

HOW DO SECOND HOMES AND COASTAL SHORT-TERM RENTALS AFFECT
MUNICIPAL PLANNING AND DECISION MAKING IN THE CONTEXT OF
CLIMATE CHANGE?

by

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Dedicated to
My Parents

TABLE OF CONTENTS

LIST OF TABLES	vi
LIST OF FIGURES	vii
ABSTRACT	ix
LIST OF ABBREVIATIONS USED	x
ACKNOWLEDGEMENTS	xii
CHAPTER 1 INTRODUCTION	1
1.1 CONTEXT AND PROBLEM STATEMENT	1
1.2 OBJECTIVES OF THE STUDY	4
1.3 METHODS	4
1.4 SCOPE	6
1.5 ORGANIZATION OF THE THESIS	7
CHAPTER 2 ARE SECOND HOMES AN ISSUE OF CONCERN FOR CANADIAN MUNICIPALITIES’ PLANNING AND RESPONSE TO CLIMATE CHANGE INDUCED EMERGENCIES?	8
2.1 INTRODUCTION	9
2.2 BACKGROUND ON SECOND HOMES	11
2.2.1 Defining Second Homes	11
2.2.2 SH Ownership and Driving Forces	12
2.2.3 SH Issues	13
2.2.4 Climate Change Effects on Coastal Communities and Emergency Management	14
2.2.5 Municipal Planning for Emergency Management	18
2.3 METHODS	20
2.3.1 Data Collection	21

2.3.2 Data Analysis	23
2.4 LIMITATIONS.....	24
2.5 RESULTS	25
2.5.1 Classification of SHs.....	25
2.5.2 Regional differences in SH Occupancy Patterns	27
2.5.3 Municipal Planning Issues	28
2.5.4 Identification of SHs by Planners	29
2.5.5 Challenges to Identify SHs	30
2.5.6 Use of SH Information for Municipal Planning	31
2.5.7 Regional Natural Phenomena Experienced by the Municipalities	32
2.5.8 Articulated Issues of SHs in Different Regions of Canada.....	34
2.6 DISCUSSION.....	36
2.6.1 Multiple-Concept and Classification of SHs	36
2.6.2 Suitable sources for identifying SHs.....	37
2.6.3 Challenges for identifying SHs.....	39
2.6.4 SH Issues and their Implementation in Municipal Planning	40
2.7 CONCLUSION.....	43
CHAPTER 3 VULNERABILITY OF COASTAL SHORT-TERM RENTALS TO CLIMATE CHANGE EFFECTS IN NOVA SCOTIA, CANADA	45
3.1 INTRODUCTION	46
3.2 BACKGROUND	49
3.2.1 Coastal Tourism and Short-term Rentals.....	49
3.2.2 Impacts of Climate Change on the Coast and Coastal Community.....	50
3.2.3 Efforts to Manage Coastal Vulnerability in NS.....	52

3.3 METHODS	53
3.3.1 Study area.....	54
3.3.2 Identifying Short-term Rentals	55
3.3.3 Data Analysis	58
3.4 Limitations	59
3.5 RESULTS	60
3.5.1 Vulnerability of CSTRs Provincially.....	62
3.5.2 Case Study: Lunenburg County.....	62
3.6 DISCUSSION	69
3.6.1 Distribution of CSTRs	69
3.6.2 Potential Risks to CSTRs and Occupants	70
3.7 CONCLUSION.....	73
CHAPTER 4 CONCLUSION.....	74
REFERENCES	77
APPENDIX A ONLINE SURVEY QUESTIONNAIRE.....	91

LIST OF TABLES

Table 2.1 Types of SHs remain in Canadian Municipalities based on planners' response.	26
Table 2.2 SH occupancy patterns in different regions of Canada based on planners' responses (%).	28
Table 2.3 Top climatic phenomena (in cumulative percent) by regions, according to participating municipal planners.	34
Table 2.4 Region-specific articulated issues with SHs.	35
Table 3.1 Local roads risk for inundation at different flood heights and CSTRs (within <1 km of the coastline) likely to be cut-off.	65

LIST OF FIGURES

Figure 2.1 Coastal risks to climate change effects (adapted from Lemmen et al., 2008).	16
Figure 2.2 Emergency management continuum (adapted from Public Safety Canada, 2010).	18
Figure 2.3 Classification of SHs based on occupancy pattern by planners' responses, ordered by frequency.	27
Figure 2.4 Municipal planning issues dealing with SH according to survey respondents.	29
Figure 2.5 Sources used and suggested by the planners to identify SH according to survey respondents.	30
Figure 2.6 Challenges experienced and might experience by the municipal planners according to survey respondents.	31
Figure 2.7 Opportunities for SH information for those who do not track and use of information for those who track according to survey respondents.	32
Figure 2.8 Natural phenomena experienced in Canadian municipalities according to survey respondents.	33
Figure 3.1 Study area.	55
Figure 3.2 Steps followed to identify geographic coordinates of the short-term rentals from VRBO website.	57
Figure 3.3 Distribution of CSTRs by county in NS.	61
Figure 3.4 Cumulative number of CSTRs that fall within different contour lines in NS.	62
Figure 3.5 Cumulative number of CSTRs (located <1 km from the coastline) that fall within different contour lines in Lunenburg County.	63
Figure 3.6 Number of CSTRs at various horizontal distances from the coastline in Lunenburg County.	63

Figure 3.7 Examples of short-term rentals in Lunenburg prone to inundation being located at 1 m road elevation..... 66

Figure 3.8 Examples of short-term rentals prone to inundation being located at 5 m road elevation..... 67

Figure 3.9 Emergency fire station services prone to be disrupted being located at various road elevations. 68

ABSTRACT

The number of second homes (SHs) and coastal short-term rentals (CSTRs) is increasing worldwide. Although SHs and CSTRs contribute to economic and tourism development, these properties remain at potential risks due to the impacts of climate change. This has become an issue of concern for many Canadian municipalities as they are responsible for ensuring the safety and security of buildings and their residents during emergencies (e.g., storm and flood). Without data and information about SHs and CSTRs, it is difficult for municipalities and emergency services to provide rescue operations. This study articulates the issues of SHs by surveying Canadian municipal planners. This study also assesses the physical vulnerability of CSTRs in the context of climate change by using Geographic Information System. Municipalities need to manage and regulate the activities of SHs and CSTRs to ensure safety and security of buildings and their occupants through planning and decision making.

LIST OF ABBREVIATIONS USED

AB	Alberta
ACASA	Atlantic Climate Adaptation Solutions Association
Airbnb	Air Bed and Breakfast
API	Atlantic Planners Institute
APPI	Alberta Professional Planners Institute
B&B	Bed & Breakfast
BC	British Columbia
CIP	Canadian Institute of Planners
CPA	Coastal Protection Act
COINAtlantic	Coastal and Ocean Information Network Atlantic
CSTRs	Coastal Short-term Rentals
EMP	Emergency Management Planning
EM	Emergency Management
GDP	Gross Domestic Product
GIS	Geographic Information System
ICSP	Integrated Community Sustainability Plan
MCCAP	Municipal Climate Change Action Plans
MS	Microsoft
MPS	Municipal Planning Strategy
MSL	Mean Sea Level
NB	New Brunswick
NGOs	Non-Government Organizations
NS	Nova Scotia
ON	Ontario
PEI	Prince Edward Island
QC	Quebec
RV	Recreational vehicle

SHs	Second Homes
TIANS	Tourism Industry Association of Nova Scotia
USA	United States of America
VRBO	Vacation Rentals by Owners
WGS	World Geodetic System
WTTC	World Travel and Tourism Council

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CHAPTER 1 INTRODUCTION

1.1 CONTEXT AND PROBLEM STATEMENT

Coastal areas are popular destinations for tourists around the world. Coastal communities earn revenue from coastal tourism by accommodating tourists and providing various services and experiences. Many people own second homes (SHs) such as coastal cottages to spend time at while vacationing, along with their primary residence. A second home is a residence that people own and utilize for recreational and secondary purposes in addition to their primary residence for part of each year. Owning a SH allows people to enjoy nature through seeing, smelling, and touching (Hiltunen, Pitkänen, & Halseth, 2016). Increasing numbers of households are interested in spending more time in appealing environments (Pitkänen, 2008). SH ownership has been growing since 1990 in many western countries (McIntyre, Williams, & McHugh, 2006; Pitkänen & Vepsäläinen, 2008; Armstrong, 2011). Hence, SH ownership has become a significant indicator of the growth of housing development, mobility, and tourism (Pitkänen & Vepsäläinen, 2008). The destinations for SH ownership for western citizens are spreading from western countries to rural places in some Asian and South African countries (Müller, 2011).

On the other hand, many other people rent accommodations (e.g., rooms, apartments, condos or entire houses) on a short-term basis to visit desired tourist attractions, sometimes in coastal areas. Coastal short-term rentals (CSTRs) are popular among tourists around the world, which have created multibillion-dollar short-term rental services such as Airbnb, HomeAway, and VRBO. Jamasi (2017) defined a short-term rental as the rental of a dwelling (apartment, house, townhouse, secondary suites, and condominium) via an online platform for less than 30 days. Like many other countries, Canadians earn revenue from this sector. It is reported that there were a daily average of 128,000 active listings on the Airbnb platform in 2018 in Canada, which brought \$1.8 billion in revenue (Cardoso & Lundy, 2019).

There are pros and cons of the growth of SHs and CSTRs. Some researchers think that SHs represent sites for the consumption of luxury (Walters & Carr, 2015), while some other researchers argue that the development of SHs represents local development in the

communities (Visser, 2004; Miletić, Žmuk, & Mišetić, 2018). Both are true, but Hiltunen et al. (2016) illustrate that SH tourism also poses some degree of adverse effects on the natural environment; the more visitors travel and pass the time in the natural environment, the more it is affected by the actions and activities of the visitors. Roca et al. (2011) suggest that second homeowners and occupants in CSTRs in some cases are more environment-friendly and educated than some other local residents. Despite this, during the peak season, SHs and CSTRs create higher demands for water supply, sewerage systems, garbage collection, and road infrastructure maintenance which accelerates environmental problems and may cause adverse effects on the local environment due to the lack of adequate municipal planning in remote areas (Brida et al., 2011; Farstad & Rye, 2013). SH tourism has other negative aspects such as conflict between locals and outsiders, increased demand for utilities and municipal services, exploitation of natural resources, environmental pollution, and increasing property prices as well as taxes (Hiltunen, 2007; Brida, Osti, & Santifaller, 2011; Long & Hoogendoorn, 2013; Hiltunen et al., 2013). Although CSTRs contribute to revenue generation and local development to coastal communities, this sector was also criticized because of its negative effect on the housing market (Jamasi, 2017; Nieuwland & van Melik, 2018; Alhmidi, 2019; Cardoso & Lundy, 2019; Gerster, 2019). Researchers also note local residents making nuisance complaints (e.g., noise) caused by CSTR guests (Nieuwland & van Melik, 2018).

SHs and CSTRs are integral parts of coastal tourism and remain at potential risk as coastal regions are considered hotspots for climate change impacts throughout the world (Torresan et al., 2012; Scott, Simpson, & Sim, 2012; Warren & Lemmen, 2014; Wijaya & Furqan, 2018). Of the climate changes and their impacts, much attention has been put on accelerated sea-level rise, extreme weather events, storms, elevated tidal inundation, increased flood frequency, accelerated erosion, increased saltwater intrusion, rising water tables, and other ecological changes. These biophysical changes are projected to cause various impacts, including socio-economic, subsistence values, cultural and ecological (Klein & Nicholls, 1999; Lieske, Wade, & Roness, 2014). Coastal and island destinations are also vulnerable to direct and indirect climate change-induced effects as most residences and infrastructure are located close to the shoreline (WTO, 2008; Torresan et al., 2012; Warren & Lemmen, 2014).

SHs and CSTRs also may remain vacant for a certain period of the year when there may not be anyone to take care of the property. Vacant SHs and CSTRs become more vulnerable during emergencies (e.g., winter storm, storm surge, flood, etc.). Moreover, those who rent these homes seasonally might not have proper knowledge about what to do during an emergency (Drabek, 1999; Bird, Gisladdottir, & Dominey-Howes, 2010). CSTRs have been criticized not ensuring the safety and security of their occupants (Jamasi, 2017). The risks to the occupants of SH and CSTRs are intensified in the absence of information on the location of short-term rentals at the municipality for planning and management during emergencies. For effective emergency management, it is essential to assess the vulnerability, identify risks, provide preventive measures and increase the adaptive capacity of SHs and CSTRs and their users through proper planning and decision making.

Canadian coastal municipalities experience storm surges, floods, and erosions which make local roads inaccessible for both residents and rescuers during emergencies (Warren & Lemmen, 2014; Bush & Flato, 2019; Council of Canadian Academies, 2019). Coastal municipalities often face challenges to provide even year-round citizens emergency management services, maintain utilities, mobility & infrastructure, and preserve natural and cultural sites from erosion and weather damage (NSDE, 2009; CNSIS, 2011; Measham et al., 2011). Despite the risks to coastal communities due to the degree of vulnerability (e.g., poor buildings and infrastructure resiliency, lack of climatic information, lack of preparedness measures) and predicted natural hazards (e.g., storms, flood, erosion, sea-level rise), I was not able to find such databases of SHs and CSTRs kept publicly available by Canadian municipalities, much less for risk assessment and risk management during emergencies. Little research has been done on the vulnerability of coastal SHs and CSTRs to climate change, particularly in the Canadian context. Municipalities thus might lack knowledge and policies to manage coastal SHs and CSTRs. To support and develop coastal tourism while protecting and managing SHs and CSTRs amidst above-stated challenges, municipalities need to generate data and understanding about SHs and CSTRs.

1.2 OBJECTIVES OF THE STUDY

The first objective of this study is to find out to what extent and why municipal planners perceive SHs as an issue for municipal planning and decision making, particularly in the context of a changing climate. Specifically:

- i. How do municipal planners classify and identify SHs?
- ii. Do municipal planners perceive SHs as an issue of concern and, if so, why it is a concern?
- iii. How do municipal planners see SHs as relating to climate change-induced emergency management?

The second objective of this study is to explore the physical vulnerability of CSTRs to the impacts of climate change (sea level rise and storm surge) using Nova Scotia as a case study. The second objective covers the following research questions:

- i. How can CSTRs be identified when municipalities do not track them?
- ii. Are CSTRs vulnerable to climate change, and if so to what extent?

Therefore, this study is intended to uncover the issues of SHs and the physical vulnerability of CSTRs in the context of climate change impacts, to aid municipalities' planning and decision making around SHs and CSTRs.

1.3 METHODS

Relating to the first objective, this study looks at how Canadian municipalities define and tackle SHs or seasonal homes in their comprehensive and emergency management planning. An online survey technique was used to reach out to municipal planners to elicit their opinions regarding SH issues. SH issues include categorizing SHs, tracking and utilizing SHs data for municipal planning and decision making, identifying contemporary challenges associated with SHs, and understanding the effects of climate change on SHs. Though mail out surveys (e.g., Stedman, 2006a; Pitkänen, 2008) are a popular technique used in the field of second home research, online surveys have frequently been used as an instrument in second home research in Europe and North America (e.g., Hiltunen, 2007; McLeod & Busser, 2014; Nouza, Ólafsdóttir, & Sæþórsdóttir, 2018). Online surveys have numerous advantages over mail-out surveys (e.g., fast, efficient, low cost, cover a wide

range of areas, and easy data entry) (Hiltunen, 2007). For this study, the online survey software Opinio (Objectplanet, 2018) was selected due to its low cost and high data security. The data collection method used in this research was approved by the Research Ethics Board of Dalhousie University (REB file# 2017-4228, 01/09/2017).

I sought to survey municipal planners to get their professional opinions regarding SH issues. Therefore, I chose current municipal planners in Canada as my target population. The Canadian Institute of Planners (CIP) is the only professional association for Canadian municipal planners, and it has over 6,300 registered members across Canada (CIP, 2018). CIP, and three of its affiliated regional bodies, distributed my survey link by posting an advertisement on their websites. In order to increase the survey responses, in addition, I collected planners' email addresses in key coastal jurisdictions, which were publicly available on municipal websites and invited them to my survey by sending the survey link via a direct email. The survey questionnaire was designed to attract and maintain participant interest in completing the survey. The survey included both closed and open-ended questions, generating both qualitative and quantitative data. The raw data from survey responses were downloaded from Opinio into Microsoft (MS) Excel format for analysis. The MS Excel data analysis tool was used to do the descriptive statistics to present the results of the survey data. Text-based data from open-ended questions and participants' additional comments were coded based on SH issues articulated.

For the second objective of this study, I used a Geographic Information System (GIS) to assess climate change-induced coastal vulnerability of CSTRs that are located along the coastline of Nova Scotia (NS). GIS is widely used in assessing the vulnerability of coastal communities (Szlafsztein & Sterr, 2007; Bathi & Das, 2016; Toubes et al., 2017; Minano et al., 2018). NS was chosen as a highly coastal jurisdiction: it has a population of 923,598 according to the 2016 census (Statistics Canada, 2018b) and 70% of the population lives in coastal communities (ECoAS, 2019). Nova Scotia's economy is driven by fishing and fish processing, aquaculture, mining, tourism and information technology (Statista, 2019). Smaller than but still among the main economic sectors, tourism is a \$2.6 billion industry in NS, supporting more than 22,000 direct jobs in the province (TIANS, 2019). In this study, I identified CSTRs that are located within <1 km from the NS coastline and used the

CSTRs of Lunenburg County (a busy area for coastal tourism) for a more detailed case analysis. One of the main reasons for choosing Lunenburg County for case analysis is that Lunenburg is one of the top destinations for tourists visiting NS every year. I identified coastal CSTRs from the VRBO (Vacation Rental by Owner) website and Google Earth's publicly available lodging dataset and produced a dataset of coastal CSTRs for NS to assess vulnerability by using GIS.

As part of the research objective to assess the vulnerability of the CSTRs to inundation due to storm surge, coastal flood, and sea-level rise, I collected contours from an inundation mapping project (Rapaport, Manuel, & Webster, 2014). Rapaport et al. (2014) in their inundation mapping project used 5 m and 10 m contours to determine inundation plausibility of different communities including Lunenburg in NS. In determining 5 m and 10 m contours, Rapaport et al. (2014) calculated plausible extreme high water levels by summing sea level rise, higher high water at large tides, and maximum recorded storm surges for different communities. The plausible high water level for Lunenburg was found to be 4.83 m for year 2100. I identified all vulnerable short-term rentals within 1 m, 2 m, 3 m, 4 m, 5 m and 10 m flood levels. I counted the CSTRs that will be affected if local roads get inundated and hinder evacuation during flooding. I also calculated the number of CSTRs at various horizontal distances up to 500 m inland from the coastline for Lunenburg County. Key emergency response sites were similarly analyzed. Together this helped to identify short-term rentals in coastal areas susceptible to extreme weather events and likely vacant for some period of time in a year, particularly severe winter storms.

1.4 SCOPE

SHs and CSTRs are two essential and growing parts of the world tourism industry. This thesis is intended to articulate the issues that SHs and CSTRs present relating to climate change impacts and municipal planning and decision making aspects. Although this research is done based in Canada (for SHs) and NS (for CSTRs), the issues articulated may fit in other jurisdictions, particularly more rural western contexts with similar governance.

There are limitations to the study. In relation to the first research objective, I targeted survey municipal planners across Canada, and I received 87 complete responses, which is not representative of all Canadian municipal planners. However, this study makes a good

start at understanding the SH issues that exist in Canadian municipalities for planning and decision making, particularly for coastal jurisdictions from which more responses came. In relation to the second research objective, I intended to identify all the CSTRs in NS. I identified 653 CSTRs from VRBO and Google Earth Lodging platforms which may not represent all CSTRs in NS as there are also other rental platforms (Airbnb, HomeAway, Hometogo, etc.) which provide short-term renting service. The method I applied to identify the spatial location of CSTRs and their physical vulnerability to climate change is a proof-of-concept for further research on this topic. Above all, this study is intended to start filling the research gaps and help municipal planners to address planning and decision making issues associated with SHs and CSTRs.

1.5 ORGANIZATION OF THE THESIS

This thesis is composed of four chapters, two of which are written in a format with the plan for submission to peer-reviewed journals for publication. This introduction chapter includes the context and problem statement of the research topic, objectives of the study, methods and research framework, and scope of the study. Chapter two focuses on a survey-based exploration of the range of SH types that exist across Canada and summarizes the extent to which responding municipal planners perceive SH as an issue of concern for municipal planning and decision making. Chapter three presents the identification and physical vulnerability assessment of CSTRs in NS along with a case study of Lunenburg County. Both of these papers will include Kate Sherren and Eric Rapaport as co-authors. The concluding chapter four summarizes the research done in the thesis, making some recommendations and delineating the scope of further research.

CHAPTER 2 ARE SECOND HOMES AN ISSUE OF CONCERN FOR CANADIAN MUNICIPALITIES' PLANNING AND RESPONSE TO CLIMATE CHANGE INDUCED EMERGENCIES?

Abstract

Second homes (SHs), an integral part of coastal tourism, are vulnerable to climate change-induced impacts especially during emergencies (e.g., winter storm, storm surge, flood, etc.). For effective emergency management (EM), it is essential to assess the vulnerability, identify risks, provide preventive measures and increase the adaptive capacity of SHs and SH users. SH tourism has other negative aspects too (e.g., social conflicts, increased demand for utilities, natural resource exploitation, pollution, increasing property prices, etc.). Little research is done in the Canadian contexts about SH and their effects for climate change and municipal planning for EM. A survey of 87 Canadian municipal planners is used to explore the range of SH types and summarize to what extent municipal planners perceive SH as an issue of concern for municipal planning and decision making. The result shows that half of the total respondents considered SHs to be a public policy or planning issue in their municipalities. A few of them expressed that they made efforts to identify SHs and produced maps or included them in comprehensive planning, EM planning, and policymaking (e.g., coastal land use, housing, and tourism) in order to provide better community services. The respondents listed sources to identify SHs, opportunities to use SH information, and region-specific natural phenomena experienced by their municipalities.

2.1 INTRODUCTION

Coastal municipalities are particularly vulnerable to damage from climate change-induced effects. A number of studies articulate the vulnerability of coastal municipalities to natural hazards such as hurricanes, storm surges, erosion, floods, and sea level rise due to the changing climate (de Sherbinin, Schiller, & Pulsipher, 2007; Silvia Torresan et al., 2008; Parkinson & McCue, 2011; Johnson, 2016; Bathi & Das, 2016; Bevacqua, Yu, & Zhang, 2018; Council of Canadian Academies, 2019; Bush & Flato, 2019). Not only coastal municipalities but also municipalities inland experience climate change-induced natural disasters such as drought, wildfire, riverine flood, and erosion (Jha, Bloch, & Lamond, 2012; Morrison, Noble, & Westbrook, 2019; Bush & Flato, 2019). However, coastal communities are more susceptible to many climate change effects.

Recent natural disasters (e.g., 2003's Hurricane Juan, 2005's Katrina, 2007's Matthew, 2008's Ike, 2012's Sandy, 2017's Irma, 2017's Maria, and 2019's Dorian) have caused catastrophic damage and humanitarian crises in Atlantic coastal regions. Hence, coastal residents and coastal tourism destinations are vulnerable to climate change and natural disasters. There is a growing body of studies assessing the vulnerability of coastal tourism to climate change and natural disasters (Moreno & Becken, 2009; Scott, Simpson, & Sim, 2012; Kaján & Saarinen, 2013; Toubes et al., 2017; Steiger et al., 2017; Santos-Lacueva, Clavé, & Saladié, 2017). The general recommendation is vulnerability assessment and building the adaptive capacity of coastal tourism operators to reduce the damage from natural disasters (Moreno & Becken, 2009; Kaján & Saarinen, 2013; Toubes et al., 2017; Steiger et al., 2017).

Second homes (SHs), an integral part of tourism, are also vulnerable to climate change-induced impacts such as flooding, storm surges, sea level rise, and erosion. SHs become more vulnerable during emergencies (e.g., winter storm, storm surge, flood, etc.). SHs remain vacant for a certain period of the year so there may not be anyone to take care of the property during emergencies. Moreover, those who rent these homes seasonally might not have proper knowledge about what to do during an emergency (Drabek, 1999; Bird et al., 2010). For effective emergency management, it is essential to identify risks, assess the

vulnerability, provide preventive measures and increase the adaptive capacity of SHs and SH users through planning and decision making.

Apart from the emergency management issue, SH tourism has some other negative aspects such as conflict between locals and outsiders, increased demand for utilities and municipal services (e.g., electricity, water supply, garbage collection, fire brigade, etc.), exploitation of natural resources, environmental pollution, and increasing property prices as well as taxes (Hiltunen, 2007; Brida, Osti, & Santifaller, 2011; Long & Hoogendoorn, 2013; Hiltunen et al., 2013). Considering both positive and negative aspects of SH, researchers suggest regulating second home tourism through planning, policy, and governance (Brida et al., 2011; Hall, 2015).

Like other western countries, SHs have become a vital part of tourism and mobility in Canada (Halseth, 2004; McLeod & Busser, 2014; McNicol & Glorioso, 2014; Walters & Carr, 2015). In spite of the various positive and negative aspects of SH tourism, little research has been done in the Canadian context about the connection between SH tourism development, climate change effects and municipal planning for emergency management. In addition, there are information and research gaps linked to SH: e.g., definitions, occupancy patterns, and the issues of concern they may represent for host municipalities. Municipal planners have expert knowledge regarding this issue that is often not written down or aggregated. This study reports upon an online Opinio survey among Canadian municipal planners to find out to what extent and why municipal planners perceive second homes as an issue for municipal planning and decision making, particularly in the context of a changing climate. In connection with this objective of the research project the following are the research questions:

- i. How do municipal planners classify and identify second homes?
- ii. Do municipal planners perceive second homes as an issue of concern and, if so, why it is a concern?
- iii. How do municipal planners see second homes as relating to climate change induced emergency management?

2.2 BACKGROUND ON SECOND HOMES

2.2.1 Defining Second Homes

A second home (SH) is a residence that people own and utilize for recreational and secondary purposes in addition to their primary residence for part of each year. SH ownership has been growing since 1990 in many western countries (McIntyre, Williams, & McHugh, 2006; Pitkänen & Vepsäläinen, 2008; Armstrong, 2011). SH ownership was initially researched as a social phenomenon in 1970 especially in the United Kingdom (UK), Scandinavia, and Canada (McIntyre et al., 2006). Later research expanded to other places in Europe and added environmental values to the investigation. By the early 1990s, researchers were working globally on SH-related social, economic and environmental issues (Müller, 2011). SH ownership has become a significant indicator of the growth in housing development, mobility, and tourism (Pitkänen & Vepsäläinen, 2008). The destinations for SH ownership for western citizens are spreading from western countries to rural places in some Asian and South African countries (Müller, 2011).

Many researchers confront difficulties when attempting to define SH. According to McIntyre et al. (2006), SH accommodation is not a discrete class; instead, it differs on the basis of occupancy, ownership, function and the character of the dwelling. Müller (2011) and Pitkänen and Vepsäläinen (2008) also discussed the difficulties in defining SH as there are different contested terminologies. They also referenced Hall and Muller's (2004) conclusion that academic researchers used the terminologies of SH inconsistently (Pitkänen & Vepsäläinen, 2008).

In SH literature, different types of dwellings that fall into the category of SH depending on the location. Examples include summer homes, vacation homes, recreation homes, beach homes, lodges, cabins, cottages, flats, huts, apartments, chalets, villas, sports cabins, and so on (McIntyre et al., 2006; Hiltunen, 2007; Marjavaara, 2008; Pitkänen & Vepsäläinen, 2008; Müller, 2011; Gallent, 2013). Caravans, recreational vehicles, boats, and tents are some other terminologies used in SH tourism. McIntyre et al. (2006) have emphasized that definitions should be based on the ownership of the home, and they provided Coppock's (1977) definition of SH as "property owned or rented on a long lease as the occasional residence of a household that usually lives elsewhere."

Muller, Hall, & Keen (2004) emphasized the structural form and mobility pattern while defining SH. They identified three categories of SH such as stationary (e.g., cottages and homes); semi-mobile (e.g., trailers and recreational vehicles); and mobile (e.g., sailing boats). The census of the United States of America (USA) defined SH as “the proportion of the housing stock that is not occupied as a primary residence but rather is maintained for seasonal, recreational or occasional use” (McIntyre et al., 2006, p.8). There are some common factors that can be found across different definitions, concepts, and purposes of SH, including that SH use is recreational and occasional, and it is an additional home to the homeowner (McIntyre et al., 2006, p.9).

2.2.2 SH Ownership and Driving Forces

The phenomenon of owning SH is widespread and most popular in the western countries (Pitkänen, 2008; Pitkänen & Vepsäläinen, 2008; Müller, 2011; Roca, Roca, & Oliveira, 2011). The decision to own any SH is always complex and interlinked with different influencing factors including individuals’ preferences and attitudes, financial conditions, expected utilization, distance from the primary homes, mode of transportation, local facilities, and resources (Nouza et al., 2018). A lack of nature or leisure opportunities in urban people’s primary homes may also fuel a desire to have a more green environment (Norris & Winston, 2010). People who own or want to own a SH often seek out places close to nature such as the coastline, mountains, forest, and lakeshore (Pitkänen, 2008; Nouza et al., 2018). Also, the relationship between the prospective homeowners and the environment in which the SHs are situated such as close to nature and recreation options are likely to have strong desirable geographic characteristics or proximity (Tangeland, Vennesland, & Nybakk, 2013). People are generally attracted by a comfortable climate and amenity-rich areas, with recreation and leisure facilities and natural beauty the most desirable for many owners (Pitkänen, 2008). Nouza, Ólafsdóttir, & Sæþórsdóttir (2018), referencing Jaakson (1986), listed ten driving factors for owning any SH: close to nature, routine and uniqueness, continuity (reconnecting with previous experiences), identity and elitism (living standards and wealth), security, aspiration (ambition of achieving), distance, work, and time. Another factor driving SH ownership is the time available to spend in the SH (e.g., number of days per year) and financial spending habits through behavioural

characteristics (Nouza et al., 2018). Proximity to the environment and nature have a positive relationship with owning a SH, and this connection is strengthened while living in a SH. The geographical context of any SH plays a vital role when people desire a SH because they want privacy and to get close to nature (Pitkänen, 2008; Tangeland et al., 2013). Place attachment is another driving factor that can be linked with a human's complex behaviour matrix in the environment of their SH (Stedman, 2006). People may want a SH because of attachment to a place even if they cannot live there year-round.

2.2.3 SH Issues

Owning a SH has gained popularity and the number of SHs has increased internationally, and this has provided economic benefits to the coastal community (Pitkänen & Vepsäläinen, 2008). SH tourism is considered an area of luxury consumption. Many researchers identify both positive and negative impacts of SH tourism to the host communities (Hiltunen, 2007; Roca, Roca, & Oliveira, 2011; Brida, Osti, & Santifaller, 2011; Anabestani, 2014; de Oliveira, Roca, & Roca, 2015). Socio-economic, cultural, and environmental impacts are the primary concerns of SH tourism (Brida et al., 2011). Roca et al. (2011) in Portugal and Brida et al. (2011) found there are some common positive economic impacts of SH tourism development on the local community in Norway such as the increasing consumption of local products and growth of the local businesses and market, generation of new employment, and more attractive physical and social infrastructure. On the other hand, it also decreases housing stock for local people and also makes housing too expensive for them; sometimes local people are forced to displace for instance in the cases of cottage-rich areas of Finland (Rinne et al., 2015).

The main social issue of SH tourism is the conflict between SH owners and local people which has been described in British Columbia, Canada (Gill et al., 2010), in Norway (Brida et al., 2011), in Portugal (Roca et al., 2011), and in Australia (Osbaldiston, Picken, & Duffy, 2015). SH owners' status, behaviour, attitudes, and values are distinctly different from those of the local permanent residents. It has therefore been a significant challenge to share the same place and resources given different background, interests, opinions and expectations (Brida et al., 2011). Brida et al. (2011) also found in Norway that the interaction of SH owners with local people is very minimal and sometimes there are no

interactions between them. Sometimes in the case of overseas owners, different languages and cultures increase the barriers to interacting with local people (Brida et al., 2011). For example Åkerlund, Lipkina, & Hall, (2015) found in their study in Finland that there are many Russian SH owners and Brida et al. (2011) found that lots of British people have their SHs in Costa del Sol, Spain, both of which suggest that language and culture may be barriers for them to interact with the local people.

Some researchers describe SH tourism as environmentally unsustainable as most of them are very close to nature. During the peak season, SH tourism creates higher demand for water supply, sewerage system, garbage collection, road infrastructure maintenance which accelerates environmental problems and may pose adverse effects on the local environment due to the lack of adequate municipal planning in remote areas (Brida et al., 2011; Farstad & Rye, 2013). Roca et al. (2011), by contrast, suggest that SH owners in some cases are more environment-friendly and educated than some other local residents.

Considering both the positive and negative effects of SH tourism, it is essential to have adequate planning of SH tourism in every SH destination. Brida et al. (2011) mentioned that proper planning for SH tourism management would foster maximum positive benefits and lower adverse effects. They stated that planning issues need to be continuously adjustable with changes to the SH number, their family structure, and compositions. Planning issues related to the SH vary from destination to destination (Brida et al., 2011).

2.2.4 Climate Change Effects on Coastal Communities and Emergency Management

Coastal regions are considered hotspots for climate change impacts throughout the world (Torresan et al., 2012; Warren & Lemmen, 2014). Of the climate changes and their impacts, much attention has been put on accelerated sea-level rise, elevated tidal inundation, increased flood frequency, accelerated erosion, increased saltwater intrusion, rising water tables, and ecological changes. These biophysical changes are projected to cause various impacts including socio-economic, ecological, cultural and subsistence values (Klein & Nicholls, 1999; Lieske, Wade, & Roness, 2014).

Coastal communities are vulnerable all over the world due to global climate change, and many are considered moderately to highly vulnerable to ongoing climate variability

(Monirul & Mirza, 2003; Heberger, Cooley, Herrera, Gleick, & Moore, 2011). Coastal vulnerability is a concept that describes the people, places, and properties that are susceptible to the effects of coastal hazards (Bevacqua et al., 2018). The primary coastal hazards associated with climate change are sea level rise, storm surge, coastal flooding, and coastal erosion which pose a continuous threat to coastal communities and the physical environment in general (Janssen et al., 2006; Bevacqua et al., 2018). Coastal vulnerabilities vary from place to place and are geographically dependent and require regional management (Bevacqua et al., 2018).

Researchers have demonstrated that the frequency of storm surge and flooding will be increased in the near future because of the changing climate and sea level rise, and as a consequence, communities living in coastal areas will be more vulnerable in terms of physical assets exposed to flooding and erosion, economic loss and health impacts (Heberger et al., 2011; Felsenstein & Lichter, 2014; Manuel et al., 2015). Withey et al. (2015) stated that sea level rise and increased storm surge would be one of the most significant impacts of climate change and that will result in increased flooding of land and erosion as well as flooding of residential and commercial buildings and other infrastructures of coastal communities. Not only coastal communities but also inland communities are also experiencing the effects of climate change such as drought, riverine flood, and erosion (Jha, Bloch, & Lamond, 2012; Bush & Flato, 2019). Flooding in inland areas has particularly become a significant issue for millions of people around the world (Mogollón, Frimpong, Hoegh, & Angermeier, 2016; Union of Concerned Scientists, 2018).

Canada is a coastal country and has the longest coastline in the world (Ricketts & Hildebrand, 2011; Dolan et al., 2019). Coasts are a significant part of the Canadian culture, economy and identity (Lemmen et al., 2016). Canadian coasts are highly dynamic, and thus they are increasingly affected by climate change that affects human and natural systems. Recent weather events (hurricanes, more frequent storm surge) indicate the potential threat to coastal infrastructure and communities (Lemmen et al., 2016; Council of Canadian Academies, 2019; Bush & Flato, 2019). Lemmen et al. (2016) developed a flowchart to demonstrate the coastal risks from climate change effects (Figure 2.1). The flowchart shows that climate change impacts (e.g., sea level rise) are accelerating coastal risks to

public safety and infrastructure due to increasing flooding frequency and increasing erosion.

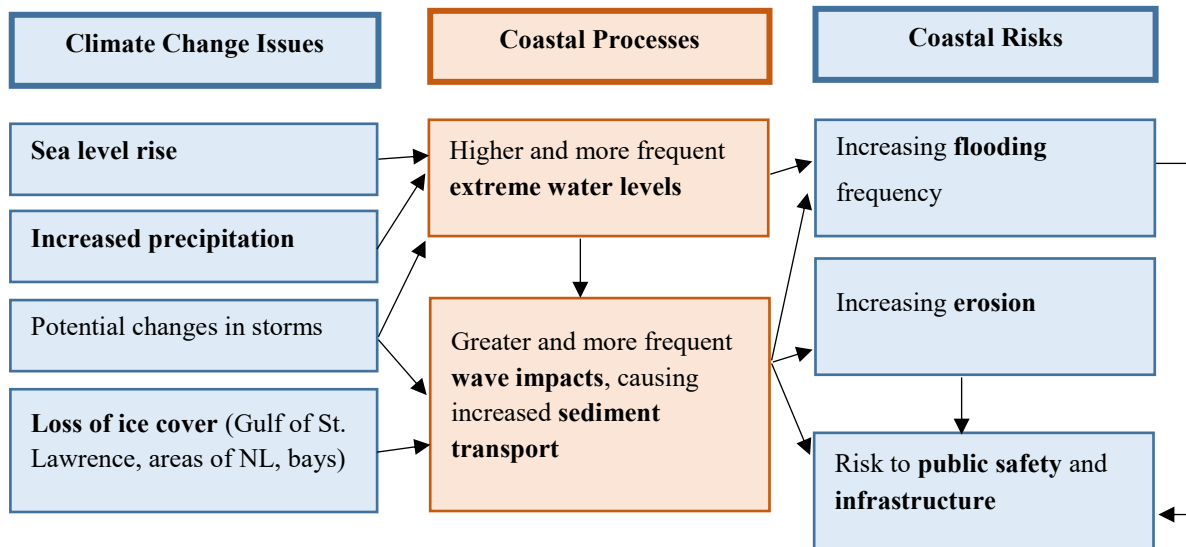


Figure 2.1 Coastal risks to climate change effects (adapted from Lemmen et al., 2008).

Some regions in Canada have been identified as highly sensitive to climate change-induced effects compared to other regions, and these sensitive regions are Maritime Canada (New Brunswick, Prince Edward Island, and parts of the Coasts of Nova Scotia), the lower mainland of British Columbia (BC), and some areas in the Beaufort Sea coast (Shaw et al., 1998; Lemmen et al., 2016; Bush & Flato, 2019). These regions are predicted to encounter inundation, erosion, increased frequency of overtopping and over washing, coastal destabilization, and beach migration (Shaw et al., 1998; Dotto et al., 2010; Lemmen et al., 2016; Bush & Flato, 2019; Council of Canadian Academies, 2019). Even some areas in the Canadian Prairie Provinces (Alberta, Saskatchewan, and Manitoba) have already experienced various climate change-induced impacts such as drought, wildfire, frequent riverine flood, and erosion, and it is predicted that the prairie provinces will continuously experience climate change impacts (Warren & Lemmen, 2014; Council of Canadian Academies, 2019; Bush & Flato, 2019; Morrison et al., 2019). For instance, the 2013 extreme flood in Southern Alberta displaced almost 100,000 people and caused \$6 billion in damage (Bush & Flato, 2019). Industrial activities in the above highly sensitive areas

will be affected due to the changing climate, but there is little published research regarding the indirect effects of climate change on various Canadian industries especially real estate, tourism, and supply chains (Warren & Lemmen, 2014).

To reduce the impacts of climate change on vulnerable communities, especially coastal communities, emergency management planning (EMP) is required.. Emergencies can be caused because of terrorism, cyber incidents, pandemic disease, and natural disasters. In this study, emergency management planning refers to the plans for managing climate-related emergencies. The aim of EMP is to save lives, protect the environment, and protect the property of residents by raising risk understanding and contributing to a prosperous, safer, disaster resilient, and sustainable society (Public Safety Canada, 2010). Integrated EMP has four pillars which are prevention and mitigation, preparedness, response, and recovery (Figure 2.2). Each pillar has its specific function to manage an incident (e.g., storm surge, flood, fire). Among the four pillars, prevention and mitigation of emergencies are related to the formulation of proper planning to reduce risk (Public Safety Canada, 2010).

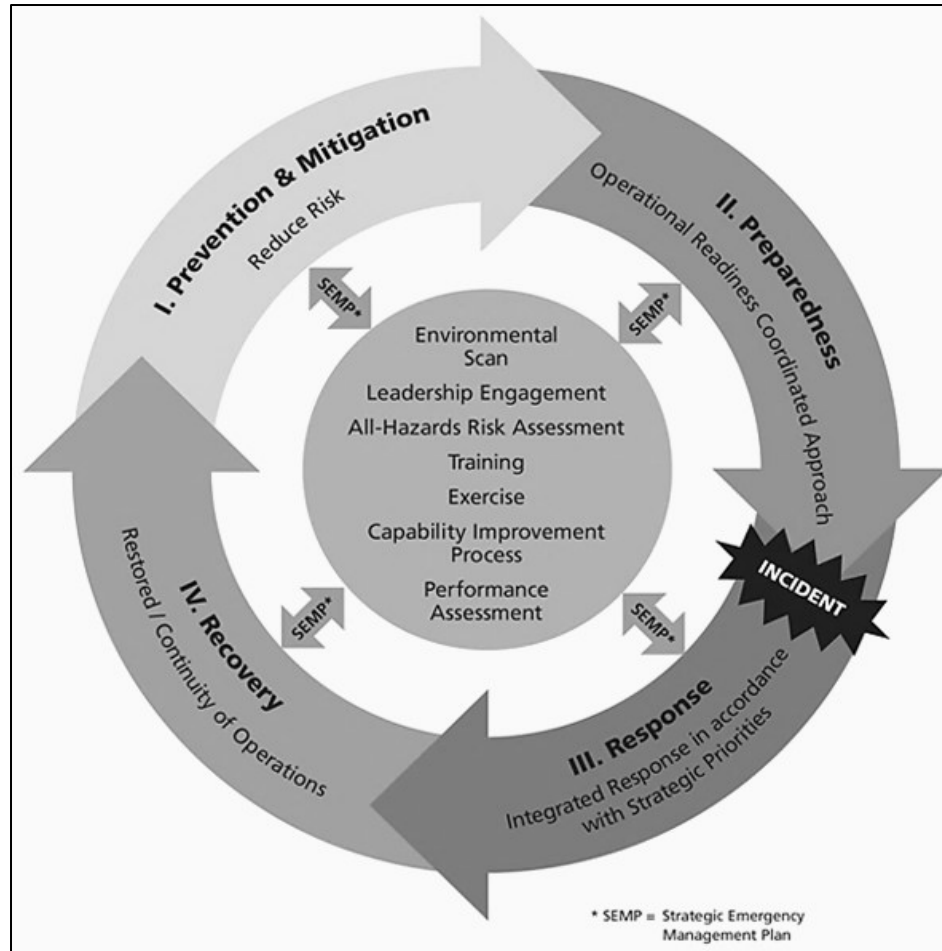


Figure 2.2 Emergency management continuum (adapted from Public Safety Canada, 2010).

2.2.5 Municipal Planning for Emergency Management

Planning for emergency management to cope with natural disaster is an essential municipal government responsibility (Henstra, 2010; Brida et al., 2011; Raikes & McBean, 2016) as local authorities (e.g., municipalities, towns, local service districts etc.) are the first respondents (Public Safety Canada, 2019). Researchers emphasize the importance of managing SHs through policy, planning and governance, as illustrated in Section 2.2.3 (Brida et al., 2011; Persson, 2015; Hall, 2015; (Osbaldiston et al., 2015). Osbaldiston et al. (2015) suggested three areas of SH governance to consider for municipal planning: health, roads and infrastructure and climate change. Brida et al. (2011) think that inadequate planning to manage SHs may affect water supply, sewage system, road infrastructure and garbage collection in the host community. Brida et al. (2011) also think that SHs must be

included in land use and housing development planning to balance the supply and demand of resources and services required for SHs and permanent residences in a locality. Hall (2015) illustrates that the governance of SHs is vital to tackle issues of mobility and multiple dwellings. Pilone et al. (2016) think that municipal emergency plans have to correlate with land use plans for emergency management in a community.

Municipal planners deal with the impacts of the interruption or damage to services caused by natural disasters through municipal planning (Kang, 2017). Municipal planning for emergency management to prepare for and deal with natural disasters includes physical planning (e.g., vulnerability mapping), engineering/construction planning (e.g., resilient housing and infrastructure development), economic planning (e.g., budget to cope with disaster and recovering from losses), management and institutional planning (e.g., regulating land use), and societal planning (e.g., public awareness regarding disaster risk, impacts mitigation and adaptation) (Louw and van Wyk 2011). Emergency planning activities for households include emergency exit plans, household emergency supply kits, emergency contact lists, and extra copies of important documents (Boyce, Conroy, & Ibrahim, 2016). Municipal planning for climate change-induced emergencies includes vulnerability assessment, disaster risk management, emergency and land use planning, allocating resources, and creating public awareness (Measham et al., 2011; Masteson et al., 2014; Pilone et al., 2016).

Realizing the vulnerability of climate change, some provinces have already adopted necessary measures to protect its communities, coastal communities in particular, and the measures include formulation of policies, plans and legislations. For example, NS is one of the Canadian provinces that has adopted some strategies to mitigate the effects of climate change and adapt to these effects. Every municipality in NS is obliged to prepare plans and policies to reduce the risks of natural hazards on coastal communities as per the NS Government's Municipal Funding Agreement (Stantec, 2011). These Municipal Climate Change Action Plans (MCCAP) help municipalities manage climate-related emergencies. Other relevant municipal planning documents are Integrated Community Sustainability Plans (ICSP), Municipal Planning Strategies (MPS), land use plans, and so on.

2.3 METHODS

The objective of this study is to find out to what extent and why municipal planners perceive second homes as an issue for municipal planning and decision making, particularly in the context of a changing climate. Specifically, this study looked at how Canadian municipalities define and tackle SH or seasonal homes in their comprehensive and emergency management planning. An online survey technique was used to reach out to municipal planners to elicit their opinions regarding SH issues. Online survey is a popular technique used in research because of its advantages (e.g., speed, efficiency, low cost, ability to cover a wide range of areas, and easy data entry) although there are some challenges of conducting online surveys such as obtaining satisfactory response rates (Van Selm & Jankowski, 2006; Sue & Ritter, 2007). Manzo & Burke (2012) suggested some techniques (e.g., incentives, pre-notifications about the survey, survey invitations, and survey reminders) to overcome those challenges.

In the survey, I targeted all Canadian municipal planners who are currently serving, and I applied non-material incentives, survey invitations and reminder techniques to overcome coverage and low response rate challenges. For the non-material incentive technique, I informed the respondents that aggregated survey results will be emailed to them if they respond and provide an email address. I included some information in the survey invitation that might have motivated the targeted respondents to respond to the survey, such as the purpose of the survey, ethics approval by the ethics review board, contact information of the researchers, and plans for maintaining the privacy and confidentiality of the respondents. I also sent out survey reminders to increase response rate, which is discussed more later.

Online surveys have frequently been used as an instrument in second home research in Europe and North America (e.g., Hiltunen, 2007; McLeod & Busser, 2014; Nouza, Ólafsdóttir, & Sæþórsdóttir, 2018). Similarly, mail out surveys (e.g., Stedman, 2006a; Pitkänen, 2008) are also a popular technique used in the field of SH research. For this study, Opinio (Objectplanet, 2018), an online survey software, was selected due to its low cost and data security. In the following sections, the methods used in data collection and data

analysis are discussed. The data collection method used in this research was approved by the Research Ethics Board of Dalhousie University (REB file# 2017-4228, 01/09/2017).

2.3.1 Data Collection

2.3.1.1 Selection of Target Population

Municipal planners are most likely to deal with SH issues described earlier, as well as emergency planning and management. Therefore, I chose municipal planners as target populations for this study. Also, I decided to survey planners who are currently working for municipalities in Canada. The Canadian Institute of Planners (CIP) is the only professional association for Canadian municipal planners, and it has over 6,300 registered members across Canada (CIP, 2018). CIP has eight regional affiliated bodies which are the largest planners' organization in each province. The following are the affiliated provincial bodies of the CIP:

- i. Atlantic Planners Institute
- ii. Alberta Professional Planners Institute
- iii. Ontario Professional Planners Institute
- iv. Manitoba Professional Planners Institute
- v. Planning Institute of British Columbia
- vi. Order of Planners of Quebec
- vii. Licensed Professional Planners Association of Nova Scotia
- viii. Saskatchewan Professional Planners Institute

I was able to convince CIP, and three of its affiliated bodies (Atlantic Planners Institute, Alberta Professional Planners Institute, Planning Institute of British Columbia) to distribute my survey link by contacting them via email, and where necessary by phone, explaining my research project and purposes. Contacting CIP members through their organizations was the best way to reach the highest number of planners at one time to get their opinion. I asked only the planners who are currently working for municipalities to fill out the survey. The language of the consent form excluded CIP members who are retired or consultants. The reason for this is that I wanted to know the current issues of SH and

planner's opinions regarding how they manage the SH in their municipalities. In order to increase the survey responses, in addition, I decided to collect the planners' email addresses which were publicly available on municipality websites to contact them individually.

2.3.1.2 Online Survey Design

I informed the participants regarding the purpose and confidentiality of the research project through the invitation email. At the very beginning of the survey, there was a consent form (attached in Appendix A) explaining the purpose and description of the survey, treatment of privacy and confidentiality, and the procedures to complete the survey. The participants had the option either to complete or cancel the survey at the beginning or at any stage of answering the questions. This survey asked the participants to answer the questions from their professional point of view. The survey did not ask for any personal information except email address (which was optional), the name of the municipality they were currently working for, and the participants' job title, none of which would be shared and which would be used only to establish response coverage or to send research results if desired. The report of the survey analysis does not quote or identify any participant by name or affiliation: identities are kept confidential.

The survey questionnaire was designed to attract and maintain participant interest in completing the survey. The survey included both closed and open-ended questions (attached in Appendix A). There was branching in the questionnaire to allow quicker completion, narrowing the question set based on earlier responses. The survey questionnaire was designed to elicit a clear concept of SH issues and how municipalities deal with them. The questionnaire asked about SH types, planning issues SHs present, data sources used to distinguish SH from year-round residences, challenges experienced trying to distinguish SH, the utility of SH data in municipal planning and decision making, and what climatic phenomena are experienced by the municipalities.

2.3.1.3 Distribution of the Survey

I reached the participants in two ways. Firstly, I distributed my survey link through the CIP and its affiliated bodies' monthly e-newsletters. CIP published my survey link in their monthly e-newsletter called 'Monthly Plan-it' on November 15th, 2017 which reached

planners across Canada. In addition, Atlantic Planners Institute (API) published my survey link in their November 14th e-newsletter which reached planners in the Atlantic Provinces (Nova Scotia, New Brunswick, Prince Edward Island), and the Alberta Professional Planners Institute (APPI) also distributed my survey in their September 16th e-newsletter. I received a total of 24 complete responses from the sources mentioned above. Secondly, I distributed the survey link directly to some participants by sending an individual invitation. I collected the email addresses of all municipal planners by researching municipal websites. In order to increase the response rate, I set three weekly reminders for the participants who did not respond. I sent a survey request this way on December 4th, 2017 to 121 planners in NS, NB, and PEI and received 36 responses. From 61 survey invitations on January 15th, 2018 in British Columbia (BC), I received 15 responses, and out of 34 survey invitations on March 19th, 2018 I received 5 responses from Alberta. The instruments were kept open from 15th September 2017 to 30th April 2018. By the end of April 2018, 87 respondents completed the survey from all modes of distribution. Due to the lack of representativeness this study does not widely reflect all Canadian municipal planners who are in service. However, this study indicates the SH issues that exist in the Canadian municipalities that did participate.

2.3.2 Data Analysis

The raw data from survey responses were downloaded from Opinio in Microsoft (MS) Excel format for analysis. The online survey responses generated both qualitative and quantitative data. The MS Excel data analysis tool was used to do the descriptive statistical analysis to present the results of the survey data. Completed survey responses were analyzed based on qualitative coding. Partially completed responses (e.g., participants' additional comments regarding SH issues in their municipalities) were used only for qualitative analysis. The responses were categorized by regions (Atlantic Canada, Central Canada, Prairies, and West Coast) to determine if there are any regional differences among them.

Further, I categorized the responses by municipality type to identify the SH issues typical in urban and rural areas. There were multiple choice questions including a free text box option for the majority of the survey themes such as types of SH, types of planning issues

regarding SH, data sources to identify SH, challenges to identify SH, the field of application of SH data and the different natural climatic phenomena experienced by the municipalities. The free text box option was used to identify issues that are not articulated in the literature and thus not offered as response options on survey. Due to the option for respondents to choose more than one answer the results show that the sum of the answers to some questions exceeded one hundred percent.

I did qualitative analysis for the open-ended questions to identify the frequently used themes/items and synthesized articulated issues. The articulated issues emerging from planners' experiences or thoughts concerning SH in their municipalities were coded thematically and presented according to the region, describing critical problems, current situations, and also the common factors concerning the Canadian municipalities. Thematic coding is a useful data analysis tool used in transforming interview or survey transcription into qualitative information to present to the readers in social science research (Boyatzis, 1998). Also, I used some direct quotations of the planners who responded (without naming them) which are interesting and relevant to present the nuances of specific situations.

2.4 LIMITATIONS

Researchers have discussed the challenges of conducting online surveys such as coverage area and response rate (Van Selm & Jankowski, 2006; Sue & Ritter, 2007; Teo, 2013). In this online survey-based research, I also encountered some challenges related to coverage area and response rate, and I adopted various measures to overcome them. The primary challenge I experienced was to find ways to reach out to planners. Specifically, as my survey was published in the e-newsletters of the associations, it was most likely possible that the survey link escaped people's attention. Additionally, I could not set up any survey reminders for the invitations sent out by the CIP and its' affiliated bodies as I did not have access to the e-newsletters' emailing lists. This has limited my coverage area and my capacity to calculate the response rate as I do not know exactly how many planners received my survey invitations. While collecting email addresses manually, some of the municipal websites did not have email addresses for the planners. Also, I found after sending the survey invitation that some email addresses were no longer in use which has limited us reaching to the maximum number of planners for surveying.

Another limitation to attempts to collect all current municipal planners' email addresses was limited time. I received few responses from Prairies and Central Canada, but if I was able to collect more planners' email addresses from those regions' municipalities that might have helped us to receive more responses. I could not collect more email addresses due to time constraints, and I prioritized coastal municipalities to achieve my research objectives. As illustrated in section 2.7, I took some measures to increase the number of responses. I think that if I could offer some sort of material incentive (e.g., gift voucher) to the survey invitees as suggested by Manzo & Burke (2012), this would help getting more responses. I could not offer this material incentive due to a lack of research funding. I did not receive any responses from the province of Quebec. I think this happened because of the language barrier as my survey was prepared in English and I did not translate my survey to a French version for the planners who would probably prefer to respond only in French. I could not send out a French version of my survey as the research team does not have adequate French language skill. This language barrier is a limitation for this study.

2.5 RESULTS

2.5.1 Classification of SHs

This study asked municipal planners about which different types of seasonal dwellings or SHs exist in their municipality. To answer this question, the municipal planners got six different options to choose including a free text box (Table 2.1).

I classified SHs based on the responses received from the respondents. The responses were converted to occupancy pattern of the SH owners for the purpose of this study. On the basis of the purpose of this study, the SHs are categorized by the pattern of stay in a SH at a particular time in a year (Figure 2.3). The categories are 'Not Empty,' 'Empty in Winter,' 'Empty in Summer,' 'Converting to Year-Round (YR) residents,' and 'Overseas.' Also, this study found some other types of homes that the planners considered as SHs in their municipalities.

Table 2.1 Types of SHs remain in Canadian Municipalities based on planners' response.

No	Options Selected by Respondents	Converted to Occupancy Pattern	Total Number of Planners Selecting
1	Cottages/summer homes/beach home (Private secondary home)	Empty in Winter	61 (70%)
2	Winter homes/ski huts/chalets (Private secondary home)	Empty in Summer	26 (30%)
3	Vacation rentals/villa/holiday homes (for tourists)	Not Empty	67 (77%)
4	Seasonal dwellings that are becoming year-round residences	Converting to YR	47 (54%)
5	Overseas (out of country)/absentee homeowners	Overseas	52 (60%)
6	Others, please describe	Illegal unit, Snowbird, Recreational vehicle	14 (16%)

Responses indicate that most of the municipalities have more than one type of SH. The results indicate that most of the participating Canadian municipalities have SHs which are occupied by tourists all year; 77% of planners selected options in the 'Not Empty' category. This 'Not Empty' (occupied all year) category of SHs includes vacation rentals, villas, and holiday homes, also called short-term rentals (see Chapter 3). 70% of planners selected options in the 'Empty in Winter' category. The 'Empty in Winter' category is composed of privately owned SHs which are known as cottages, summer homes, and beach homes where people usually spend time during the summer and where the SHs remain empty in the winter. Interestingly, 60% of planners responded that they have SHs in their municipalities whose owners live in another country and visit their SHs during the summer or winter every year. This was kept as a separate category because it had no temporal pattern but rather the ownership was an issue raised by respondents. This type of SH is categorized as the 'Overseas'. Surprisingly, 54% of planners responded that the owners of SHs in their areas are converting to year-round (YR) residents and I put this in the category 'Converting to YR.' Also, 30% of planners selected options in the 'Empty in Summer' category where the private SH owners spend time during winter. Ski huts and chalets are included in this category. Also, in some municipalities, municipal planners consider some forms of residences as SH which include secondary suites or illegal units, recreational

vehicles, snowbirds, residences for short-term purposes such as farm help or workers, student accommodation, etc.

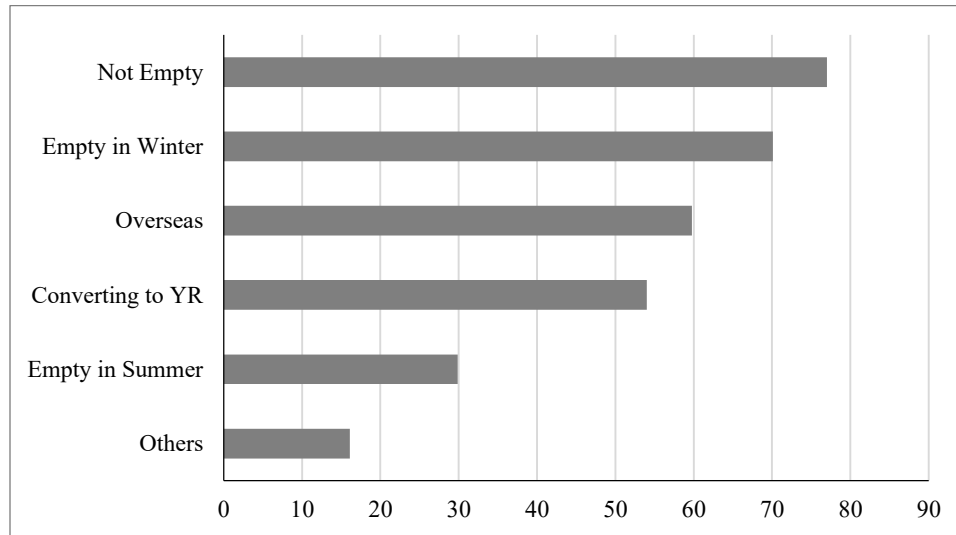


Figure 2.3 Classification of SHs based on occupancy pattern by planners' responses, ordered by frequency.

2.5.2 Regional differences in SH Occupancy Patterns

This study categorized SH in five different classes from all participating Canadian municipalities and calculated the percentage of those categories in four different regions of Canada according to planners' responses (The Maritimes, Central Canada, Prairies and West Coast) (Table 2.2). The results indicate that every region has more than one category of SH. Planners in the Maritime and West Coast regions were most likely to respond that they have SHs which are in the 'Not Empty' category. This indicates that short-term rentals are the most common issue that the municipalities in those regions are dealing with. The 'Empty in Winter' category was selected by the highest proportion of planners (80%) in the Maritime region whereas, in the West Coast region more than half (60%) of total participating planners responded to this category. In the Maritime region, a large number of planners (61%) suggested that SH owners are converting to year-round residents, which

is higher than in the Westcoast region (39%). The ‘Empty in Summer’ category is the least commonly chosen category by the planners in both the Maritimes and West Coast regions.

Table 2.2 SH occupancy patterns in different regions of Canada based on planners’ responses (%).

Regions	Not Empty	Empty in Winter	Empty in Summer	Converting to YR	Overseas	N
Maritimes	80%	80%	30%	61%	66%	44
West Coast	79%	60%	33%	39%	51%	33
Central	16%	33%	16%	66%	33%	6
Prairie	66%	50%	33%	33%	66%	6

2.5.3 Municipal Planning Issues

Half of the total respondents considered SHs to be a public policy or planning issue in their municipalities, which were 62% rural and 38% urban according to their population density as defined by Statistics Canada (400 or more people per square kilometre is defined as an urban municipality, and less than 400 people per square kilometre is defined as a rural municipality). Municipal planners have been dealing with a series of planning issues associated with SHs. Most of the municipalities have been experiencing more than one planning issue (Figure 2.4). The results show that the planning issues respondents experienced are community planning (69%), housing supply (59%), tourism demand (54%), the conflict between seasonal and year-round residents (48%), increasing demand for municipal services (44%), land inflation (41%), real estate speculation (35%), emergency response (33%), and stakeholder engagement (33%). Less common issues are SHs’ effects on the environment (12.5%), climate adaptation (5%), and others (14%). The remaining (14%) issues include recreational vehicles and short-term rentals which decrease the beauty of the surrounding environment in the locality as mentioned by the respondents.

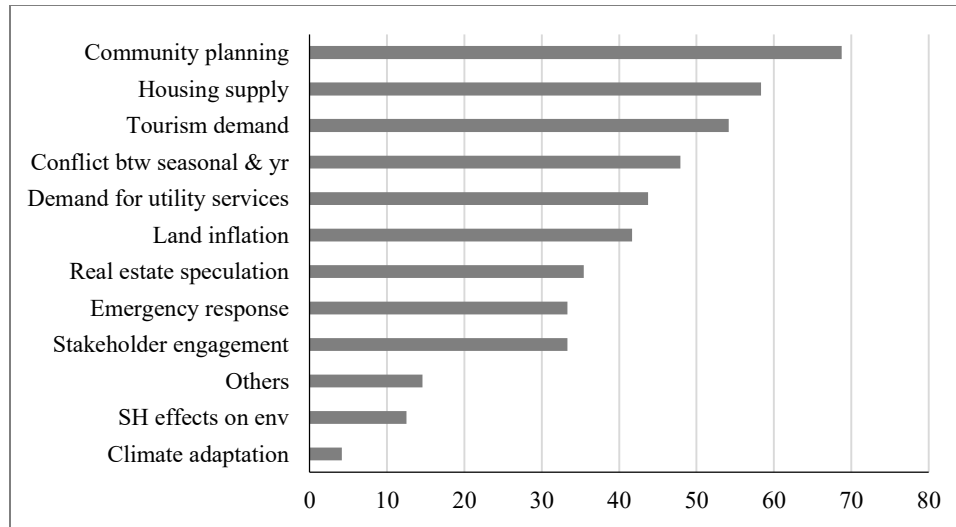


Figure 2.4 Municipal planning issues dealing with SH according to survey respondents.

2.5.4 Identification of SHs by Planners

Nearly 30% of planners (26 out of 87) and their municipalities made efforts to distinguish SHs from year-round residences. These municipal planners used different sources to identify SHs in their municipalities (Figure 2.5). Among the participating municipal planners who identified SHs, more than half of them (54%) used tax records, less than half of them (46%) used rental property databases, and more than one-third of them used foreign/non-local addresses to identify SHs (17%). The results also show that 27% of these municipal planners used municipal utility services (e.g., usage of water, internet bill, garbage collection, heating oil), 15% used mail-out surveys, and 12% used electricity bills to identify SHs. A few of these respondents also mentioned other sources to identify SHs such as population census data and municipal zoning bylaws.

On the other hand, the rest (70%) of the planners did not distinguish SHs but suggested some possible sources based on their professional experience (Figure 2.5). The results indicate that tax records (~60%), rental property databases (~60%) and foreign/non-local addresses (~60%) are the top sources suggested by these planners who do not yet work to identify SHs. They also suggested municipal utility services (e.g., water usage, internet bills, garbage collection, and heating oil), mail-out surveys, and electricity usage as

possible other sources to identify SHs. A few of the respondents mentioned census, election polls, and building databases as some other possible options.

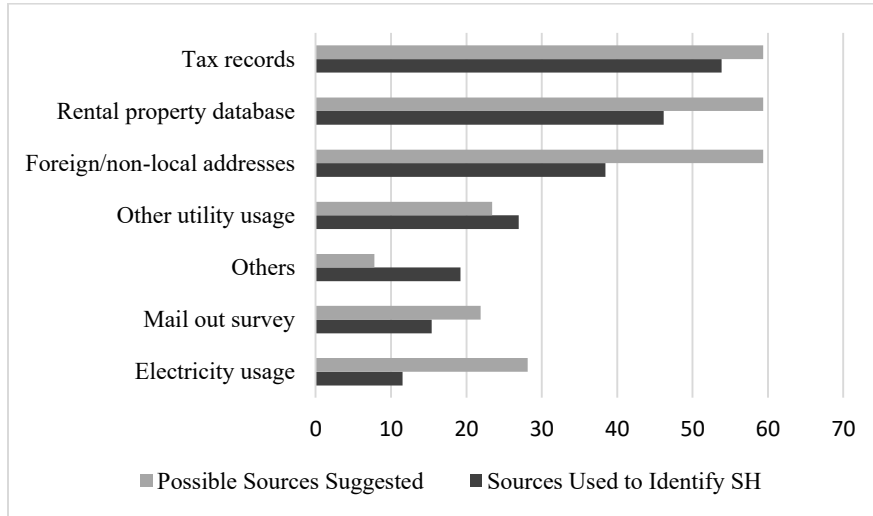


Figure 2.5 Sources used and suggested by the planners to identify SH according to survey respondents.

2.5.5 Challenges to Identify SHs

I asked municipal planners what challenges their municipalities faced or might face in its’ attempt to identify SHs. The options provided to the respondents were data completeness, privacy issues, rural properties, fraudulent behavior, with an opportunity to suggest others. Among the 30% of participating planners whose municipalities identified SHs from year-round residents, all claimed that data completeness was the major challenge for their municipalities to identify SHs. Half of those planners said that rural properties were the second major challenge for their municipalities as many SHs are located in rural and remote areas. The rest of the challenges experienced by those planners were privacy issues (33%) and fraudulent behaviour (33%) (Figure 2.6).

The 70% of the participating planners whose municipalities did not distinguish SHs from year-round residents think that their municipalities might face challenges if they attempt to do so. As with the last cohort, the majority of these planners who do not yet track SHs identified that data completeness is the major challenge. The second major challenge is

privacy as selected by 62% of these planners. The rest of the challenges are fraudulent behaviour (34%), rural properties (20%), and others (6%) which were identified by the planners based on their previous work and professional experience (Figure 2.6).

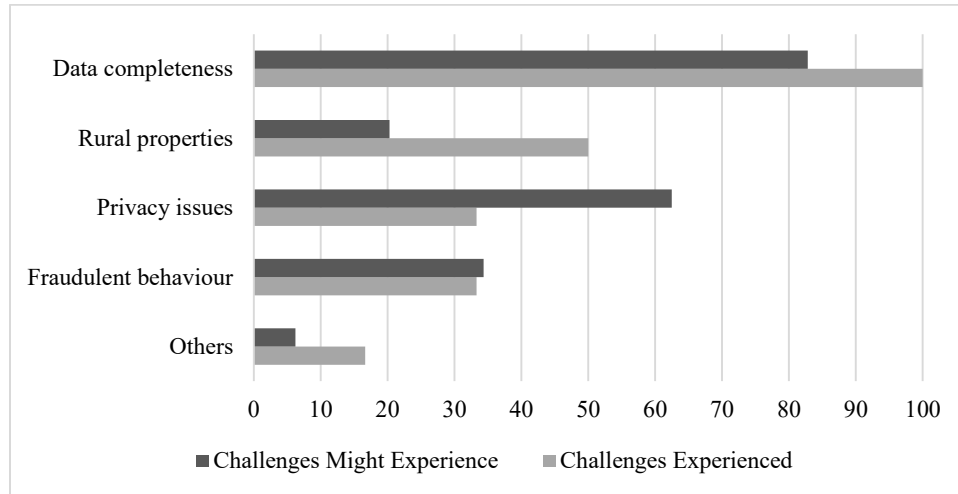


Figure 2.6 Challenges experienced and might experience by the municipal planners according to survey respondents.

2.5.6 Use of SH Information for Municipal Planning

As discussed above, 30% of responding municipal planners have identified SHs and analyzed results, and they reported that they have done so for the purposes of: comprehensive planning, emergency management (EM) planning, and policy making about coastal issues, housing and tourism to provide better community services to their residents. The municipalities which have not yet identified SHs would like to use SHs' information for community services, considering increasing utility demands, and their future plans for emergency management services. . The results indicate that more than two-thirds of the 26 municipalities identifying SHs did so for policy making (e.g., coastal policy, housing policy, tourism). One-third of the 26 has used the information for municipal comprehensive planning or making municipal master plans (Figure 2.7). The respondents also replied that they use SH information for waste management services, economic analysis, land use zoning, and road maintenance.

On the other hand, the planners without SH information (70%) said that if they had such information, they would use it for various purposes (Figure 2.7). The results indicate that two-thirds of the 70% might use SH information for policy-making and comprehensive planning. Nearly half of them said that they might use it for emergency management services. Some of these respondents replied that some municipalities had taken various initiatives to make policies for SHs; setting priorities for road maintenance; taxation for empty houses, affordable housing, and enforcement of minimum standards of dangerous and unsightly properties. Interestingly, these planners showed little interest to use SH information for climate adaptation or mitigation if they had it and those who have SH data did not use it for this issue.

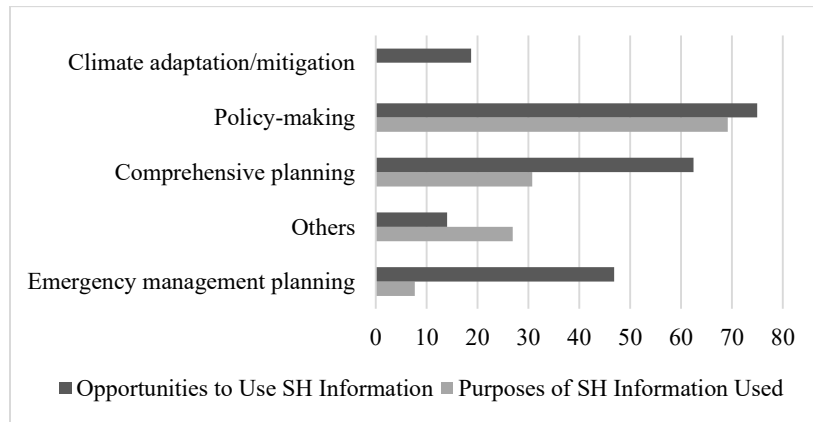


Figure 2.7 Opportunities for SH information for those who do not track and use of information for those who track according to survey respondents.

2.5.7 Regional Natural Phenomena Experienced by the Municipalities

I asked municipal planners about the natural phenomena their municipalities have experienced in the last five years. To this question, I provided numerous response options: ocean tidal effects, storm surge, sea level rise, coastal erosion, freshwater flooding, drought, heatwave, avalanche risk, well-water shortage, snowfall reduction, forest fire, and other climate-related issues.

In general, the results (Figure 2.8) indicate that freshwater flooding is the main climate change-related phenomenon in the municipalities whose planners responded, which is being experienced by 60% of the total participating planners in the last five years. Half of the participating planners have experienced coastal erosion, storm surge and drought or water shortage in their municipalities. Less than half (40%) of the planners have experienced sea level rise and well water shortages in their municipalities. Some other natural phenomena indicated by the planners include ocean tidal effect (25%), heat wave (21%), snowfall reduction (13%), forest fire (13%), avalanche risk (4%) and other climate-related issues (8%). This last 8% of other climate-related issues include damaging winds, extremely low temperature, and an increased tick population.

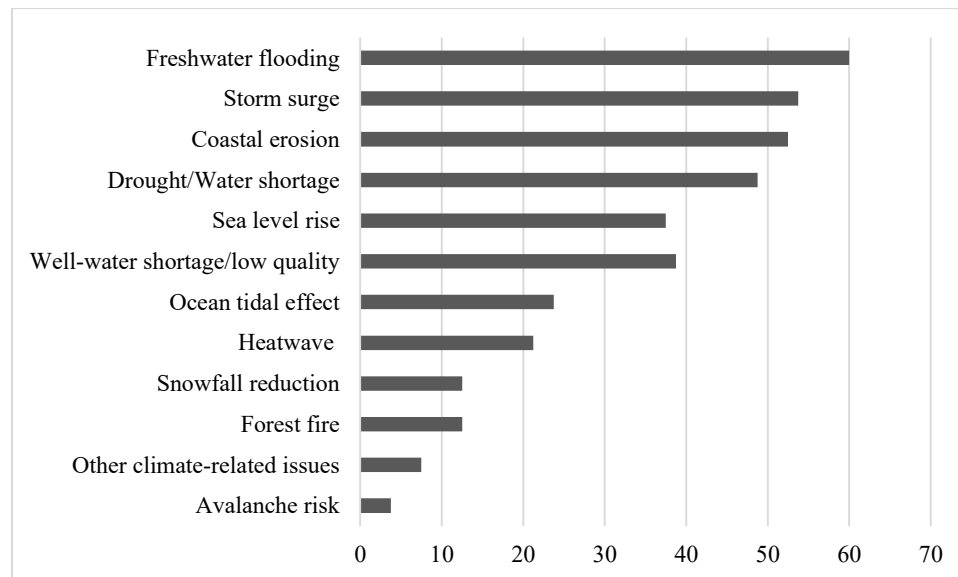


Figure 2.8 Natural phenomena experienced in Canadian municipalities according to survey respondents.

More specifically, in the Maritimes, coastal erosion, freshwater flooding and storm surge are the major problems according to the planners (Table 2.3). Nearly 70% of the planners from Maritime Canada have experienced coastal erosion and storm surge in their municipalities. The two major problems are sea level rise and freshwater flooding. Half of participating Maritime planners experienced sea level rise and freshwater flooding in their

municipalities. Also, well-water shortages (42%) and drought (30%) are being experienced by Maritime municipalities. The least experienced problems are heat wave, snowfall reduction, forest fire, and avalanche risk.

On the other hand, in West Coast regions, drought (60%) is the main problem experienced by municipalities in which the participating planners work. Forest fire (30%), heat wave (30%), and freshwater flooding (30%) are three other major problems for the West Coast municipalities. Avalanche, snowfall reduction and well water shortages are the least frequently selected. Unlike Maritime Canada’s coastal erosion, ocean tidal effects, storm surge and sea level rise are not major climate change-related issues out West. Planners from Central Canada and The Prairie Provinces also experienced freshwater flooding which is the main climate change-related problem in those regions.

Table 2.3 Top climatic phenomena (in cumulative percent) by regions, according to participating municipal planners.

Maritime Region	West Coast
<ol style="list-style-type: none"> 1. Freshwater Flooding (70%) 2. Storm surge (70%) 3. Coastal erosion (70%) 4. Well water shortage (42%) 5. Drought (30%) 	<ol style="list-style-type: none"> 1. Drought (60%) 2. Forest fire (30%) 3. Heatwave (30%) 4. Freshwater flooding (30%)

2.5.8 Articulated Issues of SHs in Different Regions of Canada

Municipal planners were asked if they had any additional comments on the issue of planning in relation to seasonal or rental SHs in their municipalities. The results indicate that currently, this is a multidimensional issue for the Canadian municipalities. Many articulated issues are similar in nature, while some only occur in specific regions. I organized these issues by the four different participating regions in Canada (Table 2.4). It is important to recall that this study received a low response rate from the Central and Prairie regions, but these respondents still provided examples of real challenges about the SH issues.

Table 2.4 Region-specific articulated issues with SHs.

Regions	Articulated Issues (in order of prevalence)
West-coast (British Columbia)	<ul style="list-style-type: none"> ▪ Illegal Airbnb ▪ Increasing housing supply-demand ▪ Implementation of rental policy development ▪ Forest fire and fire safety ▪ The conflict between SH dwellers and local people ▪
Maritime (Nova Scotia (NS), New Brunswick (NB), Prince Edward Island (PEI))	<ul style="list-style-type: none"> ▪ Increasing housing supply-demand ▪ Absentee homeowners ▪ Illegal Airbnb issue ▪ Increasing municipal facilities demand ▪ Unsightly properties ▪ Policy development is delayed ▪ Conflicts with land use regulations
Prairie (Alberta (AB))	<ul style="list-style-type: none"> ▪ Unfriendly behavior of SH owners ▪ Increasing housing supply-demand
Central (Ontario (ON))	<ul style="list-style-type: none"> ▪ Illegal secondary suits ▪ Fraudulent behavior of SH owners

In all four regions of Canada, there is an increasing demand for housing supply articulated by the planners. According to the planners, the main reason behind this is the growing popularity of short-term rentals and a significant number of absentee homeowners, which reduces the availability of long-term rentals. In some cases, tenants are evicted in favour of desirable vacation renters. Planners are also getting more queries about Airbnb, and say that many homeowners are listing their properties in vacation rentals without licensing. Planners from BC mentioned that a few municipalities have already developed policies about short-term rentals. For example, only people who want to rent out their primary residences can get short-term rental licenses for that. Some municipalities in the Maritime Provinces (e.g., NS and PEI) are preparing policy documents, and they also mentioned that some municipalities are beginning public discussions regarding this issue. Participating planners from AB complained about the unfriendly behavior of SH owners while communicating and discussing community issues. Ontario planners mentioned similar

issues, as they have many illegal secondary suites in their municipalities where the homeowners rent a unit (basement) in their primary residence without the municipality's legal procedure to avoid taxes. The absence of the basic municipal services makes them more vulnerable in case of emergency as service-providers do not know they are there.

2.6 DISCUSSION

I collected data from municipal planners using an online survey to understand planners' perceptions about SHs in the present context of climate change and climate change-induced natural hazards and disasters. Specifically, I sought to: understand different types of SHs and their associated planning issues that are existing in Canadian municipalities; learn how municipalities identify SHs and challenges to distinguish them from other types of dwellings; how SH information is used in municipal planning; and, which different climatic phenomenon that Canadian municipalities have experienced in the last five years. In the following sections, I summarize SHs issues and planners' perceptions, by discussing: (1) multiple-concepts and classifications of SHs, (2) suitable sources for identifying SHs, (3) challenges for identifying SHs, and, (4) SH issues and their implementation in municipal planning.

2.6.1 Multiple-Concept and Classification of SHs

Multiple terms have been used to describe SHs around the world making them difficult to classify for researchers (McIntyre et al., 2006; Czarnecki & Frenkel, 2015). This study gathered, collectively, all SH terms from the literature and documented which are recognized by municipal planners. This study uses a new dimension of categories of SHs largely based on the occupancy patterns of the homeowners from planners' responses. There are mainly two important factors behind using occupancy patterns for this study. First, privately owned SHs usually remain vacant for a certain period of the year when those properties might be unprotected. Second, those who rent such homes may be new to that place and might not be familiar with local climatic phenomena. In cases of an emergency like a storm surge or flooding, both the property and the dwellers would be vulnerable. This study classified five categories of SHs which are existing in Canadian municipalities. The short-term rentals which are in the 'Not Empty' category are the most

common SHs in Canada. This depicts the increasing popularity of this type of SH where people enjoy their time in a SH without owning one. The second most common category of SHs is used in summer, thus 'Empty in Winter'. The privately owned SHs are still a popular form of SHs in Canada, and most of the homeowners spend time in their SHs during summer.

Planners' responses about the category 'Overseas' showed the popularity of Canada as a destination among the foreign home buyers. Foreign homeownership has recently become an important topic of discussion due to its effects on the Canadian housing market (e.g., tax on foreign investment on housing, housing prices) (Alini, 2017). For example, Finland is the most popular place for Russian people (Müller, 2013; Åkerlund, Lipkina, & Hall, 2015) and the Caribbean Islands are a favourite for European people (Moore, 2010). However, this study found Canada to be a desirable place for foreign SH owners, though we do not know what country they come from on the basis of this work.

Many SH owners are converting to YR residences without informing the municipalities in Canada. This creates several challenges for municipalities to provide municipal services as some of the SHs are in unsuitable land use zones. This is also an issue for some other places like Greece (Karayiannis, Lakovidou, & Tsartas, 2013). Municipal planners described the following as SHs in their municipalities though the literature may not see them this way: secondary suites or illegal units, recreational vehicles, snowbirds (primary home owners move to warm places) are vacant in winter, and residences for short-term purposes such as farm help or workers, and student accommodation. Among them, recreational vehicles (RV) are the most common form of SHs and people usually use RVs in the summer. SH terms and uses are diverse in Canada.

2.6.2 Suitable sources for identifying SHs

This study found that tax records are the most common way for planners to identify SHs from the other forms of housing in Canada as SHs follow different tax systems. Previous studies from European countries such as Finland (Hiltunen, 2007), Iceland (Norris & Winston, 2009), Norway (Velvin, Kvikstad, Drag, & Krogh, 2013) and Poland (Czarnecki & Frenkel, 2015) also used census data to identify SHs for research purposes. In Canada, there are no official statistical databases of SHs, especially in the case of census data; only

the broader category of unoccupied or vacant dwellings is included in the census data. As a result, it is difficult to use census data for identifying SHs in Canada. Other countries such as Australia, Greece, Italy, Japan and Poland also use this broader category of unoccupied or vacant dwellings in their census database (Czarnecki & Frenkel, 2015), which is relatively unhelpful for planning purposes.

In this study, a significant portion of the planners (60%) chose rental property databases such as Airbnb (Air bed and breakfast), VRBO (Vacation Rentals by Owners), Home To Go etc. as useful sources to identify SHs, which again indicates the popularity of short-term rental homes in Canada. The Toronto advocacy group Fairbnb.ca released an analysis of Airbnb's impact on housing stock in three big cities in Canada: Toronto, Montreal, and Vancouver. In May 2017, the total of listings in those three cities was 81,000 which was 30,000 higher than the previous year (Wachsmuth & Kerrigan, 2017). Homeowners and renters alike are interested in using this rental property database for advertising and renting. Municipal planners are dealing with the impacts of such rental databases, and thus they chose these databases as a useful option for identifying SHs. Chapter 3 illustrates that they are more difficult to use for these purposes than might be assumed.

This study also found that a large portion of planners considered foreign or non-local addresses of homeowners as another convenient source for identifying local SHs. Moreover, Canada is becoming a popular place for foreign homeowners (see in section 2.5.1). Fewer planners (~20%) considered using mail out surveys for identifying SHs. In contrast, in European countries, mail out surveys are a commonly used method for identifying and researching SHs. Researchers in countries like Iceland (Nouza et al., 2018), Norway (Tangeland et al., 2013), and Finland (Pitkänen, 2008) have used mail out surveys for identifying SHs. Planners also considered municipal services (e.g. garbage collection, water supply, sewerage line) and electricity usages as sources for identifying SHs. Similarly, in Norway researchers used the garbage disposal registry to identify SH owners in order to mail out surveys (Velvin et al., 2013).

2.6.3 Challenges for identifying SHs

Researchers find it challenging to identify and classify SHs (McIntyre et al., 2006; Norris & Winston, 2009). This study looked for the reasons behind the difficulties of identifying SHs. More than 90% of participating municipal planners claimed that data completeness is one of the major challenges for identifying SHs. The municipal planners mentioned several factors that prevent them from collecting the necessary data: the unfriendly behaviour of some SH owners, mail being received by a local agent or office for unreachable overseas clients, and the conversion underway among some SH owners to being YR residents without informing the municipalities. Those factors also negatively affect attempts to collect SH locations.

Planners also found that privacy issues are a challenge for identifying SHs. This could be because the homeowners decide not to disclose their address or any other personal information. Also, short-term rental websites (such as Airbnb) do not disclose full addresses until someone books and pays rent. This study found that remote rural properties are a particular challenge for identifying SHs. People usually choose to develop their SH in a landscape of natural beauty and often in remote rural areas (Pitkänen, 2008; Nouza et al., 2018). In some rural places there are no municipal services, so a lack of drinking water supply and sewerage system make it difficult to identify those SH owners.

This study found fraudulent behaviour is another challenge for planners to identify actual homeowners and the status of the homes (i.e. whether primary or secondary). Planners may experience this type of problem if the home is registered in a different name or not registered at all. The provincial government of Alberta has encountered this fraudulent behaviour in their mortgage system (Service Alberta, 2018). New home buyers may provide false information regarding their home's status (e.g. bought as a primary home, but is actually a SH), and they may use a different person's name with good credit to get a bank loan at a low payment rate. A planner from BC stated: "Some second homes have validity and others do not [air bnb etc.] the challenge is how to differentiate between the two and address the social/eco/env impacts." All of the factors mentioned above make it difficult for municipalities to identify the actual number and location of SHs located in their municipalities.

2.6.4 SH Issues and their Implementation in Municipal Planning

This research found that more rural municipalities (62%) consider SHs to be a planning or public policy issue than urban municipalities (38%). This suggests that rural municipalities are facing more SH issues. Tourism research has indicated that there is an increasing interest in the governance and regulation of SHs and the rights and responsibilities of SH owners; the ownership, promotion and production is a complex governing system (from international to regional and local levels) (Åkerlund, Lipkina, & Hall, 2015; Rinne, Paloniemi, Tuulentie, & Kietäväinen, 2015). The majority of participating planners (70%) considered community planning as the top SH planning issue for their municipalities. The exact number and location of SHs in most of the Canadian municipalities are not documented except for a few municipalities. As a result, planners have been faced with difficulties to provide community and transportation facilities (especially for emergency vehicles) to SH dwellers. To manage this issue, a large number of participating planners are interested in using SH information in their comprehensive planning for future development in the long run. Åkerlund et al. (2015) suggested that SHs need to be governed by different institutional sectors such as land use planning, infrastructural planning, and environmental policy.

SHs, including short-term rentals, reduce housing supply, which is one of the most concerning issues for municipalities at present. Also, land inflation and real estate speculation are two other important planning issues which can influence housing supply positively or negatively. SH purchase and development can create pressure on housing stock availability (Muller et al., 2004). A planner from NS stated: “Dark houses - houses with no one in them in the winter (summer homes for absentee owners) are having a great impact on the amount of housing stock available.” However, where housing stock is readily available, SH tourism may be welcomed as a significant means of economic development and socio-cultural development (Muller et al., 2004). This study found that homeowners are more interested in renting their houses for short-term periods than year-round to earn more money: a planner from Atlantic region stated: “Airbnb is also having an impact as owners make more money by offering their rentals online than with renting them out on a monthly or yearly basis.” Also, illegal Airbnb creates problems when homeowners put their property in rental databases without registering them with the municipality. As a result,

there is an increasing demand for year-round renting, which influences housing policy. For this reason planners are highly interested in including SH information in their municipal housing policy. In BC, some municipalities have taken initiatives to reduce the impacts of illegal Airbnb and short-term rentals in housing supply. A planner from BC stated: “Really, our only action is a very successful short-term rental policy (virtually 100% compliance). Only principal residents can get a license; without proof of principal residency in our city no short-term rental licence.” Maritime provinces are a little behind BC as they are in the process of preparing policy documents for short-term rentals. A planner from NS stated: “The planning documents are now in review; I expect I will know more once the process with the public has begun.”

Rising tourism demand, municipal utility services, and conflict between seasonal and YR residences are important planning issues for Canadian municipalities. The conflict between seasonal and year-round residences is a recognized issue of SH in other countries like Norway (Brida et al., 2011), Portugal (Roca et al., 2011), and Australia (Osbaldiston et al., 2015). In this research, half of the respondents acknowledged the presence of this issue in their municipalities; the reasons addressed were weak neighbourhood engagement, cultural differences, and behavioural and attitudinal differences (Brida et al., 2011). One planner from BC stated: “Engaging seasonal residents is a consideration for our municipality... As they are seasonal, engaging them is difficult.” This research also found that traditional SHs have less impact in the neighbourhood than short-term rentals: a planner from BC stated: “Valid second homes do not really impact a neighborhood whereas tourism rental ones do.” Traditional or private SH owners have more attachment to their SH destinations whereas short-term renters do not. Municipal planners have to deal with increasing demand for municipal services (e.g., garbage collection, water supply, sewerage line) and public places (e.g., park) during summer. All the issues mentioned above have directed planners to take a higher interest in using SH information in their tourism policy.

Planners also have a high interest in using SH information in coastal policy because a large number of SHs are located in the coastal regions of Canada. Moreover, coastal regions and coastal communities are vulnerable due to climate change, and its induced impacts such as sea level rise, storm surge, coastal flooding and inundation, and coastal erosion (Janssen et

al., 2006; Bevacqua et al., 2018). Lemmen et al. (2016) discussed the potential threats to coastal infrastructure and communities because of recent weather events such as hurricanes and more frequent storm surges. Proactive planning for future implementation in SH planning or policy can reduce the vulnerability of SHs.

This study found that more than half of the respondents (60%) mentioned the importance of SH information (e.g., location, road connectivity, availability of utilities, ownership, etc.) in emergency management. This portrays the usefulness of SH information for the municipalities in emergency cases. Surprisingly, only one-third of the planners have the kind of SH information in their municipalities that could inform emergency management and public safety. Also, only a few planners (~20%) showed interest in such data for climate change adaptation, despite the importance of proactive planning in coastal policy. Canadian municipalities are facing major climatic phenomena including freshwater flooding, storm surges, coastal erosion, forest fires, and drought. In 2018 freshwater flooding caused huge property damage in BC and NB, and in 2017 also caused huge property damage in QC, BC, ON, and the Atlantic provinces. In May 2018, the flood in NB caused a huge loss for SH owners, as many houses were flooded and some even washed away (Canadian Red Cross, 2018). Forest fires are another devastating climatic phenomenon, and participating planners from BC experienced this most. BC has a long history of forest fires. Forest fires in 2016, 2017, and 2018 burnt many homes and made people homeless (Canadian Red Cross, 2018).

The analysis of my results shows the increasing vulnerability of SHs (as property) and their owners and occupants because of the increasing frequency of natural disasters, lack of SH information and in some cases their remote locations. At the same time, these factors make it difficult for municipalities to provide necessary services to the SHs and take appropriate measures during an emergency. The planners also mentioned that bad road conditions in rural areas can prevent emergency services from reaching the property on time. Planners considered SH issues on a broader scale and showed interest in managing at a local or regional level, which was also suggested by the previous literature (Müller, Hall, & Keen, 2004; Brida et al., 2011).

2.7 CONCLUSION

Second homes, an important part of coastal tourism, are vulnerable due to the effects of climate change. Despite their vulnerability to climate change, the number of SHs is increasing along the coastline in Canada due to tourism demand. This raises the question if municipalities are aware of the rapid growth of the SHs and include SHs in the municipal planning to address climate change impacts and to manage those properties during emergencies. This online survey-based study found that there are different types of SHs remain in Canadian municipalities. Considering the occupancy pattern, most of the SHs are empty in winter (e.g., cottages), not empty (e.g., vacation rentals), overseas-owned (e.g., absentee homeowners), and converting to year-round (e.g., seasonal dwellings) categories. This study also identified regional differences in SH occupancy patterns; for example, the majority of SHs remaining empty in winter are in the municipalities of the Maritimes, which might be an insecure property of concern during emergencies. Half of the total respondents (municipal planners) considered SHs to be a public policy or planning issue in their municipalities. The planning issues respondents experienced are: community planning, housing supply, tourism demand, and the conflict between seasonal and year-round residences, increasing demand for municipal services, land inflation, real estate speculation, emergency response, and stakeholder engagement. Remarkably, respondents considered climate adaptation and SHs' effects on the environment to be less concerning issues; this might be an area of further research. While SHs are being considered as a municipal planning issue, respondents articulated some challenges to identify SHs such as data completeness, rural location, homeowner privacy, and the fraudulent behaviour of some property owners. Despite the challenges of identifying SHs, municipal planners indicated that SHs data are or would be useful for comprehensive planning, emergency management planning, and making for coastal areas, housing and tourism.

This study pointed out the increasing vulnerability of SHs (as property) and their owners and occupants because of the increasing frequency of natural disasters, lack of SH information and in some cases their remote locations. These factors make it difficult for municipalities to provide necessary services to the SHs and take necessary measures during an emergency. The planners also mentioned that some roads become inaccessible during natural hazards (e.g., storm surge, inundation) in rural areas which prevent emergency

services, reaching to the property on time. Further research can be done to assess the vulnerability of Canadian coastal communities and the preparedness of their municipalities during emergencies.

CHAPTER 3 VULNERABILITY OF COASTAL SHORT-TERM RENTALS TO CLIMATE CHANGE EFFECTS IN NOVA SCOTIA, CANADA

Abstract

Coastal short-term rentals (CSTRs) – one of the significant contributors to the fast-growing world tourism industry – are potentially at risk due to the effects of climate change. Citizens and municipalities in Nova Scotia (NS), Canada earn revenue by offering short-term accommodations to visitors, but municipalities do not monitor data regarding short-term rentals to ensure safety and security during climate change-induced emergencies (e.g., flood, storm surge, erosion, extreme weather event, etc.). Nova Scotian coastal municipalities have been experiencing storm surges, floods, and erosion, which can cause affected properties and roads to be unsafe or inaccessible for both residents and rescuers during emergencies. There has been limited research completed on the vulnerability of CSTRs. To fill the research gap and generate knowledge for municipalities, I have identified 653 CSTRs from VRBO and Google Earth platforms for NS and assessed their vulnerabilities to inundations and extreme weather events. I have identified vulnerable short-term rentals within <1 km of the coastline at 1 m, 2 m, 3 m, 4 m, 5 m and 10 m flood heights for NS and Lunenburg County. Results show that 151 (~23%) CSTRs are within 5 m flood height in NS. Results also show that 247 km of local roads will be inundated at 5 m flood height which may disconnect 90 CSTRs from evacuation by road in Lunenburg County. I also calculated the number of CSTRs at various horizontal distances up to 500 m inland from the coastline for Lunenburg County. These short-term rentals are susceptible to extreme weather events given that they are located close to the coastline and typically vacant for significant periods of time in a year. This research is intended to help coastal municipalities recognize the need for planning in order to manage CSTRs which are susceptible to climate change.

3.1 INTRODUCTION

Coastal communities around the world are susceptible to the effects of climate change. Many coastal communities have already experienced intensifying climate change impacts such as rising sea levels, storms, storm surges, coastal floods and erosion, and it is predicted that coastal communities will continue to experience climate change impacts (Zikra, Suntoyo, & Lukijanto, 2015; Weissenberger & Chouinard, 2015; Glavovic et al., 2015; Filho, 2018; Bush & Flato, 2019). Filho (2018) categorizes climate change impacts into social (e.g., damage to properties and infrastructures and loss of tourism, recreation, and transportation functions), economic (e.g., disruption of economic activities such as fishing, tourism activities, and shipping affecting local economy), and environmental (e.g., loss of habitat and biodiversity). It is estimated that, globally, about 250 million people live within 5 m of the high water mark, and over 150 million people live within 1 m of the high water mark (Glavovic et al., 2015). These estimates indicate that a large number of people living in coastal areas are highly vulnerable to the effects of climate change. The families living in coastal communities whose income and livelihood depend on fishing and tourism activities are even more susceptible to climate change impacts (Allison et al., 2009; Scott, Simpson, & Sim, 2012; Jahan, Ahsan, & Farque, 2017; Filho, 2018; Martins & Gasalla, 2018). Studies show that tourism - a rapidly growing economic sector - is vulnerable to climate change impacts as well (WTO, 2008; Moreno & Amelung, 2009; Zikra et al., 2015; Weissenberger & Chouinard, 2015).

Tourism activities have also been criticized for their negative impacts on the natural environment (Hiltunen et al., 2016; Khan, 2017) including contributing to greenhouse gas (GHG) emissions (e.g., emissions from cruise ships) (Moreno & Amelung, 2009; MacNeill & Wozniak, 2018; Walker et al., 2018). As coastlines are increasingly made into tourist attractions, with holiday homes, new housing, and tourist developments, the intense human presence and activities are taking a toll on the coastal environment including on marine ecosystems and species (Papageorgiou, 2016; Mercer Clarke et al., 2016; WWF, 2019). Although warmer conditions caused by climate change have some advantages for the tourism industry (e.g., extended summer) (Richards & Daigle, 2011), there are challenges for coastal municipalities to provide emergency management services, utilities, mobility,

infrastructure maintenance, and protect natural and cultural sites from erosion and weather damage, among others (Measham et al., 2011).

Tourism is therefore considered a climate-sensitive industry. Both weather and climate are critical factors to travelers deciding to go on vacation. The destination image helps tourists to choose their vacation destination or revisit the same place (Antonio & Pereira, 2017). Although coastal tourism is enormously reliant on natural resources, beaches and ocean, the main factor is climate (Honey & Krantz, 2007; Jones & Philips, 2011). Climate can influence tourism both directly and indirectly. Perch-Nielsen (2008) explored in detail a number of mechanisms through which tourism is affected by weather, in particular, safety (i.e., the absence of extreme weather events such as hurricanes), pleasantness and comfort (i.e., sunshine, the absence of rain, and moderate temperature).

Coastal short-term rentals (CSTRs) are a part of coastal tourism, and are at particular risk to climate change, this risk may be higher if guests lack proper emergency management knowledge during an emergency (e.g., flooding caused by storm surge) (Bird et al., 2010). A short-term rental (also known as a vacation rental) is a furnished home, apartment or condominium whereby travelers or tourists rent for a single night to a couple of weeks. Jamasi (2017) defined a short-term rental as the rental of a dwelling (apartment, house, townhouse, secondary suites, and condominium) via an online platform (e.g., Airbnb, VRBO) for less than 30 days. The risks associated with CSTRs are diverse and include: extreme weather events; safety concerns for when the dwelling is empty; increasing cost of property insurance because dwellings are prone to damages from natural hazards; ecological damage when habitat is impacted by natural hazards; damage to tourist destinations; infrastructure damage; and limited/no access to the coast. (UNWTO, 2008; Moreno & Becken, 2009; Toubes et al., 2017; Santos-Lacueva, Clavé, & Saladié, 2017).

Climate change-induced impacts pose risks to the coastal communities of NS, an Atlantic province in eastern Canada (Shaw et al., 1998; CNSIS, 2011; Richards & Daigle, 2011; Minano, Johnson, & Wandel, 2018; NSE, 2019). Studies show that sea levels are expected to rise 70 – 140 cm in NS by the end of the 21st century, which comes with all the aforementioned threats of coastal flood and inundation, erosion, and storm surge (ICLEI, 2010; CNSIS, 2011; Minano et al., 2018; NSE, 2019). These impacts put Nova Scotia's

coastal infrastructure, transportation, housing and tourism at risk which are therefore vulnerable (Davies, 2011; Lemmen et al., 2016; CCNS, 2019). Among the major economic sectors, tourism is vital to NS and every coastal community in this province (CCNS, 2019).

Nova Scotia's coastal tourism accounts for up to 2% of the province's Gross Domestic Product (GDP) (CCNS, 2019b) and is disproportionately important in the small coastal communities (CNSIS, 2011). The Tourism Industry Association of Nova Scotia (TIANS) reported that Nova Scotia's tourism industry made \$2.6 billion in revenue in 2016 (TIANS, 2019). In order to secure continuous revenue from coastal tourism, this sector needs to be managed to protect tourism providers and tourists from climate change-induced impacts.

As elsewhere, short-term rentals along the coasts of NS are vulnerable to climate change-induced natural hazards (e.g., property damage due to flooding and storm surge) (NSDE, 2009; Richards & Daigle, 2011; Minano et al., 2018). CSTRs are vulnerable for several reasons. One of the main reasons is that some local roads are flooded and eroded each year (Mercer Clarke, Manuel, & Warren, 2016; Bush & Flato, 2019), which sometimes causes local roads to be inaccessible and inhibits emergency services to the occupants of short-term rentals. Another reason is that short-term rentals remain vacant for a certain period of the year, during which time there may be no one to take care of the property during emergencies (e.g. winter storm, storm surge, etc.) as illustrated in Chapter Two. Moreover, those who rent these homes seasonally may not have adequate knowledge of what to do during an emergency (Drabek, 1999; Bird et al., 2010).

Although coastal vulnerabilities vary from place to place and are geographically dependent, they require regional management for mitigation and adaptation (Bevacqua et al., 2018). Occupants of Nova Scotia's CSTRs are vulnerable not only due to their location but also because the municipalities do not know where they are located. It appears that there is no official database of short-term rentals in Canada to assist municipal planning and emergency management. Measham et al. (2011) illustrated that as the effects of climate change are experienced locally, climate vulnerability analysis and adaptation requires spatial analysis of the vulnerable bio-physical and social conditions. In this regard, geo-visualization or mapping of vulnerable coastal communities with Geographic Information Systems (GIS) may help local governments (e.g., municipalities) assess risk for local

communities and associated stakeholders (e.g., tourism industry, municipal planner, coastal business owner, service provider, etc.) (Wynja et al., 2015; Fraser, Bernatchez, & Dugas, 2017; Minano et al., 2018).

This paper explores the physical vulnerability of short-term rentals within 1 km of the coastline to the impacts of climate change by generating a geodatabase of CSTRs and comparing it with projected flood heights and road infrastructure. The objective of this study is to explore the physical vulnerability of CSTRs to the impacts of climate change-induced natural hazards flooding and sea-level rise using Nova Scotia as a case study. The objective covers the following research questions:

- i. How can we identify CSTRs when municipalities do not track them?
- ii. Are CSTRs vulnerable to climate change, and if so, to what extent?

3.2 BACKGROUND

3.2.1 Coastal Tourism and Short-term Rentals

Tourism has become one of the largest and fastest-growing industries in the world (WTO, 2018). According to the World Travel and Tourism Council (WTTC), tourism contributes 10.4% of the world's GDP and supports one in ten jobs worldwide (WTTC, 2019). Hall (2001) defined coastal tourism as the full range of tourism, leisure, and recreational activities that take place in coastal areas. These include all types of development associated with coastal tourism such as accommodations, short-term rentals, restaurants, the food industry, and supporting coastal infrastructure (e.g., marinas, retail businesses, activity suppliers) (Hall, 2001). Coastal tourism is one of the most popular and steadily growing parts of the global tourism industry (Hall, 2001; Honey & Krantz, 2007; Papageorgiou, 2016). Approximately 30% of the world's tourism is along the coastline or within the coastal zone (Ghosh, 2012). Many countries' economies are dependent on coastal tourism, especially island nations in the Indian Ocean, Caribbean, and South Pacific (WTO, 2018).

In 2018, Canada was ranked 13th of the top 20 largest travel and tourism economies (WTTC, 2019). The Government of Canada describes Canada's tourism as a 'hidden jewel' and reported that 2% of Canada's GDP comes from tourism (Government of Canada,

2019). The economy of many Canadian coastal and remote communities, especially in the Atlantic region, are nowadays mostly coastal tourism-dependent due to the collapse or decline of some fisheries (Beshiri, 2005; Mercer Clarke et al., 2016; Stoddart, Catano, & Vodden, 2017; COINAtlantic, 2019). NS earns significant revenue from coastal tourism, with a goal to reach \$4 billion in tourism revenues by 2024 (Tourism Nova Scotia, 2017). Many Nova Scotian coastal communities are solely dependent on coastal resources (e.g., fishing) for livelihood and tourism for earning money (e.g., accommodation through short-term rentals, selling local products, working as tourist guide) (Grady, 2018).

There are many hotels, motels and short-term rentals in key destinations. Short-term rentals are increasingly essential elements of coastal tourism particularly in rural areas. Almost anyone can be a host for listing their properties as a short-term rental. Hosts are meant to have a short-term rental license or permit with the proof of specific health and safety requirements such as fire extinguishers, smoke detectors and also maintaining zoning laws. However, through word of mouth, some people rent their properties without these requirements in place.

3.2.2 Impacts of Climate Change on the Coast and Coastal Community

Coastal regions are considered hotspots for climate change impacts throughout the world (Torresan et al., 2012; Warren & Lemmen, 2014; Weissenberger & Chouinard, 2015; Jahan et al., 2017; European Commission, 2019). Of all the climate change impacts, most attention has been placed on: accelerated sea-level rise, extreme weather events, storms, elevated tidal inundation, increased flood frequency, accelerated erosion, increased saltwater intrusion, rising water tables, and other ecological changes (Weissenberger & Chouinard, 2015; Filho, 2018; Martins & Gasalla, 2018). These biophysical changes are projected to cause various impacts, including socio-economic, ecological, cultural and subsistence values (Klein & Nicholls, 1999; Lieske, Wade, & Roness, 2014). Coastal and island destinations are particularly vulnerable to both direct and indirect climate change-induced effects as most residences and infrastructure are located close to the shoreline (WTO, 2008; Torresan et al., 2012; Warren & Lemmen, 2014). Coastal communities living at lower geographic elevations are projected to experience increased, and more frequent, localized flooding and storm surges due to sea-level rise in the coming decades (Bathi &

Das, 2016). Low-lying feeder roads are at inundation risk, which may hinder mobility in coastal areas (Toubes et al., 2017). Buildings, utilities, roads, bridges, culverts, and other infrastructure close to the shoreline are highly vulnerable to tropical storms, extreme weather events and erosion (Kaján & Saarinen, 2013; Salik et al., 2015; Chang et al., 2018; Bevacqua et al., 2018).

It has been established by researchers that coastal communities all over the world are vulnerable due to global climate change, and many coastal communities are considered moderately to highly vulnerable to ongoing climate variability (Monirul & Mirza, 2003; Heberger et al., 2011; Scott et al., 2012; Martins & Gasalla, 2018). Coastal vulnerability is a concept that describes the people, places, and properties that are susceptible to the effects of coastal hazards (Bevacqua et al., 2018). Vulnerability itself has various definitions, but there are two dominant perspectives to conceptualize vulnerability. The first perspective identifies vulnerability in terms of potential exposure to a physical hazard (e.g., low lying roads flooded due to storm surge) and the second perspective identifies adaptive capacity (e.g., ability to withstand damaging effects of a hazard and ability to recover quickly) of individuals or communities to a physical hazard (Wu, Yarnal, & Fisher, 2002). Researchers have demonstrated that the frequency of storm surges and flooding will increase in the near future because of changing climate and sea-level rise. Consequently, communities living in coastal areas will be more vulnerable in terms of risk to physical assets exposed to flooding and erosion, economic loss and health impacts (Heberger et al., 2011; Felsenstein & Lichter, 2014; Manuel et al., 2015). Withey et al. (2015) state that sea-level rise and increased storm surge will be the most significant impacts of climate change, which will result in increased flooding of land and erosion as well as flooding of residential and commercial buildings and other infrastructure in coastal communities.

Canada is a coastal country and has the longest coastline in the world. Coasts are a significant part of the Canadian culture, economy and identity (Lemmen et al., 2016). Because Canadian coasts are highly dynamic, both human and natural systems on the coasts are increasingly affected by climate change. Recent weather events (e.g., hurricanes, more frequent storm surge) indicate the potential threat of climate change to coastal infrastructure and communities (Lemmen et al., 2016). Three major regions in Canada have

been identified as highly sensitive to climate change-induced effects (Shaw et al., 1998; Lemmen et al., 2016; Bush & Flato, 2019). These regions are Maritime Canada (New Brunswick, Prince Edward Island, and parts of the Coasts of NS), the lower mainland of British Columbia (BC), and some areas in the Beaufort Sea coast. These regions are predicted to encounter inundation, erosion, increased frequency of overtopping and over washing, coastal destabilization, and beach migration (Shaw et al., 1998; Dotto et al., 2010; Lemmen et al., 2016). Industrial activities in these highly sensitive areas will be affected by changing climate but there is little published research regarding the indirect effects of climate change on various Canadian industries, especially real estate, tourism, and supply chains (Warren & Lemmen, 2014).

Like many other coasts and coastal communities around the world, studies have found that Nova Scotia's coasts and coastal communities are vulnerable to the impacts of climate change (Shaw et al., 1998; Richards & Daigle, 2011; Warren & Lemmen, 2014; Feltmate, 2016; Mercer Clarke et al., 2016; Grady, 2018). Approximately 70% of the population in NS lives in coastal communities. This is concerning because NS will be more strongly affected by sea-level rise than any other province (ECoAS, 2019) as coastlines in Atlantic provinces are very slowly subsiding (up to a few tenths of a meter per century) (Richards & Daigle, 2011). Many coastal communities in NS have already experienced climate change-induced natural hazards and it is predicted that coastal communities in this province will experience intense natural disasters in the future at current climate change scenarios (CNSIS, 2011; Critchley et al., 2012b; Kovacs, Guilbault, & Pentz, 2017; Bradley, 2019).

NS is considered to be one of the top tourist destinations in Canada. One of the most important economic sectors of NS that will be profoundly affected by climate change impacts is tourism (CCNS, 2019b). Researchers have demonstrated that climate change will also affect ecosystems in coastal areas (WTO, 2008; Mercer Clarke et al., 2016), which will directly and indirectly affect Nova Scotia's nature-based coastal destinations (Grady, 2018).

3.2.3 Efforts to Manage Coastal Vulnerability in NS

To reduce the impacts of climate change, emergency management planning (EMP) is required for vulnerable communities, especially coastal communities. The purpose of

establishing EMP is to save lives, protect the environment, and protect the property of residents by raising the understanding of risks and increasing capacity to respond to them (Public Safety Canada, 2010).

Realizing the significance of coastlines to the province's economy and society, and realizing the vulnerability of coastlines, Nova Scotia has adopted some strategies to mitigate the effects of climate change and adapt to these effects. One of the strategies is that every municipality in NS is obliged to prepare plans and policies to reduce the risks of natural hazards on coastal communities as per the NS Government's Municipal Funding Agreement (Stantec, 2011). These Municipal Climate Change Action Plans (MCCAP) help municipalities manage climate-related emergencies. Other relevant municipal planning documents are Integrated Community Sustainability Plans (ICSP), Municipal Planning Strategies (MPS), land use plans, and so on. NS also provides technical and financial assistance to local governments for such planning by providing coastal floodplain maps along with a 15-25 year projection of future sea level rises (Feltmate, 2016).

Despite the above-stated efforts, NS is the only province in Atlantic Canada that does not yet have a provincial coastal policy to regulate coastal activities and development to ensure their protection (Grady, 2018). NS has recently passed the Coastal Protection Act (CPA) Bill 106 during the 63rd General Assembly (Nova Scotia Legislature, 2019) and this legislation is still waiting for regulatory design and Royal Assent. The purpose of the CPA is to protect the coastlines of the province by preventing development and activities adjacent to the coast that damage the coastal environment and put buildings and residents at risk from sea-level rise, coastal erosion, coastal flooding, and storm surges (Nova Scotia Legislature, 2019). The specific design of the coastal protection zones has not been finalized and it is not yet clear how to deal with those buildings and infrastructure which are already located within it.

3.3 METHODS

The objective of this study is to explore the physical vulnerability of CSTRs to the impacts of climate change using Nova Scotia as a case study. To assess the vulnerability of CSTRs to climate change, I have collected the coordinates of CSTRs from VRBO and Google Earth platforms for NS. I selected the CSTRs that are located within <1 km from the

coastline to populate a database to assess the physical vulnerability of CSTRs to climate change impacts. In determining physical vulnerability, elevation from mean sea level and horizontal distances of the CSTRs from coastline were chosen as assessment criteria. Using ArcGIS, I completed an overlay analysis of the point feature of CSTRs with contours and horizontal distances. From the GIS analysis, this study identified vulnerable CSTRs to inundation and storms for Lunenburg County in NS. The following sections illustrate the study area, procedures followed to identify CSTRs, data analysis and limitations of this study.

3.3.1 Study area

I used GIS to assess climate change-induced coastal vulnerability of short term rentals that are located along the coastline of NS. NS is the second-smallest province in the country with a total area of 55,284 square kilometres (Statistics Canada, 2018b). NS has a population of 923,598 according to 2016 census (Statistics Canada, 2018b) where 70% of the population lives in coastal communities (ECoAS, 2019). Nova Scotia's economy is driven by fishing and fish processing, aquaculture, mining, tourism and information technology (Statista, 2019). Among the main economic sectors, tourism is a \$2.6 billion industry in NS, supporting more than 22,000 direct jobs in the province (TIANS, 2019).

I chose Lunenburg County in this province for a detailed case analysis. Lunenburg County is located on the south shore of NS (Figure 3.1) and has a total population of 47,126 (almost 5% of Nova Scotia's total population) according to the 2016 Census (Statistics Canada, 2018a). Lunenburg County is one of the top destinations for tourists visiting NS every year. The old town of Lunenburg is a UNESCO World Heritage site as a surviving example of British colonial settlement (Town of Lunenburg, 2019). Unfortunately, this historic site is also vulnerable to sea-level rise (Balca, 2016). Several studies have predicted that many coastal areas including Mahone Bay in Lunenburg are vulnerable to climate change effects (Richards & Daigle, 2011; Muise et al., 2012; Krawchenko et al., 2016).

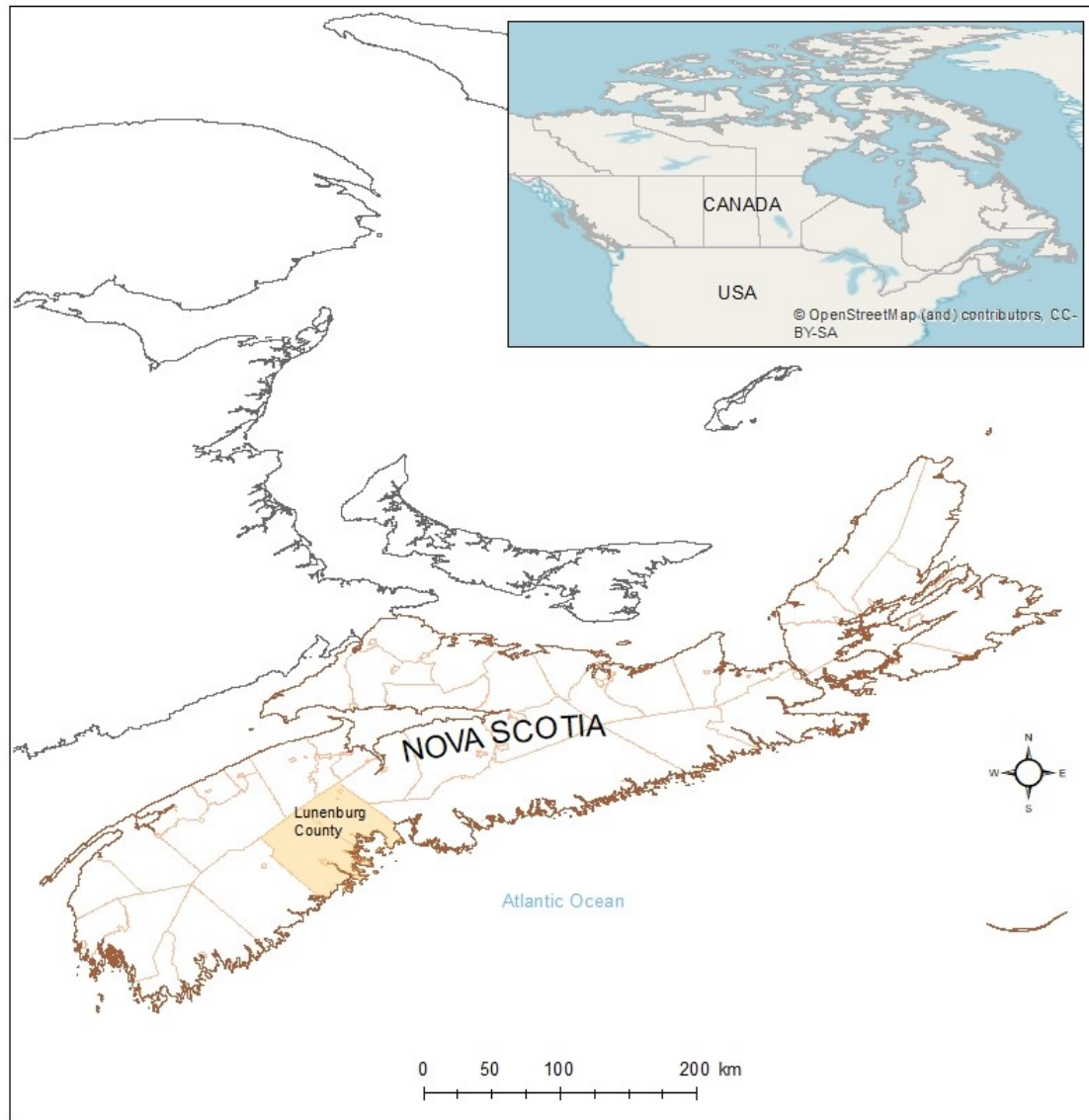


Figure 3.1 Study area.

3.3.2 Identifying Short-term Rentals

Municipalities in NS do not keep track of short-term rentals. In my study, I identified CSTRs from the website of the short-term rentals provider VRBO (Vacation Rental by Owner) and Google Earth's publicly available lodging dataset and produced a dataset of CSTRs for NS to assess vulnerability using GIS. The coordinates of short-term rentals were

collected manually from these VRBO and Google Earth platforms from September 2017 – June 2018.

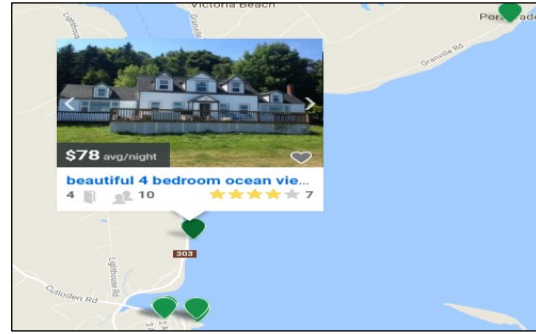
One of the main reasons for selecting VRBO and Google Earth for collecting short-term rentals was the accessibility of data. On the VRBO website, people can search available properties by place name and the website provides pictures of the property and gives information about the location of the property whereas Airbnb does not have this option until a booking is made (Franklin, 2019). Another reason was that VRBO contains the option of renting an entire house which best satisfies the purpose of this study. For instance, I was interested in assessing the vulnerability of coastal short-term renting homes when they remain empty during emergencies or do not otherwise have the owner in residence. I collected 542 short-term rental locations from the VRBO website by searching NS as the destination. Before I collected the coordinates from the placemark VRBO provides for the property, I verified the property location by comparing the pictures provided in the advertisement with Google Street View, where available. I repeated these steps to collect the coordinates of short-term rentals within <1 km from the coastline (Figure 3.2).

I also collected coordinates of the short-term rentals from the publicly available “Lodging” dataset of Google Earth. I only selected the lodgings that are located within <1 km of the coastline. I collected a total of 111 short-term rentals from Google Earth’s lodging dataset for the entire coast of NS. CSTRs identified in this study from the VRBO platform and Google Earth’s lodging dataset included hotels, motels, bed & breakfast (B & B), beach resorts, beach houses, cottages, and vacation rentals. In total, the coordinates of 653 short-term rentals were collected from both sources (VRBO and Google Earth). While combining 653 coordinates into one point dataset in Excel, I checked for duplicate coordinates and did not find any. Both datasets provide spatial data in geographic coordinates using the WGS84 datum.

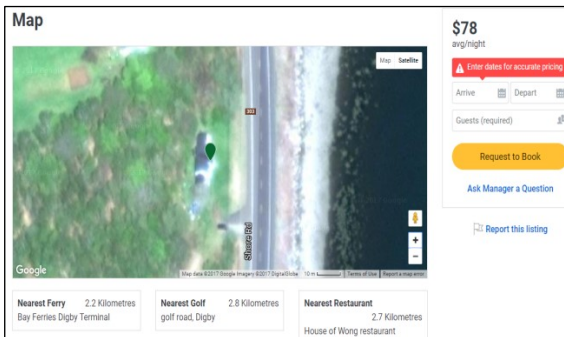
Step 1: Search for short-term rentals for NS on VRBO platform



Step 2: Selection of CSTRs located within <1 km from the coastline



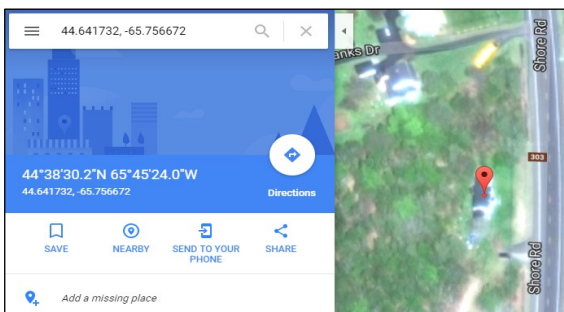
Step 3: Putting a placemark on the property (short-term rentals) on Google interface



Step 4: Verification of the advertised pictures (shown in step 2) with Google Street View



Step 5: Finding coordinate of the property from the placemarks



Step 6: Generating a list of the coordinates in MS Excel

Latitude	Longitude	Name of the Property
44.261464	-66.329080	Brier View Cottage - Freeport, Nova Scotia
44.266933	-66.348517	Bay of Fundy Inn - Westport, Nova Scotia, Canada
44.267328	-66.347725	Beautiful Apartment on Brier Island
44.270328	-66.346968	Bay of Fundy Guesthouse - Westport, Brier Island
44.378625	-66.203898	Magnificent Oceanfront Retreat on 100 Private Acres Overlooking Bays and Island
44.393212	-66.199117	Amazing Tides Guest House - Whalewatching, Hiking Fundy Vacation Base
44.417288	-66.172640	Live Well House, Near Whale Watching and Beaches
44.444534	-66.144821	Luxuriously Appointed Cosy Cottage in the Heart of Whale Watching Country
44.489791	-66.085522	Nova Scotia Waterfront Home
44.490282	-66.085540	Cottage on the Cove
44.605710	-65.922797	Gullivers Retreat - Digby, Nova Scotia, Canada
44.690135	-65.784772	Point Prim Oceanside
44.665603	-65.761213	New Oceanfront Cottage, Minutes from Downtown Digby
44.641735	-65.756671	Beautiful 4 Bedroom Ocean View Vacation Home
44.627443	-65.761443	Holdsworth House (C.1783)Loyalist Home, in the Town of Digby, Ns
44.627518	-65.761239	The Fisher House, Unique Three Bedroom Home, Three Night Minimum Stay
44.627437	-65.756195	Spectacular Annapolis Digby Nova Scotia Luxury Cottage

Figure 3.2 Steps followed to identify geographic coordinates of the short-term rentals from VRBO website.

3.3.3 Data Analysis

By following step by step procedures (Figure 3.2) as illustrated in section 3.3.2, I created a table in a Microsoft Excel spreadsheet containing X and Y coordinates of 653 short-term rentals. A spatial layer of 653 short-term rentals was created by importing the table of XY data in ArcGIS (version 10.5). This layer was then converted into a shapefile of point features (short-term rentals dataset) for further analysis. I used the World Geodetic System (WGS) 1984 datum both for GIS data collection and analysis.

As part of the research objective to assess the vulnerability of the CSTRs to inundation due to storm surge, coastal flood, and sea-level rise, I collected geospatial layers for 1 m, 2 m, 3 m, 4 m, 5 m and 10 m contours (proxies for flood heights) and coastline from a previous NS inundation mapping project (Rapaport et al., 2014). Rapaport et al. (2014) in their inundation mapping project generated their own elevation contours by merging existing lidar (light detection and ranging) DEM (Digital Elevation Model) data and the Nova Scotia 1:10,000 Topographic Database (NSTDB) and used 5 m and 10 m contours to determine inundation plausibility of different communities including Lunenburg, NS. In determining 5 m and 10 m contours, Rapaport et al. (2014) calculated the plausible extreme high water levels at high tide for year 2100 by summing up sea level rise, amplitudes of large tides, and maximum recorded storm surges for different communities. The plausible extreme high water level for Lunenburg was found to be 4.83 m for year 2100. I also considered the maximum water level during storm surge to date for Lunenburg 1.63 m measured by Richards & Daigle (2011) to determine the vulnerability of CSTRs exposure to flooding. I used the “select by location” tool in ArcGIS to identify the vulnerable short-term rentals between the coastline and the 1 m, 2 m, 3 m, 4 m, 5 m and 10 m flood heights for NS overall.

In order to do a more detailed analysis to consider connectivity and the risk of being cut-off from rescue vehicles or evacuation, I studied Lunenburg County. I counted the short-term rentals that will be affected if local roads get inundated and hinder evacuation or emergency response during flooding. To count the affected short-term rentals due to inundation, I first identified the local roads from the road dataset generated by Rapaport et al. (2014) which are susceptible to inundation at different flood heights (1 m, 2 m, 3 m, 4

m and 5 m) and then I calculated the length of the affected portions of the roads by using statistics tool in ArcGIS. The attribute table of the flood heights layer contained the sections of the local roads likely to inundate at a given water level which was previously generated by Rapaport et al. (2014). I calculated the total length of the local roads susceptible to be inundated at different flood heights by using the Statistics tool in ArcGIS. In some cases, the portions of local roads at risk of inundation will disconnect the buildings (short-term rentals) from local roads and will hinder evacuation or emergency vehicles; I have defined these road portions as cut-off points. After identifying the cut-off points, I counted the affected short-term rentals manually by overlaying the short-term rentals shapefile over the affected roads shapefile. I considered CSTRs as affected when all connecting roads are likely to be inundated which might hinder their evacuation options. I also calculated the number of CSTRs at various horizontal distances up to 500 m from the coastline for Lunenburg County. Some CSTRs are vulnerable being located close to the coastline as they might experience severe weather events (e.g., storms, Atlantic hurricanes) which may damage the property and local roads and may disrupt utilities (e.g., electricity). To count the number of vulnerable CSTRs horizontally, I used buffer tool in ArcGIS to create targeted buffer layers (e.g., 10 m, 50 m, 100 m, 250 m, 500 m etc.) of the coastline and then I used 'Select by Location' tool to identify the CSTRs that fall within different buffer zones.

3.4 Limitations

In this study, I identified short-term rentals in the coastal areas and created a short-term rentals dataset based on publicly available information on the websites of VRBO and Google Earth. This is considered as one of the key limitations of this study, as publicly available information can lack authenticity or completeness. VRBO shares some information about their property in their ad along with the spatial location, pictures, and geographic attractions of the property, which helped to identify the actual location of the property (Figure 3.2). While I tried to verify the location of the VRBO short-term rentals of interest by using Google Street View, Google Street View does not have coverage in some rural areas. Also, I did not choose other popular rental platforms such as Airbnb and Hometogo because of the inaccessibility of spatial locations for the short-term rentals on

their platforms. No rental platforms except VRBO discloses the spatial location of the rental properties until a booking is made. The short-term rentals that I collected from Google Earth's lodging dataset may also be inaccurate or out of date.

The geodata, such as the contours and coastline data that I used for the analysis, was collected from secondary sources, which is another limitation of this study. Secondary data is sometimes questionable in terms of appropriateness and data quality as the original purpose of the secondary data, when collected, may not meet the purpose of the secondary data users. However, the origin of the geodata (e.g., roads, administrative boundaries) that I used were the website (<https://nsgi.novascotia.ca/gdd/>) of the Government of NS and the source of the flood heights, contours, and coastlines is the 2014 Nova Scotia Inundation Mapping project completed by Rapaport et al. (2014) which ensures appropriateness and quality of the data to some extent.

Another limitation of my study is that I could not verify the degree of vulnerability of the CSTRs by going into the field due to lack of time and resources. Some CSTRs that I have identified as vulnerable may not be at potential risks if the property has already been protected (e.g., seawall or storm-resistant home) from natural hazards. Another limitation is that this study did not consider temporal dynamics of climate change-induced risks as this was not scoped in this research.

3.5 RESULTS

In this study, a total of 653 short-term rentals were identified that are located within <1 km of the coastline of NS. The results show that the south shore of NS has more short-term rentals than the other parts of the province. Lunenburg contains the highest number of short-term rentals (129) (Figure 3.3). Inverness, Halifax and Victoria, respectively, contain the second, third, and fourth highest number of short-term rentals in NS (Figure 3.3).

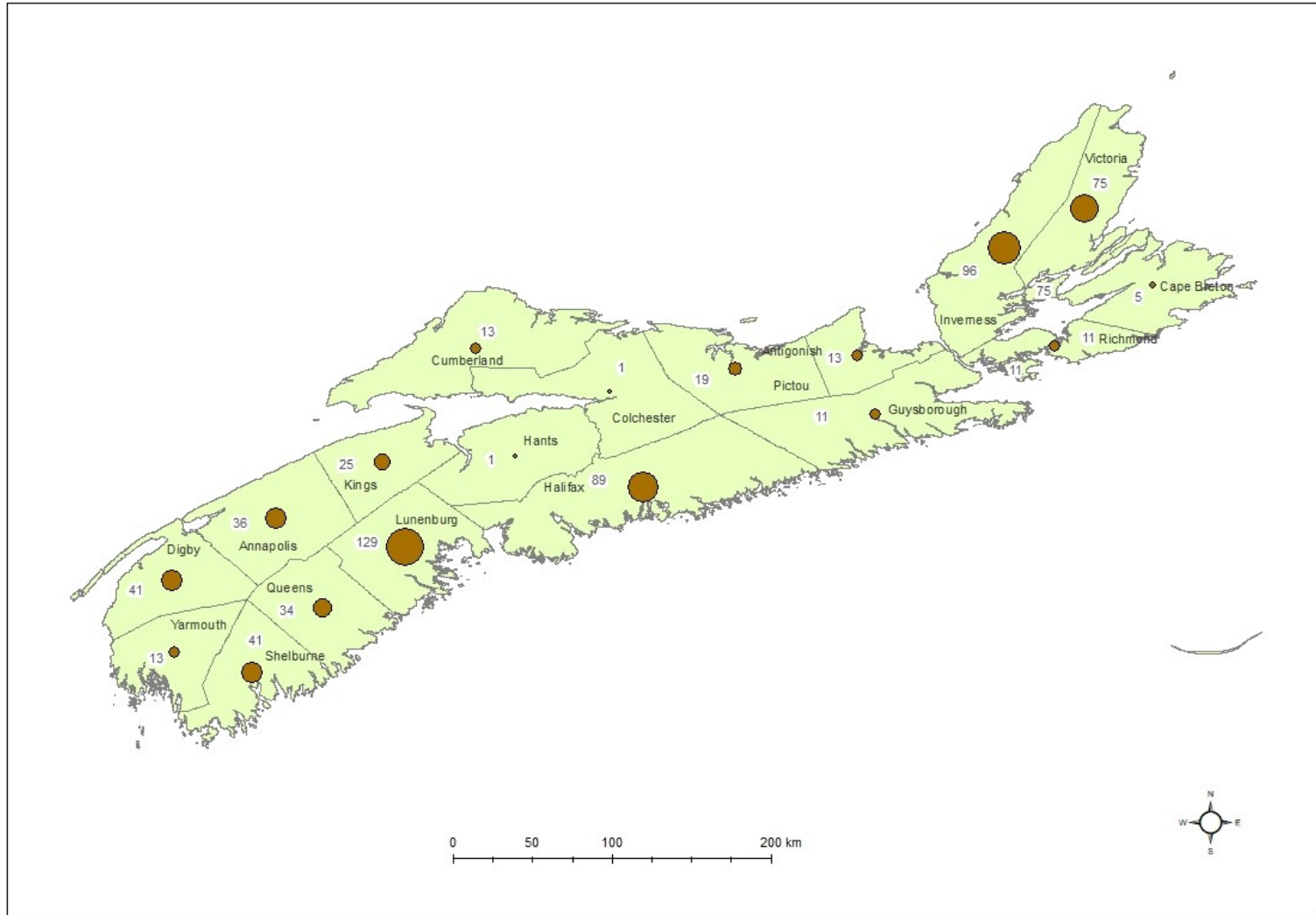


Figure 3.3 Distribution of CSTRs by county in NS.

3.5.1 Vulnerability of CSTRs Provincially

In this study, I identified the CSTRs which fall in 1 m, 2 m, 3 m, 4 m, 5 m and 10 m contours above MSL (Mean Sea Level) in NS. Within the 1 m and 5 m contour lines, there are 11 (1.7%) and 151 (23.1%) short-term rentals respectively (Figure 3.4). More than half of the CSTRs (56%) sit at or below the 10 m contour line. These CSTRs are vulnerable at different degrees of flooding.

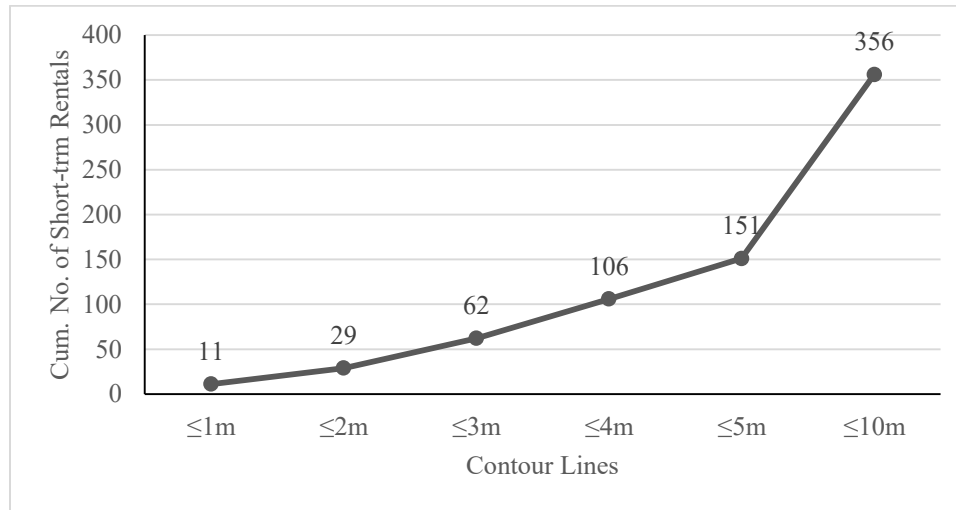


Figure 3.4 Cumulative number of CSTRs that fall within different contour lines in NS.

3.5.2 Case Study: Lunenburg County

Lunenburg County consists of the Towns of Bridgewater, Mahone Bay, Lunenburg and Chester and is a destination of many second homeowners as well as the owners of short-term rentals. There are many short-term rentals for people who wish to spend quiet and private time in the towns of Lunenburg County. This study found a total of 129 short-term rentals along the coastline (within <1 km) in Lunenburg County.

Similar to the provincial analysis above, I identified the short-term rentals which fall in 1 m, 2 m, 3 m, 4 m, 5 m and 10 m contours above MSL in the coastal areas of Lunenburg County (Figure 3.5). Within the contour lines, I identified three short-term rentals in 1 m (2%), 40 in 5 m (31%), and 84 in 10 m (65%) for the 129 short-term rentals in the county.

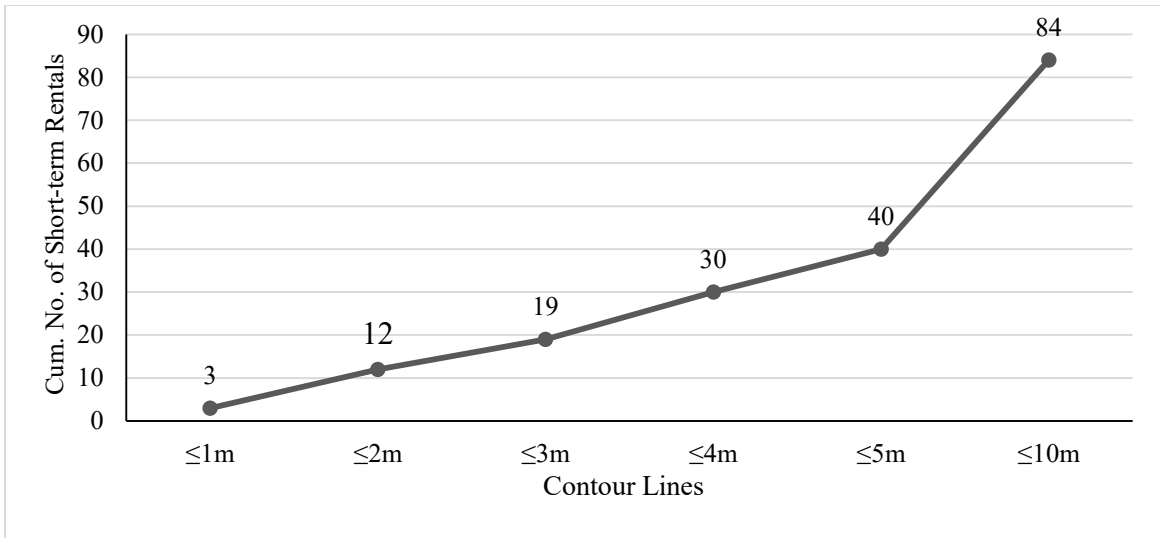


Figure 3.5 Cumulative number of CSTRs (located <1 km from the coastline) that fall within different contour lines in Lunenburg County.

This study further identified the number of CSTRs at various horizontal distances from the coastline to present the vulnerability of those buildings. Interestingly, the results show that nearly half of the total short-term rentals are located within 60 m horizontally from the coastline, and 119 (92%) of the short-term rentals are located within 500 m (Figure 3.6).

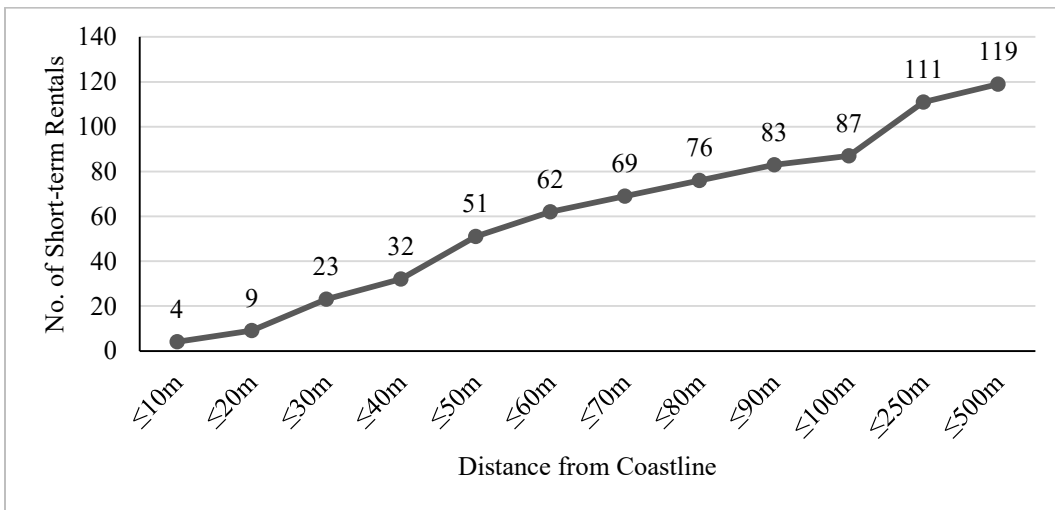


Figure 3.6 Number of CSTRs at various horizontal distances from the coastline in Lunenburg County.

3.5.2.1 Local Roads Risk for Inundation at Different Flood Heights

I next calculated the total length of roads which may become inaccessible at different water heights for flooding in Lunenburg County (Table 3.1). The results show that at 1 m flood height, approximately 20 km of local roads will be inaccessible, which will affect mobility and emergency service delivery for at least 19 short-term rentals. Figure 3.7a - b shows that local roads are disconnected at 1 m flood in Chester, creating possible disruptions during evacuation procedures. In the case of island-based communities (Lahave and Big Tancook Islands), local roads are disconnected at 1 m flood height, which may limit or negate evacuation options. In the same way, at 5 m flood heights, many local roads will be disconnected, which include local roads in Chester, Mahone Bay and Lunenburg (Figure 3.8a – d). This indicates that the residents and visitors of those buildings will be stranded during a coastal flood of that height. Results show that at 2 m flood height, 49 km of roads could be flooded, which may affect 39 short-term rentals and their residents and visitors. Furthermore, at 3 m flood height, 87 km of roads will be underwater, which may affect 67 short-term rentals and at 5 m flood height, 247 km of roads will be underwater, which may affect 90 short-term rentals (Table 3.1).

Additionally, emergency vehicles (e.g., fire brigades) may be unable to reach out to flood-affected households if local roads become inaccessible (Figure 3.9). This study identified at least four fire stations in Lunenburg County (Petite Riviere Fire Department, Riverport Fire Department, Blandford Area Fire Rescue, and Pleasantville District Fire Department) that may experience difficulties providing emergency services to the flood-affected short-term rentals as some of the local roads may be inundated and might become inaccessible at 2-5 m flood heights (Figure 3.9). For example, a 5 m flood height may inundate local roads in Lunenburg, affecting three fire stations (Petite Riviere Fire Station, Riverport Fire Station, and Pleasantville District Fire Station) by hindering mobility for rescue operations. In the same way, the local road in front of Blandford Area Fire Rescue station may be inundated at a 1 m flood height, possibly hindering rescue operations (Figure 3.9d).

Table 3.1 Local roads risk for inundation at different flood heights and CSTRs (within <1 km of the coastline) likely to be cut-off.

Flood Height (m)	Length of Roads (km) Affected	Number of CSTRs Cut-off	Percent of CSTRs Cut-off
1	20	19	14.7
2	49	39	30.2
3	87	67	51.9
4	166	81	62.8
5	247	90	69.8

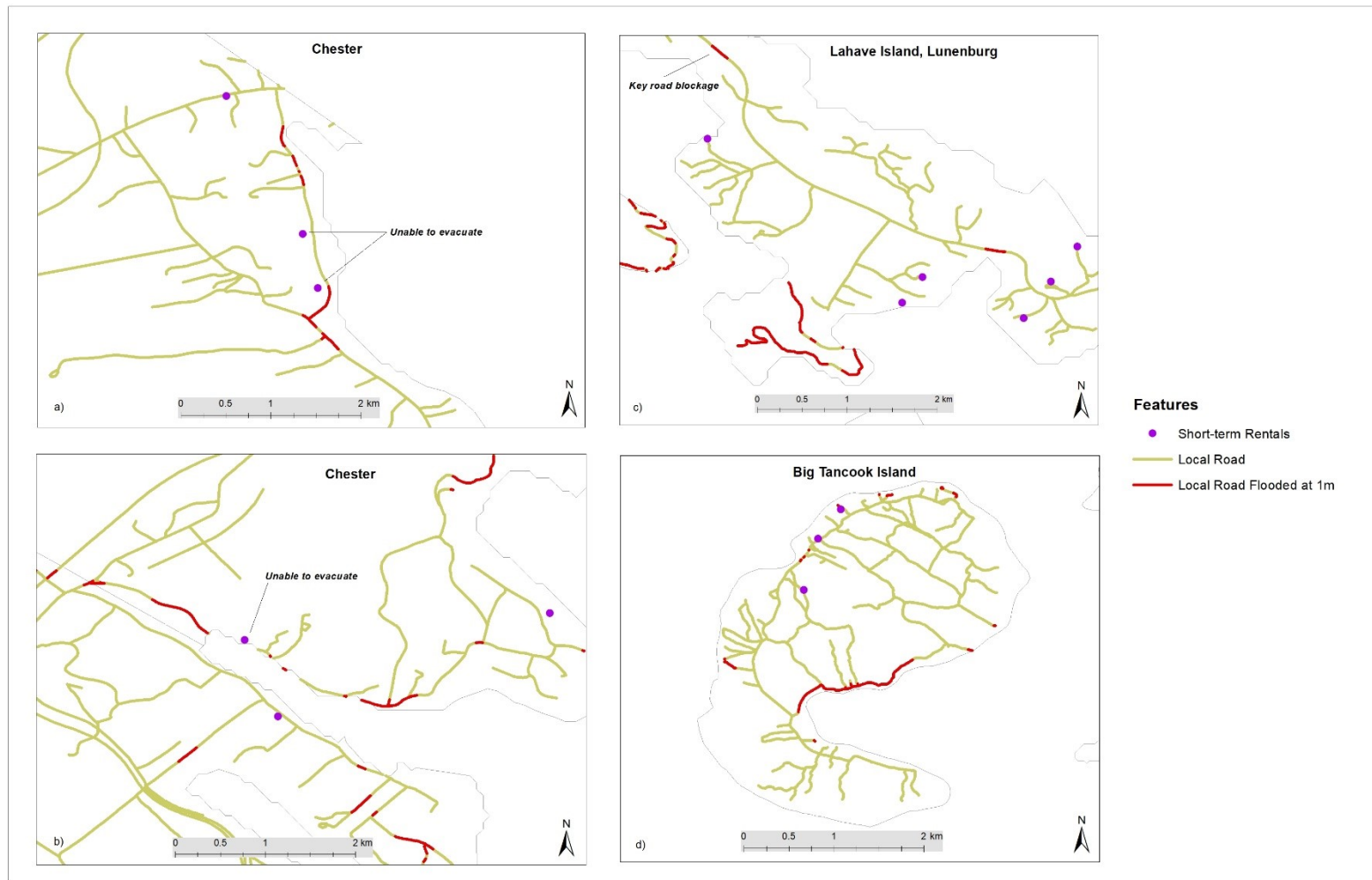


Figure 3.7 Examples of short-term rentals in Lunenburg prone to inundation being located at 1 m road elevation.

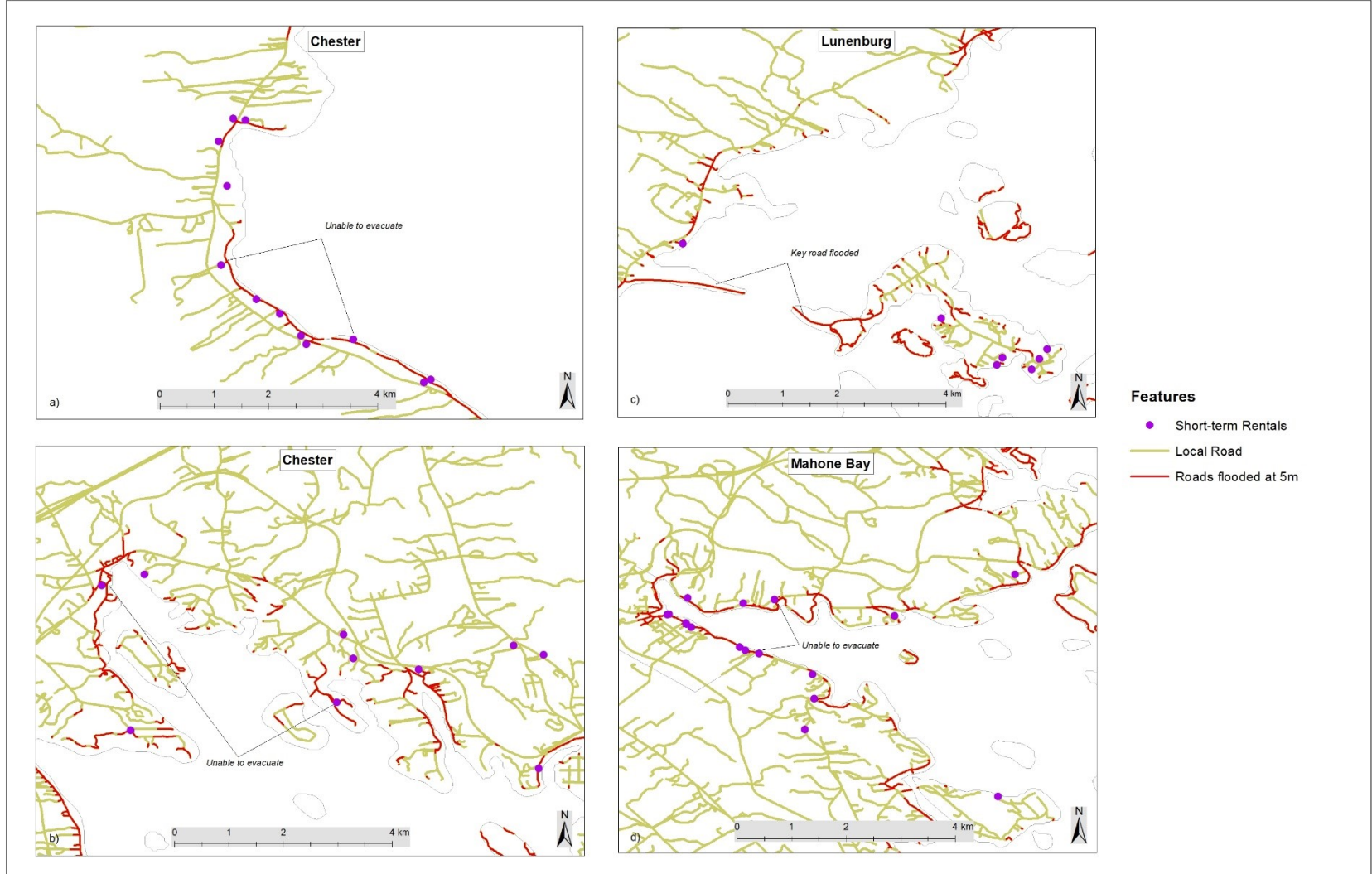


Figure 3.8 Examples of short-term rentals prone to inundation being located at 5 m road elevation.

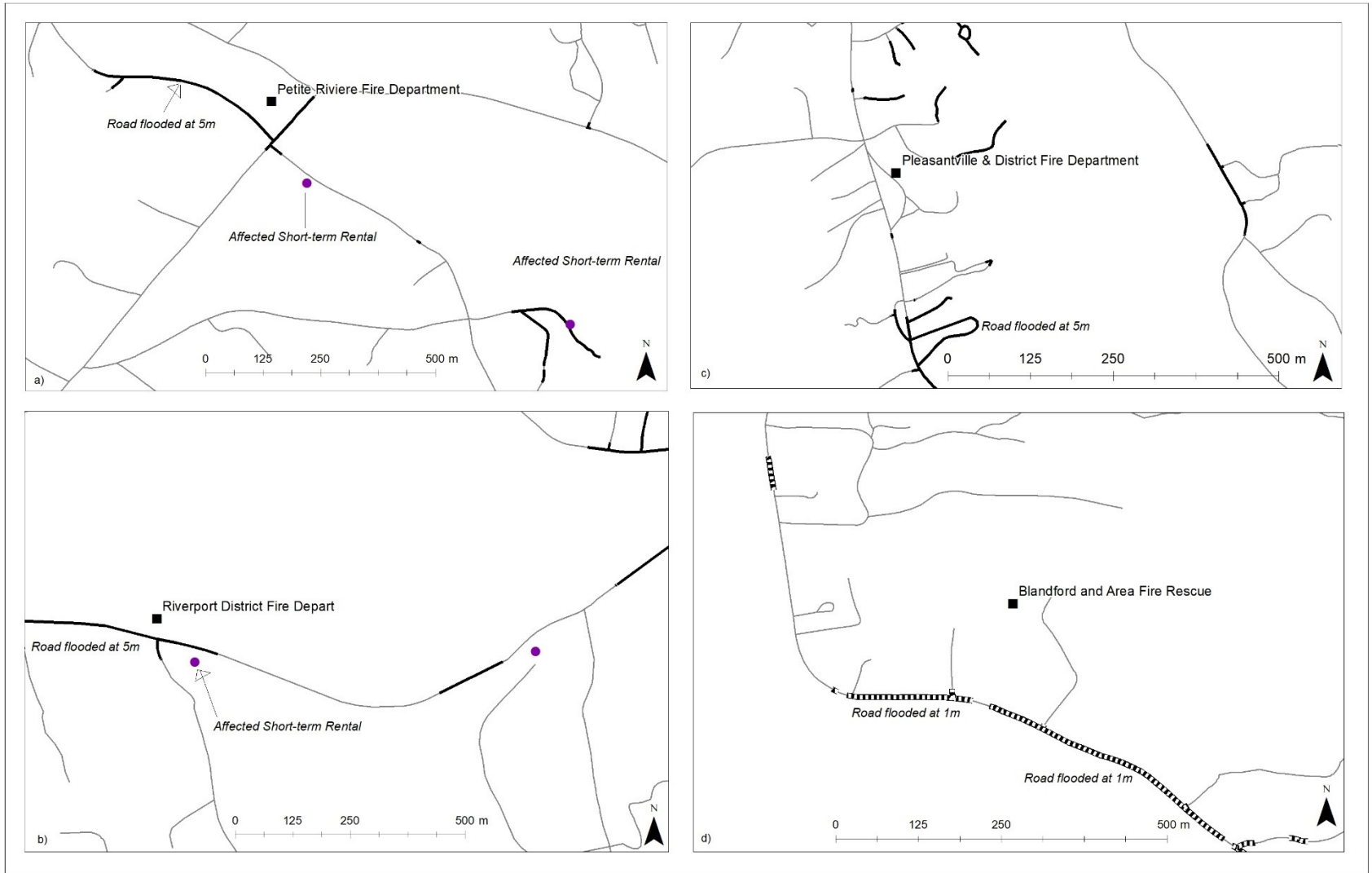


Figure 3.9 Emergency fire station services prone to be disrupted being located at various road elevations.

3.6 DISCUSSION

3.6.1 Distribution of CSTRs

This study identified 653 short-term rentals that are located within <1 km from the coastline of Nova Scotia. These 653 short-term rentals include 542 rental homes advertised on the VRBO and 111 other lodgings showing on Google Earth platforms. Among the 18 counties in NS, Lunenburg County has the highest number (129) of CSTRs. It appears that the south shore of NS has more coastal short-term rentals than the other parts of the province possibly because of the demand for tourist attractions. Some of the short-term rentals in NS are located in rural and remote coastal areas and on islands (e.g., Big Tancook Island in Lunenburg). These short-term rentals contribute to rural community development through tourism (Mirani & Farahani, 2015). Rural areas are not well-supplied with hotels, which may be a possible reason for the increasing demand for CSTRs in Nova Scotia's coastal municipalities. The number of CSTRs is expected to gradually increase as the demand for coastal tourism increases.

As NS and its municipalities do not keep a database of the short-term rentals, the actual number of CSTRs is unknown. However, a report on tourist accommodation needs assessment for NS reported that there were 821 licensed accommodation properties providing over 19,600 units and 1,589 Airbnb hosts in the province in 2016 (Tourism Nova Scotia, 2017). The same report also reported that the province will require an additional 4,500 - 6,000 units for tourists if the tourism revenues are to reach \$4 billion. Considering the demand for short-term rental accommodations in the province (Tourism Nova Scotia, 2017b; White, 2018) and the perceived negative externalities (e.g., safety and security of the residents, housing affordability and availability, gentrification, etc.) of short-term rentals (Jordan & Moore, 2018; Nieuwland & van Melik, 2018), both researchers and policy-makers have suggested to control the short-term rentals market by formulating legislation (Jamasi, 2017; Nieuwland & van Melik, 2018). The province of NS has formulated the Tourist Accommodations Act (SNS 1994-95, c. 9) to regulate accommodation sector in tourism. The new Coastal Protection Act of the Province is expected to regulate development and activity in coastal areas that put buildings and its

residences at risk of damage or destruction from climate change impacts (Nova Scotia Legislature, 2019).

To better manage short-term rentals in the province, municipalities in NS require database tracking (e.g., coordinates, ownership, occupancy, property tax, etc.) of short-term rentals. Identification and mapping of short-term rentals would be the first step in this regard. Identification and mapping of the distribution of CSTRs can be used for various purposes, such as strategic planning, community development, natural hazards and disaster management, formulation of national policy and regulations, and land use planning (Dotto et al., 2010 *p. 164-165*; Jones & Phillips, 2018 *p. 315-319*). Also, in my survey conducted among the existing municipal planners across Canada as discussed in Chapter Two, I found that information on second homes is lacking (some of which are used for short-term rentals), but can be used by municipalities for policy-making, comprehensive planning or making municipal master plans, waste management services, economic analysis, land-use zoning, and planning road maintenance.

3.6.2 Potential Risks to CSTRs and Occupants

This work shows how short-term rentals and their occupants remain potentially at risk due to their susceptibility to natural hazards and difficulties which may arise and hinder rescue operations of the emergency service providers during emergencies.

For the Lunenburg County, I identified short-term rentals at various contour lines which are at risk to flooding. As per the plausible extreme high water level of 4.83 m for year 2100 measured by Rapaport et al. (2014), 40 CSTRs at 5 m contour line are at risk to direct flooding. Additionally, nearly half of the coastal short-term rentals found (within <1 km of the coastline) in Lunenburg were located within 60 m horizontally of the coastline. These short-term rentals are potentially at risk for extended run up during severe weather events (i.e. storms and Atlantic hurricanes). Furthermore, these short-term rentals remain potentially at risk, being unoccupied for certain periods of the year (i.e. winter) when it is more likely that nobody will be present to take care of the property during emergencies (i.e. winter storm). Emergency service providers require information about the vulnerable coastal communities in order to rescue and to provide emergency services to affected people during emergencies. My study identified that some short-term rentals and occupants

would be affected as local roads will be inaccessible, being disconnected during certain flood heights (shown in Figure 3.7 and 3.8). The results show that 90 short-term rentals will be affected as 247 km local roads may become inundated at 5 m flood height in Lunenburg (Table 3.1).

This analysis is consistent with the general literature on coastal risk. Coastal communities are vulnerable to the effects of climate change. Many coastal communities have already experienced various climate change-induced natural hazards such as sea-level rise, increased storms, storm surge, flood, and erosion, and it is predicted that these coastal communities will continuously experience those natural hazards in the future (de Sherbinin, Schiller, & Pulsipher, 2007; Richards & Daigle, 2011; Lyle & Mills, 2016; Bathi & Das, 2016; Toubes et al., 2017; Dolan et al., 2019). Many coastal communities in NS experience natural hazards almost every year, and they are potentially at risk due to natural hazards such as storm, coastal flood, erosion and sea-level rise (Richards & Daigle, 2011; Minano et al., 2018). Nearly 60,000 properties touch on saltwater (Doucette, 2019), and approximately 70% of the population in NS lives in coastal communities (ECoAS, 2019). The coastal tourism of the province—a significant economic contributor—is also potentially at risk as many CSTRs and infrastructure are susceptible to storm, flooding, erosion, and sea-level rise (CCNS, 2019b).

The results of this study (as shown in Figure 3.4) indicate that some CSTRs fall within various at-risk contour lines (1 m, 2 m, 3 m, 4 m, 5 m, and 10 m) above MSL. Studies show that many coastal homes and infrastructure in NS are prone to flooding as the frequency and extent of extremely high water level events will rise (Richards & Daigle, 2011; Maher, Rapaport, & Manuel, 2012; Minano et al., 2018; Bush & Flato, 2019). It is also reported that 70% of the dikes in NS are now vulnerable to even a one-in-50-year storm (Tutton, 2019). The exposure to inundation due to sea-level rise and storm surge varies by community to community. For instance, the Municipality of the District of Lunenburg (MODL) is one of the Municipalities in NS vulnerable to sea-level rise, flood, storm surge, and erosion (Critchley et al., 2012). It is predicted that the relative sea-level rise could range between 1.46 m and 1.85 m and the worst-case flooding scenarios could vary between 4.75 m and 5.14 m by the year 2100 in MODL (Critchley et al., 2012).

My study identified four fire stations in Lunenburg which may experience difficulties responding to rescue operations and providing emergency services during floods as some local roads will be inundated at various flood heights (Figure 3.9). The coastal communities not only suffer due to inundation of their homes and damage due to a severe storm but also they suffer due to road inaccessibility when local roads are flooded and eroded during severe weather events such as storm surge and flood (Minano et al., 2018). Storm surge and rainfall-induced flood hinder people's mobility when low-lying feeder roads are inundated in coastal areas (Bathi & Das, 2016; Campbell, 2018). Moreover, emergency service providers (i.e. fire stations) might experience difficulties to reach to the coastal homes during emergencies if local roads become inaccessible due to flood and erosion.

Considering the potential risks from the effects of climate change on the coastal communities, the Government of NS has adopted some mitigation measures. These measures include enforcing municipalities to prepare MCCAP or strategies to mitigate climate change, formulating legislation for coastal protection, coastal research and development, and creating awareness among the general public. The MCCAP for each municipality focuses on both climate change mitigation and adaptation and describes how municipalities plan to respond to climate change (Canada-Nova Scotia Infrastructure Secretariat (CNSIS), 2011). Realizing the perceived and predicted threats of climate change on coastal communities, the Government of NS has passed Bill 106 in March 2019 to formulate the Coastal Protection Act (CPA), aiming to regulate coastal construction and facilitate shoreline protection (Nova Scotia Legislature, 2019). The government of the province has been working and collaborating with other Atlantic Provinces, non-government organizations (NGOs), and research institutes to find ways to protect its coastal communities and coastal resources. The Atlantic Climate Adaptation Solutions Association (ACASA) ending in 2012 was a collaborative regional initiative partnership among the provincial governments (Nova Scotia, Newfoundland and Labrador, Prince Edward Island, and New Brunswick), NGOs, industry, and indigenous communities whose motive is to build a collaborative effort to address regional climate change impacts (<https://atlanticadaptation.ca/>).

After reviewing the provincial plans, policies, and upcoming CPA related to coastal issues and concerns, it appeared to me that neither the MCCAP nor the CPA addresses the issues and concerns of CSTRs although the CPA addresses preventing development and activity in locations adjacent to the coast that put residences and buildings at risk of damage or destruction from sea-level rise, coastal flooding, storm surges and coastal erosion (Nova Scotia Legislature, 2019).

3.7 CONCLUSION

Short-term rentals contribute to the growth of tourism worldwide, and of coastal tourism in particular. Many coastal communities generate revenue by offering short-term accommodation to tourists. Many coastal communities in NS earn revenue from the short-term rental market, but climate change effects put this market at risk. The risks to the occupants of short-term rentals and the buildings themselves have been intensified in the absence of information on short-term rentals at the municipality for planning and management during emergencies. To identify and assess the vulnerability of CSTRs to climate change effects, I identified CSTRs across NS and assessed their vulnerability using GIS. Choosing Lunenburg County as an area of case analysis, my study found that there are many short-term rentals within <1 km of the coastline which are vulnerable to inundation and coastal erosion during a flood, storm surge, or extreme weather event. It was also found that many local roads are likely to be disconnected due to flooding and erosion, which put the residents and the buildings of short term rentals at risk because occupants are typically not locals and do not know how to evacuate safely, or because dwellings are empty and potentially undefended. It may also not be possible to deliver emergency services during an emergency. Short-term rentals remain highly vulnerable due to the climate change-induced effects. As a result, NS has taken some initiatives (e.g., in the process of formulating the Coastal Protection Act) to regulate coastal activities and protect coastal communities. However, the municipalities of this province should create and maintain a geodatabase of CSTRs to manage this revenue-generating resource, to ensure safety and security of the tourists occupying short-term rentals, and to protect these buildings. Further research can be done to explore the opportunities for managing short-term rentals to achieve broader goals for the tourism industry.

CHAPTER 4 CONCLUSION

SHs and CSTRs have become an issue of concern in many rural and urban municipalities. The issues of SHs and CSTRs have been studied in various contexts such as housing, land use, tourism, socio-cultural and economic impacts, governance, and pollution (Muller, Hall, & Keen, 2004; Lundmark & Marjavaara, 2013; Farstad & Rye, 2013; Hiltunen, Pitkanen, Vepsalainen, & Hall, 2013; Anabestani, 2014; Hall, 2015; Miletić, Žmuk, & Mišetić, 2018; Jordan & Moore, 2018). SHs and CSTRs have been studied in various jurisdictions with findings of positive and negative effects on host communities and the environment, but little research has been done about the effects of climate change on SHs and CSTRs and how SHs and CSTRs affect municipal planning and decision making. Despite their vulnerability to climate change, the number of SHs and CSTRs is increasing along the coastline globally. This raises the question if municipalities are aware of the rapid growth of the SHs and CSTRs and whether they include SHs and CSTRs in municipal planning to address climate change impacts and to manage those properties during emergencies. To fill in the research gap, this thesis has been done based on two objectives. The first objective asked if SHs are an issue of concern for municipal planning and climate change-induced emergencies in Canada, and the second objective assessed the vulnerability of CSTRs to coastal climate change effects in Nova Scotia, Canada.

To achieve the first objective (as illustrated in Chapter 2), I surveyed active municipal planners across Canada. It is found that there are different types of SHs in Canadian municipalities. Considering the occupancy pattern, most of the SHs are empty in winter (e.g., cottages), not empty (e.g., vacation rentals), overseas-owned (e.g., absentee homeowners), and converting to year-round (e.g., seasonal dwellings) categories. This study also identified regional differences in SH occupancy patterns; for example, the majority of SHs remain empty in winter in the municipalities of Maritime Provinces, which might be an insecure property during emergencies. Half of the total respondents (municipal planners) considered SHs to be a public policy or planning issue in their municipalities. The planning issues respondents experienced are community planning, housing supply, tourism demand, and the conflict between seasonal and year-round residences, increasing demand for municipal services, land inflation, real estate speculation, emergency response,

and stakeholder engagement. Remarkably, respondents stated that climate adaptation and effects on the environment were less concerning issues than others for SHs, which might be an area of further research. SHs being considered one of the municipal planning issues, respondents articulated some challenges to identify SHs such as data completeness, rural location, the privacy of homeowners, and the fraudulent behaviour of some property owners. Despite the challenges of identifying SHs, municipal planners indicated that SH data and information are useful for comprehensive planning, emergency management planning, coastal policymaking, housing policymaking and tourism policymaking in order to provide better community services to their residents.

This study pointed out the increasing vulnerability of SHs (as property) and their owners and occupants because of the increasing frequency of natural disasters, lack of SH information and in some cases their remote locations. These factors make it difficult for municipalities to provide necessary services to the SHs and take necessary measures during an emergency. The planners also mentioned that some roads become inaccessible during natural hazards (e.g., storm surge, inundation) in rural areas which prevent emergency services reaching to the property on time. Further research can be done to assess the vulnerability of Canadian coastal communities because of their remote location and the preparedness of the municipalities during emergencies.

To achieve the second research objective (as illustrated in Chapter 3), this study identified short-term rentals (<1 km of the coastline) from VRBO and Google Earth platforms for NS and assessed the vulnerability of the CSTRs to climate change impacts with a case study in Lunenburg. Many coastal communities generate revenue by offering short-term accommodation to tourists. NS earns revenue from the short-term rental market, but climate change effects put this market at risk as they do for SHs. The risks to the occupants of short-term rentals and the buildings themselves have been intensified in the absence of information on short-term rentals at the municipality for planning and management during emergencies. To identify and assess the vulnerability of CSTRs to climate change effects, I identified CSTRs across NS and assessed their vulnerability using GIS.

Choosing Lunenburg County as an area of case analysis, my study found that there are many short-term rentals within <1 km of the coastline which are vulnerable to inundation

and coastal erosion during a flood, storm surge, or extreme weather event. It was also found that many local roads are likely to be disconnected due to flooding and erosion, which put the residents and the buildings of short term rentals at risk because occupants are typically not locals and do not know how to evacuate safely, or because dwellings are empty and potentially undefended. It may also not be possible to deliver emergency services during an emergency. Short-term rentals remain highly vulnerable due to climate change-induced effects. As a result, NS has taken some initiatives (e.g., in the process of formulating the Coastal Protection Act) to regulate coastal activities and protect coastal communities. However, the municipalities of this province should create and maintain a geodatabase of CSTRs to manage this revenue-generating market to ensure the safety and security of the tourists occupying short-term rentals and to protect these buildings. Further research can be done to explore the opportunities for managing short-term rentals to achieve broader goals for the tourism industry and emergency management.

To conclude, municipalities lack knowledge and policies to manage SHs and CSTRs. To support and develop coastal tourism and coastal communities while protecting and managing SHs and CSTRs despite the above-stated challenges, municipalities need to generate data and information of SHs and CSTRs for mapping, coastal zoning, land use planning, and above all, for municipal planning. At the same time, policy makers, emergency managers, tourism managers, insurance companies, homeowners, tourists and other relevant stakeholders need to work together to resolve the issues of SHs and CSTRs. In the future, further research can find out the level of knowledge residents of SHs and CSTRs have to cope with emergencies. Research can be done to assess to what extent residents in short term rentals and SHs know the risk of living in coastal areas, and to assess if the residents know what to do during an emergency.

REFERENCES

- Åkerlund, U., Lipkina, O., & Hall, C. M. (2015). Second home governance in the EU: in and out of Finland and Malta. *Journal of Policy Research in Tourism, Leisure and Events*, 7(1), 77–97.
- Alhmidi, M. (2019, May 31). Short-term accommodation rentals a double-edged sword. *The Chronicleherald*. Retrieved from <https://www.thechronicleherald.ca/business/short-term-accommodation-rentals-a-double-edged-sword-317413/>
- Alini, E. (2017, December 19). Foreign homeownership less than 5% in Vancouver, Toronto: StatCan. *Global News*. Retrieved from <https://globalnews.ca/news/3924481/foreign-homebuyers-5-vancouver-toronto-statcan/>
- Allison, E. H., Perry, A. L., Badjeck, M. C., Neil Adger, W., Brown, K., Conway, D., ... Dulvy, N. K. (2009). Vulnerability of national economies to the impacts of climate change on fisheries. *Fish and Fisheries*, 10(2), 173–196.
- Anabestani, A. (2014). Effects of second home tourism on rural settlements development in Iran (case study: Shirin-Dareh Region). *International Journal of Culture, Tourism, and Hospitality Research*, 8(1), 58–73.
- Antonio, F., & Pereira, M. D. L. (2017). Evaluation of the image of a coastal tourism destination in Brazil. *International Journal of Tourism Cities*, 3(4), 324–338.
- Armstrong, A. (2011). Affluence, mobility and second home ownership. *Housing Studies*, 26(6), 967–969.
- Balca, D. (2016, May 26). Lunenburg, N.S. among world heritage sites threatened by climate change: UNESCO. *CTV News*. Retrieved from <https://www.ctvnews.ca/world/lunenburg-n-s-among-world-heritage-sites-threatened-by-climate-change-unesco-1.2919457>
- Bathi, J. R., & Das, H. S. (2016). Vulnerability of coastal communities from storm surge and flood disasters. *International Journal of Environmental Research and Public Health*, 13(2), 1–12.
- Beshiri, R. (2005). A visit to Canada's countryside: rural tourism. *Rural and Small Town Canada Analysis Bulletin*, 6(5). Retrieved from <https://www150.statcan.gc.ca/n1/pub/21-006-x/21-006-x2005005-eng.pdf>
- Bevacqua, A., Yu, D., & Zhang, Y. (2018). Coastal vulnerability: evolving concepts in understanding vulnerable people and places. *Environmental Science & Policy*, 82, 19–29.
- Bird, D. K., Gisladdottir, G., & Dominey-Howes, D. (2010). Volcanic risk and tourism in Southern Iceland: implications for hazard, risk and emergency response education and training. *Journal of Volcanology and Geothermal Research*, 189, 33–48.

- Boyatzis, R. E. (1998). *Transforming Qualitative Information: Thematic Analysis and Code Development*. Thousand Oaks, CA: SAGE.
- Boyce, J., Conroy, S., & Ibrahim, D. (2016). *Emergency preparedness and resilience: community-based fact sheets, 2014*. Retrieved from <https://www150.statcan.gc.ca/n1/en/pub/85-002-x/2016001/article/14638-eng.pdf?st=1IfB7DPI>
- Bradley, S. (2019, May 16). Extreme weather causing changes in Nova Scotia right now, says federal climatologist. *Nova Scotia*. Retrieved from https://www.cbc.ca/news/canada/nova-scotia/dave-phillips-environment-meteorologist-climate-change-1.5138348?fbclid=IwAR2kKrn2GKmOgQfR5Qz1luY8I80vLbEkBtIcg_z8i1XNrzzPjqsnm8r7YPs
- Brida, J. G., Osti, L., & Santifaller, E. (2011). Second homes and the need for policy planning. *Tourismos*, 6(1), 141–163.
- Bush, E., & Flato, G. (2019). *Canada's changing climate report*. Retrieved from https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/Climate-change/pdf/CCCR_FULLREPORT-EN-FINAL.pdf
- Campbell, F. (2018, October 6). Atlantic Canada is sinking as water levels swell. *The ChronicleHerald*. Retrieved from <https://www.thechronicleherald.ca/in-depth/rising-seas/atlantic-canada-is-sinking-as-water-levels-swell-247264/>
- Canada-Nova Scotia Infrastructure Secretariat (CNSIS). (2011). *Municipal climate change action plan guidebook*. Halifax. Retrieved from https://data.fcm.ca/documents/tools/PCP/municipal_climate_change_action_plan_guidebook_EN.pdf
- Canadian Red Cross. (2018). *Emergencies and disasters in Canada*. Retrieved from <http://www.redcross.ca/how-we-help/emergencies-and-disasters-in-canada>
- Cardoso, T., & Lundy, M. (2019, June 20). Airbnb likely removed 31,000 homes from Canada's rental market, study finds. *The Globe and Mail*. Retrieved from <https://www.theglobeandmail.com/canada/article-airbnb-likely-removed-31000-homes-from-canadas-rental-market-study/>
- Chang, S. E., Yip, J. Z. K., Conger, T., Oulahen, G., & Marteleira, M. (2018). Community vulnerability to coastal hazards: developing a typology for disaster risk reduction. *Applied Geography*, 91, 81–88.
- CIP. (2018). About Canadian Institute of Planners. Retrieved from <https://www.cip-icu.ca/About/About-Us>
- Climate Change Nova Scotia (CCNS). (2019a). Climate change impacts - coastal. Retrieved from <https://climatechange.novascotia.ca/adapting-to-climate-change/impacts/coastal>

- Climate Change Nova Scotia (CCNS). (2019b). Climate impacts - tourism. Retrieved from <https://climatechange.novascotia.ca/adapting-to-climate-change/impacts/tourism>
- COINAtlantic. (2019). Tourism. Retrieved from <https://coinatlantic.ca/index.php/themes/coastal-industrial-development/tourism>
- Council of Canadian Academies. (2019). *Canada's Top Climate Change Risks*. Ottawa (ON). Retrieved from <https://cca-reports.ca/wp-content/uploads/2019/07/Report-Canada-top-climate-change-risks.pdf>
- Critchley, J., Muise, J., Rapaport, E., & Manuel, P. (2012). *Municipality of the District of Lunenburg: a case study in climate change adaptation- part 2 section 1: future sea level rise and extreme water level scenarios for the municipality of the district Lunenburg, Nova Scotia*. Halifax, NS. Retrieved from <https://atlanticadaptation.ca/en/islandora/object/acasa%253A544>
- Czarnecki, A., & Frenkel, I. (2015). Counting the 'invisible': second homes in Polish statistical data collections. *Journal of Policy Research in Tourism, Leisure and Events*, 7(1), 15–31.
- Davies, M. (2011). *Climate change and shoreline protection*. Halifax. Retrieved from <https://atlanticadaptation.ca/en/islandora/object/acasa%253A291>
- de Oliveira, J. A., Roca, M. de N. O., & Roca, Z. (2015). Economic effects of second homes: a case study in Portugal. *Economics and Sociology*, 8(3), 183–196.
- de Sherbinin, A., Schiller, A., & Pulsipher, A. (2007). The vulnerability of global cities to climate hazards. *Environment and Urbanization*, 19(1), 39–64.
- Dolan, A. A. H., Walker, I. J., Dolan, A. H., & Walker, I. J. (2019). Understanding vulnerability of coastal communities to climate change related risks. *Coastal Education & Research Foundation*, III(39), 1316–1323.
- Dotto, L., Duchesne, L., Etkin, D., Jones, B., Jaffit, El., Joe, P., ... Stocks, B. (2010). *Canadians at risk: our exposure to natural hazards*. Retrieved from https://www.unisdr.org/files/13008_CanadiansatRisk20101.pdf
- Doucette, K. (2019, March 12). Nova Scotia set to regulate coastal construction as sea levels rise. *Global News*. Retrieved from <https://globalnews.ca/news/5047782/nova-scotia-coastal-construction/>
- Drabek, T. E. (1999). Disaster evacuation responses by tourists and other types of transients. *International Journal of Public Administration*, 22(5), 655–677.
- ECoAS. (2019). Sea level rise: Atlantic Canada. Retrieved from <http://www.sealevelrise.ca/assets/slr-infographic-11x17.pdf>

- European Commission. (2019). The challenge of climate change to the European coastal areas. Retrieved from https://ec.europa.eu/environment/iczm/state_coast.htm
- Farstad, M., & Rye, J. F. (2013). Second home owners, locals and their perspectives on rural development. *Journal of Rural Studies*, 30, 41–51.
- Felsenstein, D., & Lichter, M. (2014). Social and economic vulnerability of coastal communities to sea-level rise and extreme flooding. *Natural Hazards*, 71(1), 463–491.
- Feltmate, B. (2016). *Climate change and the preparedness of Canadian provinces and Yukon to limit potential flood damage*. Retrieved from [https://www.intactcentre.ca/wp-content/uploads/docs/Climate Change and the Preparedness of Canadian Provinces and Yukon \(Oct 31 2016\).pdf](https://www.intactcentre.ca/wp-content/uploads/docs/Climate Change and the Preparedness of Canadian Provinces and Yukon (Oct 31 2016).pdf)
- Filho, W. L. (2018). Impacts of Climate Change in Coastal Areas: Lessons Learned and Experiences. In *Climate Change Impacts and Adaptation Strategies for Coastal Communities* (pp. 471–476). Hamburg: Springer International Publishing.
- Franklin, M. J. (2019, May 1). Airbnb vs. Vrbo: everything you need to know about both accommodation sites. *Mashable*. Retrieved from <https://mashable.com/article/airbnb-vs-vrbo-trip-booking/>
- Fraser, C., Bernatchez, P., & Dugas, S. (2017). Development of a GIS coastal land-use planning tool for coastal erosion adaptation based on the exposure of buildings and infrastructure to coastal erosion, Québec, Canada. *Geomatics, Natural Hazards and Risk*, 8(2), 1103–1125.
- Gallent, N. (2013). The social value of second homes in rural communities. *Housing, Theory and Society*, 31(2), 174–191.
- Gerster, J. (2019, June 24). Should Canadian cities ban Airbnb and other home-sharing platforms? *Global News*. Retrieved from <https://globalnews.ca/news/5424568/airbnb-regulations/>
- Ghosh, T. (2012). Sustainable coastal tourism: problems and management options. *Journal of Geography and Geology*, 4(1), 163–169.
- Gill, A., Williams, P., & Thompson, S. (2010). Perceived water conservation attitudes and behaviours in second-home island settings. *Tourism and Hospitality Research*, 10(2), 141–151.
- Glavovic, B., Kelly, M., Kay, R., & Travers, A. (2015). Introduction. In *Climate Change and the Coast: Building Resilient Communities* (First). Boca Raton, Florida: CRC Press.
- Government of Canada. (2019). Tourism in Canada. Retrieved from <https://www.ic.gc.ca/eic/site/134.nsf/eng/home>

- Grady, C. (2018). *Coastal Protection Act: a future scenario analysis of coastal policy in Nova Scotia*. Dalhousie University.
- Hall, C. M. (2001). Trends in ocean and coastal tourism: the end of the last frontier? *Ocean and Coastal Management*, 44(9–10), 601–618. [https://doi.org/10.1016/S0964-5691\(01\)00071-0](https://doi.org/10.1016/S0964-5691(01)00071-0)
- Hall, C. M. (2015). Second homes planning, policy and governance. *Journal of Policy Research in Tourism, Leisure & Events*, 7(1), 1–14.
- Halseth, G. (2004). The ‘cottage’ privilege: Increasingly elite land-scapes of second homes in Canada. In *Tourism, Mobility and Second Homes: Between Elite Landscape and Common Ground* (pp. 35–54). Clevedon: Channel View Publications.
- Heberger, M., Cooley, H., Herrera, P., Gleick, P. H., Moore, E., Heberger, M., ... Moore, E. (2011). Potential impacts of increased coastal flooding in California due to sea-level rise. *Climatic Change*, 109, 229–249. <https://doi.org/10.1007/s10584-011-0308-1>
- Henstra, D. (2010). Explaining local policy choices: a multiple streams analysis of municipal emergency management. *Canadian Public Administration*, 53(2), 241–258.
- Hiltunen, M. J. (2007). Environmental impacts of rural second home tourism – Case Lake district in Finland. *Scandinavian Journal of Hospitality and Tourism*, 7(3), 243–265.
- Hiltunen, M. J., Pitkänen, K., & Halseth, G. (2016). Environmental perceptions of second home tourism impacts in Finland. *Local Environment*, 21(10), 1198–1214.
- Hiltunen, M. J., Pitkanen, K., Vepsalainen, M., & Hall, C. M. (2013). Second home tourism in Finland: current trends and eco-social impacts. In *Second home tourism in Europe- lifestyle issues and policy responses* (pp. 165–198). Surrey: Ashgate.
- Honey, M., & Krantz, D. (2007). *Global trends in coastal tourism*. Washington, DC. Retrieved from https://www.responsibletravel.org/docs/Global_Trends_in_Coastal_Tourism_by_CESD_Jan_08.pdf
- ICLEI. (2010). *Changing climate, changing communities: guide and workbook for municipal climate adaptation*. Toronto, ON. Retrieved from http://www.icleicanada.org/images/icleicanada/pdfs/GuideWorkbookInfoAnnexes_WebsiteCombo.pdf
- Jaakson, R. (1986). Second home domestic tourism. *Annals of Tourism Research*, 13(1), 367–391.
- Jahan, I., Ahsan, D., & Farque, M. H. (2017). Fishers’ local knowledge on impact of climate change and anthropogenic interferences on Hilsa fishery in South Asia: evidence from Bangladesh. *Environment, Development and Sustainability*, 19(2), 461–478.

- Jamasi, Z. (2017). *Regulating Airbnb and the short-term rental market*. Ontario. Retrieved from [https://www.policyalternatives.ca/sites/default/files/uploads/publications/Ontario Office/2017/06/Regulating Airbnb and the Short-Term Rental Market_FINAL.pdf](https://www.policyalternatives.ca/sites/default/files/uploads/publications/Ontario%20Office/2017/06/Regulating%20Airbnb%20and%20the%20Short-Term%20Rental%20Market_FINAL.pdf)
- Janssen, M. A., Schoon, M. L., Ke, W., & Boner, K. (2006). Scholarly networks on resilience, vulnerability and adaptation within the human dimensions of global environmental change. *Global Environmental Change, 16*, 240–252. <https://doi.org/10.1016/j.gloenvcha.2006.04.001>
- Jha, A. K., Bloch, R., & Lamond, J. (2012). *Cities and flooding: a guide to integrated urban flood risk management for the 21st Century*. Washington DC.
- Johnson, V. C. T. (2016). *Wave and surge vulnerability of coastal residences*. Notre Dame.
- Jones, A., & Philips, M. (2011). *Disappearing destinations: climate change and future challenges for coastal tourism*. Oxfordshire, UK: CABI.
- Jones, A., & Phillips, M. (2018). *Global climate change and coastal tourism: recognizing problems, managing solutions and future expectations*. Oxfordshire, UK: CABI.
- Jordan, E. J., & Moore, J. (2018). An in-depth exploration of residents' perceived impacts of transient vacation rentals. *Journal of Travel and Tourism Marketing, 35*(1), 90–101.
- Kaján, E., & Saarinen, J. (2013). Tourism, climate change and adaptation: a review. *Current Issues in Tourism, 16*(2), 167–195.
- Kang, B. J. (2017). *Exploring a methodology for creating flood risk vulnerability of land use classification using professional opinions from municipal planners and emergency management official in Nova Scotia*. Dalhousie University.
- Karayiannis, O., Lakovidou, O., & Tsartas, P. (2013). Historic, symbolic aspects and policy issues of the second home phenomenon in the Greek tourism context: the Cyclades case study. In *Second home tourism in Europe- lifestyle issues and policy responses* (p. 229). Ashgate Pub. Limited.
- Khan, H. R. (2017). Impacts of tourism activities on environment and sustainability of Pattaya beach in Thailand. *Journal of Environmental Management & Tourism, 8*(8), 1469–1473.
- Klein, R. J. T., & Nicholls, R. J. (1999). Assessment of coastal vulnerability to climate change. *Royal Swedish Academy of Sciences, 28*(2), 182–187.
- Kovacs, P., Guilbault, S., & Pentz, B. (2017). *Communicating hurricane risk in Eastern Canada: enhancing the communication lines between the Canadian Hurricane Centre, municipalities and insurers*. Retrieved from <https://www.iclr.org/wp-content/uploads/2018/08/communicating-hurricane-risk-in-eastern-canada-enhancing-the-communication-lines-between-the-canadian-hurricane-centre-municipalities-and-insurers.pdf>

- Krawchenko, T., Keefe, J., Manuel, P., & Rapaport, E. (2016). Coastal climate change, vulnerability and age friendly communities: linking planning for climate change to the age friendly communities agenda. *Journal of Rural Studies*, 44, 55–62.
- Lemmen, D.S., Warren, F. J., Lacroix, J., & Bush, E. (2008). *From impacts to adaptation: Canada in a changing climate 2007*. Ottawa, ON. Retrieved from https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2007/pdf/full-complet_e.pdf
- Lemmen, Donald S, Warren, F. J., Lemmen, D., Warren, F., James, T., & Mercer Clarke, C. (2016). *Canada's marine coasts in a changing climate*. Ottawa, ON. Retrieved from https://www.ouranos.ca/publication-scientifique/Coastal_Assessment_Synthesis_en.pdf
- Lieske, D. J., Wade, T., & Roness, L. A. (2014). Climate change awareness and strategies for communicating the risk of coastal flooding: a canadian maritime case example. *Estuarine, Coastal and Shelf Science*, 140.
- Long, D. P., & Hoogendoorn, G. (2013). Second home owners' perceptions of a polluted environment: the case of Hartbeespoort. *South African Geographical Journal*, 95(1), 91–104.
- Louw, E., & van Wyk, S. (2011). Disaster Risk Management - planning for resilient and sustainable societies. *Civil Engineering*, 19(7), 16–18.
- Lundmark, L., & Marjavaara, R. (2013). Second home ownership: a blessing for all? *Scandinavian Journal of Hospitality and Tourism*, 13(4), 281–298.
- Lyle, T. S., & Mills, T. (2016). Assessing coastal flood risk in a changing climate for the City of Vancouver. *Canadian Water Resources Journal*, 41(1–2), 343–352.
- MacNeill, T., & Wozniak, D. (2018). The economic, social, and environmental impacts of cruise tourism. *Tourism Management*, 66, 387–404.
- Maher, P., Rapaport, E., & Manuel, P. (2012). *Visualising sea-level rise*. Halifax, NS. Retrieved from <http://atlanticadaptation.ca/en/islandora/object/acasa%253A737>
- Manuel, P., Rapaport, E., Keefe, J., & Krawchenko, T. (2015). Coastal climate change and aging communities in Atlantic Canada: a methodological overview of community asset and social vulnerability mapping. *Canadian Geographer*, 59(4), 433–446.
- Manzo, A. N., & Burke, J. M. (2012). Increasing response rate in web-based/internet surveys. In *Handbook of survey methodology for the social sciences* (Online, pp. 327–342). New York: Springer.
- Marjavaara, R. (2008). *Second home tourism: the root to displacement in Sweden?* Umeå University.

- Martins, I. M., & Gasalla, M. A. (2018). Perceptions of climate and ocean change impacting the resources and livelihood of small-scale fishers in the South Brazil Bight. *Climate Change*, 147, 441–456.
- Masteson, J. H., Peacock, W. W., Zandt, S. S., Grover, H., Schwarz, L. F., & Cooper, J. T. (2014). *Planning for Community Resilience: A Handbook for Reducing Vulnerability to Disasters*. Washington, DC: Island Press.
- McLeod, B., & Busser, J. A. (2014). Second homeowners hosting friends and relatives. *Annals of Leisure Research*, 17(1), 86–96. Retrieved from <http://dx.doi.org/10.1080/11745398.2014.888955>
- McIntyre, N., Williams, D. R., & McHugh, K. E. (2006). *Multiple dwelling and tourism negotiating place, home and identity* (First). Oxfordshire, UK: CABI.
- McNicol, B. J., & Glorioso, R. S. (2014). Second home leisure landscapes and retirement in the Canadian Rocky Mountain community of Canmore, Alberta. *Annals of Leisure Research*, 17(1), 27–49.
- Measham, T. G., Preston, B. L., Smith, T. F., Brooke, C., Gorrard, R., Withycombe, G., & Morrison, C. (2011). Adapting to climate change through local municipal planning: barriers and challenges. *Mitigation and Adaptation Strategies for Global Change*, 16(8), 889–909.
- Mercer Clarke, C. S. L., Manuel, P., & Warren, F. J. (2016). The coastal challenge. In D.S. Lemmen, F. J. Warren, T. S. James, & C. S. L. Mercer Clarke (Eds.), *Canada's Marine Coasts in a Changing Climate*. Ottawa, ON. Retrieved from https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2016/Coastal_Assessment_Chapter3_CoastalChallenge.pdf
- Miletić, G. M., Žmuk, B., & Mišetić, R. (2018). Second homes and local socio-economic development: the case of Croatia. *Journal of Housing and the Built Environment*, 33(2), 301–318.
- Minano, A., Johnson, P. A., & Wandel, J. (2018). Visualizing flood risk, enabling participation and supporting climate change adaptation using the Geoweb: the case of coastal communities in Nova Scotia, Canada. *GeoJournal*, 83(3), 413–425.
- Mirani, S. Z., & Farahani, B. M. (2015). Second homes tourism and sustainable rural development in all around the world. *International Journal of Leisure and Tourism Marketing*, 4(3/4), 176.
- Mogollón, B., Frimpong, E. A., Hoegh, A. B., & Angermeier, P. L. (2016). An empirical assessment of which inland floods can be managed. *Journal of Environmental Management*, 167, 38–48.
- Monirul, M., & Mirza, Q. (2003). Climate change and extreme weather events: can developing countries adapt? *Climate Policy*, 3(3), 233–248.

- Moore, W. R. (2010). The impact of climate change on Caribbean tourism demand. *Current Issues in Tourism*, 13(5), 495–505.
- Moreno, A., & Amelung, B. (2009). Climate change and coastal & marine tourism: review and analysis. *Journal of Coastal Research*, SI(56), 1140–1144.
- Moreno, A., & Becken, S. (2009). A climate change vulnerability assessment methodology for coastal tourism. *Journal of Sustainable Tourism*, 17(4), 473–488.
- Morrison, A., Noble, B. F., & Westbrook, C. J. (2019). Flood risk management in Canada's Prairie Provinces : an analysis of decision-maker priorities and policy preferences. *Environmental Management*. Retrieved from <http://dx.doi.org/10.1007/s00267-019-01208-0>
- Muise, J., Critchley, J., Rapaport, E., & Manuel, P. (2012). *Municipality of the District of Lunenburg: a case study in climate change adaptation*. Halifax. Retrieved from <https://atlanticadaptation.ca/en/islandora/object/acasa%3A545>
- Müller, D. K. (2011). Second homes in rural areas: reflections on a troubled history. *Norwegian Journal of Geography*, 65(3), 137–143.
- Müller, D. K. (2013). Progressing second home research: a Nordic perspective. *Scandinavian Journal of Hospitality and Tourism*, 13(4), 273–280.
- Muller, D. K., Hall, C. M., & Keen, D. (2004). Second home tourism impact, planning and management. In *Tourism, mobility and second homes: between elite landscape and common ground* (pp. 15–32). Clevedon: Channel View Publications.
- Nieuwland, S., & van Melik, R. (2018). Regulating Airbnb: how cities deal with perceived negative externalities of short-term rentals. *Current Issues in Tourism*, 1–15.
- Norris, M., & Winston, N. (2009). Rising second home numbers in rural Ireland: Distribution, drivers and implications. *European Planning Studies*, 17(9), 1303–1322.
- Norris, M., & Winston, N. (2010). Second-home owners: escaping, investing or retiring? *Tourism Geographies*, 12(4), 546–567.
- Nouza, M., Ólafsdóttir, R., & Sæþórsdóttir, A. D. (2018). Motives and behaviour of second home owners in Iceland reflected by place attachment. *Current Issues in Tourism*, 21(2), 225–242.
- Nova Scotia Department of Environment (NSDE). (2009). *Toward a greener future: Nova Scotia's climate change action plan*. Halifax, NS. Retrieved from <https://climatechange.novascotia.ca/sites/default/files/uploads/ccap.pdf>

- Nova Scotia Department of Environment (NSDE). (2019). *Public and stakeholder consultations on coastal protection legislation in Nova Scotia*. Halifax. Retrieved from <https://novascotia.ca/coast/CoastalProtectionLegislationConsultationReport.pdf>
- Nova Scotia Legislature. Bill 106: Coastal Protection Act (2019). Retrieved from https://nslegislature.ca/legc/bills/63rd_2nd/1st_read/b106.htm
- Objectplanet. (2018). Opinio Survey. Retrieved from <http://www.objectplanet.com/opinio/>
- Osbaldiston, N., Picken, F., & Duffy, M. (2015). Characteristics and future intentions of second homeowners: a case study from Eastern Victoria, Australia. *Journal of Policy Research in Tourism, Leisure & Events*, 7(1), 62–76.
- Papageorgiou, M. (2016). Coastal and marine tourism: a challenging factor in marine spatial planning. *Ocean and Coastal Management*, 129, 44–48.
- Parkinson, R. W., & McCue, T. (2011). Assessing municipal vulnerability to predicted sea level rise: City of Satellite Beach, Florida. *Climatic Change*, 107, 203–223.
- Persson, I. (2015). Second homes, legal framework and planning practice according to environmental sustainability in coastal areas: the Swedish setting. *Journal of Policy Research in Tourism, Leisure and Events*, 7(1), 48–61. <https://doi.org/>
- Pilone, E., Mussini, P., Demichela, M., & Camuncoli, G. (2016). Municipal emergency plans in Italy: requirements and drawbacks. *Safety Science*, 85, 163–170.
- Pitkänen, K. (2008). Second-home Landscape: the meaning(s) of landscape for second-home tourism in Finnish Lakeland. *Tourism Geographies*, 10(2), 169–192.
- Pitkänen, K., & Vepsäläinen, M. (2008). Foreseeing the future of second home tourism. The case of Finnish media and policy discourse. *Scandinavian Journal of Hospitality and Tourism*, 8(1), 1–24.
- Public Safety Canada. (2010). Emergency Management Planning Guide 2010–2011. Retrieved from <https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/mrgnc-mngmnt-pnnng/mrgnc-mngmnt-pnnng-eng.pdf>
- Public Safety Canada. (2019). *Emergency management strategy for Canada: toward a resilient 2030*. Ottawa, ON. Retrieved from <https://www.publicsafety.gc.ca/cnt/rsrscs/pblctns/mrgncy-mngmnt-strty/mrgncy-mngmnt-strty-en.pdf>
- Raikes, J., & McBean, G. (2016). Responsibility and liability in emergency management to natural disasters: a Canadian example. *International Journal of Disaster Risk Reduction*, 16, 12–18.
- Rapaport, E., Manuel, P., & Webster, T. (2014). *Nova Scotia inundation mapping project - interim report*. Halifax.

- Richards, W., & Daigle, R. (2011). *Scenarios and Guidance for Adaptation to Climate Change and Sea-Level Rise - NS and PEI Municipalities*. Halifax. Retrieved from https://www.novascotia.ca/nse/climate-change/docs/ScenariosGuidance_WilliamsDaigle.pdf
- Ricketts, P. J., & Hildebrand, L. (2011). Coastal and ocean management in Canada: progress or paralysis? *Coastal Management*, 39(1), 4–19.
- Rinne, J., Paloniemi, R., Tuulentie, S., & Kietäväinen, A. (2015). Participation of second-home users in local planning and decision-making – a study of three cottage-rich locations in Finland. *Journal of Policy Research in Tourism, Leisure and Events*, 7(1), 98–114.
- Roca, M. de N. O., Roca, Z., & Oliveira, J. A. (2011). Features and impacts of second homes expansion: the case of the Oeste Region, Portugal. *Hrvatski Geografski Glasnik*, 73(2), 111–128.
- Salik, K. M., Jahangir, S., Zahdi, W. ul Z., & Hasson, S. ul. (2015). Climate change vulnerability and adaptation options for the coastal communities of Pakistan. *Ocean and Coastal Management*, 112, 61–73. Retrieved from <http://dx.doi.org/10.1016/j.ocecoaman.2015.05.006>
- Santos-Lacueva, R., Clavé, S. A., & Saladié, Ò. (2017). The vulnerability of coastal tourism destinations to climate change: the usefulness of policy analysis. *Sustainability*, 9(2062), 1–19.
- Scott, D., Simpson, M. C., & Sim, R. (2012). The vulnerability of Caribbean coastal tourism to scenarios of climate change related sea level rise. *Journal of Sustainable Tourism*, 20(6), 883–898.
- Service Alberta. (2018). *Mortgage and title fraud*. Retrieved from https://www.servicealberta.ca/pdf/tipsheets/mortgage_title_fraud.pdf
- Shaw, J., Taylor, R. B., Solomon, S., Christian, H. A., & Forbes, D. L. (1998). Potential impacts of global sea-level rise on Canadian coasts. *Canadian Geographer*, 42(4), 365–379.
- Stantec. (2011). *UNSM municipal climate change mitigation plan guide*. Retrieved from <https://www.nsfm.ca/sustainability/319-municipal-climate-change-mitigation-plan-guide-final-jan-16-2012/file.html>
- Statista. (2019). Distribution of gross domestic product of Nova Scotia, Canada, in 2018, by industry. Retrieved from <https://www.statista.com/statistics/607879/gdp-distribution-of-nova-scotia-canada-by-industry/>

- Statistics Canada. (2018a). 2016 Census: Lunenburg County. Retrieved from <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CD&Code1=1206&Geo2=PR&Code2=12&Data=Count&SearchText=Lunenburg&SearchType=Begins&SearchPR=01&B1=All&GeoLevel=PR&GeoCode=1206&TABID=1>
- Statistics Canada. (2018b). 2016 Census: Nova Scotia. Retrieved from <https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/Page.cfm?Lang=E&Geo1=PR&Code1=12&Geo2=&Code2=&Data=Count&SearchText=NovaScotia&SearchType=Begins&SearchPR=01&B1=All&GeoLevel=PR&GeoCode=12>
- Stedman, R. C. (2006). Understanding place attachment among second home owners. *American Behavioral Scientist*, 50(2), 187–205.
- Steiger, R., Scott, D., Abegg, B., Pons, M., & Aall, C. (2017). A critical review of climate change risk for ski tourism. *Current Issues in Tourism*, 1–37. <https://doi.org/10.1080/13683500.2017.1410110>
- Stoddart, M. C. J., Catano, G., & Vodden, K. (2017). Regional assets and the benefits of tourism for host communities. In *Regional Tourism Networks and Social-Environmental Wellbeing in Rural Coastal Communities*. Canadian Electronic Library (Firm) distributor.
- Sue, V. M., & Ritter, L. A. (2007). *Conducting online surveys*. London, UK: SAGE Publications.
- Szlafsztein, C., & Sterr, H. (2007). A GIS-based vulnerability assessment of coastal natural hazards, state of Pará, Brazil. *Coastal Conserv.*, 11, 53–66.
- Tangeland, T., Vennesland, B., & Nybakk, E. (2013). Second-home owners' intention to purchase nature-based tourism activity products - a Norwegian case study. *Tourism Management*, 36, 364–376.
- Teo, T. (2013). Online and paper-based survey data: are they equivalent? *British Journal of Educational Technology*, 44(6), 196–198.
- Torresan, S., Critto, A., Rizzi, J., & Marcomini, A. (2012). Assessment of coastal vulnerability to climate change hazards at the regional scale: the case study of the North Adriatic Sea. *Nat. Hazards Earth Syst. Sci*, 12, 2347–2368.
- Torresan, Silvia, Critto, A., Dalla Valle, M., Harvey, N., & Marcomini, A. (2008). Assessing coastal vulnerability to climate change: comparing segmentation at global and regional scales. *Sustainability Science*, 3(1), 45–65.
- Toubes, D., Gössling, S., Hall, C., & Scott, D. (2017). Vulnerability of coastal beach tourism to flooding: a case study of Galicia, Spain. *Environments*, 4(4), 83.

- Tourism Industry Association of Nova Scotia (TIANS). (2019). Tourism revenue reached \$2.6 billion in 2016 - with right approach, more to come. Retrieved from <http://www.tians.org/news-and-media/170-tourism-revenue-reached-26-billion-in-2016>
- Tourism Nova Scotia. (2017). *Tourist accommodation needs assessment: final report*. Halifax, NS. Retrieved from <https://tourismns.ca/research/tourist-accommodations-needs-assessment>
- Town of Lunenburg. (2019). Explore Lunenburg. Retrieved from <https://www.explorelunenburg.ca/>
- Tutton, M. (2019, March 30). Nova Scotia is one “perfect storm” away from being cut off from Canada. *CBC*. Retrieved from <https://www.cbc.ca/news/canada/nova-scotia/storm-maritime-provinces-1.5075448>
- Union of Concerned Scientists. (2018). *Climate change, extreme precipitation and flooding*. Retrieved from <https://www.ucsusa.org/resources/climate-change-extreme-precipitation-and-flooding>
- UNWTO. (2008). *Climate change and tourism - responding to global challenges*. Retrieved from <https://sdt.unwto.org/sites/all/files/docpdf/climate2008.pdf>
- Van Selm, M., & Jankowski, N. W. (2006). Conducting online surveys. *Quality & Quantity*, 40(3), 435–456.
- Velvin, J., Kvikstad, T. M., Drag, E., & Krogh, E. (2013). The impact of second home tourism on local economic development in rural areas in Norway. *Tourism Economics*, 19(3), 689–705.
- Visser, G. (2004). Second homes and local development: issues arising from Cape Town’s De Waterkant. *GeoJournal*, 60, 259–271.
- Wachsmuth, D., & Kerrigan, D. (2017). Airbnb: short-term rentals, short-term thinking. *Canadian Dimension*, 51(4), 1. Retrieved from https://canadiandimension.com/articles/view/airbnb-short-term-rentals-short-term-thinking?fbclid=IwAR1uxB5S7jYq1QlZAnJ9Lkd1w2YNpiUwk_oHACrJtlzMw2MczDmxyWfXr3w
- Walker, T. R., Adebambo, O., Del Aguila Feijoo, M. C., Elhaimer, E., Hossain, T., Edwards, S. J., ... Zomorodi, S. (2018). Environmental effects of marine transportation. In *World Seas: An Environmental Evaluation*.
- Walters, T., & Carr, N. (2015). Second homes as sites for the consumption of luxury. *Tourism and Hospitality Research*, 15(2), 130–141.

- Warren, F. ., & Lemmen, D. . (2014). *Canada in a changing climate: sector perspectives on impacts and adaptation*. Ottawa, ON. Retrieved from http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/assess/2014/pdf/FuII-Report_Eng.pdf
- Weissenberger, S., & Chouinard, O. (2015). The Vulnerability of Coastal Zones Towards Climate Change and Sea Level Rise. In *Adaptation to Climate Change and Sea Level Rise: The Case Study of Coastal Communities in New Brunswick, Canada* (pp. 7–27). Newbrunswick: Springer.
- White, S. (2018, June 15). Short-term rentals vital to N.S. tourism boom. *The Chronicleherald*.
- Wijaya, N., & Furqan, A. (2018). Coastal tourism and climate-related disasters in an archipelago country of Indonesia: tourists' perspective. In *Procedia Engineering* (Vol. 212, pp. 535–542). Bangkok, Thailand: Elsevier B.V.
- Withey, P., Lantz, V. A., & Ochuodho, T. O. (2016). Economic costs and impacts of climate-induced sea-level rise and storm surge in Canadian coastal provinces: a CGE approach. *Applied Economics*, 48(1), 59–71.
- World Tourism Organization (WTO). (2018). *UNWTO tourism highlights: 2018*. Madrid. Retrieved from <https://www.e-unwto.org/doi/book/10.18111/9789284419876>
- World Travel & Tourism Council (WTTC). (2019). Country analysis. Retrieved from <https://www.wttc.org/economic-impact/country-analysis/>
- WTO. (2008). *Climate change and tourism: responding to global challenges*. Madrid. Retrieved from <https://www.e-unwto.org/doi/pdf/10.18111/9789284412341>
- Wu, S. Y., Yarnal, B., & Fisher, A. (2002). Vulnerability of coastal communities to sea-level rise: A case study of Cape May County, New Jersey, USA. *Climate Research*, 22(3), 255–270.
- WWF. (2019). Beautiful coastlines disappearing under concrete. Retrieved from https://wwf.panda.org/our_work/oceans/problems/tourism/
- Wynja, V., Demers, A.-M., Laforest, S., Lacelle, M., Pasher, J., Duffe, J., ... Giles, T. (2015). Mapping coastal information across Canada's northern regions based on low-altitude helicopter videography in support of environmental emergency preparedness efforts. *Journal of Coastal Research*, 31(2), 276–290.
- Zikra, M., Suntoyo, & Lukijanto. (2015). Climate change impacts on Indonesian coastal areas. *Procedia Earth and Planetary Science*, 14, 57–63.

APPENDIX A ONLINE SURVEY QUESTIONNAIRE

Second homes: an issue of concern for municipal planning?

Consent form for the survey

You are invited to take part in a research study being conducted by me, Farzana Karim, a Masters student in School for Resource and Environmental Studies, as part of my degree at Dalhousie University. The purpose of this research is to find out to what extent current municipal planners perceive second homes/rental homes as an issue for municipal planning and emergency management. An online survey will be conducted among the members (who are currently working for the municipality) of the Canadian Institute of Planners (CIP) using Opinio survey domain. I will write up the results of this research in a paper for my Master's thesis.

As a participant in the research, you will be asked to complete a short survey (10-12 minutes) over the internet whose purpose is to seek information on how municipalities currently see and tackle different issues related to second homes/rental homes. All responses will be saved on a secure Dalhousie server during the survey and processed using Stata Statistical software. The survey responses will be stored in an encrypted password protected file on a USB stick at the end of the survey and the responses will be deleted by the researcher from the Dalhousie server. The survey will not ask your name and any other personal information except your email address, job title and municipality name which will not be disclosed anywhere. Any quotes I use will not be attributed. Only my supervisors and I will have access to the raw survey results. I will describe and share aggregated findings in my master's thesis, the listserv that sent out the survey and a paper will be published in Plan Canada Journal. You can also have it sent directly to you if you provide an email address.

Your participation in this research is entirely your choice. You do not have to answer questions that you do not want to answer, and you are welcome to cancel the survey at any time if you no longer want to participate. All you need to do is close your browser to exit from the survey. You can also save the survey and return to it later. However, if you complete the survey and change your mind later to exclude your response from the survey, I will not be able to remove the information you provided unless it is possible to identify your submission based on the unique information you provided like an email address or any free-text provided under the open-ended survey questions.

There will be no direct benefit to you in participating in this research, and you will not receive compensation. The research, however, might contribute to generating new knowledge regarding the issue of second homes and its importance for municipal planning and decision making. If you have any questions about this study, please feel free to contact us.

If you have any query about this study, please contact Farzana Karim. If you have questions later, please feel free to contact me at farzana.karim@dal.ca or my supervisors Dr. Kate Sherren at kate.sherren@dal.ca and Dr. Eric Rapaport (MCIP) at eric.rapaport@dal.ca

If you have any ethical concerns about your participation in this research, you may contact Research Ethics, Dalhousie University at (902) 494-1462, or email ethics@dal.ca.

If you agree to complete the survey, please click on the “Start” button.

Questionnaire

1. What is the name of the municipality you work for?

2. What kinds of seasonal dwellings/second homes exist in your municipality? (Tick any that apply)

- Cottages/summer homes/beach home (Private secondary home)
- Winter homes/ski huts/chalets (Private secondary home)
- Vacation rentals/villa/holiday homes (for tourists)
- Seasonal dwellings that are becoming year-round residences
- Overseas (out of country)/absentee home owners
- Others, please describe _____

3. Are seasonal dwellings/second homes a public policy or planning issue in your municipality? (if your answer is “No” proceed to question 10)

- Yes No

4. What types of planning issues have come up in your municipality when considering seasonal secondary homes? (Tick any that apply)

- Community planning
- Emergency response
- Housing supply
- Real estate speculation
- Land inflation
- Tourism demand
- Stakeholder engagement
- Climate adaptation
- Conflict between seasonal and year-round residents
- Second homes' effects on the environment
- Increasing demand for utility and municipal services
- Others, please describe _____

5. Has your municipality ever tried to distinguish the above categories of seasonal/second homes from those occupied year-round? (if your answer is "No" proceed to question 10)

- Yes No

6. What data types did your municipality use to identify second homes? (Tick any that apply)

- Tax records (e.g. classified as second home or commercial)
- Foreign/non-local addresses (e.g. on tax record or property assessment)
- Rental property database (Airbnb, VRBO, kijiji)
- Electricity usage

Other utility usage (e.g. water, telephone/internet bill, heating oil, garbage collection, etc.) please Specify _____

Mail out survey

Others, please describe _____

7. Did your analysis produce a map of second homes or their prevalence?

Yes No

8. Did your municipality face any challenges in its attempt to map second homes?

Yes No

If so, what type of challenges: (Tick any that apply)

Data completeness

Privacy issues

Rural properties (off the grid)

Fraudulent behavior (e.g. offshore residents using a friend's local address for tax purposes)

Others, please describe _____

9. How did the municipality use the results of the analysis? (Tick any that apply)

Comprehensive planning

Emergency management planning

Climate adaptation or mitigation planning

Policy-making (e.g. coastal policy, housing, tourism etc.)

Others, please describe _____

Skip questions 10, 11, 12 if you answered previous questions 6, 7, 8, 9

10. What do you think could be used to identify second homes in your municipality if you needed to?

- Tax records (e.g. classified as second home or commercial)
- Foreign/non-local addresses (e.g. on tax record or property assessment)
- Rental property database (Airbnb, VRBO, kijiji)
- Electricity usage
- Other utility usage (e.g. water, telephone/internet bill, heating oil, garbage collection, etc.) please specify _____
- Mail out survey
- Others, please describe _____

11. What challenges do you think municipalities might face identifying second homes? (Tick any that apply)

- Data completeness
- Privacy issues
- Rural properties (off the grid)
- Fraudulent behavior (e.g. offshore residents using a friend's local address for tax purposes)
- Others, please describe _____

12. If you had information on where second homes are in your municipality, how might your municipality use it? (Tick any that apply)

- Comprehensive planning
- Emergency management planning
- Climate adaptation or mitigation planning
- Policy-making (e.g. coastal policy, housing, tourism etc.)
- Others, please describe _____

13. In your opinion, has your municipality experienced any of the following phenomena in the last 5 years? (Tick any that apply)

- Ocean tidal effect
- Storm surge
- Sea level rise
- Coastal erosion
- Freshwater flooding
- Drought/water shortage
- Heatwave
- Avalanche risk
- Well-water shortage/low quality
- Snowfall reduction
- Other climate-related issues:

14. What is your role in the municipality you work for?

- Chief Executive Officer/CAO
- Emergency Management Officer
- Municipal Planner
- Municipal Engineer
- Financial Officer
- Individual consultant (as a planner)
- Others, please write down _____

15. Do you have any additional comments about the issue of planning in relation to seasonal/second/rental homes in your municipality?

16. Please provide your email address if you would like to get the survey results sent directly to you. Note that results will also be sent to the listserv that sent you this invitation.
