a framework from the Tamarack Institute for Community Engagement, which highlights steps for consulting and involving. This can include utilizing both social media, as well as traditional methods to engage public participation (Lipcsei, 2015).

Table 13. Framework for Community Engagement and Examples (Lipcsei, 2015)

Framework Stage	Example Techniques
Inform	<ul style="list-style-type: none"> • Fact sheets • Websites • Open houses
Consult	<ul style="list-style-type: none"> • Focus groups • Surveys • Public meetings
Involve	<ul style="list-style-type: none"> • Workshops • Deliberate polling
Collaborate	<ul style="list-style-type: none"> • Citizen advisory • Consensus building • Participatory-decision making
Empower	<ul style="list-style-type: none"> • Citizen juries • Ballots • Delegated decision

It is recommended that Nova Scotia's municipalities include participation-specific content in MCCAPs to include public.

5.3.2 Recommendation 3.2: Implementation of rural-specific public participation strategies

In conjunction to *Recommendation 3.1*, public participation strategies should vary to also cater to rural communities. The Province of Nova Scotia is home to 22 Towns with fewer than 5,000 residents (Philp, 2019). Some MCCAPs stated that a lack of resources was to blame for the lack of public participation, therefore it is important to consider the capacity of municipalities.

According to the Tamarack Institute for Community Engagement, challenges for public engagement in rural communities can range from meeting logistics to adapting ideas into action. In rural areas, residents are typically more geographically spaced out and transit can be viewed as a barrier. Having community engagement meetings solely at town halls may not be convenient for residents. Without properly a functioning transit system, this may limit participation. Another challenge for smaller municipalities is implementing feedback from public participation meetings. With budget constraints, it may be difficult for local planning departments to execute feedback discussed in community meetings. Managing expectations is crucial to gain trust for public participation (Lipcsei, 2015).

Public engagement tools and resources that work well in rural settings are as follows (Lipcsei, 2015):

- Issue-based committees to address a broad range of interests
- Social Media use – Facebook, Twitter, local blogs
- Surveys and Polls as a consultation method
- Incentive-based engagement strategies i.e., Speakers corners, events, inline engagement tools, in-person engagement

Incentive-based strategies can help to elicit engagement, but also make it valuable to the public. Addressing the barriers that are common to rural communities such as remoteness and lack of available resources is important for consideration. This recommendation looks to inform about rural engagement so that the diversity of the province's municipalities be considered when forming strategies.

5.4 Recommendation #4: Climate Change Training and Education for Planners

Climate change is a pressing issue that planners must face. The Province's mandate of MCCAPs is an excellent start to local-level climate change action. A recommendation for the municipalities would be that local planners continue their learning of climate change related subject matter. This would contribute to creating the most effective strategies to address local climate change effects. Climate change education can affect society and future developments, therefore its existence is crucial (Filho, 2010). *Recommendation 4.1* looks to implement climate change curriculum for all local planners in the province. *Recommendation 4.2* looks to provide continuous professional learning opportunities towards planners in relation to climate change.

5.4.1 Recommendation 4.1: Climate Change Curriculum and Strategies for Planners

Climate change is a pressing threat to Nova Scotia's municipalities. Planners have the professional obligation to inform themselves of climate change strategies so municipalities will be best prepared. Academics have noted the disconnect between planning and climate change, stemming from an insufficient inclusion of climate change in formal planning education (Preston-Jones, 2020). It can be argued that climate change impacts many areas of planning, therefore it is crucial that planners have access to formal climate change education. Academics have suggested a large-scale planning education as a potential solution to the gap in education (Preston-Jones, 2020). Making a climate change curriculum accessible to

students and planners already working is important. This can take the form of continuous professional learning opportunities which is discussed further in *Recommendation 4.2*. An extension of this recommendation can also be to promote climate change education towards stakeholders that are significantly involved in planning decision-making.

A climate change curriculum should provide the basic foundations of climate change including:

- Science of Climate Change
- Mitigation Strategies that can be applied locally
- Adaptation Strategies that can be applied locally
- Climate change implications for land use, urban design, and infrastructure

It is recommended that a mandate is created to which local planners receive some form of formal climate change planning education by the Province. This can be included in the Provincial MCCAP Guidelines. It is recommended that all incoming planners to municipalities have some background in local climate change impacts.

5.4.2 Recommendation 4.2: Continuous Professional Learning Opportunities for Local Planners

Continuous learning opportunities are important for the planning profession as the nature of the work is evolving. It is recommended that local planners access these professional learning opportunities to stay up to date with climate change planning best practices. Planners can access learning resources through professional planning institutes such as the Canadian Institute of Planners (Seasons, 2021). There are also many Provincial and Territorial Institutes and Associations that provide opportunities, such as the Atlantic Planners Institute. For members of the CIP, obtaining credits for Continuous Professional Learning (CPL) is mandatory. There is an abundance of local or regional opportunities for planners to engage in.

For local planners, the Licensed Professional Planners Association of Nova Scotia (LPPANS) offers various webinars to members. The LPPANS advocates that planners pursue

continuous learning as they manage a dynamic environment. Webinars can be an accessible medium of learning for more remote municipalities. Many of these webinars revolve around climate change and can expand the knowledge of planners at any level. Topics range extensively, with examples of addressing coastal flooding or active transportation promotion (LPPANS, 2021). In addition, a partnership with a university/college that specializes in climate change education can be beneficial for local planners to reach out to. Climate change best practices are evolving and rely on new information, therefore it is critical that planners prioritize being informed as they can then make the best decisions for their municipalities.

5.5 Reflection and Research Contributions:

As climate change presents various threats to municipalities, it requires urgent action by planners and government. Being a coastal province, Nova Scotia will experience climate change threats such as rising sea levels and coastal erosion. The mandate of MCCAP creation for all municipalities was an excellent start to draw attention to how climate change is being addressed at the local level. These MCCAPs have been used to set out adaptation and mitigation goals, that are catered to the local landscape and climate change challenges.

Upon evaluating a sample of community MCCAPs using a plan quality framework created by Guyadeen et al. (2019), common plan inclusions and exclusions were examined. Recommendations were proposed based on evidence and the evaluation process. The recommendations can be used to accentuate the original MCCAPs, which could benefit from more direction or additions. The MCCAPs in their current state will help move Nova Scotia's municipalities towards becoming more resilient and adaptable to future climate change impacts. However, with the addition of some or all of the mentioned recommendations, this can propel these climate change plans to incorporate more plan quality best practices.

The main research question posed within this research was *How are municipalities in Nova Scotia planning for climate change?* This research addressed that question by:

- Identifying municipal climate change action plans (MCCAP) and their mandated contents
- Comparing MCCAPs to a best practices framework for evaluation

- Evaluating and identifying commonly present/absent characteristics of MCCAPs, and
- Creating a set of evidence-based recommendations to support municipalities in improving current planning processes based on best practices framework and evaluation.

This research has contributed to enhanced community-based climate action planning by providing an in depth look at the contents of MCCAPs in Nova Scotia. Qualitative methods such as a content and thematic analysis were used to review documents and analyze patterns in document content. Evaluation framework tables for each MCCAP were completed to display if indicators were present or not present. Areas that were often included and absent in MCCAPs were identified. Evaluation indicated that areas often overlooked in MCCAPs were fact base and identifying local climate change impacts, as well as including adaptation and mitigation goals. There was an inconsistent inclusion of implementation factors, monitoring and evaluation strategies, and inclusion of public participation. Based on plan quality best practices, these are essential elements to successfully execute a municipal climate change plan. Upon gaining this knowledge from research, municipalities can refer to these recommendations to more easily identify strengths and weaknesses in their climate change planning in comparison to best practices. This research can inform future MCCAP updates or revisions so that recommendations be included in the plan process. This research can also be used as an example for other jurisdictions that wish to mandate community MCCAPs.

This research can be used to better understand the current state of MCCAPs, however it is recommended that the Province does an individual follow-up and evaluate the performance of the plans. This could possibly lead to an updated mandate of newer and revised MCCAP content. Through continuous updating, this can lead to staying informed with current knowledge and not having plans with outdated information. Ultimately, with more provincial guidance and monitoring, this can eliminate “performative” planning, where plans are created just to reach a quota or for an incentive. The MCCAPs were all created with the incentive of receiving Gas Tax Funds, and it would be interesting to learn if every municipality would have created a MCCAP without the Provincial mandate. Nonetheless, the mandate was

a forward-thinking approach to preparing municipalities to be in an informed position in regards to climate change.

5.5.1 Research Limitations:

Throughout this research process, there were limitations. Firstly, the research was dependent on publicly accessible documents. In qualitative research, this can narrow the scope of information-gathering. Documents that were kept private or inaccessible by the public were not included in this research. Since a content and thematic analysis were completed, this relies on documents being available.

Secondly, the evaluation process used a binary coding protocol that followed giving indicators a score of “0” or “1”. This demonstrated if an indicator attributed to a plan characteristic was present or not present. Limitations to this type of evaluation method are that just because there is the presence of indicators, does not necessarily equate to a high-quality plan. However, these characteristics being present are indicative of having plan quality best practices. In addition, the framework by Guyadeen et al. (2019) values all plan quality characteristics equally, which may not be true to actual planning practice. There may be certain areas of the planning process that hold more importance in comparison to others (Guyadeen, 2019).

In addition, this research was conducted during the Covid-19 pandemic which influenced some of the decisions regarding research methodology. Ideally, an area of qualitative research that could be added is interviews with key stakeholders. This would have been beneficial to contributing to understanding the “full” picture that each municipality has experienced and better to understand local planning constraints. Future similar replications of this study can include that to better incorporate individual opinions of planners facing climate change challenges in their communities.

5.5.2 Future Directions:

This research leaves room to progress in future directions. As it revolves around the formation of recommendations towards municipalities, it would be fascinating to see what the results would be of implemented recommendations. In addition, it would be interesting to apply the same framework towards updates to MCCAPs, and analyze the most significant changes to index scores. Questions that could be posed are what areas are most different and if recommendation areas are addressed. One of the recommendation areas is “Monitoring and Evaluation”, which looks to implement appropriate indicators for monitoring plan progress. Future research can investigate which indicators best measure the progress being made in municipalities which would be important for future research. Additionally, future research can look into the impact that public participation has on climate plans.

Another research direction would be to examine how climate change planning in Nova Scotia evolves. Nova Scotia was the first province in Canada to mandate the creation of MCCAPs, making it a leader in climate change planning. As society gathers more information about climate change and new adaptation measures become available, planners will have options at their disposal for creating resilient communities. Future research can examine the most effective policy and planning legislation that can have the greatest impact on communities. Additionally, future research can examine other municipal climate change plans in comparison to Nova Scotia’s MCCAPs. It would be interesting to use the same framework and compare where others score in comparison to Nova Scotia’s municipalities. Climate change planning is of utmost importance, so there is no shortage of future research opportunities to those interested.

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Appendix A
Supporting Charts and Figures

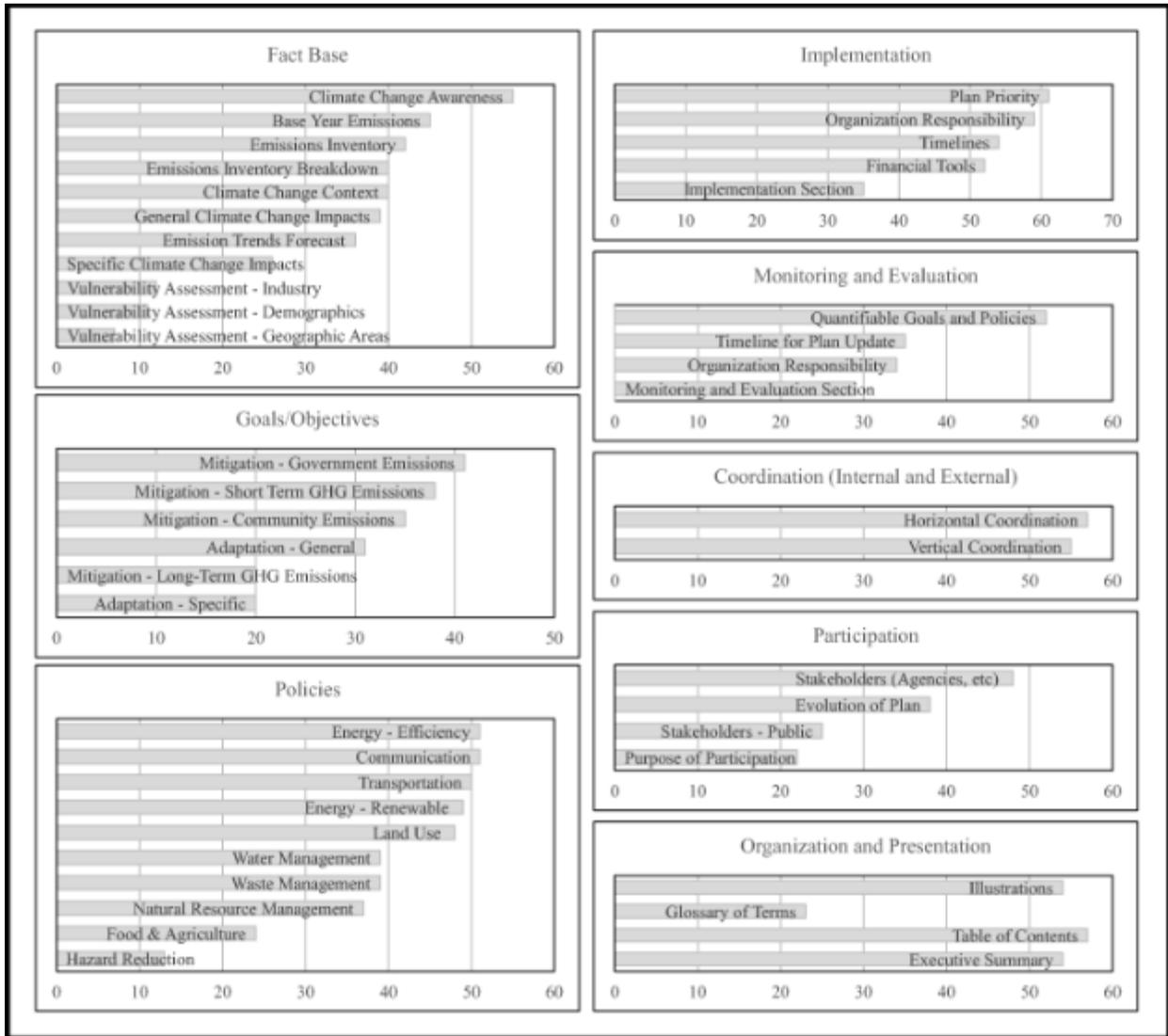


Figure 16. Plan evaluation results from original study conducted by Guyadeen et al. (2019)

Retrieved from (Guyadeen, 2019).

		Title of plan:			
		Jurisdiction:		Year:	Comments
Indicator	Description			Coding	
				0 = Not Present	
				1 = Present	
Fact base: Describes the contextual information related to climate change. The intent is to demonstrate an awareness of climate change, including describing the causes, effects and impacts of climate change on the local jurisdiction. The fact base helps to communicate why climate change is a local issue (Baynham and Stevens 2014; Tang et al. 2010). Indicators based on Baynham and Stevens 2014; Tang et al. 2010					
1.	Climate Change Awareness	Does the plan include a description of the causes of climate change?			
2.	Climate Change Context	Does the plan frame climate change as both a global and local issue?			
3.	Emissions Inventory	Does the plan include an emissions inventory, such as greenhouse gases (GHG) and hydrofluorocarbons (HFCs)?			
4.	Emissions Inventory Breakdown	Does the plan include a breakdown of the emission inventory, such as providing an inventory of emissions by sector?			
5.	Base Year Emissions	Does the plan include the base year for emissions?			
6.	Emission Trends Forecast	Does the plan include the emissions forecast (e. g. carbon footprint reduction in the future, etc.)?			
7.	General Climate Change Impacts	Does the plan include a discussion of the general impacts of climate change (e.g., sea level rise, increasing temperature, storm frequency, impact on quality of life, local air quality, etc.)?			
8.	Specific Climate Change Impacts	Does the plan include a discussion of the specific impacts of climate change to the jurisdiction (e.g., identifies specific locations in the jurisdiction that are vulnerable to the effect of climate change)?			

Figure 17. Indicators supporting Characteristic #1 Fact Base with explanation. Retrieved from (Guyadeen, 2019).

<u>Hazard</u>	<u>Severity</u>	<u>Frequency</u>	<u>Area</u>
Sea Level Rise	Moderate	/	Medium
Storm Surge	High	Sometimes	Medium
Flooding	High	Sometimes	Medium
Erosion	Moderate	Often	Medium
Drought	Low	Rare	Large
Forest Fire	High	Sometimes	Large
Hurricane / Tropical Storm	High	Sometimes	Large

Figure 18. Region of Queens Municipality Hazard Matrix. Retrieved from (Region of Queens Municipality, 2014)

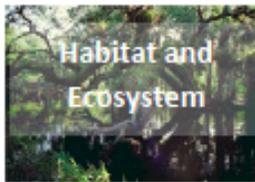
SYSTEM	SUMMARY OF POTENTIAL IMPACTS
 <p>Buildings</p>	<ul style="list-style-type: none"> • Water Damage to buildings and property from sea level rise or increased severity of precipitation. • Increased maintenance; Loss of investments; increased cost for demolition of damaged infrastructure and restoration of lands and coasts due to increased storm activity.
 <p>Energy</p>	<ul style="list-style-type: none"> • More frequent power outages associated with extreme weather events.
 <p>Forest</p>	<ul style="list-style-type: none"> • Migration of species and populations capitalizing on the change in climate. • Change in forest composition due to a combination of impacts.
 <p>Habitat and Ecosystem</p>	<ul style="list-style-type: none"> • Migration of species and populations capitalizing on the change in climate • Increased risk of species and ecosystem breakdown • Habitat loss due to potential flooding, in particular in low-lying coastal areas
 <p>Mobility</p>	<ul style="list-style-type: none"> • Land based transportation route disruption (loss of road network connectivity in coastal areas). • Decreased road safety due to more frequent and severe weather events and coastal instability through barrier stretching (eg. Janvrin's Island).
 <p>Water</p>	<ul style="list-style-type: none"> • Sewer overflows from stormwater runoff and river flows due to increased number of peak events. • Well contamination.

Figure 19. Summary of potential climate change impacts for the Municipality of the County of Richmond (David & Theriault, 2013)

Appendix B

Evaluation Framework Tables

Table 14. Evaluation Framework Table Example (Guyadeen, 2019)

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness		
	Base Year Emissions		
	Emissions Inventory		
	Emissions Inventory Breakdown		
	Climate Change Context		
	General Climate Change Impacts		
	Emission Trends Forecast		
	Specific Climate Change Impacts		
	Vulnerability Assessment – Industry		
	Vulnerability Assessment – Demographics		
	Vulnerability Assessment – Geographic Areas		
			Score - /11
<i>Goals/Objectives</i>	Mitigation – Government Emissions		

	Mitigation – Short Term GHG Emissions		
	Mitigation – Community Emissions		
	Adaptation – General		
	Mitigation – Long-Term GHG Emissions		
	Adaptation – Specific		
			Score - /6
<i>Policies</i>	Energy – Efficiency		
	Communication		
	Transportation		
	Energy – Renewable		
	Land Use		
	Water Management		
	Waste Management		
	Natural Resource Management		
	Food & Agriculture		
	Hazard Reduction		
			Score - /10
<i>Implementation</i>	Plan Priority		
	Organization Responsibility		
	Timelines		
	Financial Tools		
	Implementation Section		
			Score - /5
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies		

	Timeline for Plan Update		
	Organization Responsibility		
	Monitoring and Evaluation Section		
			Score - /4
<i>Coordination (Internal and External)</i>	Horizontal Coordination		
	Vertical Coordination		
			Score - /2
<i>Participation</i>	Stakeholders (Agencies, etc.)		
	Evolution of Plan		
	Stakeholders – Public		
	Purpose of Participation		
			Score - /4
<i>Organization and Presentation</i>	Illustrations		
	Glossary of Terms		
	Table of Contents		
	Executive Summary		
			Score - /4

Completed Evaluation of MCCAPs using plan quality framework by Guyadeen et al. (2019)

Table 15. Evaluation of the Municipal Climate Change Action Plan (MCCAP) for the Cape Breton Regional Municipality

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness	Plan demonstrates climate change awareness and impacts to municipality	1
	Base Year Emissions	Base year of 2008 for energy and emission inventory	1
	Emissions Inventory	In 2009, a GHG emissions inventory was completed for all municipal operations	1
	Emissions Inventory Breakdown	Emissions Inventory is broken down by sector	1
	Climate Change Context	Significant discussion about climate change and its impacts to CBRM	1
	General Climate Change Impacts	- In depth descriptions of climate change impacts to CBRM outlined i.e. sea level rise, coastal erosion etc.	1
	Emission Trends Forecast	Forecasts for weather and sea level rates, but no mention of emission trend forecasts for the Municipality	0
	Specific Climate Change Impacts	- Impaired roads for emergency access etc.	1
	Vulnerability Assessment – Industry	- Plan looks at the vulnerability of storm water, road infrastructure,	1

		water supply, service delivery	
	Vulnerability Assessment – Demographics	<ul style="list-style-type: none"> - Power outages for seniors - Aging and declining population - First nations 	1
	Vulnerability Assessment – Geographic Areas	<ul style="list-style-type: none"> - Uses maps to highlight regions of concern i.e. Figure 4.3., 	1
			Score - 10/11 = 0.91
<i>Goals/Objectives</i>	Mitigation – Government Emissions	<ul style="list-style-type: none"> - Provided information about sector emissions that would be under government jurisdiction 	1
	Mitigation – Short Term GHG Emissions	<ul style="list-style-type: none"> - Not explicitly stated, but goals are presented that can be undertaken in the “short-term” 	1
	Mitigation – Community Emissions	<ul style="list-style-type: none"> - Set of mitigation actions proposed for the municipality are presented in the plan 	1
	Adaptation – General	<ul style="list-style-type: none"> - Adaptation Committee created - Adaptation determined as necessary to address 	1

	Mitigation – Long-Term GHG Emissions	- Not explicitly stated, but goals are presented that can be undertaken in the “long-term”, i.e. “upgrade interior and exterior building lighting to new high efficiency type”	1
	Adaptation – Specific	- Specific adaptation measures were described and identified, i.e. stormwater infrastructure and roads	1
			Score - 6/6 = 1.00
<i>Policies</i>	Energy – Efficiency	- Energy efficient opportunities listed	1
	Communication	- Processes related to emergency event communication i.e. Section 4.6.2	1
	Transportation	- Mentioned separate plan in introduction	1
	Energy – Renewable	- Not included	0
	Land Use	- Discussion of land use management i.e. setback requirements, development restrictions	1

	Water Management	- “Discusses including a policy that addresses the potential adverse effects of storm water runoff”	1
	Waste Management	No policy included	0
	Natural Resource Management	- Policy 6 - Policy 7 to develop a liaison with NS Department of Natural Resources to create plan for shoreline areas	1
	Food & Agriculture	Not included	0
	Hazard Reduction	No policy included	0
			Score - 6/10
<i>Implementation</i>	Plan Priority	Importance of plan stated	1
	Organization Responsibility	- Mention that measures will be implemented by policy adoption processes by Council	1
	Timelines	- No timelines provided	0
	Financial Tools	- No mention of financial tools - Only vaguely describes implementation by way of operating budget planning	0

	Implementation Section	No explicit Implementation Section	0
			Score - 2/5 = 0.4
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	- Vague goals with no associated timeline	0
	Timeline for Plan Update	- No mention of plan update	0
	Organization Responsibility	No explicit mention	0
	Monitoring and Evaluation Section	No explicit monitoring and evaluation section	0
			Score - 0/4 = 0.00
<i>Coordination (Internal and External)</i>	Horizontal Coordination	- worked with organizations and local governments (check)	1
	Vertical Coordination	- working under Provincial Government's mandates	1
			Score - 2/2 = 1.00
<i>Participation</i>	Stakeholders (Agencies, etc.)	- team spoke to key informants and reviewed documents created by stakeholders	1
	Evolution of Plan	- plan describes it's development	1
	Stakeholders – Public	- <u>Holding broad public consultation meetings was not made required by the Province for the planning process</u>	1

		- <u>States that the plan built upon the Municipality's ICSP process, which includes participation from a wide variety of residents</u>	
	Purpose of Participation	(rationale for why stakeholders were involved) Stated that participation by stakeholders presented important contributions	1
			Score - 4/4 = 1.00
<i>Organization and Presentation</i>	Illustrations	- Pictures - Tables - Graphs	1
	Glossary of Terms	Not present in Plan	0
	Table of Contents	Table of Contents in report present	1
	Executive Summary	Executive summary present in report	1
			Score - 3/4 = 0.75

Table 16. Evaluation of the Region of Queens Municipality Municipal Climate Change Action Plan

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
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<i>Fact Base</i>	Climate Change Awareness	Climate change awareness and urgency made clear <ul style="list-style-type: none"> - Looking at municipal preparedness 	1
	Base Year Emissions	Use the year 2009 for creating the report data	1
	Emissions Inventory	Emissions Inventory Table included	1
	Emissions Inventory Breakdown	Breakdown of emissions inventory by sector included	1
	Climate Change Context	Context of climate change impacts to the region established	1
	General Climate Change Impacts	General climate change impacts outlined in depth	1
	Emission Trends Forecast	Forecast for future emission trends not included	0
	Specific Climate Change Impacts	<ul style="list-style-type: none"> - Impacts and Hazards section outlining - Included a Hazard/Impact Matrix 	1
	Vulnerability Assessment – Industry	<ul style="list-style-type: none"> - Assessed vulnerability of facilities and infrastructure in the municipality i.e. Offices, water treatments, recreation 	1
	Vulnerability Assessment – Demographics	<ul style="list-style-type: none"> - Population demographics – aging and declining population 	1

		- Plan looks at the social impacts of climate change	
	Vulnerability Assessment – Geographic Areas	- Affected locations of climate change impacts	1
			Score - 10/11 = 0.91
<i>Goals/Objectives</i>	Mitigation – Government Emissions	- Provides a corporate inventory of emissions i.e. buildings, street lights etc.	1
	Mitigation – Short Term GHG Emissions	- Presented a short term goal to create a new benchmark for energy consumed by facilities (i.e. December 2015)	1
	Mitigation – Community Emissions	- Mitigation for community emissions through new regulations such as conversion to LED streetlights	1
	Adaptation – General	- Plan addressed climate change adaptation issues	1
	Mitigation – Long-Term GHG Emissions	- Broad goals but in a long-term context i.e. “ promote sustainable transportation	1
	Adaptation – Specific	- Ranked specific adaptation priorities i.e.	1

		climate change issues impacting public safety	
			Score - 6/6 = 1.00
<i>Policies</i>	Energy – Efficiency	- Improve energy performance	1
	Communication	- Action 7.2 – Communication Strategy	1
	Transportation	- No policy included	0
	Energy – Renewable	No policy included	0
	Land Use	- Mention of land use policy and mapping i.e. Policy 7.3.15 - New setback requirements i.e. Policy 7.3.7	1
	Water Management	- Actions 3.1 – 3.4 look at flooding and storm water management plans	1
	Waste Management	Action 1.5 – assess climate change impacts on waste water systems	1
	Natural Resource Management	- Mention of land use by law relating to vegetation and erosion measures	1
	Food & Agriculture	- No policy included	0
	Hazard Reduction	- No policy included	0
			Score - 6/10

<i>Implementation</i>	Plan Priority	Implementing strategies to attain goals has been made a priority	1
	Organization Responsibility	Each goal is accompanied by the organization responsible for its implementation i.e. goal of establishing a new benchmark for energy consumed will be overseen by the finance department and Engineering and Works Department	1
	Timelines	Time frame for each of the 4 goals included	1
	Financial Tools	No mention of financial tools	0
	Implementation Section	Section 9.7 is a dedicated Implementation section	1
			Score - 4/5 = 0.8
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	Lacked adding quantitative aspects to goals, most use words such as “establish, promote etc.” without quantitative goals	0
	Timeline for Plan Update	- No mention of plan update	0
	Organization Responsibility	The Adaptation Committee will oversee the plan	1
	Monitoring and Evaluation Section	- No explicit monitoring and evaluation section	0
			Score - ¼ = 0.25

<i>Coordination (Internal and External)</i>	Horizontal Coordination	- Worked alongside other industries and sectors i.e. Nova Scotia Transportation	1
	Vertical Coordination	Creating plan based on Provincial guidelines	1
			Score - 2/2 = 1.00
<i>Participation</i>	Stakeholders (Agencies, etc.)	- Many stakeholders participated such as Queens EMO, NS Department of Transportation, Nova Scotia Power etc.	1
	Evolution of Plan	The plan was created with the input of stakeholders. The municipality's Climate Change Adaptation Committee consisted of staff, councilors, and stakeholders	1
	Stakeholders – Public	- Did not explicitly state that public consultation was included in planning process, instead focused on including NSPI and NSTIR as stakeholders	0
	Purpose of Participation	Purpose of agency participation was included	1
			Score - 3/4 = 0.75

<i>Organization and Presentation</i>	Illustrations	Tables and images included	1
	Glossary of Terms	No glossary of terms	0
	Table of Contents	Table of Contents present	1
	Executive Summary	No executive summary	0
			Score - 2/4 = 0.5

Table 17. Town of Mahone Bay – Municipal Climate Change Action Plan

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness	Awareness as to how climate change is impacting the municipality	1
	Base Year Emissions	Inventory used the base year of 2006	1
	Emissions Inventory	Emissions inventory was completed	1
	Emissions Inventory Breakdown	Emissions inventory breakdown included in appendix	1
	Climate Change Context	Plan is framed in a climate change context outlining threats and adaptation measures	1
	General Climate Change Impacts	General climate change impacts affecting municipality addressed, i.e. coastal flooding, inland flooding etc.	1
	Emission Trends Forecast	No forecast for emissions included, just current levels	0

	Specific Climate Change Impacts	- Climate change impacts and threats were identified and explained	1
	Vulnerability Assessment - Industry	Hazard, Risk and Vulnerability Assessment was completed for each of the hazards - Looking and facilities and infrastructure	1
	Vulnerability Assessment – Demographics	- Climate change hazards impacting various population were identified	1
	Vulnerability Assessment – Geographic Areas	examined the vulnerability of affected locations	1
			Score - 10/11= 0.91
<i>Goals/Objectives</i>	Mitigation – Government Emissions	Mitigation addresses government and municipal emissions	1
	Mitigation – Short Term GHG Emissions	Has presented short-term options for implications of climate change hazards i.e. Economic implications	1
	Mitigation – Community Emissions	A significant amount of the municipality’s emissions comes from the community, such as the water and sewer, as well as the building assets	1

	Adaptation - General	Adaptation Committee was assembled when preparing this plan	1
	Mitigation – Long-Term GHG Emissions	Has presented long-term options to address implications of climate change hazards i.e. economic implications	1
	Adaptation – Specific	Established priorities for adaptation in separate section in increments of short-term, medium-term, and long-term.	1
			Score - 6/6
<i>Policies</i>	Energy – Efficiency	- No policy included	0
	Communication	- No policy included	0
	Transportation	- No policy included	0
	Energy – Renewable	- No policy included	0
	Land Use	Mention of strengthening land use by laws	1
	Water Management	- Water supply	1
	Waste Management	No policy included	0
	Natural Resource Management	- Monitoring watersheds	1
	Food & Agriculture	- No policy included	0
	Hazard Reduction	- No policy included	0
			Score - 3/10
<i>Implementation</i>	Plan Priority	The plan mentions that implementing recommendations that are presented in the	1

		report as being important	
	Organization Responsibility	Stated that implementation of climate change mitigation and adaptation will need to be assisted by the Provincial and Federal Government i.e. cost-sharing for implementation	1
	Timelines	Timelines included for adaptation priorities that follow short-term, medium-term, and long-term	1
	Financial Tools	No explicit mention of financial tools	0
	Implementation Section	No implementation section, only mention that the town is working to implement the recommendations of the report	0
			Score - 3/5 = 0.6
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	Goals are set by increments and by time	1
	Timeline for Plan Update	Mention of updating according to climate change and new information becoming available	1
	Organization Responsibility	Highlights responsibility for each priority – planning department is responsible for plan updates	1

	Monitoring and Evaluation Section	No explicit section, but mention of re-evaluating the MCCAP over the long-term (20-years)	1
			Score - /4
<i>Coordination (Internal and External)</i>	Horizontal Coordination	Worked with other departments and agencies	1
	Vertical Coordination	Created plan according to Provincial guidelines and standards <ul style="list-style-type: none"> - Stated how it is important to work along Provincial and Federal Government to ensure adaptation policies are implemented properly 	1
			Score - 2/2 = 1.00
<i>Participation</i>	Stakeholders (Agencies, etc.)	Stakeholders are planning staff and emergency coordinators	1
	Evolution of Plan	The Municipality's Climate Change Adaptation Committee is responsible for completing this plan	1
	Stakeholders – Public	No mention of including public participation towards stakeholder engagement	0
	Purpose of Participation	Did not include rationale for stakeholders or to not include public participants	0
			Score - 2/4 = 0.5

<i>Organization and Presentation</i>	Illustrations	Maps included	1
	Glossary of Terms	No Glossary of Terms	0
	Table of Contents	Table of Contents included	1
	Executive Summary	No executive summary	0
			Score - 2/4 = 0.5

Table 18. Municipality of the County of Richmond: Municipal Climate Change Action Plan

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness	Demonstrates awareness and preparedness	1
	Base Year Emissions	2006 was selected as base year	1
	Emissions Inventory	Emissions Inventory included	1
	Emissions Inventory Breakdown	Emissions inventory breakdown by category (buildings, water and wastewater, streetlights etc.), and energy type, energy consumption, emission factors, emissions	1
	Climate Change Context	Describes climate change context in the Municipality	1
	General Climate Change Impacts	Describes general climate change impacts – sea level rise, flooding, inundation	1

	Emission Trends Forecast	Mention of the difficulty of forecasting sea level rise – no explicit forecasts	0
	Specific Climate Change Impacts	Looks at specific climate change hazards impacting the Municipality – Impact Matrix	1
	Vulnerability Assessment - Industry	The primary hazards of concern are presenting concerns for areas such as: transportation and public works, planning and infrastructure, and emergency responses <ul style="list-style-type: none"> - Economic considerations 	1
	Vulnerability Assessment – Demographics	<ul style="list-style-type: none"> - Impacts the growing rate of senior citizens in the municipality – emergency responses etc., low population density constraints - Cultural considerations section 	1
	Vulnerability Assessment – Geographic Areas	Looks at hazards that can impact geographic areas, i.e. road connectivity, coastal erosion – used maps	1
			Score - 10/11 = 0.91
<i>Goals/Objectives</i>	Mitigation – Government Emissions	Addresses corporate actions towards implementing goals and mitigation i.e.	1

		promotion of public transit	
	Mitigation – Short Term GHG Emissions	Short term goals to be completed shortly after MCCAP creation i.e. increase transportation choice and efficiency	1
	Mitigation – Community Emissions	Has set community initiatives for mitigation, including goals and timelines for set goals	1
	Adaptation - General	Priorities for Adaptation section – establishes priorities and current adaptation initiatives	1
	Mitigation – Long-Term GHG Emissions	Long term goals that span from retrofitting homes etc.	1
	Adaptation – Specific	Presents specific adaptation initiatives to address each sector of priorities <ul style="list-style-type: none"> - Identified 37 action priorities for adaptation 	1
			Score - 6/6
<i>Policies</i>	Energy – Efficiency	- Inclusion of energy efficient policies	1
	Communication	- No policy included	0
	Transportation	- Diversifying transportation use in the municipality	1
	Energy – Renewable	- Provincial government offering rebates or incentives to	1

		invest in renewable energy	
	Land Use	- Efficient land use planning regarding development of “small scale green industries” and wind turbine development	1
	Water Management	- No policy included	0
	Waste Management	- Under wastewater management section, municipality will support existing infrastructure	1
	Natural Resource Management	- No policy included	0
	Food & Agriculture	- No policy included	0
	Hazard Reduction	- No policy included	0
			Score - 5/10
<i>Implementation</i>	Plan Priority	Stated that with partnership with ICURA researchers, the County is in a good position to implementation of priorities to address climate change issues	1
	Organization Responsibility	Richmond County responsible for implementation	1
	Timelines	Timelines for goals, i.e. Goal 1: Improve the Energy Efficiency of	1

		Buildings (Time Frame: 2010-2015)	
	Financial Tools	Costs associated with capital projects included i.e. waste water treatment	1
	Implementation Section	No explicit implementation section	0
			Score - 4/5 = 0.8
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	Goals scattered throughout MCCAP, i.e. Nova Scotia Power to produce 25% of its energy from renewable sources by 2015, goal to reduce greenhouse gas emissions in Richmond County by 20% from 2005 levels <ul style="list-style-type: none"> - 5 community and corporate goals for mitigation 	1
	Timeline for Plan Update	No mention of plan update	0
	Organization Responsibility	Richmond County	1
	Monitoring and Evaluation Section	No explicit monitoring and evaluation section	0
			Score - 2/4 = 0.5
<i>Coordination (Internal and External)</i>	Horizontal Coordination	Coordinated with many academic institutions such as the University of Ottawa, University of New Brunswick, University Sainte Anne; Community-University Research Alliance (ICURA) project, Managing Adaptation to Environmental Change	1

		in Coastal Communities: Canada and the Caribbean	
	Vertical Coordination	Followed provincial guidelines of producing MCCAP	1
			Score - /2
<i>Participation</i>	Stakeholders (Agencies, etc.)	Academic institutions, hydro companies	1
	Evolution of Plan	Academic institutions provided significant insight towards this MCCAP	1
	Stakeholders – Public	No explicit mention of public participation	0
	Purpose of Participation	Did not provide a rationale as to why participation is an important part of this process, - did mention the assistance of academic institutions as helpful	0
			Score - 2/4 = 0.5
<i>Organization and Presentation</i>	Illustrations	Illustrations, images, and maps included	1
	Glossary of Terms	No glossary of terms included	0
	Table of Contents	Table of Contents Included	1
	Executive Summary	No executive summary, but introduction included	1
			Score - ¾ = 0.75

Table 19. Climate Change Action Plan – Town of Shelburne

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness	Plan demonstrates awareness of importance to address climate change	1
	Base Year Emissions	Used 2009 Energy Audit	1
	Emissions Inventory	Emissions Inventory included – Table 22	1
	Emissions Inventory Breakdown	Inventory breakdown by municipal buildings and operations is included	1
	Climate Change Context	Describes climate change hazards impacting the Town, and the importance of adaptive capacity	1
	General Climate Change Impacts	<ul style="list-style-type: none"> - Mention of 8 natural hazards, of which inland flooding, coastal flooding, and storm surge pose threats to Town 	1
	Emission Trends Forecast	No explicit emission trends forecast included	0
	Specific Climate Change Impacts	<ul style="list-style-type: none"> - Created a hazard impact matrix to rate and rank hazards effecting the Town i.e. inland flooding - - matrix per hazard - used ranking tool – Hazard Risk Vulnerability 	1

		Assessment (HRVA)	
	Vulnerability Assessment – Industry	- lists all the infrastructure and municipal facilities	1
	Vulnerability Assessment – Demographics	- social considerations – health of residents etc. - identified vulnerability	1
	Vulnerability Assessment – Geographic Areas	Identified at-risk geographic areas by utilizing Coastal Flood Risk Maps to display areas of concern	1
			Score - 10/11 = 0.91
<i>Goals/Objectives</i>	Mitigation – Government Emissions	Climate change actions put in to address municipal emissions	1
	Mitigation – Short Term GHG Emissions	There are mitigation actions that fall under the short-term timeline – 9.2 “Reduce energy consumption at Waste Treatment Plants: As T12 double fixtures burn out, replace bulbs”	1
	Mitigation – Community Emissions	Some of the climate change actions that aim to reduce GHG emissions look towards community emissions, i.e. “reduce energy consumption at Town Hall”	1
	Adaptation - General	Plan presented 9 strategies for adaptive capacity i.e. “protect	1

		future drinking water supply”	
	Mitigation – Long-Term GHG Emissions	<p>Mention of prioritizing mitigation of events such as strong hurricanes and other events that can be accentuated by climate change</p> <ul style="list-style-type: none"> - an adaptive capacity goal is to reduce greenhouse gas emissions - some climate change actions fall under the “medium term”, i.e. Action 9.1, 9.3, and 9.4 	1
	Adaptation – Specific	Each climate change action is broken down into specific actions to reach set goals i.e. climate actions 9.1, 9.2, 9.3, 9.4	1
			Score - 6/6 = 1.0
<i>Policies</i>	Energy – Efficiency	Recommendation to create municipal policy towards new building construction being LEED certified	1
	Communication	Recommendation to create municipal policy that addresses work stoppages in extreme heat brought on by climate change	1
	Transportation	<ul style="list-style-type: none"> - No policy included 	0

	Energy – Renewable	<ul style="list-style-type: none"> - Mention of the Eastern Shelburne County Energy Strategy - Support renewable energy projects 	1
	Land Use	<ul style="list-style-type: none"> - Example of land use planning setbacks 	1
	Water Management	<ul style="list-style-type: none"> - No policy included 	0
	Waste Management	Mention of recommendation to create municipal policy that acts as protection to staff employed at sewage treatment plants in instance of severe weather events	1
	Natural Resource Management	<ul style="list-style-type: none"> - No policy included 	0
	Food & Agriculture	<ul style="list-style-type: none"> - No policy included 	0
	Hazard Reduction	Mention to look further into the Natural Hazards Analysis, and update policies accordingly	1
			Score - 6/10
<i>Implementation</i>	Plan Priority	In the “Recommendations” section, it states that the plan aims to “provide a practical framework for climate change action plan implementation and monitoring”	1
	Organization Responsibility	The Town has responsibility for implementation	1

	Timelines	Timelines are included for climate change actions for “actions to reduce greenhouse gas emissions”	1
	Financial Tools	Mentions municipal budget, but no mention of tools for implementation of MCCAP	0
	Implementation Section	No explicit implementation section for goals set out in MCCAP	0
			Score - 3/5 = 0.6
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	No quantifiable goals or indicators to measure success of set goals	0
	Timeline for Plan Update	Mentions update to Municipal Planning Strategy and Bylaw as MCCAP priority	1
	Organization Responsibility	Town of Shelburne	1
	Monitoring and Evaluation Section	No explicit monitoring and evaluation section or indicators <ul style="list-style-type: none"> - one of the 9 adaptive capacity strategies is “environmental protection and monitoring” 	0
			Score - 2/4 = 0.5
<i>Coordination (Internal and External)</i>	Horizontal Coordination	- Worked with EMO reports	1
	Vertical Coordination	Worked along Province’s guidelines and recommendations	1

			Score - 2/2 = 1.0
<i>Participation</i>	Stakeholders (Agencies, etc.)	<ul style="list-style-type: none"> - Interviews with municipal staff - Municipal departments contributed to plans 	1
	Evolution of Plan	<p>Climate Change Action Plan Committee consisted of Councilors, administrators, EMO Coordinators and public member</p> <ul style="list-style-type: none"> - Consulting team was hired to contribute to plan, individuals ranged from researchers to engineers 	1
	Stakeholders – Public	<p>Committee included two individuals of the public, but one having a scientific background was preferable</p> <ul style="list-style-type: none"> - Citizens were reached out to by press release if they wanted to learn about the MCCAP process - Committee chose not to host public engagement event 	1
	Purpose of Participation	Committee was created to create Plan and contribute	1
			Score - 4/4 = 1.0

<i>Organization and Presentation</i>	Illustrations	- Maps and images included	1
	Glossary of Terms	- Provides definitions to key concepts	1
	Table of Contents	Table of Contents included	1
	Executive Summary	Executive summary included	1
			Score - 4/4 = 1.0

Table 20. Municipality of the County of Annapolis – Municipal Climate Change Action Plan

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness	Awareness of climate change threats and reference to IPCC report	1
	Base Year Emissions	Base year of 2009	1
	Emissions Inventory	Emissions inventory included	1
	Emissions Inventory Breakdown	No breakdown included in MCCAP	0
	Climate Change Context	Plan is created in a climate change context with emphasis on adaptation and mitigation	1
	General Climate Change Impacts	Lists general climate change impact effecting municipality – storm surge flooding, inland flooding, disruption of services etc.	1

	Emission Trends Forecast	Future climate change impact trends were discussed <ul style="list-style-type: none"> - Forecast regional trends 	1
	Specific Climate Change Impacts	Plan addresses general climate change impacts effecting most of the Province, but also looks at specific impacts that will impact the Municipality	1
	Vulnerability Assessment - Industry	Assessed vulnerability of municipal infrastructure <ul style="list-style-type: none"> - Table 4.1: At-Risk Municipality Infrastructure - Evaluated quantitatively based on a scale 	1
	Vulnerability Assessment - Demographics	Looks at preparedness of municipality when climate change can impact people i.e. elderly residents and emergency response	1
	Vulnerability Assessment – Geographic Areas	Assessed vulnerability of affected locations within Municipality	1
			Score - 10/11 = 0.91
<i>Goals/Objectives</i>	Mitigation – Government Emissions	Goals span to include government emissions, or government owned processes	1
	Mitigation – Short Term GHG Emissions	There are mitigation goals with more recent timelines i.e. completion within 5 years, therefore are intended to be short-term	1

	Mitigation – Community Emissions	Emissions generated from “municipal operations” were targeted for mitigation via retrofitting buildings, and decreasing energy demand	1
	Adaptation - General	Lists adaptation measures i.e. potable water infrastructure, roads, land use management adaptive updates etc.	1
	Mitigation – Long-Term GHG Emissions	There are mitigation goals that have an ongoing timeline thus are intended to be long-term	1
	Adaptation – Specific	Various measures associated with each adaptation area	1
			Score - 6/6 = 1.0
<i>Policies</i>	Energy – Efficiency	- No policy included	0
	Communication	- REMO Plan – assess communications strategy	1
	Transportation	- No policy included	0
	Energy – Renewable	- Municipality has made the goal of creating the conversion of 50% of municipal buildings to grass pellet fueled heating	1
	Land Use	- Land use management i.e. setbacks,	1

		development in floodplains	
	Water Management	- No policy included	0
	Waste Management	- No policy included	0
	Natural Resource Management	- No policy included	0
	Food & Agriculture	- No policy included	0
	Hazard Reduction	- No policy included	0
			Score - 3/10
<i>Implementation</i>	Plan Priority	Implementation section highlights importance in order to reach set goals in MCCAP	1
	Organization Responsibility	Once plan is adopted by Council, the measures within will be implemented by processes and polices, as well as budget planning <ul style="list-style-type: none"> - Essential staff will oversee Plan implementation - Responsibility for each sector of mitigation goals is stated 	1
	Timelines	Timelines for each mitigation goal included, i.e. Building envelope improvements = 2013-2018	1
	Financial Tools	No financial tools included	0
	Implementation Section	Implementation section included – Section 7.3	1
			Score - 4/5 = 0.8

<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	Quantifiable goals present in plan i.e. “the energy audit targeted a 16.8% reduction in energy consumption costs”	1
	Timeline for Plan Update	No mention of plan update	0
	Organization Responsibility	The Municipality is responsible for monitoring	1
	Monitoring and Evaluation Section	No explicit monitoring and evaluation section	0
			Score - 2/4 = 0.5
<i>Coordination (Internal and External)</i>	Horizontal Coordination	Worked alongside agencies i.e. NS Agriculture	1
	Vertical Coordination	Worked along the Provincial guidelines to develop MCCAP	1
			Score - 2/2 = 1.0
<i>Participation</i>	Stakeholders (Agencies, etc.)	Stakeholders that were consulted during plan development were: <ul style="list-style-type: none"> - NS Agriculture - NS Transportation and Infrastructure Renewal - NS Power - Municipal Recreation Services 	1
	Evolution of Plan	Table is included describing how each individual stakeholder contributed to plan development	1

	Stakeholders – Public	General public was not consulted as it was not made mandatory by the SNSMR MCCAP Guidebook	0
	Purpose of Participation	Purpose of stakeholder participation was explained as it led to its development and an “inclusive” plan	1
			Score - $\frac{3}{4}$ = 0.75
<i>Organization and Presentation</i>	Illustrations	Photos and tables included	1
	Glossary of Terms	No glossary of terms included	0
	Table of Contents	Table of Contents included	1
	Executive Summary	Executive summary included	1
			Score - $\frac{3}{4}$ = 0.75

Table 21. HalifACT 2050

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness	Displays urgency for addressing climate change - Highlights 2018 IPCC report	1
	Base Year Emissions	Baseline year of 2016	1
	Emissions Inventory	No emissions inventory included	0

	Emissions Inventory Breakdown	No emissions inventory breakdown included	0
	Climate Change Context	Plan is described in a climate context	1
	General Climate Change Impacts	Lists general climate change impacts effecting the Municipality – increasing number of severe storms, flooding events, sea level rise, etc.	1
	Emission Trends Forecast	Discusses trends alongside 2018 IPCC report that depicts emissions and temperature trends	1
	Specific Climate Change Impacts	Plan lists specific climate change impacts such as “reduced water quality and quantity”, “increased demands on emergency services”, etc.	1
	Vulnerability Assessment - Industry	Assessed vulnerability of various municipal industries – energy sector, infrastructure etc.	1
	Vulnerability Assessment - Demographics	Highlights climate change risks that can impact population, and discusses how it can disproportionately impact some groups more than others	1
	Vulnerability Assessment – Geographic Areas	Assessed vulnerability of specific geographic areas such as coastal regions	1
			Score - 9/11 = 0.82

<i>Goals/Objectives</i>	Mitigation – Government Emissions	Section 5.2.4 looks to “green” government operations and further mitigation	1
	Mitigation – Short Term GHG Emissions	Actions that fall under the “short term” are included	1
	Mitigation – Community Emissions	Community emissions are heavily discussed and collective action i.e. vehicle emissions, community capacity etc.	1
	Adaptation - General	Adaptation actions included to reach goals set out in plan	1
	Mitigation – Long-Term GHG Emissions	Actions that fall under “long term” are included	1
	Adaptation – Specific	Each adaptation action also has specific quantitative targets and objectives i.e. section 5.2.1	1
			Score - 6/6
<i>Policies</i>	Energy – Efficiency	- Retrofitting current buildings	1
	Communication	- Section 5.3.1 – Improve emergency management communication	1
	Transportation	- Actions 5.1 - Decarbonizing transportation - Prepare for electric vehicle growth through policy	1
	Energy – Renewable	- Investing in renewable energy actions	1

		- Section 5.2.2	
	Land Use	- Amending land use bylaw regulations, land protection	1
	Water Management	- Stormwater management standards	1
	Waste Management	- Waste strategy to reduce residential waste	1
	Natural Resource Management	- No policy included	0
	Food & Agriculture	- Create Food Action Plan	1
	Hazard Reduction	- No policy included	0
			Score - 8/10
<i>Implementation</i>	Plan Priority	Implementation strategies are scattered throughout plan for achieving goals and actions	1
	Organization Responsibility	The Municipality is responsible for implementation	1
	Timelines	Timelines for each plan action included, symbols used as well	1
	Financial Tools	Plan mentions investments towards components and goals of Plan - Figure 5 – “low carbon investments by economic sector”	1
	Implementation Section	Although not explicit, Section 6: “Acting on Climate Together” looks	1

		towards ways that implementing the plan can be achieved	
			Score - 5/5
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	Plan includes quantifiable goals as part of each action i.e. “improve industrial process efficiency 75% by 2040”	1
	Timeline for Plan Update	Plan is constantly being monitored and evaluated	1
	Organization Responsibility	Halifax is responsible for monitoring	1
	Monitoring and Evaluation Section	Section 5.4.3: Monitoring and Reporting looks to create indicators for climate actions	1
			Score - 4/4 = 1.0
<i>Coordination (Internal and External)</i>	Horizontal Coordination	Plan looks to work alongside agencies and stakeholders	1
	Vertical Coordination	Plan also looks to work with Provincial government	1
			Score - 2/2 = 1.0
<i>Participation</i>	Stakeholders (Agencies, etc.)	Stakeholders included various levels of government, advocacy groups, and industries	1
	Evolution of Plan	A wide variety of stakeholders were included in plan creation – over 250 internal and external stakeholders	1
	Stakeholders – Public	Communities, youth, and various groups were consulted	1

	Purpose of Participation	Climate change insights and further knowledge on hazards were <u>gained from community meetings and responses</u> <ul style="list-style-type: none"> - Section 2.2 lists the insights found from community workshops and sessions 	1
			Score - 4/4 = 1.0
<i>Organization and Presentation</i>	Illustrations	Used charts and tables to support ideas <ul style="list-style-type: none"> - Lots of illustrations 	1
	Glossary of Terms	No glossary of terms included	0
	Table of Contents	Table of contents included	1
	Executive Summary	No executive summary, however Plan included ‘Mayor’s Foreward’	0
			Score - 2/4 = 0.5

Table 22. Municipal Climate Change Action Planning Halifax Regional Municipality

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness	Plan demonstrates climate change awareness and urgency	1
	Base Year Emissions	2008 base year	1
	Emissions Inventory	2008 GHG Emissions Inventory for HRM	1

	Emissions Inventory Breakdown	No breakdown of emissions inventory	0
	Climate Change Context	Plan is developed in a climate change context and under the Provincial MCCAP guidelines	1
	General Climate Change Impacts	Uses framework to assess climate change risks i.e. Step 1: understanding the context, Step 2: identify climate change impacts and risks, Step 3: Identify, quantify and qualify the risks ...	1
	Emission Trends Forecast	Milestone 1 of the PCP Program looks at “creating a GHG emissions inventory and forecast”	1
	Specific Climate Change Impacts	Describes specific climate change impacts throughout plan i.e. “increased variability in demand for snow and ice removal due to the impacts on snow and rainfall patterns	1
	Vulnerability Assessment – Industry	<ul style="list-style-type: none"> - Risk and Vulnerability Assessment Tool – Halifax Regional Municipality - Report/survey completed: - economic sector survey (Stantec, 2013) 	1
	Vulnerability Assessment - Demographics	During a 2013 review, key climate change issues identified were those that	1

		infringe on emergency vehicle access to residents	
	Vulnerability Assessment – Geographic Areas	Looks at vulnerability of geographic areas in conjunction to coastal erosion and inundation <ul style="list-style-type: none"> - Can impact land use - Has performed reviews of floodplains and flood risk areas 	1
			Score - 10/11 =0.91
<i>Goals/Objectives</i>	Mitigation – Government Emissions	Lists “recent/current operational CCM initiatives” <ul style="list-style-type: none"> - i.e. HRM Corporate Plan to Reduce Greenhouse Gas Emissions 2012-2020 	1
	Mitigation – Short Term GHG Emissions	Lists recent emission reduction activities <ul style="list-style-type: none"> - plan also consisted of goal by 2020 to aim for a 30% reduction in equivalent carbon dioxide below 2008 levels 	1
	Mitigation – Community Emissions	<ul style="list-style-type: none"> - section 3.3.2 - community education program – educates residents about climate change and how they themselves can 	1

		mitigate these impacts	
	Adaptation – General	- Included a cost-benefit analysis of adaptation options	1
	Mitigation – Long-Term GHG Emissions	Lists mitigation efforts that will be implemented in the long-term i.e. energy conservation, improved energy efficiency etc.	1
	Adaptation – Specific	Lists current CCA (climate change adaptation) initiatives i.e. enhancing community outreach, hazard mapping	1
			Score - 6/6 = 1.0
<i>Policies</i>	Energy – Efficiency	Policy and guidelines related to new building development	1
	Communication	HRM decided to conduct a 5-year review of the Active Transportation (AT) Priority Plan	1
	Transportation	Plan looks towards promoting active transportation methods and network - Includes list of projects related to AT	1
	Energy – Renewable	“Chapter 2 of Draft 2 of the RMPS includes policy statements associated with Wind Energy”	1
	Land Use	- Sustainability guidelines land use bylaws that require LEED silver certification	1

	Water Management	HRM created voluntary Sustainability Guidelines in the Downtown Halifax Land-Use By-Law which includes addressing non-sewage water and ground storm water	1
	Waste Management	- Sustainability guidelines in By laws to address construction waste management	1
	Natural Resource Management	- Initiative supported by Natural Resources Canada	1
	Food & Agriculture	- No policy included	0
	Hazard Reduction	HRM has looked to create policies that focus on sea level rise and floodplain mapping, i.e. Policy E-16 of Draft 2 of the RMPS	1
			Score - 9/10
<i>Implementation</i>	Plan Priority	Plan is a priority for local government as seen by years to have certain goals completed by	1
	Organization Responsibility	HRM is responsible for implementation	1
	Timelines	Included figure describing CCA Research Timeline i.e. Figure 1 - Corporate Plan to Reduce Greenhouse Gas	1

		Emissions 2012-2020 - Years associated with some goals	
	Financial Tools	- Stated that HRM has gained a lot of funding from Federal and Provincial opportunities for adaptation research, i.e. Atlantic Climate Adaptation Solutions (ACAS) funding - Looking for opportunities to gain funding is on-going	1
	Implementation Section	Milestone 4 of the PCP Program highlights implementing local action plans, however there is no explicit implementation section	0
			Score - 4/5 = 0.8
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	Quantifiable goals present in plan - Under section 4.2 "Climate Change Mitigation & the Regional Municipal Planning Strategy" establishes 8 goals	1
	Timeline for Plan Update	Under the section "Planning and Infrastructure", section 1.1: complete Regional Plan 5-Year Review	1

		<ul style="list-style-type: none"> - In 2016, an update to the GHG Reduction Plan is expected 	
	Organization Responsibility	HRM is responsible for monitoring MCCAP	1
	Monitoring and Evaluation Section	<p>Based on the PCP Program, in 2011, HRM reached milestone 5 “monitoring progress and reporting results”</p> <ul style="list-style-type: none"> - “Halifax Regional Municipality Corporate Plan to Reduce Greenhouse Gas Emissions 2012-2020” - no explicit monitoring and evaluation section 	1
			Score - 4/4 = 1.0
<i>Coordination (Internal and External)</i>	Horizontal Coordination	Worked alongside agencies for plan development	1
	Vertical Coordination	<p>Worked with Provincial government to create new policies and strategies</p> <ul style="list-style-type: none"> - Section 3.3.7 describes intergovernmental collaboration – lists involvement with organizations 	1
			Score - 2/2 = 1.0
<i>Participation</i>	Stakeholders (Agencies, etc.)	Agencies were consulted such as: Transportation and Public Works (TPW),	1

		community & Recreation Services (C&RS)	
	Evolution of Plan	<ul style="list-style-type: none"> - Community engagement - Standing Committee Approach - Committee met 4 times a year minimum 	1
	Stakeholders – Public	Some members of the Standing Committee were community groups and volunteers	1
	Purpose of Participation	Purposely chose a wide variety of groups represent HRM’s commitment to addressing climate change issues	1
			Score - 4/4 = 1.0
<i>Organization and Presentation</i>	Illustrations	Illustrations and maps included	1
	Glossary of Terms	No glossary of terms included	0
	Table of Contents	Table of Contents included	1
	Executive Summary	Executive summary included	1
			Score - 3/4 = 0.75

Table 23. Municipality of Cumberland – Municipal Climate Change Adaptation Plan (MCCAP)

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness	Describes climate change concern and preparedness	1
	Base Year Emissions	Base year emissions of 2006 and 2007	1
	Emissions Inventory	Municipalities completed inventories in 2006 and 2007	1
	Emissions Inventory Breakdown	Included breakdown of emissions inventory	1
	Climate Change Context	Plan is framed in a climate change context	1
	General Climate Change Impacts	Lists concerns such as sea level rise, storm surge, coastal erosion, flooding etc.	1
	Emission Trends Forecast	No emissions trends included	0
	Specific Climate Change Impacts	<ul style="list-style-type: none"> - Appendix A: MCCAP Infrastructure Risk Assessment Matrix - Appendix B: Climate Change Hazard Impact Matrix - Bay of Fundy low areas particularly susceptible 	1
	Vulnerability Assessment – Industry	<ul style="list-style-type: none"> - Assessed economic implications of climate change i.e. tourism being affected by beachfront loss and coastal erosion 	1
	Vulnerability Assessment - Demographics	Section 5a.1 looks to identify populations who are considered to be at greater risk and more vulnerable	1

		- Help from the Red Cross to complete this	
	Vulnerability Assessment – Geographic Areas	Assessed vulnerability of specific geographic areas – i.e. Bay of Fundy low areas, flooding along the Northumberland Strait, etc.	1
			Score - 10/11 = 0.91
<i>Goals/Objectives</i>	Mitigation – Government Emissions	Municipality formed the Cumberland Energy Authority – an inter-municipal body	1
	Mitigation – Short Term GHG Emissions	- Conversion of streetlights to LED's	1
	Mitigation – Community Emissions	- Upgraded office lighting	1
	Adaptation - General	There was an Adaptation team created	1
	Mitigation – Long-Term GHG Emissions	Mentions that a priority mitigation activity will be developing the “Cumberland Energy Authority”	1
	Adaptation – Specific	Not much mention of specific adaptation endeavors in the plan	0
			Score - 5/6 = 0.83
<i>Policies</i>	Energy – Efficiency	- No policy included	0
	Communication	- No policy included	0
	Transportation	- No policy included	0
	Energy – Renewable	- No policy included	0
	Land Use	- No policy included	0
	Water Management	- No policy included	0
	Waste Management	- No policy included	0

	Natural Resource Management	- No policy included	0
	Food & Agriculture	- No policy included	0
	Hazard Reduction	- No policy included	0
			Score - 0/10
<i>Implementation</i>	Plan Priority	Implementing the plan is a priority, as well as the Environmental Planning Framework	1
	Organization Responsibility	The Municipality is responsible for implementation	1
	Timelines	Implementation of Framework would take 3 or 4 years	1
	Financial Tools	No financial tools indicated	0
	Implementation Section	“The MCCAP will contain an implementation plan” - Section 6 is “priorities for action/implementation plan”	1
			Score - 4/5 = 0.8
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	No quantifiable goals included	0
	Timeline for Plan Update	“The Team will provide periodic updates to Council”	1
	Organization Responsibility	The Municipality will be responsible for monitoring	1
	Monitoring and Evaluation Section	No explicit monitoring and evaluation section	0
			Score - 2/4 = 0.5
<i>Coordination (Internal and External)</i>	Horizontal Coordination	No mention of horizontal coordination	0

	Vertical Coordination	Worked along Provincial guidelines for creation of MCCAP	1
			Score - ½ = 0.5
<i>Participation</i>	Stakeholders (Agencies, etc.)	No mention of agencies involved in stakeholder consultations	0
	Evolution of Plan	Stakeholders were not included in evolution of plan	0
	Stakeholders – Public	Outside stakeholders were not consulted during certain of the plan due to resources	0
	Purpose of Participation	Mentions that stakeholder consultation will occur following adoption of the Plan	1
			Score - ¼ = 0.25
<i>Organization and Presentation</i>	Illustrations	No illustrations included	0
	Glossary of Terms	No glossary of terms included	0
	Table of Contents	Table of contents included	1
	Executive Summary	No executive summary included	0
			Score - ¼ = 0.25

Table 24. Municipal Climate Change Action Plan – Town of Pictou

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness	Plan displays climate change awareness	1
	Base Year Emissions	No base year indicated	0
	Emissions Inventory	Emissions inventory included	1

	Emissions Inventory Breakdown	Emissions inventory breakdown included by category	1
	Climate Change Context	Plan is presented in a climate change context and describing how climate change will impact the Town	1
	General Climate Change Impacts	Chapter 2 of MCCAP looks at climate change impacts and hazards i.e. storm surges etc.	1
	Emission Trends Forecast	No emission trend forecast provided for the Town	0
	Specific Climate Change Impacts	The MCCAP describes specific and future climate change impacts, i.e. sea level rise, seawater intrusion etc.	1
	Vulnerability Assessment - Industry	Assessed vulnerability of various town industry sectors – infrastructure and utilities Table 4.2 looks at the vulnerability of key infrastructure	1
	Vulnerability Assessment - Demographics	Assessed vulnerability of emergency services and hospitals <ul style="list-style-type: none"> - Section 5.1 “Who will be affected” - Assesses vulnerable communities and groups 	1
	Vulnerability Assessment – Geographic Areas	<ul style="list-style-type: none"> - Figure 2.1 depicts the areas of the Town that have been affected by 	1

		<p>weather events etc.</p> <ul style="list-style-type: none"> - Figure 2.2 depicts locations that are vulnerable to climate change hazards - Chapter 3 looks as “Affected Locations” 	
			Score - 9/11 = 0.82
<i>Goals/Objectives</i>	Mitigation – Government Emissions	The Town has made substantial investments for emissions reduction strategies <ul style="list-style-type: none"> - i.e. Table 7.2 	1
	Mitigation – Short Term GHG Emissions	Some “in-progress” projects had a short term timeframe associated with them i.e. 1 year for completion	1
	Mitigation – Community Emissions	Town has made effort to reduce community emissions and targeting community sectors i.e. Public Works Upgrades	1
	Adaptation - General	Town has assembled an Adaptation Committee	1
	Mitigation – Long-Term GHG Emissions	Long term mitigation actions can include educating the public on general climate change concerns, which the Town is undergoing	1
	Adaptation – Specific	Chapter 6 lists adaptive actions i.e. developing a stormwater management plan	1
			Score - 6/6 = 1.0

<i>Policies</i>	Energy – Efficiency	- LED Streetlight replacement	1
	Communication	Town is encouraging residents to gain an education about climate change and mitigation Section 5.2.2 “Options for Mitigating Economic Impacts” - Promoting relevant courses and educational opportunities	1
	Transportation	- No policy included	0
	Energy – Renewable	- No policy included	0
	Land Use	- Town has been suggested to establish setbacks from sensitive habitats	1
	Water Management	Development of a stormwater management plan	1
	Waste Management	- No policy included	0
	Natural Resource Management	- No policy included	0
	Food & Agriculture	- No policy included	0
	Hazard Reduction	Suggested to implement “coastal erosion control measures”	1
			Score - 5/10
<i>Implementation</i>	Plan Priority	Plan makes implementation a priority	1
	Organization Responsibility	The Adaptation Committee and other individuals will be	1

		responsible for the implementation of the MCCAP	
	Timelines	<ul style="list-style-type: none"> - Timelines are associated with each future project i.e. Table 8.2 	1
	Financial Tools	<p>MCCAP will be used within Towns Capital Investment Plan (CIP) (i.e. capital budget)</p> <p>Explains where financing sources come from</p> <ul style="list-style-type: none"> - costs associated with each project are included 	1
	Implementation Section	Chapter 8 looks at Implementation	1
			Score - 5/5 = 1.0
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	No quantifiable goals included in MCCAP	0
	Timeline for Plan Update	<ul style="list-style-type: none"> - Chapter 8 describes how the MCCAP is required to be updated at least twice in a 5-year cycle 	1
	Organization Responsibility	The Adaptation Committee will oversee the Plan and monitor where it can be improved/updated	1
	Monitoring and Evaluation Section	No monitoring and evaluation section included	0
			Score - 2/4 = 0.5

<i>Coordination (Internal and External)</i>	Horizontal Coordination	Lists that the Plan will work with agencies - Nova Scotia EMO, Nova Scotia Power etc.	1
	Vertical Coordination	Plan works along Provincial guidelines when creating the MCCAP	1
			Score - 2/2 = 1.0
<i>Participation</i>	Stakeholders (Agencies, etc.)	Section 6.11 recommends that the Town meet annually with other infrastructure agencies, organizations and groups	1
	Evolution of Plan	Stakeholders did not participate in the evolution of the MCCAP	0
	Stakeholders – Public	Stakeholders were not directly involved in the creation of the MCCAP, but rather community concerns were summarized in the ICSP	0
	Purpose of Participation	No purpose of stakeholder participation identified	0
			Score - ¼ = 0.25
<i>Organization and Presentation</i>	Illustrations	Maps included	1
	Glossary of Terms	No glossary of terms included	0
	Table of Contents	Table of Contents included	1
	Executive Summary	No executive summary included	0
			Score - 2/4 = 0.5

Table 25. Toward a Greener Future: Nova Scotia's Climate Action Plan

Plan Characteristics (8)	Indicators (46)	Plan Evaluation/Comments	Score for if Indicator is not present or present (0 or 1)
<i>Fact Base</i>	Climate Change Awareness	Plan is presented with climate change impacts and how Province will be effected by climate change	1
	Base Year Emissions	Base year of emissions is 2005	1
	Emissions Inventory	Emissions inventory included	1
	Emissions Inventory Breakdown	Emissions inventory breakdown included via graph	1
	Climate Change Context	- References 2007 IPCC Report	1
	General Climate Change Impacts	Lists general climate change impacts that Province will face i.e. sea level rise	1
	Emission Trends Forecast	Plan offers graph to display provincial GHG emissions trends (pg.4)	1
	Specific Climate Change Impacts	- Sea level rise sue to large coastline, location makes the Province more susceptible to hurricanes	1
	Vulnerability Assessment - Industry	Plan addresses Province working with various industries and how they could be impacted by	1

		climate change i.e. forest industry	
	Vulnerability Assessment - Demographics	States that population is vulnerable due to being primarily situated along the coast	1
	Vulnerability Assessment – Geographic Areas	Proximity to coastline makes region more vulnerable	1
			Score - 11/11
<i>Goals/Objectives</i>	Mitigation – Government Emissions	Moving away from fossil fuel use – coal targets	1
	Mitigation – Short Term GHG Emissions	Plan presents short-term targets in emissions reduction efforts	1
	Mitigation – Community Emissions	<ul style="list-style-type: none"> - Increasing energy efficiency in homes and buildings 	1
	Adaptation - General	Plan includes 9 actions related to adaptation <ul style="list-style-type: none"> - Creation of an Adaptation Fund 	1
	Mitigation – Long-Term GHG Emissions	The Plan presents long-term targets to reduce emissions i.e. goal of an 80% reduction in emissions by 2050	1
	Adaptation – Specific	Plan lists specific adaptation actions and how much GHG emissions they can reduce	1
			Score - 6/6 = 1.0
<i>Policies</i>	Energy – Efficiency	Action 8 – amendments to the Nova Scotia Building Code Act <ul style="list-style-type: none"> - 2009 Energy Strategy 	1

	Communication	The Province understands the importance education plays in climate change awareness <ul style="list-style-type: none"> - schools are educating about climate change 	1
	Transportation	<ul style="list-style-type: none"> - Plan addresses emissions generated from emissions - Sustainable Transportation Strategy 	1
	Energy – Renewable	In 2007, a Renewable Energy Standard was created by the province	1
	Land Use	<ul style="list-style-type: none"> - Np policy included 	0
	Water Management	Action 65 – to develop a water resource management strategy	1
	Waste Management	<ul style="list-style-type: none"> - No policy included 	0
	Natural Resource Management	<ul style="list-style-type: none"> - Strategy to ensure sustainability of Province’s natural capital 	1
	Food & Agriculture	Proposal to create an “Chair in Farm Energy Conservation” at Nova Scotia Agricultural College	1
	Hazard Reduction	The Environmental Goals and Sustainable Prosperity Act sets out targets for air pollution	1

			Score - 8/10
<i>Implementation</i>	Plan Priority	Plan makes implementation of actions a priority based on timeline	1
	Organization Responsibility	The Province is responsible for achieving these GHG targets <ul style="list-style-type: none"> - Climate Change Action Plan and Department of Energy 2009 Energy Strategy will help province to achieve goal 	1
	Timelines	Timelines for certain actions are included i.e. short-term, long-term etc.	1
	Financial Tools	Targets related to GHG emissions will be assessed every 5 years	1
	Implementation Section	No explicit implementation section	0
			Score - 4/5 = 0.8
<i>Monitoring and Evaluation</i>	Quantifiable Goals and Policies	Plan includes quantifiable goals – i.e. “reducing greenhouse gas emissions, target: 5 megatonnes annually by 2020	1
	Timeline for Plan Update	Progress report on adaptation to climate change will be updated biannually	1
	Organization Responsibility	The Province will be responsible for monitoring	1

	Monitoring and Evaluation Section	Section for accountability – “Measurement and Accountability” section	1
			Score - 4/4 = 1.0
<i>Coordination (Internal and External)</i>	Horizontal Coordination	Worked alongside other sectors to educate create targets	1
	Vertical Coordination	?	
			Score - /2
<i>Participation</i>	Stakeholders (Agencies, etc.)	No mention of stakeholders such as agencies being consulted to create this plan	0
	Evolution of Plan	Action 2 highlights that stakeholders will help develop policies to target GHG emissions	1
	Stakeholders – Public	No mention of stakeholders being consulted when creating this plan	0
	Purpose of Participation	No reasoning as to the purpose of participation	0
			Score - ¼ = 0.25
<i>Organization and Presentation</i>	Illustrations	Tables included	1
	Glossary of Terms	No glossary of terms included	0
	Table of Contents	Table of contents included	1
	Executive Summary	No executive summary included	0
			Score - 2/4 = 0.5