

Examining the relationship between climate change risk perceptions and the implementation of climate-related policies

by

Shireen Aslam

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AUTHOR'S DECLARATION

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

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Abstract

Climate change is a global problem that will have local impacts on regions and municipalities. Many parts of Canada are already experiencing severe weather events such as extreme levels of rainfall, severe flooding, and increased frequency of storms. Local planning officials have the capacity to respond to climate change through mitigation and adaptation strategies, but before asking the question of whether any action is being taken on the local level, there needs to be an understanding of how local planning officials view climate change and whether the issue reaches policy attention. For the general public, literature tells us that most people perceive climate change to be a temporally and geographically distant issue. This absence of personal relevance renders that people fail to take responsive action. Some authors have also noted that there is an absence of municipal action on climate change because it is also not viewed as a local concern. At the same time, climate change is but one of the many issues that municipal councils must consider and address on a daily basis, often leaving the matter to be pushed aside, in place of other more pressing issues.

The main objectives of this thesis were to understand how local planning officials view climate change, assess whether climate change is recognized as an issue requiring policy attention, and perform a policy review to assess the current state of local action in the Regional Municipality of Waterloo. In total, 21 professionals working in the Region took part in the study, and came from a diverse range of backgrounds including planning, environment, emergency management, public health and economic development, among others.

With respect to the main research question, ‘what is the relationship between climate change risk perceptions and implementation of climate-related policies’, this study found there to be four guiding frameworks. These were 1) the need for collaboration: perceptions indicated a need, while policy demonstrated feasibility; 2) the need for leadership: perceptions suggested that leadership is critical, but somewhat limited in practice, while policy suggested it already exists; 3) the need for integration of climate change in the planning context and other planning issues: perceptions suggested disconnect, while policy also suggested disconnect; and 4) the need for presenting climate change as a local issue: perceptions demonstrated a need, while policy can provide the supporting document.

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Chapter 1– Introduction

This study will examine the relationship between climate change risk perceptions amongst local planning officials and the implementation of climate-related policies. Recognizing that climate change is a global problem but that the impacts will be felt acutely at local levels, there is an imperative need to understand what actions are being taken at the local level and how climate change risk perceptions may be related to these activities. Particularly with the issue of climate change, individuals are presented with several challenges. For example, strong impacts may not be felt in one's lifetime, or if particular weather events do occur, there might be uncertainty as to whether that event was related to climate change. Similarly, if individuals decide to take actions to mitigate or adapt to climate change, there may be a lack of feedback as to whether those actions were effective or made a difference. This relationship is largely based on the perception of what risks are involved, what barriers or constraints prevent one from taking action, and what specific activities are required to address the issue at hand.

When examining the way people think about and engage with climate change more closely, the environment-behaviour literature demonstrates that most people consider climate change to be a temporally and geographically distant issue. There is a lack of personal engagement as people fail to see themselves as being personally at risk; instead, perceiving it to be a problem for different geographical locations, different generations, and for more vulnerable societies.

There are also several challenges related to the municipal response for climate change. For example, organizations like the Federation of Canadian Municipalities have developed programs to engage members in climate change mitigation, and encourage decision makers to create action plans to reduce greenhouse gas emissions. However, as of August 2013, only 240 municipalities, from Canada's 4000+ municipalities, have committed to the program (FCM, 2013c; Robinson & Gore, 2005). There are also multiple barriers for climate action in municipalities, such as having the financial resources, knowledge, capacity, and human resources to effectively take action (Robinson & Gore, 2005).

Despite these challenges, there is a critical need for municipalities to consider climate change in decision making and integrate the issue into daily activities and planning documents. Many parts of Canada are already experiencing severe weather events such as extreme levels of rainfall, severe flooding, and increased frequency of storms. On October 29th, 2012, parts of Eastern Canada were

impacted by Hurricane Sandy. On April 12th, 2013, a powerful ice storm resulted in a massive power outage for the Waterloo Region. On April 16th, 2013, Huntsville and Bracebridge, Ontario, declared a state of emergency from severe levels of flooding. In July 2013, Calgary also experience tremendous flooding while in the same month, Toronto received an incredible 126 millimetres of rain over the span of only a few hours, surpassing the regulatory Hurricane Hazel record of 121 millimetres.

Local planning officials have the capacity to respond to climate change through mitigation or adaptation strategies and can play a key role in implementing public policy. But before asking the question of whether action is being taken on a local level, there needs to be an understanding of how local planning officials view climate change and whether the issue even receives policy attention. In other words, there needs to be an understanding of whether local planning officials, like the general public, also view climate change to be a temporally and geographically distant issue.

The scope of inquiry for this thesis is hence to understand how local planning officials view climate change and whether this relates to the types of policies that are being implemented at the regional and municipal level. Specifically, examining risk perceptions provides one method of approaching this inquiry, as it takes into account how personally relevant the issue may be (i.e. perceived susceptibility), and temporal factors surrounding climate change impacts (i.e. perceived severity). Second, this thesis aims to gain a sense of whether climate change is recognized as an issue requiring policy attention. This requires an understanding of what other issues are given policy attention, whether mitigation and adaptation are considered in decision making, and what possible barriers influence the policy implementation process. Finally, in light of the minimal response from municipalities on climate change, this thesis includes a policy review of various planning documents to understand the current state of climate action at a regional and municipal level.

Given notable gaps in the literature in terms of how perception relates to both intention to act and behaviour, as well as gaps in the literature for how local planning officials (in contrast to the general public) perceive climate change risk, the specific research question this study will address is: What is the relationship between climate change risk perceptions amongst local planning officials and the implementation of climate-related policies? The Regional Municipality of Waterloo in Ontario, Canada, was selected as the study site for convenience purposes, with ‘local planning officials’ referring to professionals working for the Region of Waterloo, and cities, Waterloo, Kitchener and Cambridge. Climate-related policies refer to any type of policy directed toward mitigating or adapting to climate change impacts. Mitigation is defined by the Intergovernmental Panel on Climate Change

(IPCC) as, “an anthropogenic intervention to reduce the anthropogenic forcing of the climate system; includ[ing] strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks” (IPCC, 2007a). Adaptation on the other hand is defined as, “adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm, or exploits beneficial opportunities” (IPCC, 2007b). Adaptation can be further distinguished as anticipatory or proactive, “adaptation that takes place before impacts of climate change are observed”; autonomous or spontaneous, “adaptation that does not constitute a conscious response to climatic stimuli but is triggered by ecological changes in natural systems and by market or welfare changes in human systems; or planned adaptation, “adaptation that is the result of deliberate policy decision, based on an awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state” (IPCC, 2007b).

Knowledge of this relationship will offer insight on what factors shape perceptions, what barriers prevent climate change mitigation and adaptation from becoming a top priority in policy-making, and where missed opportunities exist in various planning documents. This study ultimately aims to gain a better understanding of how local planning officials view and respond to climate change, in order to assess how the process of implementing mitigation and adaptation strategies can be facilitated.

The following 8 chapters are organized as such: Introduction (chapter 1), Literature review (chapter 2), Methodology (chapter 3), Questionnaire findings (chapter 4), Policy review findings (chapter 5), and Analysis and recommendations (chapter 6). These chapters present a discussion on the scope of inquiry and objectives of this thesis, the academic literature on climate change risk perceptions and relevance to local planning officials, as well as the methods for measuring risk perceptions, intentions to act and behaviour (which provides the guiding concepts to develop a questionnaire instrument). These chapters also describe the particular sampling group, recruitment process and study location, the findings from the questionnaire instrument and policy review, as well as their implications for local planning for climate change. Chapter 3 will outline the eleven sub-questions and one main research question this study aims to address. Chapters 4 and 5 specifically address the eleven research sub-questions, while chapter 6 focuses largely on the main research question, “what is the relationship between climate change risk perceptions and the implementation of climate-related policies”.

Chapter 2 – Literature Review

Understanding human behaviour is a complex issue. While it may be assumed that there is a linear relationship between what people think about a particular subject, how these thoughts influence decisions to take action, and the resulting behaviour the person ultimately performs, there can be a multitude of factors that influence attitudes, intentions and actions. Different situational, cultural and contextual factors can bring about certain behaviours in one scenario, but not in another. Similarly, people may act one way in one scenario, but act differently when put in the same scenario at a later time.

In the context of climate change, there are several further challenges added. Individuals may not feel strong impacts in their lifetime, or if they decide to perform certain actions, there may be a lack of feedback as to whether those actions actually had an impact or made a difference. There is also a great deal of uncertainty. For example, there is uncertainty as to whether temperature changes or abnormal weather events experienced in an environment, are in fact tied to climate change. Consequently, decisions to take precautions and to perform certain behaviours are mediated by perceptions of what risks will be involved, what barriers may be in place that constrain behaviour, what actions are required to address the problem at hand, and how meaningful those actions will be.

To express it another way, people often rely on ‘heuristics’ when trying to understand what outcomes may be involved in situations that are uncertain or not clear. As the literature shows, these heuristics help inform individuals about what actions to take, but can also introduce a great deal of error and bias in judgment.

Another important consideration is to understand what sources of information people consult to learn more about climate change. How do these different sources inform people about what risks are involved and how necessary adaptation or mitigation measures may be? Moreover, how do levels of knowledge and perceptions of how informed a person is, influence their decisions to take action and the actual resulting behaviour. Can it be assumed that personal factors such as perceptions of risk, knowledge or experience with severe climatic events play a stronger role in motivating behaviour, or might situational factors such as the organizational culture in a department, and economic constraints play a stronger role in decisions to implement policy?

Understanding how this process of decision making might relate to behavioural outcomes can hence be considered a valuable research direction, as it may shed light on the ways we can promote

greater response in the interest of climate change mitigation and adaptation. The following sections examine these issues in more detail, beginning with a look at the different theories on risk perceptions.

2.1 Theories on risk perception

While there does not appear to be consensus in the literature in terms of which theory best explains risk perceptions, there does appear to be some agreement that risk perceptions are constructed by an interaction of personal, social, cultural, and political factors.

The literature particularly points to three theoretical frameworks for how risk perceptions can be constructed. These are the psychometric paradigm (Slovic, 1987), cultural theory (Douglas & Wildavsky, 1982), and social amplification of risk theory (Kasperson et al., 1988).

2.1.1 Psychometric paradigm

Stemming from studies in psychology, the psychometric paradigm holds that people make quantitative judgments about how risky various events and hazards are by considering several factors such as perceptions and attitudes (controllability, knowledge, feelings of dread, etc.), benefits or trade-offs for society (e.g. acceptable levels of risk given benefits), and costs to society (e.g. number of deaths caused by hazard in a typical year versus disastrous year) (Slovic, 1987). Sjoberg (2002) adds that risk perceptions result from thoughts, constructs and beliefs and particularly due to the uncertain and complex nature of most risks, people use ‘heuristics’ or rules of thumbs to estimate what outcome they will face (Helgeson, Dietz, Chabay, 2010). One of the main objectives in this theory is to develop a categorization of different hazards or events (e.g. nuclear power, smoking, motor vehicles etc.) such that they can be better understood and better prepared for (Slovic, 1987).

Van Winsen et al. (2011) note that there can be individual differences in risk perceptions as a result of different personal experiences, social or cultural backgrounds, and distinct interpretations of risk. This suggests a highly personal and cognitive element in risk perceptions. Slovic (1987) found that there were in fact, differences between certain groups of people, although there has been criticism as to whether individual differences were actually measured (Marris, Langford, O’Riordan, 1998). Slovic’s (1987) work showed how a group of woman voters ranked nuclear power as having the most risk (ranking of 1) from a list of 29 other activities and technologies. Experts on the other hand, ranked nuclear power at a much lower end of the risk spectrum (ranked only 20 out of 30) (Slovic, 1987). The author suggests that experts tend to consider more technical aspects of risks (e.g. annual

fatalities), whereas lay groups often consider more hazardous elements (e.g. threats to future generations). Slovic (1987) adds that the difference between the groups is not necessarily from differences in opinions, but rather differences in the assessment method and different definitions of the risk concept. The theory is not merely an assortment of risk statistics either, as psychological factors such as emotion, trust and worldviews can influence perceptions (Schliep, Bertzky, Hirschnitz, Stoll-Kleeman, 2008).

2.1.2 Cultural theory

Stemming from studies in sociology and anthropology, cultural theory places more value on how groups interpret risks collectively (Marris, Langford, O’Riordan, 1998). Douglas and Wildavsky (1982) criticize cognitive and affective theories for failing to consider how culture can influence risk perceptions (Van De Linden, 2012). How risky an object or event is perceived to be is instead mediated by the social context, hence it is the socially shared worldview which determines risk (Oltedal et al., 2004; Van Winsen et al., 2011).

In adopting Douglas and Wildavsky’s (1982) cultural-worldview typologies, Leiserowitz (2007) found that cultural worldviews were indeed a significant predictor of risk perceptions in the context of climate change. Different cultures respond to threats differently and social structures can lead to diverging attitudes, or a cultural bias towards a risk. This in turn plays a large role in constructing individual perceptions of risk (Schliep et al., 2008).

It is also worth noting how the organizational cultural may relate to climate action, further lending support to a cultural theory of risk perception. Juhola et al. (2011) found noteworthy results of how the ‘framing’ of adaptation can lead to different policy outcomes. In analyzing policy problems such as climate change, Juhola et al. (2011) found that the definition of adaptation varied between actors depending on which frame was applied, the perception of climate change risk, and the measures that were deemed appropriate for adaptation in each context. As the authors describe, “different initial framings of adaptation result in a particular definition of the problem, and consequently lead to particular policy solutions while excluding others” (Juhola et al., 2011, p.460).

Schliep et al. (2008) also found the organizational culture to be an important factor in their survey of Protected Area managers’ risk perceptions on climate change. The authors note that continuous climate change discourse goes hand in hand with high degrees of information diffusion, and that personal factors such as awareness and motivation to take climate action can stem from social factors

such as the organizational culture (what is being discussed) and what information or knowledge is communicated in the department.

2.1.3 Social amplification of risk

A third theory relating to risk perception is the ‘social amplification of risk theory’. The principle behind this theory is that risk events interact with cultural, psychological and social factors to either increase or decrease perceptions of risk (Kasperson et al., 1988). As Kasperson et al. (1988) describe, amplification occurs through two stages. The first is that information about the risk is communicated, while a second process takes place in the form of a response mechanism by society. This theory is mainly applied to threats in the environment or for human health, and examines how communication of risk travels between channels and persons (Van Winsen et al., 2011). Key aspects to consider include how the scientist communicates the risk, how cultural groups interpret the information, how the news media covers the story and how other interpersonal networks transfer information (Kasperson et al., 1988).

2.1.4 Limitations of theories

Although there has been a great deal of literature dedicated to understanding and applying these theories, there remain some weaknesses. For example, Sjoberg (2000) argues that the psychometric model is likely the “leading contender in the field” (p. 1) but notes that the theory’s exploratory value only accounts for 20% of the variance in raw data. Cultural theory in contrast explains even less with about 5-10% of the variance in perceived risk being accounted for.

Despite being the dominate theory in studying risk perceptions, the psychometric approach has also received other criticisms. One of the main criticisms is that it fails to provide reasoning for why and how individuals differ in their risk perceptions (Van Winsen et al., 2011). Marris, Langford and O’Riordan (1998) add that psychometric studies claim to represent personality profiles for different hazards yet there is limited research on how other groups aside from experts and laypersons perceive risk. The main cause of this problem, the authors point out, is largely a result of psychometric studies using aggregate data, whereas several other studies have shown individual differences in ratings of the same risk (Marris, Landford, O’Riordan, 1998).

Another major limitation of the theories relates to their explanation of behaviour, or as some authors have expressed it, the ‘behaviour-intention gap’ (Sheeran, 2002). For instance, although people may express willingness to take action (e.g. recycling, using more active forms of

transportation), there is often an absence of measurable behaviour, as people fail to follow through (i.e. not recycling, continuing to drive a car). Van Der Linden (2012) notes that most metareviews consistently find 60% to 70% of the variance in behaviours as being unpredictable. This can again, be a result of a multitude of factors influencing decisions, including situational barriers such as political or economic constraints; social and contextual influences such as considering social norms or what the group is doing; as well as personal factors such as habit. Together, these issues illustrate the necessity in understanding what motivates behaviour, and whether risk perceptions of climate change are involved.

2.2 Risk perception versus other constructs

Why study risk perceptions and not constructs such as concern, or engagement? Van Der Linden (2012) points out that the studies that examine psychological and behavioural determinants of climate change action, often adopt ‘fuzzy terms’ such as ‘involvement’, ‘awareness’ or ‘engagement’. Instead, measuring ‘risk perception’ is more appropriate, given that the construct incorporates dimensions like societal risk factors, general concern, personal levels of worry and perceived seriousness or severity of threats (Leiserowitz, 2007; Bord, O’Connor, Fisher, 2000; Truelove, 2009). Grothmann and Patt (2005) further attest that decisions to adapt to climate change are influenced and motivated largely by personal goals, norms and values, which serve to form the relative risk perception. People evaluate the likelihood of being exposed to, and how harmful climate change impacts will be, in relation to evaluating the people, places and objects that they value, as well as the other pressing issues that the person may be dealing with at the time (Grothmann & Patt, 2005).

Tam and McDaniels (2013) point out that in order for adaptation strategies to be implemented successfully, risk perceptions and attitudes on the acceptability of policy alternatives, must first be understood. Likewise, risk perceptions have been identified in both conceptual (Adger et al., 2009), and empirical studies (Grothmann & Patt, 2005) as being an important factor for encouraging climate change adaptation as well determining adaptation outcomes (Tam & McDaniels, 2012).

2.3 Climate change risk perception

Looking at risk perceptions associated with climate change more specifically, the literature presents some noteworthy findings for how these perceptions can influence intention to act and behaviour. For example, O’Connor, Bord, Yarnal and Wiefek (2002) examined the factors that influence people’s support for reducing greenhouse gas emissions and found that cognitive factors played a strong role.

Specifically, participants would reduce emissions if they understood the causes of climate change; perceived there to be a substantial risk if average surface temperatures increased; and if they believed they would not lose their jobs if they supported mitigation policies (O'Connor, Bord, Yarnal, Wiefek, 2002).

With respect to intention to act, Grothmann and Patt (2005) found that perceived adaptive capacity and perceived probability of an adverse event occurring (in contrast to economic, social and political factors) explained more of the variance between those who decided to take adaptive action and those who did not. O'Connor, Bord and Fisher (1999) also found that risk perceptions were important for predicting behavioural intentions, and in particular, the specific risk perception variable measured held its predictive power even after general environmental beliefs were considered.

In terms of motivating behaviour, Semenza, Ploubidis and George (2011) found that perceived susceptibility and perceived severity of climate change were important factors. For example, participants were more likely to reduce energy consumption if they believed climate change could affect their way of life (i.e. perceived susceptibility), endanger their life (i.e. perceived severity), or saw serious barriers to protecting themselves from climate change. Moreover, the study found that voluntary mitigation was dependent on perceived susceptibility to threats and severity of climate change impacts, whereas adaptation was dependent on the availability of information about climate change (e.g. scientific information about impacts, etc.) (Semenza, Ploubidis, George, 2011).

2.4 Risk perception summary

Taken together, the discussion above on the academic literature for risk perceptions provides the rationale for examining risk perceptions amongst other constructs. Given the notable factors that influence risk perceptions, and the theories that attempt to explain these perceptions but tend to come up short in their connection to behaviour, the current study aims to examine this relationship more closely. Specifically, the research assesses personal and organizational aspects in climate action, issues surrounding perceived susceptibility and severity, and an assessment of behaviour, in this case, measured by implemented policies.

The next section describes two other important considerations in measuring climate change risk perception; these are, the sources of information that people consult to inform their knowledge of climate change, and how different types of communication methods can have different effects for motivating behaviour.

2.5 Information about climate change

It is important to recognize that some sources of information (e.g. newspaper and other media) attempt to instill a level of threat or fear when communicating climate change impacts. To illustrate, Hulme (2007) reviewed 10 major U.K. national newspapers for the coverage of the Intergovernmental Panel on Climate Change (IPCC) Working Group 1 Report. This report is a major global assessment of the socio-economic, technical and economic aspects of climate change. The author found that in nine out of ten of the papers reviewed, the adjectives catastrophic, shocking, terrifying, and devastating were introduced, however none of these words were actually part of the original IPCC report (O'Neill & Nicholson-Cole, 2009). This demonstrates one of the ways in which mass and print media, in contrast to the scientific community, may convey information about climate change differently. Although the subject of fear is not a main focus in this study, it is important to consider the influence these representations may have on shaping risk perceptions. While some studies have demonstrated that presenting a more fearful representation of climate change impacts may have an effect on shaping attitudes, intent, or encouraging behavioural change, other studies have shown that fear is generally ineffective for personal engagement.

2.5.1 Effectiveness of fear in climate change communication

Witte and Allen (2000) performed a meta-analysis of 93 fear experiments and found a positive average correlation, although small, between fear and behavioural outcomes. Specifically, the authors found that as fear appeals increased in strength, so did feelings of fear, perceptions of the threat's severity, and perceptions of being susceptible to the threat (Witte & Allen, 2000).

Meijinders, Midden and Wilke (2001a) found that evoking fear responses when describing CO₂ risk, resulted in systematic processing of energy conservation information as a risk-reducing strategy. In other words, more thoughtful consideration was given when participants evaluated CO₂ risk, as opposed to making a judgment without much thinking. The authors also found that participants had more favourable attitudes toward energy conservation. In another study by the same authors, it was found that participants in moderate and high fear conditions related to greenhouse gases reported more favourable attitudes towards energy-saving light bulbs (Meijinders, Midden, Wilke, 2001b). Similarly, Hass, Bagley and Rogers (1975) found that fear appeals communicated about the U.S. energy crises influenced perceptions of severity, in turn producing stronger intentions amongst participants to reduce energy consumption.

Leiserowitz (2006) examined risk perceptions about climate change amongst the general public and found similarities between risk perceptions and affective imagery. Affective imagery in this context, referred to the type of positive or negative ideas or images that were elicited when evaluating climate change risk (Leiserowitz, 2006). Common fearful representations of climate change include glaciers and icebergs melting, intense drought and heat waves, sea level rise and flooding, and extreme weather events (O'Neill & Nicholson-Cole, 2009). In analyzing the affective imagery associated with climate change, Leiserowitz (2006) found that images of melting polar ice and glaciers was the largest response category reported by participants, followed by heat and rising temperatures, sea level rise, and flooding. This illustrates the importance of considering how fear appeals play a role in shaping risk perceptions.

Moreover, Leiserowitz (2007) noted that communities who held similar risk perceptions, affective imagery and sociodemographic characteristics differed from other communities in the way they conceptualized and responded to climate change. Of interest, those who had very high risk perceptions ('alarmists'), strongly supported government policies to mitigate climate change (including raising taxes) and were significantly more likely to have taken personal action to reduce greenhouse gas emissions. In contrast, those who had very low or non-existent risk perceptions ('naysayers') were politically active, significantly more likely to vote, had strong representations in national government and had powerful allies in the private sector (Leiserowitz, 2007).

2.5.2 Ineffectiveness of fear in climate change communication

O'Neill and Nicholson-Cole (2009) argue that these fearful or 'wicked' representations render people to perceive climate change as being an impersonal and distant issue. Similarly, Spence and Pidgeon (2010) note that distant impacts about climate change are viewed by the public as being more serious, however people also tend to view them as less personally threatening. When participants evaluated the risk of climate change impacts, they viewed them as being more problematic for people in distant locations and more vulnerable societies (Spence & Pidgeon, 2010). Many other authors have also confirmed that climate change is generally perceived as being a temporally and geographically distant issue (Leiserowitz, 2005; Lazarus, 2009; Lorenzoni, Nicholson-Cole, Whitmarsh, 2007, Spence, Poortinga, Pidgeon, 2011). This becomes problematic when considering how intentions to act and behaviour may be impacted by this perception. For example, Moser and Dilling (2004) and Wilson (2002) have both noted that people have an evolutionary tendency to pay attention to more immediate and personally relevant issues (Lorenzoni, Nicholson-Cole, Whitmarsh,

2007). In other words, the more people perceive climate change to be a distant issue, the less likely they will be to think about it or pay attention to it.

It is also important to consider the different sources of information that people consult to obtain information about climate change, as different sources (e.g. media, scientific literature, etc.) will not only communicate climate change risk differently, but may have a different effect on perceptions and behaviour. For example, many studies examining the relationship between climate change risk perceptions and behaviour often emphasize the affective or emotional component in communication and note the influence this component has on behaviour. Several authors have provided evidence to suggest that risk perception is largely influenced by affective and emotion-driven processes (Chaiken & Trope, 1999; Epstein, 1994; Sloman, 1996, Lowenstein, Weber, Hsee & Welch, 2001; Slovic et al., 2006; Weber, 2006; as cited by Van Der Linden, 2012, p. 16). The argument is that when information is presented in a way that attends to people's emotions, there is a greater level of personal engagement that develops. The parallel argument is that this level of engagement is not created when statistical or technical data is presented. That said, despite the influence this type of information may have on risk perceptions, it does not necessarily explain behaviour in the context of climate change (Van Der Linden, 2012). Furthermore, there have been some studies that show how emotions can be an important and significant predictor for environmental behaviour in general (Maloney, Ward & Braucht, 1975; Grob, 1995, as cited by Van Der Linden, 2102), however there has not been a great deal of research examining risk perception, emotion and behaviour in the context of climate change (Van Der Linden, 2012).

Weber (2010) summarizes these findings quite well. The author examined how perceptions of climate change can be informed by different processes, and contrasted information from non-scientists or media sources, climate scientists, and policy makers. The results indicate that affect-based information, which typically stems from non-scientists and attempts to elicit emotions, fails to influence behaviour given that people do not perceive climate change to be a personally relevant issue. Analysis-based information such as statistical information and scientific reports (i.e. from climate scientists), fails to motivate behavioural change because people tend to discount impacts to distant locations and timeframes. The author instead suggests that rule-based information such as setting laws, social norms or self-imposed punishments (i.e. typically stemming from policy-makers and in the form of public policy) may be more effective in influencing behaviour given that it

communicates a level of moral and social responsibility (Weber, 2010). A good example of rule-based information would be setting specific targets to reduce greenhouse gas emissions.

Not mentioned in this review is the underlying aspect of efficacy. Efficacy is the perception that one can or is capable of performing a certain action (Bandura, 1977). For example, there is a level of certainty and control communicated in rule-based information, in the sense that people are given direction on which actions to take, and it is passively suggested that these actions are linked to addressing the problem described. On the other hand, statistical or affect-based information does not necessarily provide this sense of direction, given that the problem may be presented as being more grand, more distant, and less relevant to the individual. We will come back to the concept of efficacy a bit later.

2.5.3 Climate change information and sources summary

As the discussion above has demonstrated, different types of information and communication methods can have diverging effects on risk perception and behaviour. What may work for some people, may not necessarily work for others. What seems to be the more important consideration is whether individuals perceive climate change to be a relevant issue and whether there is personal engagement to take action. The current study is hence guided by this idea and will evaluate what sources of information are consulted most frequently, and how these sources may inform risk perceptions and motivate behaviour. This framework also provides the rationale for specifically examining perceived susceptibility and perceived severity components of risk perception, as it gets at the heart of the temporal and cognitive aspects of climate change.

At this point, there should be a fairly good understanding of climate change risk perceptions. The following section provides a brief discussion on the relevance of climate change to the field of Planning, and the particular interest in examining the risk perceptions of local planning officials.

2.6 Local planning officials and climate change

The discussion thus far has described some of the different factors that can influence risk perceptions, however, there still remains the question of ‘whose’ perceptions are of interest. The current study aims to better understand how local planning officials perceive climate change risk for several reasons. For one, there has been a great deal of research examining the general public’s risk perceptions, attitudes and behaviour with respect to climate change (Leiserowitz, 2006; O’Connor, Bord, Yarnal, Wiefek, 2002; Grothmann, & Patt, 2005; O’Connor, Bord, Fisher, 1999; Semenza,

Ploubidis, George, 2011), however there is a lack of research on how these factors relate to local municipal planners. Corfee-Morlot et al. (2011) note that because city officials are in close proximity to stakeholders and the public, they have the advantage of having access to local knowledge about vulnerabilities, which Henstra (2012) notes can be an important resource for adaptation policy design. Similarly, a number of authors have expressed that city officials play a key role in many public functions that are imperative for adaptation to extreme weather events. These include things such as land-use regulation, critical infrastructure protection, emergency planning, and building inspection (Henstra, 2012). The Natural Resources of Canada notes that local governments have a critical and unique role with regards to managing climate change risks because they are at the ‘front line’ for protecting the safety of communities, promoting economic sustainability and ensuring the effective management of risk (Richardson, 2010). This ‘front line’ aspect has been captured elsewhere, as some residents perceive municipal governments to be the most ‘accessible’ level of government (FCM, 2005; as cited by Robinson & Gore, 2005). Moreover, because climate change can bring unpredictable weather events, there may be a bigger risk if action is not taken.

2.6.1 Recent extreme weather events

Major cities across Canada are already experiencing severe weather events, such as the July 2010 hailstorm in Calgary. This storm resulted in \$400 million dollars-worth of damages for the city, earning it the title of the being the costliest storm in Canadian history (Feltmate & Thistlethwaite, 2012).

In July 2013, Calgary was hit by another incredible storm which left the city with a devastating \$256 million dollars in damage from flooding (CBC, July 2013). There can also be significant impacts to critical infrastructure. For example, flooding from severe weather can result in disruptions to communication lines, water treatment, energy transmission and generation, as well as transportation (Richardson, 2010). This was witnessed firsthand in Toronto on July 8th, 2013. What would amount to the average rainfall expected over the course of a month, the City received an astounding 126 millimetres of rain over the course of only a few hours. Toronto Transit Commission (TTC) lines were brought to a standstill, commuters were left stranded, rivers became flooded, highways were completely submerged, and an estimated 300,000 people in the Greater Toronto Area were left without power (Newstalk 1010, July 2013). Moreover, emergency crews were sent to rescue an estimated 1,400 commuters from a GO train, which had become trapped due to the high waters of the flooded Don Valley River (Armstrong, July 2013).

Not only was a precedent set in history for Toronto receiving the most rain in a single day, but the event should serve as a red flag for policy makers. The regulatory standard set by the Province is to plan for 100-year storms or the equivalent of Hurricane Hazel (Conservation Authorities Act, 2006). At the same time, many Official Plans and municipal planning documents make reference to this regulatory standard. With 126 millimetres of rain, the July 2013 storm brought record levels of rain which surpassed the 121 millimetres amount seen from Hurricane Hazel on October 15, 1954. This presents just one of the many reasons why policy documents warrant closer examination and why planning officials need to consider climate change mitigation and adaptation.

2.6.2 Economic, environmental, social and health impacts

There can also be critical economic impacts. A report published by the National Roundtable on the Environment and the Economy estimates that the economic impact of climate change will cost Canada up to 5 billion dollars a year in 2020, and increase to between \$21 - \$43 billion per year in 2050 (NRT, 2011). The Insurance Bureau of Canada reports that claim payouts have doubled every 5-10 years since the 1980s, as a result of severe weather (IBC, 2013).

But the impacts are not just limited to the economic sector, nor will they be experienced only in the form of more frequent storm events. Warmer temperatures can bring a number of health-related problems that planning officials need to also be aware of. Since 1948, average temperatures in Ontario have warmed by approximately 1.4 degrees Celsius (Lemmen et al., 2008). As this trend continues, the province will likely also witness more intense rainfall events, smog advisories, and more frequent heat waves (Lemmen et al., 2008). This places more demand on health care and social services to adequately provide for those impacted by degraded air quality. Damaged property as a result of extreme weather events may also place more pressure on providing housing and shelter accommodations for those having to relocate (Health Canada, 2009).

With warmer temperatures, there is also a greater risk for the spread of vector-borne diseases, and heavier levels of rainfall can open the door for other health problems such as the Walkerton Tragedy of May 2000. While several factors contributed to the tragedy occurring (Salvadori et al., 2009), it was from heavy precipitation that contaminants from agricultural land could wash into town drinking wells, ultimately leading to the loss of seven lives, while making another 2300 people ill (Lemmen et al., 2008).

There are also challenges with regards to water shortages and droughts. It is anticipated that as populations increase, places like Waterloo, Wellington County and Durham County will likely experience water shortages over the next 20 years (Lemmen et al., 2008). Together, these impacts make climate change a particularly timely, and important issue for municipalities.

2.6.3 Barriers to policy implementation

It is important to note that there will most likely be challenges in implementing policy that may not necessarily stem from risk perceptions. For example, there may be social, economic, and political barriers that constrain efforts for implementation. One of the greatest challenges for policy development is knowing the magnitude, timing, and severity of climate change impacts, which makes adaptation planning difficult (Henstra, 2012). The perceived long-term nature of climate change in particular, renders that the issue is pushed aside in policy agendas, while the more immediate and pressing issues are given preference (Henstra, 2012).

Despite this, Burton et al. (2002) suggests that climate adaptation policy is the most effective when it is applied or ‘mainstreamed’ into daily actions and decision making of governments (Henstra, 2012). To this extent, it is important to consider the attitudes, behaviours and risk perceptions of people in the position to develop and implement policy, given that these factors are also prevalent in daily activities. Guariguata et al. (2012) add that when examining climate change risk perceptions on a local level, there needs to be particular consideration of how personal values, experiences and beliefs can influence perceptions. Decisions for adaptation in this sense, depend on the scope and amount of the knowledge available, the personal attitudes of risk, and the institutional and policy barriers in place (Patt & Schroter, 2008, as cited by Keller et al., 2011, p. 28). In this regard it is imperative to understand the discourse and agenda setting for different initiatives as they can shed light on which issues are given consideration and what barriers may prevent actions.

2.6.4 Exceptions to the literature gap on local planning officials

It should be noted that there are a few exceptions to literature gap on local planning officials. Brody, Grover, Lindquist and Vedlitz (2010) studied whether local, regional and state decision makers were deciding to take action for climate change, and whether these types of actions can be characterized as mitigation or adaptation. As expected, the authors found that environmental organization had the greatest level of support for mitigation and adaptation action responses, but troublingly, the level of concern and consideration did not even reach midpoint values (i.e. on a scale

of 0-10, 0 indicating that the organization ‘never considers’ mitigation or adaptation, and 10 indicating that the organization ‘frequently considers’ it, all mean values were under 5) (Brody, Grover, Lindquist, Vedlitz, 2010).

Another exception is a study by Maibach, Chadwick, McBride, Chuk, Ebi and Balbus (2008), which looks at the perceptions and responses surrounding climate change amongst local public health department directors. While most of the participants viewed climate change as being a problem for their particular jurisdiction, and recognized these problems as becoming more severe or common in the next 20 years, few had actually made climate change a priority issue in their department. When looking at the reasons for why this was the case, participants reported that there was a lack of knowledge amongst personnel in their department or other stakeholders in their community; a lack of expertise within departments in order to create effective mitigation or adaptation plans; and a lack of funding, staff and training to effectively respond to climate change (Maibach et al., 2008).

Stedman (2004) examined a similar relationship. The author measured policy-maker’s perceived risk of climate change and whether this perception interacted with political, attitudinal and socio-demographic factors. Of interest, Stedman (2004) found that one’s position within the policy process influenced their perception of climate change risk. However, the author did not measure actual behavior or what types of policies were being implemented.

Guariguata, Locatelli and Haupt (2012) also examined a similar relationship however were more selective in their focus. The authors examined the relationship between climate change risk perceptions and the implementation of adaptation actions, however only for forest managers. Of interest, the authors found that work experience influenced how forest managers perceived climate change risk. Specifically, in comparison to managers that had less than 10 years of experience, managers who had over 10 years of work experience more strongly agreed that climate change was a serious threat.

2.7 Mediating factors

There will be a number of mediating factors that influence the relationship between climate change risk perception, intention to act, and behaviour. These are uncertainty of climate change information, self-efficacy, availability heuristics, and knowledge.

2.7.1 Uncertainty of climate change information

Sundblad (2008) noted that scientific uncertainty can play a role in terms of how climate change risk is perceived. The author found that perceptions of worry and severity of damage from climate change consequences were influenced by whether the information was presented as scientifically uncertain or certain. Specifically, participants had lower risk evaluations when consequences of climate change were reported as being scientifically uncertain (Sundblad, 2008).

2.7.2 Self-efficacy

Witte and Allen (2000) found that strong fear appeals produced the greatest behavioural change when combined with high-efficacy messages. In contrast, strong fear appeals with low-efficacy messages produced the greatest level of defensive responses.

Brody et al. (2008) found perceived efficacy to be one of the most significant variables related to increasing risk perception ($r=.361$, $p=.000$). Specifically, participants showed more concern for potential climate change risks when they believed they could mitigate adverse impacts and had a responsibility to do so.

A number of authors have found that self-efficacy is a significant factor in predicting intentions to act (see: Heath & Gifford, 2006; O'Connor et al., 2002; Hidalgo & Pisano, 2010; Kellstedt, Zahran, Vedlitz, 2008). Hidalgo and Pisano (2010) suggest that because there have been numerous studies showing a relationship between self-efficacy and both risk perception and intentions to act; this illustrates that self-efficacy might in fact be a *prerequisite* [emphasis added] for how people approach the issue of climate change and their decisions to take action.

Hidalgo and Pisano (2010) found that self-efficacy, along with level of knowledge and attitudes toward climate change explained 44% of the variance in climate change risk perception. Moreover, self-efficacy, along with attitudes toward climate change, explained 17% of the variance in behavioural intentions (Hidalgo & Pisano, 2010).

In measuring the role psychological, infrastructural and sociodemographic variables have on mobility-related greenhouse gas emissions, Hunecke, Haustein, Grischkat, and Bohler (2007) found the strongest predictor for use of private modes of transportation was public transport control. In other words, participants would drive less if they perceived high ability to use public transportation (Hunecke et al., 2007).

The question of whether self-efficacy can act as a mediating factor is further supported by findings from Lorenzoni, Nicholson-Cole and Whitmarsh (2007). The authors found that ‘drop in the ocean’ feeling was one of the most common responses for why people failed to engage with climate change. This finding reflects the idea that participants do not perceive their actions as being meaningful, or contributing to the grandiose nature of climate change problems (i.e. participants associated their actions as being akin to a ‘drop in the ocean’). This finding raises the critical question of whether people who have higher levels of self-efficacy (i.e. individuals that perceive their actions as being meaningful, and contributing to climate change mitigation and adaptation), are less influenced by extreme perceptions of climate change risk than individuals with lower levels of self-efficacy. In other words, individuals who have higher levels of self-efficacy may also be more likely to perform activities to mitigate or adapt to climate change).

2.7.3 Availability heuristics

Botterill and Mazur (2004) note that the ‘availability’ heuristic is regarded as the most important type of heuristic in understanding risk perceptions, albeit it only explains a small amount of variance of perceived risks. The idea behind availability heuristics is that the more ease a person has in recalling an event, or the ease at which the individual can bring an incident to mind, the more likely it is that the individual will perceive that event as being probable (Sunstein, 1999; Botterill & Mazur, 2004).

With this in mind, it is important to consider whether people have been exposed to any recent changes in their environment; whether they have experienced any severe weather events that may be indicative of climate change; and whether climate change is a prevalent topic in day-to-day discussions. These questions can assist in identifying whether availability heuristics related to climate change exist, and whether they might be influencing risk perceptions, intentions to act or behaviours.

2.7.4 Knowledge

Van Der Linden (2012) notes how the idea behind the attitude-behaviour relationship is that the more a person knows and understands the relationship between behaviour and environmental threats, the more likely they will be to adjust their behaviour accordingly. This highlights the importance of examining knowledge as a meditating variable.

Kollmus and Aageyman (2002) describe this relationship as the Knowledge-Attitude-Behaviour (KAB) model, but caution that only a small portion of environmental behaviour can be directly

explained by environmental knowledge. That said, Hines, Hungerford and Tomera (1986) found a significant correlation between behaviour and environmental knowledge and knowledge of action strategies ($r = 0.30-0.37, p < 0.001$) (Van Der Linden, 2012).

Meinhold and Malkus (2005) found a linear relationship between environmental knowledge, attitude and behaviour. Specifically, participants who had strong pro-environmental attitudes and high environmental knowledge produced significantly more environmentally-friendly behaviour. Bord et al. (2000) also found a strong relationship between knowledge about climate change and behaviours. The authors found that the variable, 'knowledge' maintained statistical validity as an independent predictor of behavioural intentions, and was also a strong relative predictor of intentions. Specifically, knowledge explained 11% of the variance to take voluntary action in the interest of climate change, and 20% of the variance in supporting new government policies (Van Der Linden, 2012).

2.7.5 Local planning officials and mediating factors summary

At this point, the discussion has illustrated how climate change is an important issue for the field of Planning, how local officials play a key role in climate action, and how critical impacts to the economy, public health and environment mandate the need for climate change considerations in decision making. At the same time, the discussion acknowledged important barriers that can challenge policy implementation, as well as identified several mediating factors that should be considered in the study design. With this foundation, the following chapter will outline the methodology for this thesis.

Chapter 3 – Methodology

The following sections outline the methods used in carrying out this research project. In particular, the methodological framework, study location and targeted sample group will be identified, as well as the guiding concepts for measuring risk perception, intention to act, and behaviour, which ultimately lead to the development of a questionnaire instrument to interview participants with. The chapter will also describe the recruitment process, study design, issues surrounding generalizability, reliability and limitations, criteria for policy selection and analysis, and pre-test findings.

3.1 Methodological framework

Given the finding that most research has focused on climate change risk perceptions for the general public, the current study aims to understand how local planning officials specifically view climate change risk. While there can be a number of individuals involved in the policy process (communities, special interest groups, stakeholders, etc.), speaking with those who play a more directive role may be more informative as it provides a stronger measure for the link between risk perceptions and behaviour. As introduced earlier, this thesis is also guided by the finding that most people perceive climate change to be a temporally and geographically distant issue. The specific research question this study aims to address is “what is the relationship between climate change risk perception and the implementation of climate-related policies”. In terms of research sub-questions (RSQ), this study also seeks to address the following:

- RSQ1: How knowledgeable are local planning officials about climate change and what sources of information inform this knowledge?
- RSQ2: Is there an organizational culture that is in favour of climate action?
- RSQ3: What are local planning officials’ perceptions of climate change risk?
- RSQ4: What are local planning officials’ levels of efficacy for climate change?
- RSQ5: What actions do local planning officials view as being the most critical for climate change mitigation and adaptation?
- RSQ6: What role should local government play in adapting to climate change?
- RSQ7: Is climate change regarded as an issue that requires policy attention?
- RSQ8: What barriers or constraints prevent policy implementation for climate change?

- RSQ9: Are there differences in climate change risk perceptions between different departments?
- RSQ10: Are there differences in climate change risk perceptions related to work experience? And;
- RSQ11: Is climate change recognized in public policy?

3.2 Sample and location

In terms of the sampling method, a purposive/targeted method will be used in order to exclusively recruit participants that play a direct role in the policy process. While purposive sampling may minimize generalizability in comparison to random sampling for example (where each individual has an equal chance of being selected from a population) (Creswell, 2009), this type of method allows for more control over measuring risk perceptions for those particularly involved in policy activities. Specifically, individuals in senior or managerial type positions will be invited to participate given their authority and direct influence in implementing public policy. Alternatively, other individuals who have a direct influence in planning, budgeting, or other policy-making activities will be invited to participate.

For convenience, the Regional Municipality of Waterloo has been selected as the site for this study, including both the regional and municipal level. Individuals will be recruited from the cities, Waterloo, Kitchener, and Cambridge. This study will also recruit individuals from a diverse range of departments. For example, agricultural departments may have a more direct impact from changes in the environment in comparison to economic development departments. In light of this difference, there may be similar differences in risk perception characteristics.

Modelled after Brody, Grover, Lindquist and Vedlitz (2010), individuals will be recruited from planning, environmental, agricultural, emergency management, public health and economic development departments. Of interest, Brody et al. (2010) examined whether or not climate change was identified by state and local decision-makers as being a relevant problem, and whether the issue was placed on the agenda for policy-making solutions. The authors not only found differences between departments, but also differences in whether the type of solution was adaptation or mitigation. With regard to the expected sample size, interviews will be conducted until theoretical saturation has occurred (i.e. the point at which no new interview reveals any new information).

3.3 Methods and procedure

3.3.1 Qualitative inquiry

A qualitative research method has been adopted for this study given its particular strength in exploring perception of risk and intention to act. The literature provides evidence to suggest that risk perceptions are influenced by qualitative attributes, such as immediacy of adverse effects, decision making and appraisal of choices, and familiarity and appraisal of control (Boholm, 1998). Given this cognitive component in risk perceptions, a qualitative method provides a good measure in understanding the complexities of human behaviour. This type of method is also particularly valuable when the research is emergent, that is, the researcher begins with an initial plan but may not tightly prescribe to all phases as it is not clear what the ultimate end point will be (Creswell, 2009).

3.3.2 Study design

The first step of this study will be to develop a questionnaire to measure perception of risk about climate change and intention to act. A set of questionnaire items will be created after conducting a thorough review of the literature on this topic. Next, a pre-test will be performed to assess the effectiveness of the questionnaire instrument. Friends, family, colleagues and any other person who has not been informed about the study design or objectives will be invited to take part in the pre-test. Similarly, students in the University of Waterloo undergraduate planning co-op program may be invited to take part in the pre-test, given their possible familiarity with the policy implementation process in the Region of Waterloo.

The student investigator will perform a directory search to identify key individuals (potential participants) involved in the policy making process. With recommendations from the faculty supervisor on a key informant, this informant will be requested to further assist in identifying potential participants for the study. Potential participants will then be contacted via email information letters and consent forms. A follow up phone call or email will take place (approximately after 2 weeks) to ensure that the email has been received and further request participation in the study.

Participants will be sent a thank-you letter by email, restating the objectives of the study and provided with the contact information of the researcher should they have any further questions or comments. This letter will also inform participants that they can receive a copy of the transcript or research report if interested, once the study and data analysis has been completed (expected August 2013).

The main study will consist of two major phases. The first phase will entail structured interviews with participants, and the second phase will involve a review of public policy. It should be noted that participants will be given the option to either complete an in-person interview where the researcher will administer the questionnaire, or participants can choose to complete an online version (using SurveyMonkey software). This is in hopes to achieve high participation and completion rates, but also to recognize that individuals in this particular sample will likely have time constraints. Moreover, literature has shown that where individuals are given the choice between these two methods, most prefer the online method (Brody et al., 2010). However, in-person interviews may provide a more in-depth analysis on open-ended questions that should not be overlooked. To minimize response burden, the online questionnaire will be presented in segments rather than presenting the document in full. Presenting fewer items at a time may also help to ensure that questions are not missed. In terms of the in-person interviews, participants will be notified when they are reaching the final few sections of the questionnaire.

Although research with policy makers in regional locations presents the risk of key individuals being identified, given the small scale of the project and limited number of people directly involved in policy making, the researcher is cognizant of this risk. All procedures will be taken to ensure that no direct identifiers (age, gender, income, department location, etc.) are published in this thesis – especially in the event that direct quotations or comments are used. Participants will be informed that they are free to withdraw from the study at any time, with no penalty. Any information provided by the participant will be considered confidential and not released unless the participant gives consent, or consent is required by law. This study received full ethics clearance from the University of Waterloo, Office of Research Ethics on May 17th, 2012; with modifications submitted and approval received on October 29th, 2012.

A number of strategies will be adopted in efforts to strengthen validity. In qualitative research, this refers to checking the accuracy of findings (Creswell, 2009). For the first strategy, items will be referenced against recent weather events in the region that may heighten risk perceptions. Second, there may be limitations related to social desirability, that is, participants may respond in a way that presents themselves in a favourable light, whereas personal beliefs or actions would suggest otherwise or reflect alternate attitudes. With this in mind, a review of implemented policies further strengthens validity as it provides a method of verifying some of the responses.

Given the notion that certain departments may hold different views on climate change as a result of their being impacted differently, the current study attempts to strengthen validity by inviting participants from a variety of departments. This further reduces bias from only speaking with individuals from one department (e.g. planning). Finally, what this study may lack in breadth (e.g. selective sample group, exclusive focus on the Region of Waterloo in contrast to multiple regions), it makes up for in depth. That is, the questionnaire instrument includes over 70 items relating to a broad range of issues such as climate change risk perceptions, recent weather events, levels of concern, media coverage, departmental culture, personal actions, challenges with the policy implementation process, and successful initiatives. As Yin (1994) notes, this rigor in non-experimental research attests to the quality of the work as it is not a matter of meeting a minimum number of cases or randomly selecting a sample, but to develop the best study design which will adequately address the specific research question.

Reliability on the other hand reflects the consistency of the researcher's approach with other researchers and projects (Creswell, 2009). It can also be understood by the adage, '*if the study was carried out at time x, it would produce the same results at time y*'. While the current study used pre-existing rating scales and questionnaire items that have been validated in other studies, and only made modifications based on a thorough review of the literature or findings from the pre-test results, reliability may still be somewhat low. Over the course of this research process, the Region of Waterloo and surrounding areas have endured a number of extreme weather events that may impact risk perceptions and the urgency for climate-related policies. Interviews were carried out between November 24, 2012 and April 16, 2013, with notable extreme weather events taking place on April 12 (massive power outage due to an ice storm in the Waterloo Region), April 16 (declaration of a state of emergency due to severe flooding in Huntsville and Bracebridge), and July 2013 (severe flooding in Calgary and extreme levels of rainfall in Toronto). There is a very high possibility that if the same participants were interviewed, there would be different responses related to risk perceptions and exposure to weather events, as well as different interests in policy implementation. This said, the current study attempts to strengthen reliability by documenting all procedures used and provide detailed accounts on all steps of the research process, as recommended by Yin (2003).

Generalizability is used in a limited way in qualitative studies given that these studies are often very context specific and as such, generalizing the findings to other locations and individuals are not the main objective in this form of inquiry (Creswell, 2009). That said, it is worth considering whether

the findings from this study can be generalized to other municipalities or other levels of government, given that other locations must also deal with climate change among other policy issues, and will have planning officials that hold different values, attitudes, and beliefs about climate change risk.

There are a several dimensions of this research that reduce generalizability. The current study asks questions regarding the critical actions needed for climate change mitigation and adaptation, and these are specific to the Region of Waterloo. Similarly, the policy review component in the current study reviews documents exclusively for the Region and municipalities (with the exception of the Planning Act and Provincial Policy Statement). The Region of Waterloo was also the first to adopt state of the environment reporting and has expressed an explicit intention of becoming a sustainable community (Quon, Martin, Murphy, 2001). This may mean that there is more active involvement in this location in contrast to other locations. There is also a focus on the municipal and regional scale. Arguably, climate response may be different at provincial and federal levels, leading to different objectives, methods, durations of initiatives and cost amongst others factors. The relationship between risk perceptions and implementation of climate-related policies, may hence differ depending on the scale of analysis. Together, these aspects render that these findings are not generalizable to other study sites.

However, with this said, it is the belief of this author that the relationship between risk perceptions and climate-related policies can be generalized to other municipalities if careful consideration is given to assessing all relevant contextual factors. For example, the specific economic, social and political barriers that impact policy implementation in other municipalities, the weather events that other local planning officials experienced that might influence their perceptions, the organizational culture in different departments, and so forth. This study in a sense, identifies which factors may be important in forming risk perceptions and influencing behaviour, which can be considered by researchers for other study sites.

3.4 Data collection and guiding concepts for questionnaire development

3.4.1 Phase I

In terms of the first phase (structured interviews), participants will be asked questions regarding:

- knowledge of climate change causes and self-perception of knowledge
- source and availability of climate change information

- climate change risk perceptions (perceived susceptibility and severity)
- intentions to act (whether climate change mitigation or adaptation is recognized as an issue requiring policy attention and what personal and situational factors influence intentions to act)
- policy (what strategies or initiatives have been put in place to mitigate or adapt to climate change),
- and demographic information

The pre-test will determine the final contents of the questionnaire, however a draft version will be created with the following components in mind.

3.4.1.1 Knowledge of climate change

With respect to measuring knowledge, participants will be asked questions relating specifically to the causes of climate change. Although a number of studies sometimes incorporate more general statements about climate change (Takahashi & Meisner, 2011), or questions about the current state, and anticipated consequences (Sundblad et al., 2007, 2009), Roser-Renouf and Nisbet (2008) point out that only one type of knowledge (causes of climate change) has consistently correlated with risk perception (see: Krosnick et al., 2006, Sundblad et al., 2007, and Bord et al., 2000).

For the purpose of this study, 12 true or false statements that were developed by Sundblad et al. (2007) will be used to measure knowledge. These statements relate specifically to the causes of climate change. The items are listed below with the appropriate true or false answer in brackets. It is important to note that these items reflect data from the Intergovernmental Panel on Climate Change (IPCC) 2001 report, hence the final survey may need to be updated to reflect current data (e.g. verifying statements are still accurate based on the IPCC fourth assessment 2007 climate change report).

1. Climate change is mainly caused by increased concentration of greenhouse gases. (True)
2. Climate change is mainly caused by the ozone hole. (False)
3. Climate change is mainly caused by a natural variation in sunbeam and volcanic eruption. (False)
4. The carbon dioxide concentration has increased more than 30% in the atmosphere during the latest 250 years. (True)
5. The carbon dioxide concentration has increased between 20% and 30% in the atmosphere during the latest 250 years. (False)

6. Methane has increased more than 20% in the atmosphere during the latest 250 years. (True)
7. Carbon dioxide is responsible for approximately 80% of the emissions of greenhouse gases. (True)
8. Carbon dioxide is emitted in the use of fossil fuels. (True)
9. Methane is emitted mainly from the use of fossil fuels. (False)
10. The increase of greenhouse gases is mainly caused by human activities. (True)
11. The increase of greenhouse gases is mainly caused by a surplus of heat from tempered buildings. (False)
12. The increase of greenhouse gases is mainly caused by air pollutions from the industry. (False)

3.4.1.2 Self-perception of knowledge

Roser-Renouf and Nisbet (2008) go so far as to say that studies should avoid using self-assessed knowledge or measuring how ‘informed’ participants are, in place of measuring actual knowledge. The authors suggest this to be the case because a number of constructs can conflate how the respondents interpret the question. For example, when asked how much one thinks they know about climate change, the respondent may reflect on how much of the science they know behind the issue, how much media coverage they have been exposed to, and how much they actually talk about the issue (Roser-Renouf & Nisbet, 2008). That said, Takahashi and Meisner (2011) as well as Sundblad et al., (2009) have both found that self-perception of knowledge reflects actual levels of knowledge. Similarly, Roser-Renouf and Nisbet (2008) suggest that if self-perceptions of knowledge are to be used, questions should have a more directed focus for instance, incorporating levels of certainty and attitudes. The authors cite Krosnick et al. (2006), stating that a more appropriate method of measuring self-assessed knowledge can be from not only asking how much participants feel they know about climate change, but also asking how much they have thought about the issue. Moreover, Krosnick et al. (2006) point out that the ACE Model (measuring Attitudes, Certainty and Existence beliefs) holds that “people develop a sense of certainty about global warming if they feel they know a lot about it... and if they have thought a great deal about it” (p. 14).

For the purpose of this study, a 6-point scale has been added to each knowledge-related question in order to assess level of certainty (1= very uncertain, 2=fairly uncertain, 3=more uncertain than certain, 4=more certain than uncertain, 5=fairly certain and 6=very certain). Furthermore, the statement “How much do you think you know about climate change” developed by Takahashi and Meisner (2011) will be adopted, using a 4-point scale (1=nothing, 2=some, 3=quite a bit, and 4=a lot).

Following this, another statement will be included to ask how often the respondent finds themselves thinking about the issue, using a 5-point scale (1=never, 2=less than once a month, 3=several times a month, 4=several times a week, and 5=everyday). These last two statements not only offer a measure of self-assessed knowledge, but also provide a more directed focus (i.e. how much the respondent thinks about the issue), as recommended by Roser-Renouf and Nisbet (2008).

3.4.1.3 Source of information

The literature shows that different sources of information can have an effect on risk perceptions, intentions to act and actual behaviour. For example, there may be an element of ‘trust’ that comes with information from scientific publications that may not exist for information from movies. Alternatively, movies may elicit a more affective component, which can result in individual’s connecting more emotionally to the issue at hand. Marx et al. (2007) note that people are more motivated by affective and experiential information when attending to different risks and deciding to take protective action, rather than statistical information.

In terms of measuring source of information, participants will be asked to report the frequency with which they receive information from different sources. As adopted from Takahashi and Meisner (2011), this includes information from experts, scientists, and/or scientific publications; family and/or friends; Internet; magazines; newspapers; peers/co-workers, and/or government officials; radio; schools and/or universities; television shows and/or movies; and television news. Frequency is measured using a 5-point scale with 1=never, 2=less than once a month, 3=several times a month, 4=several times a week, and 5=every day.

3.4.1.4 Availability heuristics

‘Availability heuristics’ offer a measure of understanding how prevalent the topic of climate change may be for individuals. It also offers a way of measuring whether participants have been exposed to any recent events that may influence their perceptions of risk and behaviour (Whitmarsh, 2008). Keller et al. (2012) note that individuals will judge an event as more likely if they can easily recall the event. However the authors note that ‘availability’ can be misguided by emotional factors, recent events and widespread media coverage. Sunstein (2006) also adds that ‘familiarity’ and ‘saliency’ may influence availability. For example, reading about a fire in a local newspaper may not impact people in the same way as actually seeing a home burning in one’s neighbourhood (Tversky & Kahneman, 1982). Similarly, people will rate certain issues as more of a threat if they are familiar

with the particular risks that are involved. In the context of climate change, availability heuristics help explain why some people fail to view impacts as a severe risk given that there may be a lack of prevalent events, personal experiences or saliency. This is further complicated by the distant temporal and spatial nature of impacts.

In order to measure availability heuristics, participants will be asked 1) whether or not they have experienced any changes in their environment that may be indicative of climate change. The participant will be required to respond with either a yes or a no. If answered no, the participant will be instructed to move on to the next question. If answered yes, three sub-questions will follow instructing the participant to report when they experienced the changes (i.e. to provide the most recent date), what changes the participant experienced, and to rate the level of concern associated with the changes (10 point scale with 1 indicating 'not at all concerned' and 10 indicating 'extremely concerned'). These questions all seek to explore elements of recency, familiarity and saliency.

The second question related to availability heuristics asks the participant to recall the most recent media coverage they heard or saw about climate change. If the participant cannot recall any media coverage, they will be instructed to move on to the next question. The question asks the participant to provide the date for when they last heard or saw this media coverage, what the medium of the coverage was (e.g. newspaper, television show, movie, scientific publication, etc.), and to rate their level of concern.

The third question related to availability heuristics asks the participant whether or not they are aware of any policy initiatives taking place in other municipalities that may be directly related to mitigating or adapting to climate change. The participant will be required to respond with either a yes or a no. If answered no, the participant will be instructed to move on to the next question. If answered yes, three sub-questions will follow. The first asks the participant to provide the most recent date for when they last heard about these initiatives, the second asks for the date for when these initiatives were implemented or expected to be implemented, and the third question asks whether or not the participant feels their department can implement something similar. While this last item diverges a bit from the other availability heuristic questions, there are still noteworthy aspects that may be meaningful in measuring climate change perceptions and intentions to take actions. For example, aspects such as familiarity and recency are still assessed. Learning about what other municipalities are doing in terms of mitigating and adapting to climate change may be meaningful in influencing others

to take action. On the other hand, asking whether the participant feels their department can do the same may provide important information on possible barriers for policy implementation.

3.4.1.5 A note about values

Although values are commonly used to explain environmental action (see Stern et al., 1999), there does not appear to be a strong relationship in terms of how values affect risk perceptions. Moreover, where values are examined with an explicit focus on climate change risk perceptions, there is an emphasis on collective or group values as opposed to personal values. For example, Wildavsky and Dake's (1990) and Douglas' (1999) cultural theory of climate change risk assessment holds that membership in certain social groups can lead to predispositions in viewing risks (Roser-Renouf & Nisbet, 2008). Some risks are seen as more dangerous than others as a result of the common group or collective values. For these reasons, individual 'values' related to climate change will not be examined in the current study, however there will be a focus on possible group values in risk perception (e.g. capacity of department to implement adaptation and/or mitigation policies, willingness of department to take climate action, etc.).

3.4.1.6 Measuring risk perception

With respect to measuring risk perceptions, participants will be asked questions about their attitudes toward climate change and the perception of risk (i.e. perceived severity and susceptibility). Questions will relate to the temporal scale of perceived impacts, geographical location and personal relevance. Figure 1 presents a sample of the items asked in a survey by Kellstedt, Zahran and Vedlitz (2008).

Survey Question	Factor Loading
Global warming and climate change will have a noticeably negative impact on my health in the next 25 years.	0.743
Global warming and climate change will have a noticeably negative impact on my economic and financial situation in the next 25 years.	0.676
Global warming and climate change will have a noticeably negative impact on the environment in which my family and I live.	0.756
In your opinion, what is the risk of global warming and climate change exerting a significant impact on public health in your state?	0.766
In your opinion, what is the risk of global warming and climate change exerting a significant impact on economic development in your state?	0.716
In your opinion, what is the risk of global warming and climate change exerting a significant impact on the environment in your state?	0.782
Eigenvalue	3.290
Cronbach's alpha	0.873

Note: The survey items were asked in succession. The first three were preceded by the following stem: “Do you strongly agree, agree, disagree, or strongly disagree with the following statements?” Only one factor was retained.

Figure 1. Factor analysis of six items of public concern for global warming

Although the questions presented in Figure 1 assess concern for climate change as well as global warming, the current study will focus exclusively on climate change. The term global warming entails a different risk perception characteristic in comparison to that of climate change, particularly in terms of the imagery involved. Schuldt, Konrath and Schwarz (2011) illustrate that people frequently associate global warming with increasing temperatures which also creates a stronger emotional response. The term ‘climate change’ on the other hand, presents a more neutral connotation. This not only presents an un-biased method for measuring perception of risk (i.e. avoiding the use of loaded terms like ‘global warming’), but also provides a more general term that considers variations in weather (e.g. both increasing as well as cooling temperatures).

In reviewing the items presented by Kellstedt et al. (2008), there is also a notable timeframe provided (i.e. the next 25 years). This addresses the issue of whether participants perceive climate change as being a temporally distant issue. Also note that the items provide an element of personal relevance. That is, some questions ask whether the participant believes the effects of climate change will impact the environment for which they or their family lives in, or whether the impacts will affect the public health or economic development of the state. Arguably, impacts to the participants’ family may be deemed as more of a concern than impacts to the economic development of the location that they live in. In this regard, these variations allow the researcher to assess the level of personal relevance, further providing a strong measure for perception of risk.

As adapted from Leiserowitz (2007), another possible question could be whether participants perceive climate change as being a threat to their current location, or whether it will be a threat to

other countries. This measures whether climate change is perceived to be a geographically distant issue, as the environment-behaviour literature suggests.

3.4.1.7 Measuring intention to act

In terms of measuring intention to act, participants will be asked questions relating to personal feelings of self-efficacy; what actions they feel should be taken with respect to climate change; which issues take priority over others; and what are the perceived political, social, and economic constraints that limit intentions to act.

With respect to measuring self-efficacy, three items developed by Kellstedt et al. (2008) will be adopted with responses ranging on a 5-point scale between strongly agree and strongly disagree (see Figure 2).

Survey Question	Factor Loading
I believe my actions have an influence on global warming and climate change.	0.659
My actions to reduce the effects of global warming and climate change in my community will encourage others to reduce the effects of global warming through their own actions.	0.453
Human beings are responsible for global warming and climate change.	0.586
Eigenvalue	1.442
Scale reliability coefficient (alpha)	0.634

Note: The survey items were asked in succession, and were preceded by the following stem: “The following statements are about climate change and global warming. Please tell me if you strongly agree, agree, disagree, or strongly disagree with each of them?” Only one factor was retained.

Figure 2. Factor analysis of three items of personal efficacy for global warming

It is important to consider whether one perceives that they can contribute to climate change mitigation and adaptation, and whether the individual perceives their efforts to be meaningful. If there is a lack of personal efficacy, there needs to be consideration of whether there will be any motivation to direct behaviour (i.e. intention to act, or implemented policies). In this regard, asking questions similar to the ones presented by Kellstedt et al. (2008) in Figure 2 (e.g. “I believe my actions have an

influence on global warming and climate change”), provides one good method of measuring intentions to act.

That said, Oskamp (2000) notes that measures of self-efficacy will often produce low results given that environmental problems such as climate change often present such ominous or large challenges. Furthermore, as Roser-Renouf and Nisbet (2008) add, statements like “I can take actions to help reduce global warming” imply that the respondent knows what actions to take, and that those actions will in fact, reduce global warming. Instead, a more appropriate method of measuring efficacy is offered by Zhao (in preparation), and recommended by Roser-Renouf and Nisbet (2008), that is, asking participants to report on specific behaviours.

For the purpose of this study, the three statements presented above will still be used to measure self-efficacy as they provide a general idea of whether the individual believes their actions can influence climate change. Following this, several questions will relate to specific behaviours dealing with response efficacy (i.e. whether the actions reduce the threat of climate change), and self-efficacy (i.e. whether the individual is capable of taking action) (Roser-Renouf & Nisbet, 2008).

To measure response efficacy, 7 items as developed by Zhao (in preparation) will be adopted using a 7-point scale (1=would not help, 7=would help a lot). These items are as follows:

50. How much would your changing the light bulbs at your home to more energy saving ones, help reduce your personal contribution to future climate change
51. How much would your shutting off your home computer when you are not using it, help reduce your personal contribution to future climate change
52. How much would your turning down thermostat during night or when gone, help reduce your personal contribution to future climate change
53. How much would your driving less and using more public transportation, help reduce your personal contribution to future climate change
54. How much would your recycling paper, beverage containers, and other recyclable products, help reduce your personal contribution to future climate change
55. How much would your using cold water to wash clothes, help reduce your personal contribution to future climate change
56. How much would your purchasing energy efficient home appliances, help reduce your personal contribution to future climate change

To measure self-efficacy, 7 items as developed by Zhao (in preparation) will be adopted using a 7-point scale (1=not at all sure, 7=completely sure). These items are as follows:

57. How sure are you that you could changing the light bulbs at your home to more energy saving ones, if you wanted to
58. How sure are you that you could shut off your home computer when you are not using it, if you wanted to
59. How sure are you that you could turn down thermostat during night or when gone, if you wanted to
60. How sure are you that you could drive less and using more public transportation, if you wanted to
61. How sure are you that you could recycle paper, beverage containers, and other recyclable products, if you wanted to
62. How sure are you that you could use cold water to wash clothes, if you wanted to
63. How sure are you that you could purchase energy efficient home appliances, if you wanted to

3.4.1.8 Climate change and actions

It should be noted that a similar study was conducted by Caldwell and colleagues (2011). The study looked at local municipal planners' awareness and responsiveness to climate change and peak oil challenges, albeit in a more rural context. Of interest, common trends were found on the municipal and community level when local planners were asked what evidence they saw of people planning for climate change. A list of these common trends is presented in the table below. For the purpose of this study, participants will be asked to provide a list of the actions they feel their city should take with respect to climate change. It is anticipated that the reported actions will fall into similar categories.

Table 1 Municipal and community climate change trends

Municipal Climate Change Trends	
1.	Sustainability Planning (storm reserve fund, stormwater management strategy, environmental committees, walkable and transit-supportive community planning, heat islands and shade structures, renewable energy projects)
2.	Planning Policy
3.	Minimize carbon footprint within municipal structure (operations, municipal buildings, staff, recycling, composting, etc.), risk assessment
4.	Emergency plans/response to weather
5.	Community Action, Adaptation and Mitigation Plans
6.	Education and Awareness

Community Climate Change Trends	
1.	Environmental Initiatives and Green Energy
2.	Community Sustainability Programs
3.	Education and Awareness
4.	Transition Towns
5.	Local Food Production

To better understand whether participants feel local government should even play a role in adapting to climate change, one statement as adapted from Measham et al. (2011) will ask, “overall, what role should local government play in adapting to climate change”. If participants do not feel local government should play a role, there needs to be consideration of whether any relevant policy would be implemented. To better understand possible situational constraints affecting policy implementation, one statement also adapted from Measham et al. (2011), will ask, “what should local councils need to do differently in order to effectively adapt to climate change”. As adapted from Brody et al. (2010), two questions to understand whether mitigation and adaptation is considered in the department’s decision making include:

1. If mitigation is defined as human intervention to reduce the sources of greenhouse gases, is mitigation something your organization considers in its decision making.
2. If adaptation is defined as adjustments in natural or human systems in response to climate change conditions or effects, is adaptation something your organization considers in its decision making.

More generally, the next four statements relate to the other issues that are given higher priority in policy making, and the possible economic, social, and political constraints that exist to prevent policy implementation for mitigating or adapting to climate change.

3.4.1.9 Implemented mitigation and adaptation initiatives

Participants will be asked to list any initiatives or strategies implemented by their department that serve to mitigate or adapt to impacts from climate change. This will help ensure that climate-related polices implemented by the department are not overlooked in the policy review phase.

It should also be noted that participants will be given an opportunity to reflect on questions at the end of each section and elaborate on any of the responses they have provided. This allows participants

to explain their rationale for choosing certain answers but also to provide more information that may have not been captured in the survey.

3.4.1.10 Demographic information

The last few items of the questionnaire pertain to demographic information. Participants will be asked to indicate which category best describes their profession or industry from a selection of Planning, Environmental, Agricultural, Emergency Management, Public Health, and Economic Development. Recall that these categories were adapted from Brody, Grover, Lindquist and Vedlitz (2010). Participants will also be asked to report their current position or professional title. This is designed as a means to verify that participants in fact, hold a senior or managerial type position, or have a direct influence in the policy-making process. Lastly, participants will be asked to report the number of years for which they have held their current position. As Stedman (2004) has found, one's position within the policy process influences their risk perception of climate change. Moreover, Guariguata, Locatelli and Haupt (2012) found that years of work experience influenced how forest managers perceived climate change risks. Specifically the authors found that managers who had over 10 years of work experience more strongly agreed that climate change was a serious threat in comparison to those who had less than 10 years of work experience.

3.4.2 Phase II

3.4.2.1 Policy review

The second stage of this study involves a review of public policy. A preliminary list noting any legal documents, plans or strategies that may be relevant to climate change mitigation and adaptation will be compiled. This list will later be expanded based on responses from item 69 of the questionnaire. This item asks participants to list any noteworthy climate-related policies their department has implemented to mitigate or adapt to climate change impacts.

The main research sub-question this component of the thesis aims to address is “is climate change recognized in public policy” (RSQ10). The following sections will outline the criteria for policy selection and criteria for policy analysis. In the latter section, the academic literature is reviewed to develop a set of indicators to guide the policy analysis. This includes reflections on additional variables that might assist with the review, and methods to measure the variables of interest.

3.5 A note about policy selection

It should be noted that a separate thesis can alone be dedicated to a policy review of this nature. For example, an extensive list can be created noting potential plans or policies that relate to some aspect of climate change mitigation and adaptation. Heritage plans can examine factors related to preserving natural heritage. Parks and recreational activity plans can include practices to promote green and open spaces, which in turn, can have benefits for air quality. Cultural plans may promote aspects of community integration, which can have positive effects in enabling social capital, and bringing communities together to adopt green initiatives to mitigate climate change. Waste management strategies and water management strategies can both achieve great benefits for the environment and reduce energy use; as can biosolid master plans in efforts to reduce emissions from landfill sites. There can be related growth management strategies, which strive to achieve more complete and efficient development, in turn, minimizing energy use and protecting the environment. Economic development strategies can provide municipalities with the resources to effectively deal with climate change impacts. While cities may have a transportation master plan, there can also be several additional plans implemented which facilitate alternative transportation strategies. These include multi-use and trails master plans, as well as bikeway or cycling network plans. Moreover, there are several provincial initiatives that promote green power, protect green spaces and natural habitat, control urban boundaries, and even explicitly aim to mitigate and adapt to climate change.

As you can see, the list of potential plans that incorporate some form of climate action is quite exhaustive. Several plans from the study site were listed for review and many contained information that was noteworthy. However, upon the initial stages of the review, it became clear just how large this list was. Moreover, some plans that were thought to have some acknowledgement of climate change in fact, had virtually no mention of it (i.e. all emergency management plans, some parks and open space plans, some heritage master plans). In particular, emergency management plans recognized severe weather events or natural hazards (e.g. floods, tornadoes, hurricanes, etc.), however there was no recognition of possible changes to weather patterns or a possible increase in the severity, frequency or duration of these weather events.

Given the nature of a master's thesis and time constraints, it would be neither feasible nor practical to perform a complete and detailed review of all possible plans. As such, criteria to enable a more narrow focus and develop a more selective list, must be defined.

3.5.1 Selective criteria for policy review:

- Document must have a broad focus and not be site-specific (e.g. exclude Waterloo Park Master Plan)
- Document must be the most current version
 - o If draft version available, review draft version in full with reflections on changes from last approved version
- Document must have clear or obvious relationship to climate change impact (e.g. transportation plans included given focus on greenhouse gas emissions; stormwater management plans included given focus on managing flooding risks; community, culture and recreation services plan excluded given unclear relationship to climate change)
- If multiple plans relate to climate change impacts, review plan that has broader or more comprehensive focus (e.g. preference given to transportation master plans over cycling master plans).
- Environmental plans and strategies given top priority (i.e. if ‘Community Strategic Plan and ‘Strategic Plan for the Environment’ published, review ‘Strategic Plan for the Environment’).
- Preference given to plans or strategies that were reported by participants in Item 69 (even in instances where document does not meet criteria above).

3.6 Criteria for policy analysis

3.6.1 Subcategories and variables of interest

To the knowledge of this author, there has been no other study to date that has reviewed regional and municipal official plans, and key provincial legislation for the explicit coverage of climate change, other than the very recent publication by Baynham and Stevens (2013). The authors reviewed municipal community official plans for mitigation and adaptation content. This was in light of provincial mandates in British Columbia, which required that municipal OPs must set targets and policies to reduce greenhouse gas emissions. The authors found that in 39 of the plans reviewed, 25 explicitly addressed climate change and that there was a stronger focus on providing goals and policies, as opposed to facts and implementation provisions (Baynham & Stevens, 2013). One other

study had a similar focus, but evaluated climate change actions plans as opposed to Official Plans. Tang, Brody, Quinn, Chang and Wei (2010) reviewed local climate change actions plans in order to assess how well the issue of climate change was recognized, and the level of preparation for mitigation and adaptation. It should be noted that local climate change action plans (contrast to OPs) will likely have a more aggressive and explicit approach to addressing climate change impacts. However, both plans discuss similar issues such as transportation policies, land use policies and implementation priorities. As such, the criteria used by Tang et al. (2010) to evaluate local climate change action plans can be relevant in evaluating official plans and key provincial legislation. Moreover, Tang et al.'s (2010) indicators for "action approaches", provides a more comprehensive list of actions than those offered by Brody et al. (2010). Thus, for the purpose of the current study, Tang et al.'s (2010) indicators will help guide the policy review (see Table 2).

Table 2 Action approaches (Tang et al., 2010)

Sub-category	Indicator
Communication and collaboration policies	Public awareness, education, and participation Inter-organisational coordination procedures (business, government, IPCC, CCP, etc.)
Financial tools	GHG reduction fee Establish a carbon tax
Land use policies	Mixed use and compact development Disaster-resistant land use and building code Green building and green infrastructure (i.e. urban forests, parks and open spaces, natural drainage systems) standards Low-impact design for impervious surface Control of urban service/growth boundaries
Transportation policies	Alternative transportation strategies Transit-oriented development and corridor improvements Parking standards adjustment Pedestrian/resident-friendly, bicycle-friendly, transit-oriented community design
Energy strategies	Renewable energy and solar energy Energy efficiency and energy stars
Waste strategies	Landfill methane capture strategy Zero waste reduction and high recycling strategy

	Waste and storm water management
Resources management strategies	Creation of conservation zones or protect areas Watershed-based and ecosystem-based land management Vegetation (forest/woodlands) protection
Implementation and monitoring strategies	Establish implementation priorities for actions Financial/budget commitment Identify roles and responsibilities among sectors and stakeholders Continuously monitor, evaluate and update

3.6.2 Sub-category and indicator additions

In the initial stages of performing the policy review, it appeared that some of the plans discussed climate change in the context of air quality as well as in terms of the ‘green economy’, which did not really fit well into Tang et al.’s (2010) categories. These included actions like reducing smog days, reducing greenhouse gas emissions, and promoting green jobs, or a vision of corporate environmental sustainability. There was also mention of financial incentives which was not specified in Tang et al.’s (2010) financial tools sub-category. Furthermore, the Region of Waterloo has a rather strong farming industry; hence the topic of local food was discussed several times. Taken together, the sub-categories of Air Quality, Green Economy, and Local Food were added to this list, as well as the Financial Incentives indicator.

Table 3 Additional sub-categories and indicators

<i>Sub-category</i>	<i>Indicator</i>
Air quality	Improve air quality, reduce smog days, reduce greenhouse gas emissions
Green economy	Promote and protect environmental jobs Environmental business initiatives and corporate environmental sustainability
Local food	Production and promotion of local food and farmers’ markets Strengthening local food systems Supporting farmers and local farm economy
Financial tools	Financial incentives

There were also some differences between documents in terms of how many times climate change was stated (if at all), whether the focus was on mitigation or adaptation, and the timeframe surrounding plan objectives and implementation. These variables were also included to the list.

Table 4 Additional variables of interest

<i>Variable</i>	
“Climate change”	(e.g. 0, 1, 2, 3...)
“Mitigation”	(e.g. 0, 1, 2, 3...)
“Adaptation”	(e.g. 0, 1, 2, 3...)
Timeframe	(e.g. “2007-2010”, “to 2031”)

3.6.3 Variable and indicator measurement

There are a number of ways that policies can be analyzed, however there is no main, or correct method. Whichever method is chosen should reflect on the research question being asked, and the possible contextual aspects that may lend to one approach yielding more informative results than another approach. For example, research on policy can assess the stakeholders involved (Liu, Lindquist, Vedlitz, Vincent, 2010); the depth and breadth of elements included in a plan (Tang et al., 2010); the nature of the goals being set and measures left out (Wheeler, 2008), and effectiveness of a plan in meeting objectives (Baynham & Stevens, 2013).

Because climate change is already not a top priority in municipal policy making (see Robinson & Gore, 2005 for full discussion), it is likely that there would not be a great deal of coverage in regional and municipal planning documents. Moreover, because certain climate action initiatives can also have corresponding benefits for communities – for example, there can be health benefits in creating a more walkable and bike-friendly community, or environmental benefits in protecting natural heritage areas; these activities may be included in plans but not with the goal of mitigating or adapting to climate change. Recall that the main question guiding the policy review is whether or not climate change is recognized in public policy. In terms of the criteria for analysis then, an assessment of whether the term is explicitly referenced or not, will suffice.

A three-point Likert Scale is adopted to assess references that are Implicit (I) – ‘issue was addressed without specific reference to climate change’; Explicit (E) – ‘issue addressed with overt reference to climate change’; or Not Evident (NE) – ‘issue remains unaddressed’.

It should be noted that some sections may talk about climate change in an introductory statement, with the particular issue (e.g. renewable energy) appearing later in the discussion. Similarly, climate change may be addressed in an opening line, with the particular issue appearing later in the form of a bullet point. Examples like these will be recorded as having an explicit reference.

Alternatively, the term ‘climate change’ may not appear in the plan, but there may be mention of a climate change component (e.g. carbon emission, greenhouse gas emission). Where these components are included, the issue will be recorded as having an explicit reference (e.g. creating compact communities to reduce greenhouse gas emissions). Similarly, if the plan acknowledges the likelihood of changing environmental conditions, the issue will be regarded as making an explicit reference. In other words, it will not be enough to talk about severe storms or flooding. The plan must recognize an increasing severity in storm events, more frequent flooding, changes in the intensity of storms, and so forth. With this criteria in mind, chapter 5 presents an overview of the documents selected and results of the policy review. Before this, the following section presents the findings from the pre-test study, while chapter 4 presents the data collected from the questionnaire.

3.7 Summary of pre-test findings

In total, six participants took part in the pre-test study. Participants were mainly graduate students in the University of Waterloo Planning department, with the exception of one student from an Engineering department. In terms of Section A – Knowledge of Climate Change, the pre-test revealed no major issues. Minor changes were made to improve the fluency of some statements (e.g. item 4 and 5 changed to say ‘last’ 250 years rather than ‘latest’ 250 years), and item 5 and 6 were reversed to improve the logical order of the statement (i.e. if the respondent answered true for “the carbon dioxide concentration has increased between 20% and 30% in the atmosphere during the latest 250 years” the next item asking “the carbon dioxide concentration has increased more than 30% in the atmosphere during the latest 250 years” would logically be false). No changes were made to Section B. A minor change was made to Section C – Source of information; a blank space was added to item 17 for respondents to report the main internet site used to obtain information regarding climate change. This was due to participants frequenting the internet for various types of sources (i.e. news podcasts online, journal articles, blogs etc.).

In Section D – Availability Heuristic, the pre-test revealed redundancy between item 27 b and 27 c. The latter was removed. The pre-test also revealed a high loading for items in Section E – Personal

Relevance of Climate Change. These were simplified to isolate a part of the statement at the beginning of the scale (i.e. “climate change will have a noticeably negative impact on”) followed by the rest of the statement as a separate item (i.e. “... my health in the next 10 years”; “... my health in the next 30 years”). Changes were also made to remove the redundancy of ‘financial’ impact items versus ‘economic’ impact items. The final questionnaire will only ask for financial impacts to emphasize the personal aspect (i.e. economic considers a more community-based dimension, and a question on economic development in the Region of Waterloo is already included in the next section). In the same regard, item 34 and 35 relating to negative impacts on the environment have been altered to specify ‘natural environment in my immediate surrounding’, again to emphasize a more personal dimension. There was repetition of two items relating to health (item 36 and 37), which has been removed for the final questionnaire. The pre-test revealed that no questions captured possible opportunities or benefits that can arise from climate change (i.e. only asks about significant impacts or noticeably negative effects). As a result, one item has been added to ask whether the participant perceives there to be an opportunities or benefits that can result from climate change (e.g. warmer weather).

Minor changes were made to Section F – Severity of Threat for Climate Change. The pre-test revealed confusion over what ‘your local community’ referred to, as some participants were only in Waterloo to attend university. Considering that some participants may be traveling into the Region for work, items stating ‘your local community’ have been revised to specify ‘the Region of Waterloo’. Minor changes were also made to specify ‘current’ perceptions of severity (as some participants noted that their ratings would be different in 30 years from now).

The pre-test revealed challenges in answering items 44 to 46. As a result, the final version will present these on a 5-point scale as done in Section E. No major changes were made to section G. Section H was also revised to reduce the load of items. The pre-test revealed a ‘too simplistic’ nature of items relating to self-efficacy. As one participant noted, the items do not consider what actions are already being taken. As a result, these items have been removed and instead, items asking about current activities will be included.

Minor changes were made to Section F to specify the local municipal level in policy making (in contrast to the federal or provincial level). The pre-test revealed an error in that item 67 and 68 were asking the same thing, thus the final questionnaire will include the correct definition for adaptation. Minor changes were made to items 70 to 72 to specify constraints or barriers.

Considering that one participant was from an Engineering department, and that this was not captured in the profession/industry categories in the questionnaire, a separate category listing ‘other’ has been added to the final version. A copy of the final questionnaire can be found in Appendix A.

Chapter 4 – Questionnaire Results

4.1 Sample profile

A preliminary list of potential participants was developed from recommendations of a key informant. This list was later expanded by performing a directory search of individuals working at the Region of Waterloo and cities of Kitchener, Waterloo and Cambridge that might be involved in policy-making activities. Council meeting agendas and minutes were also reviewed to identify individuals that were involved with local policies. A search for climate change initiatives in the Region also led to the discovery of efforts from the Grand River Conservation Authority as well as ClimateActionWR, hence participants were also contacted from these organizations. This study involved a method of snowball sampling whereby participants would recommend other individuals that might be suitable candidates for the study. This further helped develop the list of potential participants to contact.

Participants were initially contacted by email. The email letter introduced the student investigator and faculty supervisor, and stated the study objectives. Individuals were informed that the student investigator has been contacting individuals working in the Region of Waterloo, and from a variety of departments (e.g. planning, environment, emergency management, economic development and public health) to take part in the study. It was also stated that the student investigator was particularly interested in speaking with individuals involved in the policy-making process. It was made clear that this referred to policies in general and not necessarily climate-related policies (i.e. policies can be related to social housing which would be meaningful in identifying what other issues are given priority in policy-making). Individuals were informed of how the student investigator came across their name (i.e. whether they were identified from a directory search on a city website, or whether recommended by another participant), and given their particular position (which was stated to verify that the individual currently holds this position), the individual was then requested to take part in the study.

Individuals were informed that the questionnaire takes about 30 minutes to complete and that they had the choice to complete the questionnaire in either an online or in-person format at their convenience. The link for the online version was provided in the email. Attached to the email was a copy of the information and consent form to provide individuals with a more detailed overview of the study objectives and requirements. This letter also stated that the study had obtained ethics approval

from the University of Waterloo, and contained the contact information of the School of Planning, faculty supervisor, student investigator, and Office of Research Ethics. Finally, the email letter stated that there was no set deadline to complete the questionnaire but that the student investigator had aimed to close the online version in March. This was to provide a flexible deadline to encourage individuals to respond.

In total, 52 individuals were contacted to take part in the study. The first few emails were sent between November 24, 2012 and February 21, 2013. A second email was sent after a minimum of two weeks to follow-up if no response had been made after the first contact. In some cases, a follow up telephone call (third contact) was made in the month of March, if there was no response from the previous attempts. The last follow-up contact for all individuals was made on April 12, 2013. Data from the final questionnaire was collected on April 16, 2013.

Of the 52 individuals that were contacted, 34 responded, and 22 agreed to participate. Eight individuals declined participation for reasons being that they were not involved with policy, they did not work closely with climate change issues, climate change was not their area of specialty, or they were too busy at the time. Four individuals expressed interest to participate at first, however could not be reached again after repeated attempts. In total, 21 questionnaires were completed in full leaving a final sample size of $N=21$ (response rate 40.3%).

Of the 21 questionnaires, 5 were completed in-person whereas the remaining 16 were completed online. Data from the in-person interviews was later transferred online. Any information that was collected from the in-person interview that was not covered in the online format was added in the online format via the comment/reflection sections. For example, item 17 asks the frequency for which the participant consults internet sources for information about climate change. The in-person format asks if there is a particular site that the participant mainly frequents. This was to gauge the credibility of the site (i.e. academic source versus user blog). In contrast, the online format does not ask the participant to specify the site. Similarly, in asking whether or not the participant's department considers mitigation (item 64) or adaptation (item 65) in their decision making, the in-person interviews offered an opportunity to ask whether there was a preference between the two types of initiatives. For example, whether there is more of an emphasis on mitigation rather than adaptation. This was also something not covered in the online format. This was a short-sightedness in the questionnaire design for the online format given that it was only after conducting the in-person interviews that it became apparent to ask these questions.

Participants were all professionals working in the Region of Waterloo. Although one of the research aims was to contact individuals from a variety of departments in order to compare potential differences between departments, the final sample did not lend to enough representation from each department to evaluate the results. For example, there was only one participant from an economic development department, whereas there were no representation from an agricultural department. In contrast, there was a large proportion of the sample that came from planning departments. In light of this, differences between the departments cannot be assessed. Instead, the sample was analyzed uniformly to represent local planning officials more generally. A summary of the department representation can be found below.

Table 5 Distribution of participants' industry

Industry/Profession		Number of participants	Proportion
Planning		5	33%
Environmental		4	26.7%
Agricultural		0	0%
Emergency Management		2	13.3%
Public Health		3	20.0%
Economic Development		1	6.7%
Other		9	
	Fleet services	1	
	Water, Wastewater, Stormwater	2	
	Landscape Architecture/Project Management/Construction	3	
	Emergency Response	1	
	Social Services	2	

Note: total number of participants does not match total sample because some participants self-identified in multiple categories.

4.2 RSQ1: How knowledgeable are local planning officials about climate change and what sources of information inform this knowledge? (Items 1-27b)

Participants had a strong understanding of climate change causes and fairly strong self-perception of their knowledge. Internet was the most consulted source of information. However, almost all

participants also had exposure to weather changes that were indicative of climate change (most in the last 6 days), heard or saw media coverage on climate change (most within the last 10 days), or knew of a climate-related initiative taking place in another municipality. These latter sources serve to also inform knowledge on climate change.

4.2.1 Questionnaire evidence

4.2.1.1 Knowledge of climate change

The majority of participants answered the causes of climate change questions correctly, with the exception of items 4 and 12, and 5 to a lesser extent. The group was most divided on item 4 (the carbon dioxide concentration has increased between 20% and 30% in the atmosphere during the last 250 years – correct answer was false) with 40.9% answering true, and 40.9% answering false; and item 12 (the increase of greenhouse gases is mainly caused by air pollutions from the industry – correct answer was false), with 42.9% answering true, 47.6% answering false (see Figure 3).

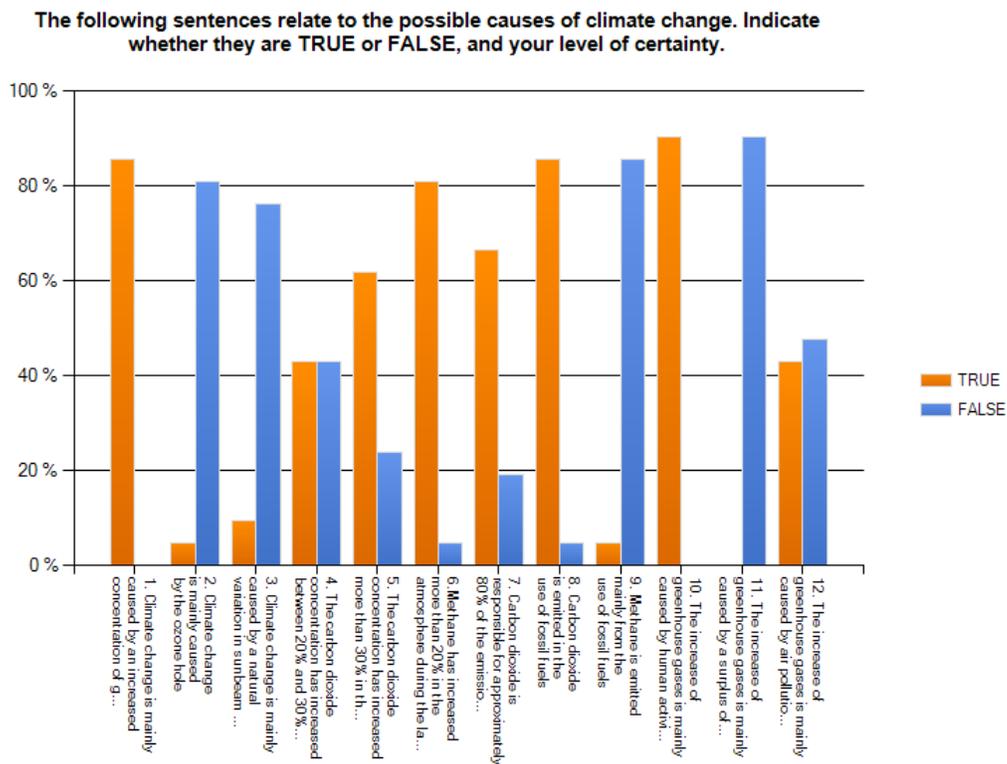


Figure 3. True and false statement on climate change causes

In terms of uncertainty, items 3, 4, 6 and 9 received the highest number of ‘very uncertain’ ratings, with 13.6%, 13.6%, 14.3% and 14.3% of the responses, respectively. In contrast, the items that participants felt most certain about was item 8 (carbon dioxide is emitted in the use of fossil fuels) and item 10 (the increase of greenhouse gases is mainly caused by human activities), with 61.9% of participants reporting ‘very certain’ for both items (see Figure 4).

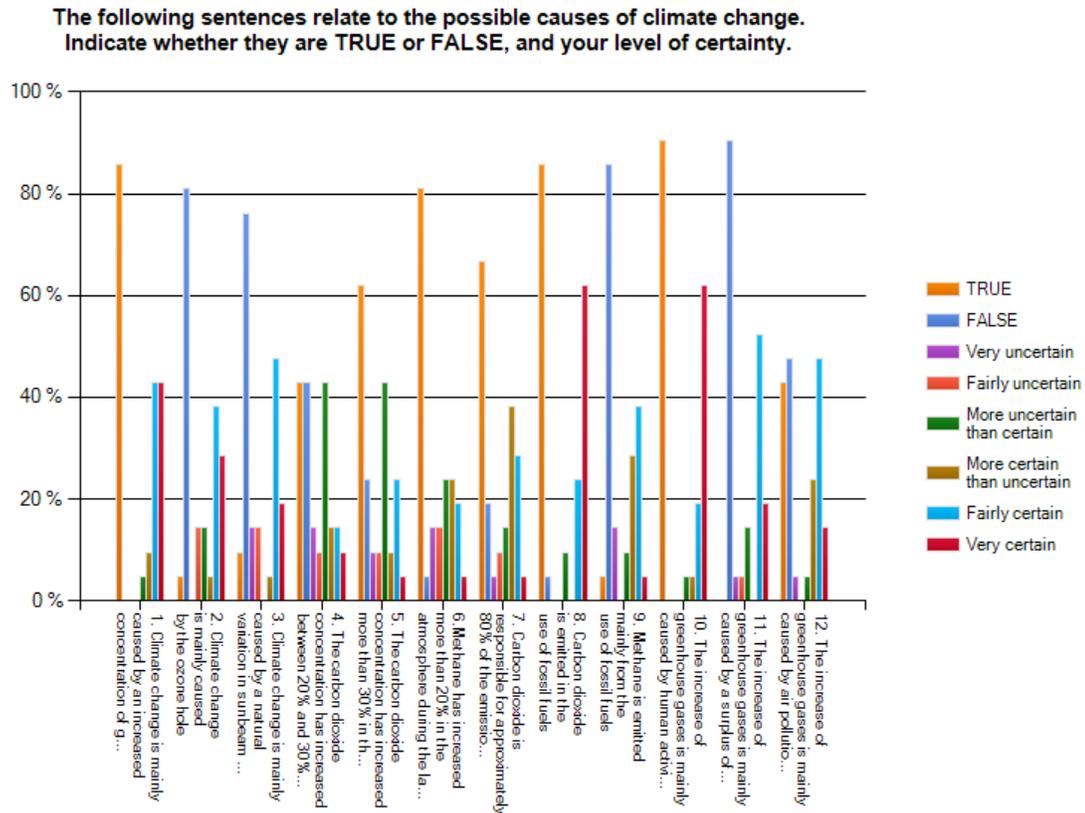


Figure 4. Level of certainty on climate change causes

Despite these uncertainties however, participants still answered the questions correctly with the exception of item 4. These findings demonstrate that participants had a very good understanding of the causes of climate change.

Participants had the most difficulty with questions surrounding precise levels (e.g. 20-30% versus over 30%), which may stem from inconsistency in general information released to the public on climate change (e.g. media exaggerating or underplaying climate data). Participants also had more difficulty with questions relating to methane (item 6 and 9), but for the most part, seemed to be more

confident in questions dealing with carbon dioxide emissions. This may reflect the fact that carbon dioxide is the most common anthropogenic greenhouse gas emissions (Sustainable Waterloo, 2010). Not only is it readily discussed, but there is a human dimension associated to it (e.g. emissions from automobile usage) which may make it more personally relevant to individuals. The less certainty surrounding knowledge on other greenhouse gas emissions may possibly be explained by their environmental dimensions, for instance, in the context of agricultural activity or degradation of wetlands and other natural habitats.

While the increase of greenhouse gases is mainly caused by human activities (IPCC, 2007c), rendering that item 12 is false in asserting that the main cause is air pollutions from industry, the confusion and uncertainty may be a result of the general description of ‘industry’.

Together, these findings support previous literature on the possible disconnect with statistical information (Weber, 2010).

4.2.1.2 Self-perception of Knowledge

In terms of self-perception of knowledge, all participants reported knowing either some (57.1%), or quite a bit (42.9%). No participant reported knowing either “nothing” or “a lot”. Based on the accuracy of responses above, self-perception of knowledge appears to also be accurate, which is in line with previous research (Takahashi & Meisner, 2011; Sundblad et al., 2009).

The majority of participants (42.9%) also reported thinking about climate change “several times a week” (see Figure 5).

14. How often do you find yourself thinking about climate change?

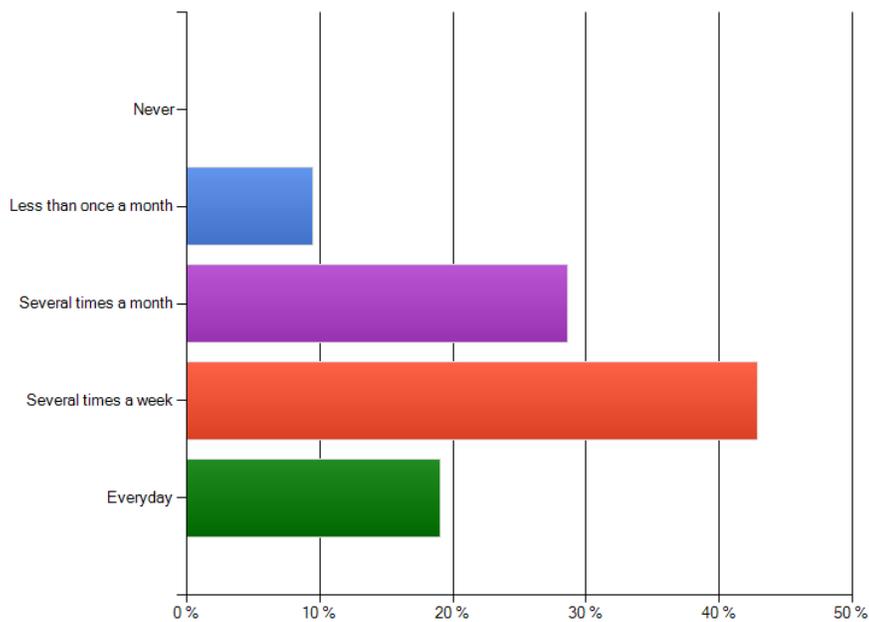


Figure 5. Consideration for climate change

As Krosnick et al. (2006) point out, the ACE Model (measuring Attitudes, Certainty and Existence beliefs) holds that “people develop a sense of certainty about global warming if they feel they know a lot about it... and if they have thought a great deal about it”(p.14). With this framework in mind, it can be argued that the current sample has a moderate sense of certainty about climate change. Although the sample did not report knowing “a lot” about climate change, they reported thinking about it “several times a week” and some even “everyday” (19%).

4.2.1.3 Source of information

The following figure shows the results for items 15-24, relating to frequency of information from different sources.

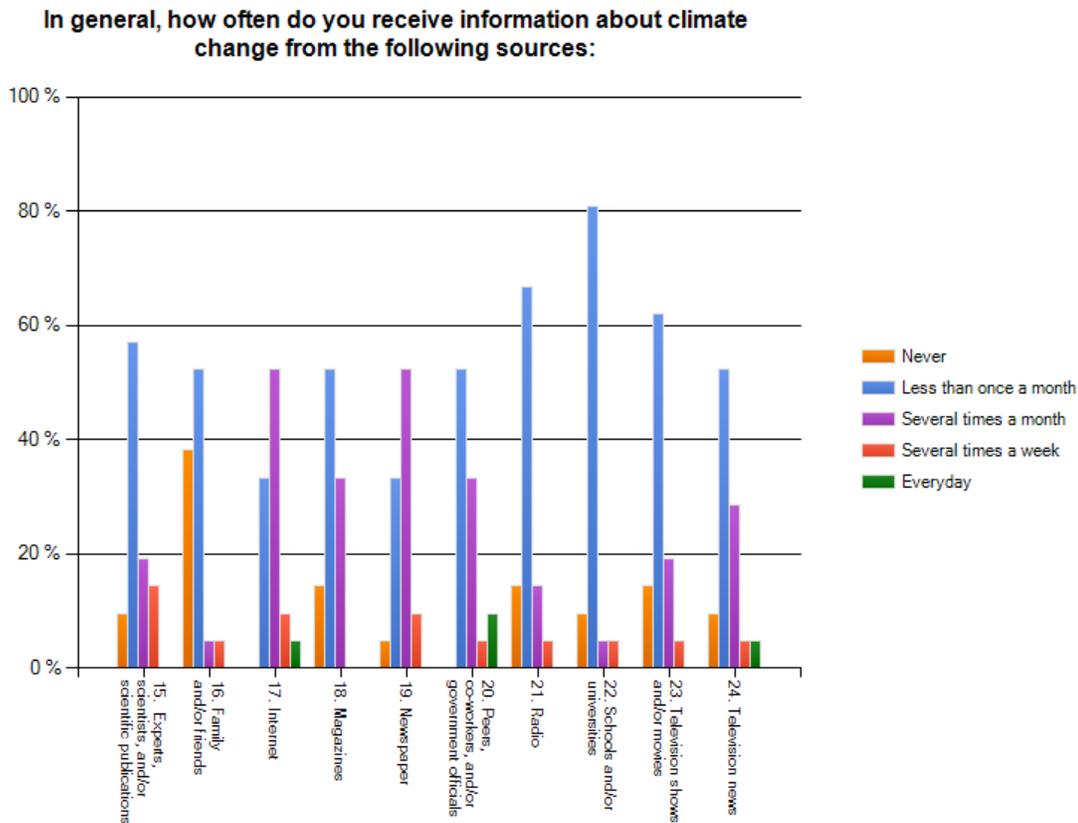


Figure 6. Sources of information and frequency

Most notably, the least consulted source of information was Family and/or Friends, which had the highest number of participants reporting ‘never’ (rating average of 1.76 out of 5). Schools and universities received the second lowest rating (rating average of 2.05), with the majority of the sample consulting this source ‘less than once a month’ (81.0%). Internet appeared to be the most frequented source, with 52.4% of participants reporting that they consulted this source several times a month (rating average 2.86), followed by newspaper (average rating 2.67).

Interestingly, the results of the current study were almost identical to the findings from Takahashi and Meisner (2011). The authors found that internet was the most frequently consulted source of information, followed by newspaper, television, radio, magazines, experts, schools, then family and friends. The current study revealed very similar results, except experts were more frequently consulted and radio less so. The current study also differentiated television news from television show/movies after pre-test results warranted the distinction.

The findings however were very different from Brody and Grover’s (2010) results. The authors found that friends and family were the most consulted source of information in contrast to co-workers, supervisors, the organization’s research department, or other professionals in the community. The authors also reflected on the importance of evaluating communication channels, as they can be important indicators of whether climate change is part of the knowledge exchange and information flow for individuals. Moreover, it is important to understand whether friends and family are consulted suggesting personal concern, or whether community and organization leaders are consulted who may have a larger role in policy debates and planning for climate change (Brody & Grover, 2010).

For the current study, the fact that almost 40% of participants reported never talking to friends or family about climate change is troubling because it suggests that climate change may not be a personally-relevant issue. For instance, people typically consult interpersonal sources of information for issues they share interests in, as well as issues they might care about or have concern for (Robinson & Levy, 1986). Moreover, Stamm, Clark, Eblacas (2000) found that interpersonal sources such as family and friends played a significant role and much stronger role in comparison to media sources in several aspects of global warming understanding. Specifically, significant correlations were found for several variables relating to the importance of causes, concern about effects, and helpfulness of solutions, whereas this relationship was not as strong for media sources. While information-seeking behaviour was not assessed, the absence of communication with friends and family should not be taken lightly as it may suggest a lack of personal interest for climate change.

4.2.1.4 Availability of Information

In terms of experiencing changes in the environment that may be indicative of climate change, an overwhelmingly large proportion of the sample had personal exposure (95.2%), whereas only 4.8% did not. Most participants (7) also experienced changes within the last six days (see Table 6). Interestingly, four participants made specific reference to changes experienced in the summer of 2012, albeit this was the most recent date for only two of the four participants.

Table 6 Date last experienced climate change related event

Time Lag Category	Response Count
Last 6 days	7
Last month	1

Last 3-4 months	3
Last 7 months	2
Last year	3
More than 1 year	2
Unknown	1

With regards to the literature on availability heuristics, these findings would suggest that participants should have a fairly high risk perception of climate change events. Recall that the more ease a person has in remembering an event, or the ease at which they can bring an incident to mind, the more likely it is that the person will perceive an event as being probable (Sunstein, 1999; Botterill & Mazur, 2004). Based on the high percentage of participants that experienced an event, and reported experiencing an event within the last 6 days, it is likely that participants would perceive there being a high risk for these events to happen again.

In terms of the changes experienced, Table 7 below presents the response summary for participants. It should be noted that for each response provided, a content analysis was performed to identify key words belonging to distinct categories. In other words, the response was broken up and sorted into different categories. It should also be noted that one response may fall into two different categories. For example, one participant may talk about experiencing a warmer winter as well as an increase in rainfall. The first part of this response would be recorded in the ‘seasonal changes’ category, whereas the latter would fall under the ‘changes in precipitation’ category. The analysis was carefully conducted to ensure that specific components of a response were not counted in multiple categories, unless the participant explicitly stated multiple changes.

Table 7 Response categories for weather changes experienced

Response Category	Response Count
Seasonal Changes/ early spring/warmer winter	9
Change in precipitation levels	6
Changes in frequency/intensity/ duration of weather events	6
New records/new standards reached	4
Low water levels	4
Severe weather events (ice storms, hurricanes)	2

Flash flooding	2
Drought	2
Increased transmission of vector-borne diseases	1

As the table shows, the most common response category was ‘Seasonal changes/early spring/warmer winter’. For example, many participants pointed out that they experienced warmer winters and an earlier spring season. The second most common response category was for ‘change in precipitation levels’ and ‘changes in frequency/intensity/and duration of weather events’. For example, participants talked about an absence of snow, little rainfall or ‘months full of rain’. Similarly, participants pointed out an increase in the frequency of weather events, heavier rainfall, and changes to the intensity and duration of storm events. The third largest categories were ‘new records/new standards’ and ‘low water levels’. Multiple participants talked about how new records have been reached such as the ‘hottest year on record’, as well as how standards have changed such as how the 25 year storms or 50-100 year storms are gauged and more frequently encountered. Multiple participants also explicitly noted lower water levels in the Great Lakes. The categories ‘severe weather events’, ‘flash flooding’ and ‘drought’ were each referenced twice, and ‘increased transmission of vector-borne diseases’ was mentioned only once.

In terms of the level of concern for these changes, most participants reported a level of 9 (35.0%) (see Figure 7). As it will become clear from the subsequent item, changes personally experienced instilled greater level of concern in contrast to information communicated by media sources.

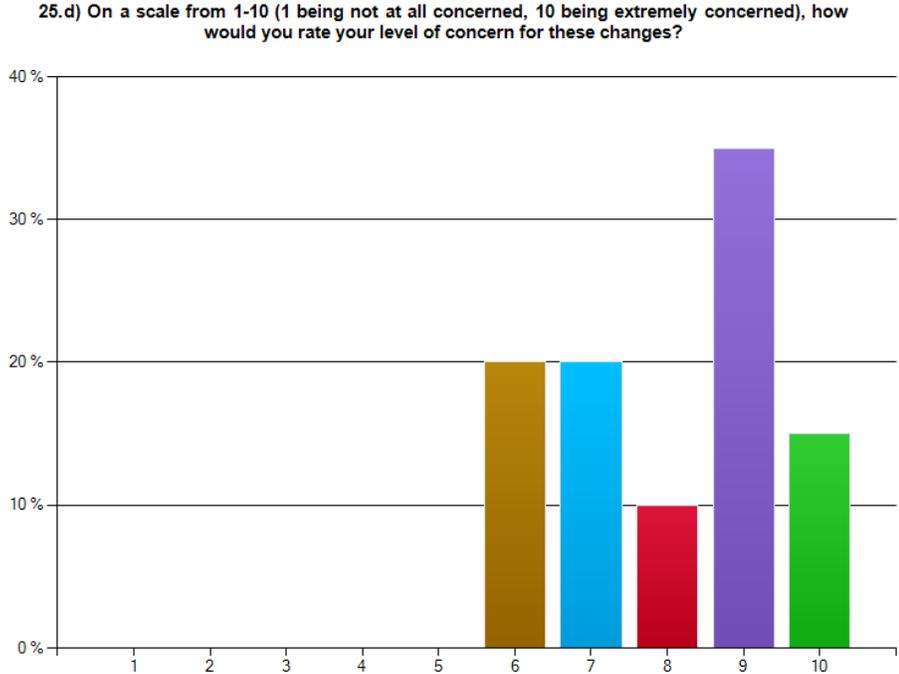


Figure 7. Concern for weather changes

One of the most intriguing findings from these responses was the number of participants that made specific reference to places or activities of personal relevance. When considering the personal connection made, it becomes easier to understand why participants expressed such a high level of concern. For example, some participants talked about pastime activities such as skiing or playing hockey and how warmer weather and less snow prevented their ability to take part in these activities. Several participants noted lower water levels at cottage lakes or the Great Lakes which suggests changes to places of leisure and personal interest. One participant also discussed having more snow in their childhood, and how it cannot be denied that the climate is changing. Another participant expressed concern over livelihood, as their partner is a part-time farmer whose crops have suffered as a result of extreme drought in the past year. Multiple participants also noted changes in the summer of 2012, which may have been realized from summer leisure activities. Together, these findings demonstrate that participants connect climate change issues to the things they value or are interested in the most.

In terms of media coverage, most participants heard or saw coverage in the past 10 days (Table 8), and most commonly received this information from television and newspaper sources (Table 9).

Table 8 Date last exposed to relevant media coverage

Time Lag	Response Count
Past 24 hours	1
Past 10 days	6
Past Month	5
More than one month ago	1

Table 9 Type of media coverage

Response Category	Response Count
Television	4
Newspaper	4
Internet/Facebook/blog	3
Online news article*	2
Radio	1
Scientific Publication	1

Note: Online news article treated differently than newspaper because of comment section available online

Compared to level of concern from changes experienced however, participants were less concerned by information from media sources.

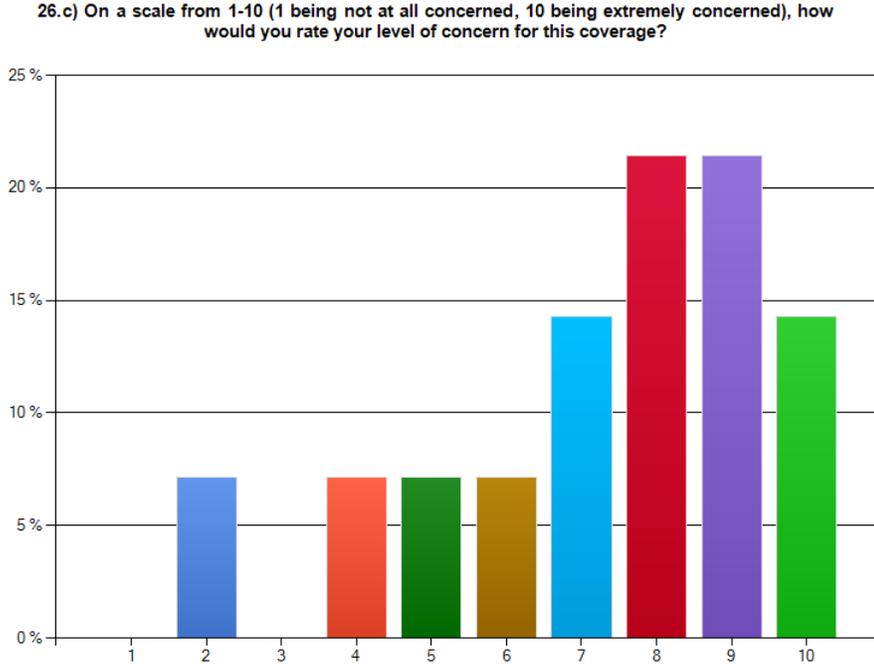


Figure 8. Concern for media coverage

As the Figure 8 shows, the majority of participants gave a rating of 8 (21.4%) or 9 (21.4%), however a relatively large portion also gave a rating of 7 (14.3%). This demonstrates that level of concern for media coverage is much more varied (i.e. more people reported a level of concern of less than 5). Reflecting on these findings, the fairly recent exposure to media sources would again suggest that participants are thinking about climate change and with the influence of availability heuristics, will likely perceive a higher risk for climate impacts. However, information from media source as demonstrated, works differently than actually experiencing a weather event. Moreover, there are issues with trust and biases related to this source of information, which may actually compromise efforts to take climate action.

Given that the sample most commonly received information from newspaper and television, the credibility of these sources are questionable and sensationalization in the coverage is likely. The most clear indication that participants did not connect as strongly to this information is evident from the more varied ratings for level of concern.

Item 27 a) asked whether participants were aware of any policy initiatives taking place in other municipalities that may be directly related to mitigating or adapting to climate change. A large

proportion of the sample reported yes, they were aware (90.5%), whereas only 9.5% reported not being aware. In terms of the date that participants last heard of these initiatives, most reported either the past day (4 participants) or past year (4) (Table 10). Five responses however had to be removed, as participants did not provide a clear date.

Table 10 Date last heard of initiative in other municipality

Response Category	Response Count
Past 24 hours	4
Past week	2
Past month	2
Past 3 months	1
Last year	4

4.3 RSQ2: Is there an organizational culture that is in favour of climate action (Items 27c, 63, 64, and 61)

There appeared to be a quite favourable organizational culture for climate action. Participants perceived there to be a very high capacity to take action, almost all participants considered mitigation (90%) and over half considered adaptation (65%) in decision making; and the role of local government in helping to address climate change was realized by participants.

4.3.1 Questionnaire evidence

4.3.1.1 Examples from other municipalities

In reflecting on the initiatives taking place in other municipalities, and when asked whether participants felt their department can implement something similar, the majority of participants felt their department could do so (89.5%), whereas only a few said no (10.5%). The Table below presents the response categories relating to participants' reasoning.

Table 11 Capacity of department to implement similar initiative as seen in other municipalities

Yes	
Response Category	Response Count
Already doing something similar	8

There is a way (no mention of department already doing something similar but acknowledges a method to go about it)	5
...But we need financial and human resources	2
...But we need political will	1
No	
Lack of support	1

Of the participants that felt their department could implement something similar, the majority explained that this was the case because they were ‘already doing something similar’. For example, a number of participants listed activities such as partnering with NGOs, installing heat recovery and energy conservation measures, implementing a stormwater credit program or rural water quality program, or currently participating in the regional climate action planning process. Some participants did not state that their department was already doing something similar, but instead discussed what measures needed to be taken in order to implement something similar. In other words, these participants acknowledged that there was a way to go about implementing something similar, as opposed to discussing there being barriers that constrain efforts to take action. This category contains responses that acknowledged that ‘there is a way’ and forms the second largest group. Participants talked about how emissions from truck and facility usage can be monitored as well as how emission reductions and green energy can be incorporated into many policy areas (e.g. Official Plans, green procurement policies, parking policies, etc.) for most departments. Participants also talked about how risk assessments for critical infrastructure can be undertaken, how water flows and storm frequency needs to be modelled so pipes can be appropriately sized and stormwater retention areas can be properly developed; and how a climate change action plan can follow greenhouse gas inventories.

Two participants noted that their department can implement something similar, but will need financial and human resources to do so, and one participant added that there needs to be political will. For the latter, the participant commented that efforts are typically more reactive rather than proactive.

As mentioned above, two participants felt that their department could not implement something similar, however only one participant offered an explanation for their response. This participant described how another city had prepared a community energy efficiency plan and how the city had the help of their respective hydro utility service provider. This participant commented that such an action is an ambitious option for distributing renewable resources, and that they did not feel that their

department was able to implement something similar given that there was a lack of support from the hydro utility service provider.

Taken together, these responses are very encouraging, and suggest that there is a high capacity for the region and municipalities to take climate action. This was a critical factor identified by Grothmann and Patt (2005). Almost all of the planning officials were knowledgeable about other policy initiatives taking place, and perceived that their particular department could implement something similar. Either the department was already working on something similar, or was aware of what actions needed to be taken. In terms of the relationship with environmental behaviour (i.e. implemented policies), these findings would suggest that there are already policies in place, or soon to be implemented. That said, an understanding of possible barriers and constraints is still warranted.

4.3.1.2 Mitigation and Adaptation in decision making

There appeared to be a favourable environment for climate action given that participants also reported that mitigation and adaptation were considered in decision making. Item 63 asked, “if ‘mitigation’ is defined as human intervention to reduce the sources of greenhouse gases, is mitigation something your department considers in its decision making”. In terms of the response, 90.0% of participants answered yes and only 10.0% of participants answered no. Item 64 on the other hand asked, “if ‘adaptation’ is defined as adjustments in natural or human systems in response to climate change conditions or effects, is adaptation something your department considers in its decision making”. In terms of the response, 65.0% of participants answered yes and 35.0% of participants answered no.

These findings demonstrate an opportunity for departments to talk about and develop strategies and policies to address climate change impacts, however they also demonstrate that there may be more consideration for mitigation initiatives as opposed to adaptation. That said, it is worth noting that in two out of the five interviews that were conducted in person, participants added the caveat that there is more of an emphasis on mitigation. This was something that was not captured very well in the online survey. This suggests that even though 65.0% of participants reported that ‘yes’, adaptation is considered in the decision making, it is possible that adaptation is still not as widely or strongly considered as mitigation. In other words, the true extent to which adaptation is considered, *relative* to mitigation, is not fully captured. Despite this, the findings still demonstrate a favourable organizational culture. With regards to the policy review, this would also suggest a stronger focus on mitigation activities.

4.3.1.3 Role of local government

The responses for item 61 on the role of local government are discussed in length in another section for research sub-question 6, hence a detailed summary is not provided here. The most critical thing to note from the findings however, was the fact that participants recognized the importance of the local level for climate change planning. With the exception of one participant, all responses reflected the idea that local governments needed to be leaders and act on climate change; they are the level for which action happens (a sentiment frequently addressed in the literature) and in a sense, have the responsibility to implement strategies. That said, one participant felt that local government should not be playing a role in adapting to climate change, which may denote that this attitude exists in the region. A more extensive study exploring this issue is warranted to understand how prevalent the attitude may be.

4.4 RSQ3: What are local planning officials' perceptions of climate change risk? (Items 28-43)

Participants perceived climate change to be a temporally and geographically distant issue. There was a higher risk perceived for the environment, in comparison to personal health or financial situations. Interestingly, participants viewed that public health, in contrast to economic development in the Region, will be more significantly impacted by climate change in the next 30 years. Over half of the participants also viewed there being opportunities or benefits related to climate change, with most participants specifically noting increased agricultural productivity and longer growing seasons.

4.4.1 Questionnaire evidence

4.4.1.1 Personal relevance to climate change

Consistent with the literature, participants were more likely to agree that climate change will affect the natural environment as opposed to affecting themselves personally (i.e. personal health and financial impacts). Overall, 66.7% agreed that “climate change will have a noticeably negative impact on the natural environment in my immediate surroundings in the next 10 years” and 66.7% strongly agreed that “climate change will have a noticeably negative impact on the natural environment in my immediate surroundings in the next 30 years”. There was also a noticeable temporal effect. Participants were more likely to agree that climate change will have a noticeably negative impact on their health, their financial situation, and the natural environment in 30 years relative to 10 years. Like

many other studies have shown before, these findings demonstrate that climate change is viewed as distant issue and more of a problem for the natural environment.

There was a very small difference in average ratings for impacts to health in the next 10 years and the personal financial situation in the next 10 years (average of 2.86 and 2.96 respectively out of 5). However this difference was slightly more pronounced when considering personal health in the next 30 years (2.24) relative to the personal financial situation in the next 30 years (2.43) (see Figure 9).

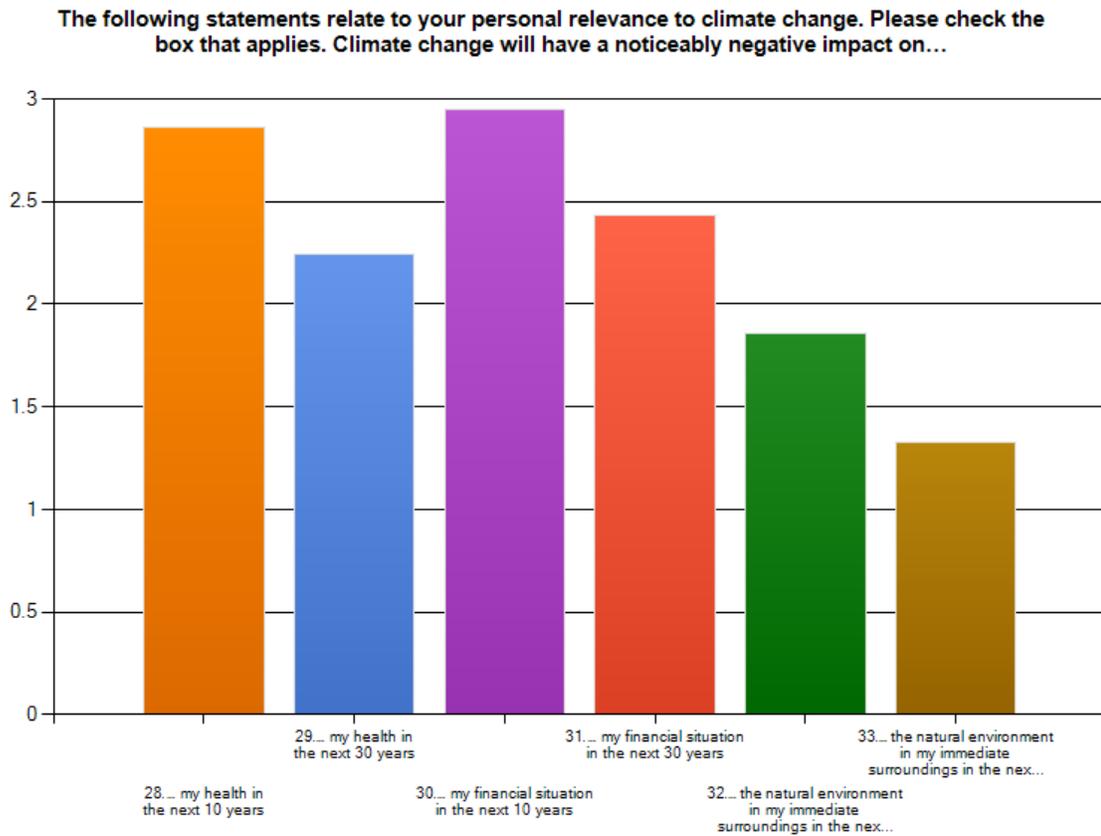


Figure 9. Personal relevance to climate change

When presented with the statement “climate change will exert a significant impact on _____ (public health, economic development and the natural environment) in the Region of Waterloo in the next 30 years”, participants were more likely to agree with statements relating to the natural environment (61.9% strongly agreed, compared to only 28.6% strongly agreeing for economic development, and 42.9% for public health) (see Figure 10).

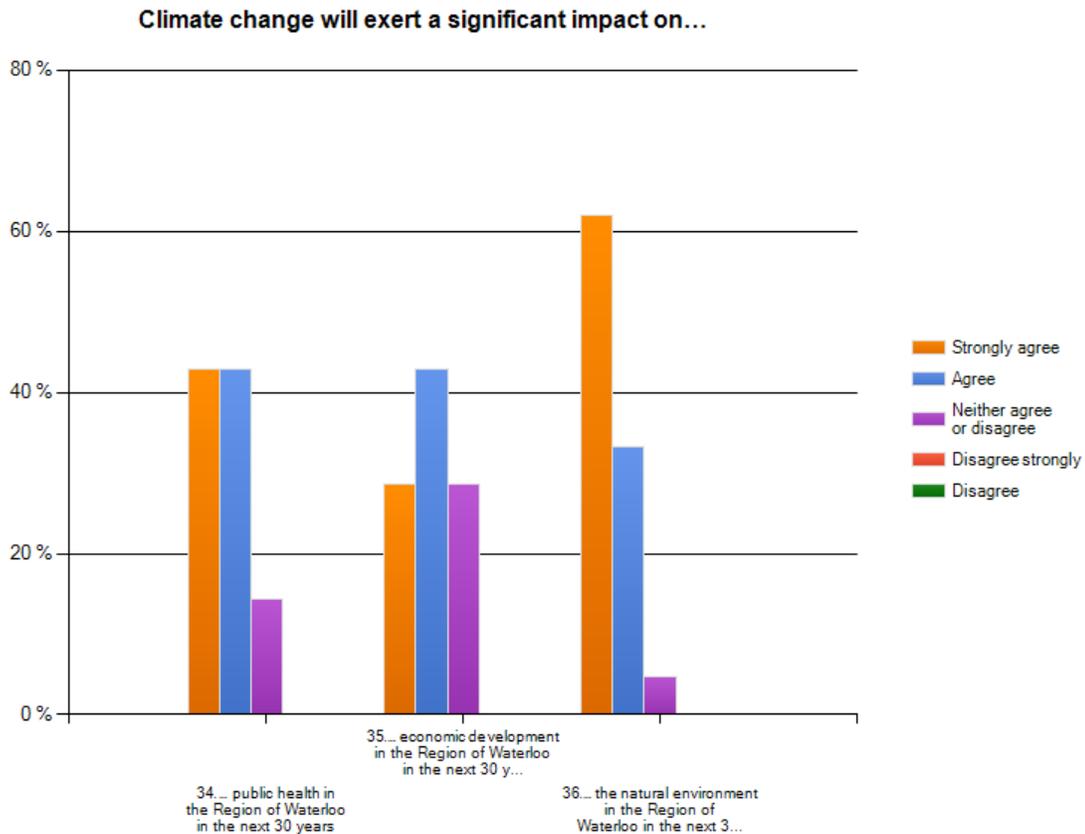


Figure 10. Significant impacts from climate change

What was most surprising about these results was the finding that participants perceived there to be a bigger impact on public health in the next 30 (average rating 1.70), in comparison to economic development (average rating 2.00). As described earlier, there can be significant economic impacts as a result of damage done by severe weather events. While there can also be significant public health problems (e.g. increased prevalence of respiratory problems as a result of increased smog days), the financial impacts related to climate change may be felt more readily (e.g. infrastructure damage from heavy rains and flooding). The finding that participants perceived public health to be more vulnerable, may reflect attitudes surrounding the nature of the problem (e.g. respiratory problems may be more difficult to deal with than infrastructural damages), but also a belief that opportunities related to climate change may help to counteract some of the economic impacts. The latter view is supported by the findings for the next item.

4.4.1.2 Benefits and opportunities

When asked, “do you perceive there to be any benefits or opportunities (personal or otherwise) with climate change (e.g. warmer temperatures)”, 66.7% of participants answered yes and 33.3% answered no. For those that answered yes, most participants felt that there will be increased agricultural productivity and longer growing season benefits (see Table 12).

Table 12 Opportunities and benefits related to climate change

Response Category	Response Count
Increased agricultural productivity/ longer growing season	5
Warmer temperatures appreciated	4
Motivate and shape policy for the better/ stimulate creativity and innovation	4
Green economy benefits	2
Recreational benefits	2
Need and cost reduced for snow removal and salt cover	2
Use less energy for heating	1
Benefits for increased oil exploration	1

Specifically, participants talked about how there might be increased agricultural productivity, extended growing seasons (albeit with negative feedback effects such as effects to rainfall, in turn affecting irrigation, inability to infiltrate the land, and placing more of a demand on water management), and personal benefits for farmers such as increased crop revenue.

The categories ‘warmer temperatures appreciated’ and ‘motivate and shape policy for the better/stimulate creativity and innovation’ both received the second largest proportion of responses. It should be noted however, that ‘warmer temperatures’ was provided as an example in the question to participants. As such, there should be consideration of a ‘priming effect’ in evaluating the most common responses; that is, participants may have thought about ‘warmer temperatures’ only after reading the question, hence priming them to respond with this specific answer.

Participants generally talked about how warmer temperatures and more mild winters are welcomed. For example, warmer weather may make commuting easier for cyclists. With regards to the ‘motivate and shape policy for the better/stimulate creativity and innovation’ category, participants talked about opportunities to shape policy and promote more mitigation and action. One participant mentioned that

despite negative feedbacks from an extended growing season (see discussion above for increased agricultural productivity category), these impacts may be a ‘good thing’ given that ‘necessity is the mother of invention’. That is, these impacts encourage more of a push to look at a broad range of options and encourage individuals to continue to find ways to absorb changes. One participant also talked about how opportunities may arise from developing alternatives for present day fuel usage. Another participant commented that climate change will need ‘innovations of numerous kinds’ and that this will drive innovation across sectors and industries.

The categories ‘green economy benefits’, ‘recreational benefits’ and ‘need and cost reduced for snow removal and salt cover’ were each referenced twice. For the ‘green economy benefits’ category, participants talked about how economic benefits from climate change in the Region of Waterloo will be particularly attached to the green industry, and how opportunities can be found in green infrastructure, programs, funding and jobs to cope with climate change. Participants also mentioned how there might be recreational benefits, for example, activities that were typically performed in the summer can now be done throughout the year. There might also be benefits in having to shovel less as a result of less snow, and cost reductions from reduced snow removal and salt cover practices. One participant noted that as a result of milder winters, there may be benefits in energy conservation as less energy is used for heating. Another participant discussed benefits in increased oil exploration and commented that the crux of the problem is the fact that Canada will have significant benefits from climate change, rendering the issue a ‘great tragedy’.

Together these findings demonstrate how most participants perceived there to be benefits or opportunities tied to climate change, which is problematic as it may diminish some of the urgency to take climate action. That said, a number of participants also provided countering arguments. At the same time, while not all opportunities were in the form of economic benefits (as item 34-36 would have suggested), for example, participants talked about opportunities for innovation and warmer temperatures allowing for more outdoor recreational activities; participants still recognized opportunities for increased agricultural productivity (most common opportunity reported), green economy benefits, and increased oil exploration capabilities. Acknowledging these benefits would indeed help to counteract some of the economic development impacts the Region may face in the next 30 years as a result of climate change. This would explain why participants perceived there to be a bigger impact to public health in the Region.

4.4.1.3 Severity of threat

Consistent with the literature, participants were also less likely to see climate change as a threat to themselves personally (average rating 6.52 out of 10), their family (7.05) and to the Region of Waterloo (6.81), in comparison to people in other parts of Canada (7.71), people in other countries (8.38) or to plants and animals (8.24) (see Figure 11). This finding further supports the literature showing that people perceive climate change to be more of a problem for people in distant geographical locations and for the natural environment.

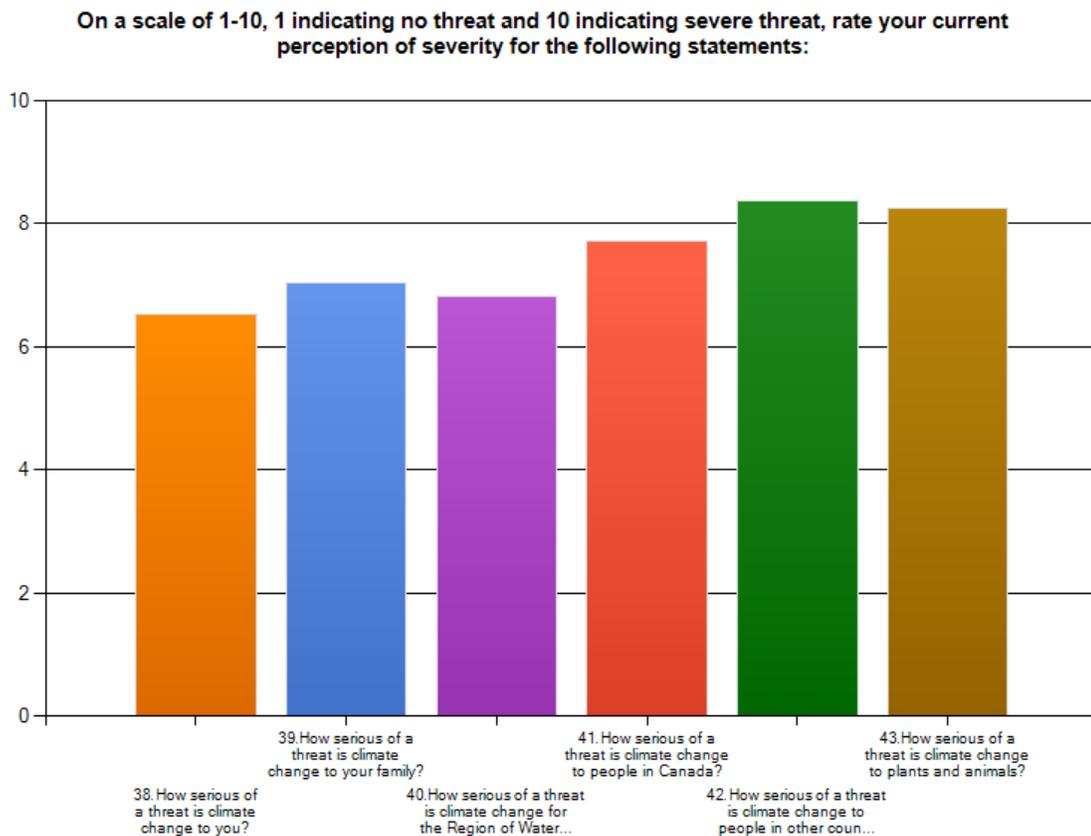


Figure 11. Severity of threat from climate change

4.5 RSQ4: What are local planning officials' levels of efficacy for climate change? (Items 44-59)

There was not a strong sense of self-efficacy for climate change but additional comments reflected a need for collective efficacy.

4.5.1 Questionnaire evidence

4.5.1.1 Efficacy and selected measures of efficacy and climate change

Participants were more likely to strongly agree or agree with the statements “human beings are responsible for climate change” (average rating 1.52 out of 5) and “I believe my actions have an influence on climate change” (average rating 1.67). However, participants were less likely to agree with the statement, “my actions to reduce the effects of climate change in my community will encourage others to reduce the effects of climate change through their own actions” (average rating 2.19) (see Figure 12).

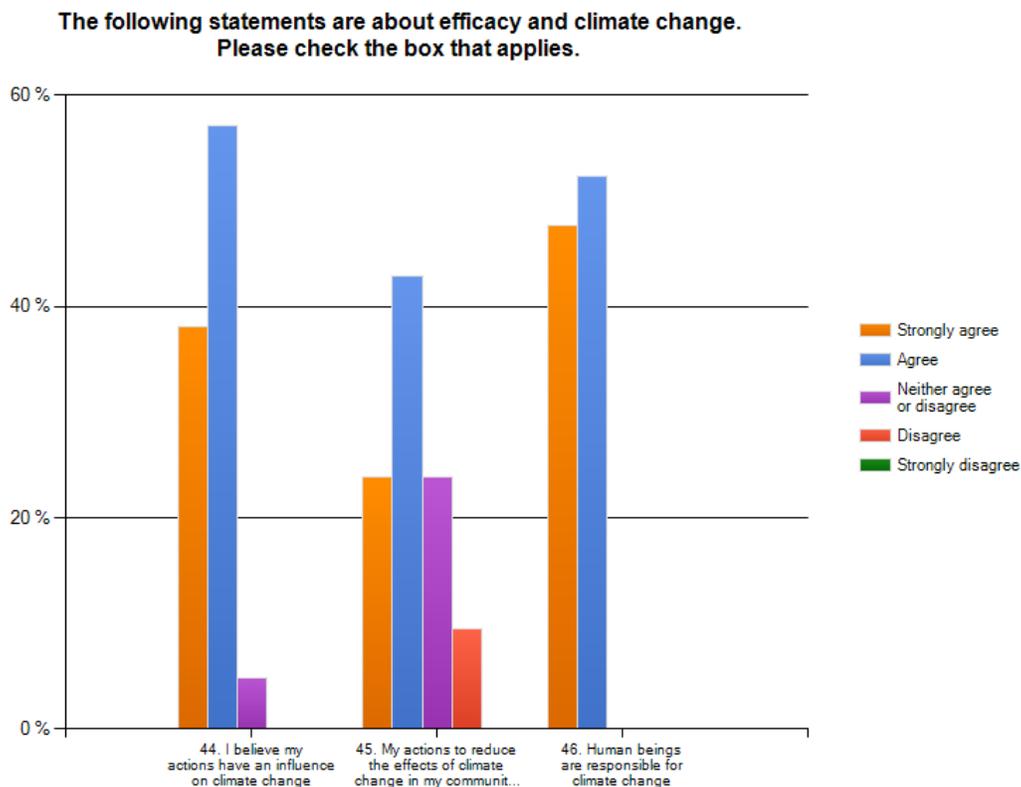


Figure 12. Self-efficacy and climate change

There did not appear to be any major differences between select measures of efficacy. Item 50 (driving less and using more public transportation) had a slightly higher average rating (5.57 out of 7) than other actions, in helping reduce personal contributions to climate change. Item 51 (recycling paper, beverage containers and other recyclable products) had the lowest average rating (4.19),

followed by item 51 (changing the light bulbs at home to more energy saving ones) with 4.24 (see Figure 13). There also did not appear to be any major differences in voluntary actions (see Figure 14).

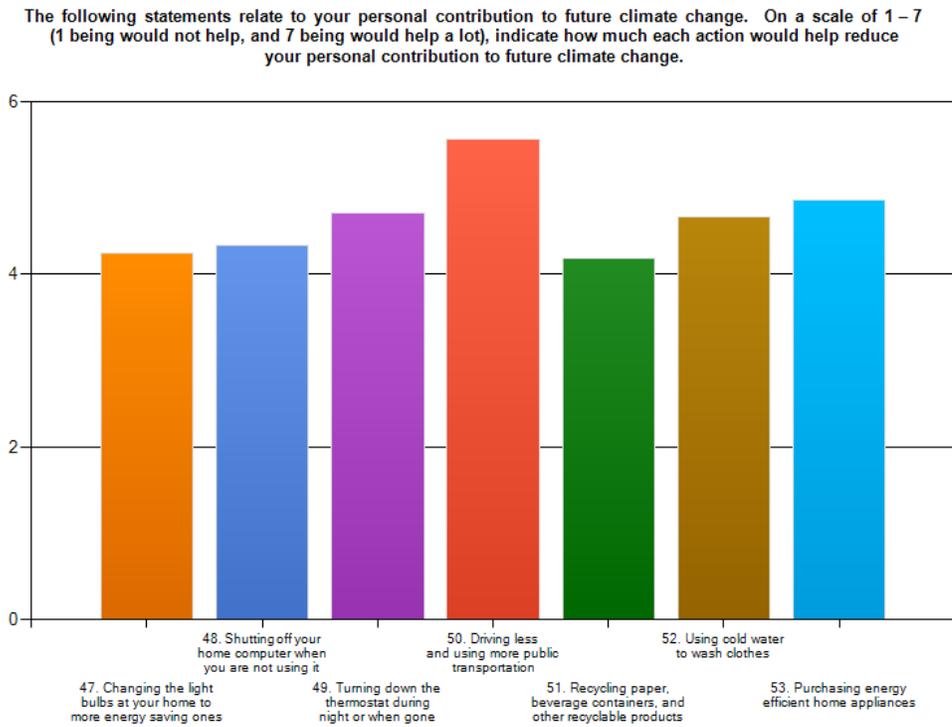


Figure 13. Perceived helpfulness of actions

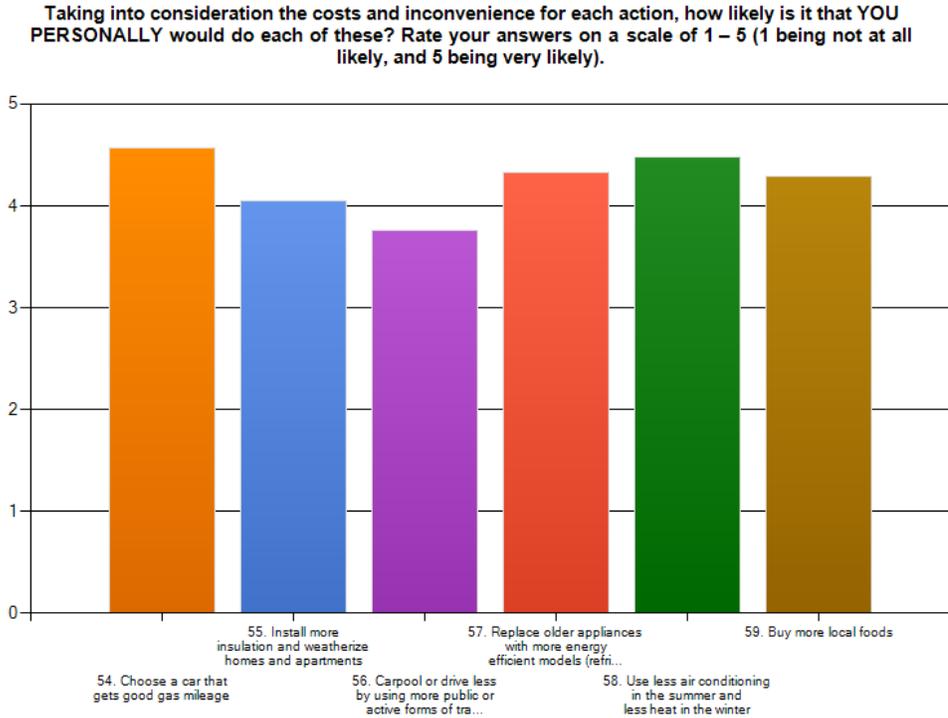


Figure 14. Likelihood of performing actions

Item 56 (carpool or drive less by using more public or active forms of transportation) received a slightly lower average rating (3.76) for the likelihood that participants would perform this action, relative to the other actions.

Taken together, these findings would suggest that there is not a strong sense of self-efficacy, or intent to take action. While participants acknowledged that their actions had an influence on climate change (albeit, this may reflect the negative connotation of contributing to climate change through the use of automobiles); and unanimously agreed that human beings were responsible for climate change, few felt their action would motivate others to perform actions. Likewise, the average rating for how helpful certain activities were remained low, and the activity that was viewed as being most helpful was least likely to be performed.

Upon reviewing the additional comments and reflections section, a number of participants raised questions regarding the impact of these actions. For example, some may have little contribution to mitigating climate change but be critical for awareness and engagement. Others noted that they gave a lower rating simply because the activity had little impact. The latter is a finding which has been

brought up extensively in other studies (See: Lorenzoni et al., 2007; Whitmarsh & O’Neill, 2010; Kollmuss & Agyeman, 2002; Semenza et al., 2008). This may reflect attitudes that climate change poses a grandiose challenge where individual actions have little effect, and hence are not practiced. This notion is further supported by a participant’s reflection on the need for collective action, in that hybrid cars would work, only if everyone else participated. Low ratings for item 45 on other community members being encouraged to take action, further suggests a need for collective action.

4.6 RSQ5: What actions do local planning officials view as being the most critical for climate change mitigation and adaptation? (Item 60)

Participants viewed transportation-related strategies as being the most critical action for climate change mitigation and adaptation.

4.6.1 Questionnaire evidence

4.6.1.1 Climate Change and Actions

Item 60 sought to gauge a list of actions that participants believed would be the most critical for mitigating or adapting to climate change in the Region of Waterloo. Participants were instructed to list as many actions as they felt were relevant, for a maximum of ten actions. Table 13 presents a summary of the questionnaire findings.

Table 13 Most critical actions for climate change mitigation and adaptation

Response Category	Response Count
Active and alternative transportation/transit investments and infrastructure/cycling and walking routes	25
Energy efficient construction/ sustainable design, Building code/green infrastructure support	9
Energy alternatives/ renewable energy/ energy efficiency	7
Residential and private energy audits/retrofits	7
Develop climate change plan/mitigation and adaptation strategies/ vulnerability assessment	7
More compact, walkable built environment	6
Community information/ education	5
Infrastructure resiliency (efficient, fix leaks)/upgrades	4
Tree planting/urban forest	4

Reduce, Reuse, Recycle	4
Stormwater management/flood line mapping	3
Implement current or draft plans	3
Accountability/ reporting from industry	2
Shade policy	2
Community environmental programs/sustainability initiatives	2
Green industry/tech support	2
Watershed management and water conservation	2
Agricultural land and policies	2
Partnership with private sector	2
Upstream approach (address source)	1
Tax cars	1
Inter-governmental collaboration	1
Monitoring/reporting rainfall intensity	1
Leadership	1

As seen from the table above, the largest response category by far was the ‘active and alternative transportation/transit investments and infrastructure/cycling and walking routes’ group (i.e. transportation-related strategies), with 25 responses. Participants often referenced support for the new Light Rail Transit initiative in the Region, and subsidization for public transit. Participants also listed the need for improvements and linkages in community trails and cycling paths, and the need to lessen reliance on the automobile.

The next three categories all dealt with energy however, there were notable differences between these categories. The first group dealt more closely with energy efficiency for in-house operations, construction and municipal buildings. For example, participants talked about the need for energy efficiency for new construction projects, sustainable design policies, and green fleet. This group was referenced 9 times by participants. The second group entailed a general reference to energy efficiency, that is, no specific reference for energy efficiency in municipal buildings or for homeowners. This group also included actions involving renewable energy sources. For example, participants listed actions such as using more geothermal and solar energy sources, and having more energy efficient vehicles or electric cars. This group was referenced 7 times by participants. Finally

the third group dealt more closely with residential and private energy audits and retrofits. Participants listed actions such as evaluating the household carbon footprint, providing more incentives for better home insulation, and using smart meters or times for appliance use. This group was also referenced 7 times by participants.

The ‘develop climate change plan/mitigation and adaptation strategies/vulnerability assessment’ was the next most referenced category, with 7 counts. Participants talked about the need for developing a climate change plan, implementing ‘no regret’ mitigation and adaptation measures’ developing municipal and regional mitigation and adaptation plans, and preparing for more severe weather. Participants also noted the need for vulnerability assessments, and assessing adaptation capacity, as well as implementing the ClimateActionWR plan.

The next largest categories were the ‘more compact, walkable built environment’, and ‘community information/ education’ categories, referenced 6 and 5 times respectively. The categories ‘infrastructure resiliency/upgrades’, ‘tree planting/urban forest’, and ‘reduce, reuse, recycle’, were each referenced 4 times by participants.

Participants also noted how stormwater management is a critical action that needs to be taken, as well as how current or draft plans such as the Regional official plan, the Regional city growth management strategy and the Kitchener economic development strategy need to be implemented. Other actions that were reported but which were not as popular included, having greater accountability from industry, for example, implementing a right-to-know bylaw for industries to report air pollutants, and prosecuting businesses that do not follow policies for emissions; implementing shade policy and structures; supporting community environmental programs and sustainability initiatives; support for green industries and green technology; watershed management and conservation; protecting agricultural land and promoting policies; and fostering partnerships with the private sector. Individual responses were also received for having more upstream approaches (addressing the source of the problem in interventions); taxing cars; having more inter-governmental collaboration; monitoring and updating data on rainfall intensity; and showing leadership in the community with green initiatives.

Taken together, these findings suggest that participants viewed transportation-related strategies, energy strategies, and climate change planning as being the most critical actions. In terms of the policy review, it would make the most sense to find these categories as receiving the most attention. In contrast, categories such as inter-governmental collaboration, monitoring and reporting, and

leadership were acknowledged by some participants, but fell at the bottom end of the critical action spectrum.

The above data could not be organized under Caldwell and colleagues’ (2011) categories, mainly because the latter study looked at municipal trends already performed, while the current study specifies which actions need to be taken. That said, there was some overlap in terms of the high ratings for transit-supportive community planning, and renewable energy projects (i.e. sustainability planning). In contrast, notable differences were found in the ordering of certain initiatives (e.g. development of mitigation and adaptation plans was placed higher on the spectrum in the current study, whereas shade policy was found at the lower end).

4.7 RSQ6: What role should local government play in adapting to climate change (Items 61 and 62)

Participants noted that local government should play a leadership role and ‘lead by example’. There was not a strong consensus on what local councils needed to do differently in order to effectively adapt to climate change.

4.7.1 Questionnaire evidence

4.7.1.1 Role of local government

Item 61 asked participants, “what role should local government play in adapting to climate change (relative to provincial and federal government). Table 14 presents the questionnaire findings.

Table 14 Response summary for the role of local government

Response Category	Response Count
Leadership/Lead by example	7
Resilient infrastructure and local adaptation planning	5
Public education/ awareness; communication and knowledge dispersal	3
Level of government where action happens – on the ground solution/implement actions	3
Legislate via regulations	2
Reduce GHG emissions	1
Integrate science/knowledge into policy	1

No action	1
Support research	1

As the table shows, the most common response dealt with issues of “leadership” and “leading by example”. For example, one participant described how local governments need to be “stewards of positive change” and set an example for other municipalities. Similarly, one participant commented that local governments should play a leadership role in concert with communities (i.e. an organizational responsiveness to residents). The second largest response category dealt with resilient infrastructure and local adaptation planning. Participants described how local adaptation plans can be prepared to ensure resilient communities and infrastructure; emergency plans can help to prepare for severe weather events; and infrastructure can be more appropriately sized. One participant pointed out that more can be done in terms of adaptation planning, albeit the process is messy given the role of the province.

The third largest response categories described how the local scale is the level for which “action happens” (i.e. the level of government that produces on-the-ground solutions and implements policies) and the level that can assist with public education and awareness. For example, one participant described how the municipal level is where the “rubber hits the road”. Another participant stated that the local level involves the policy-makers and where technologies can be implemented.

In terms of public awareness and education, one participant described how local government is responsible for communication and knowledge dispersal. Another participant described how local government needs to raise awareness about their local efforts, whereas another stated how this form of government can provide a consistent message for the Region, public, and staff.

Responses were received for a number of other responsibilities. Two participants described how local government should continue to legislate via regulations such as the Green Energy Act. One participant suggested that they should reduce greenhouse gases. One participant described how local government should integrate science and knowledge into policy, for instance, to develop strategies to mitigate change based on predictive models of how climate change will affect regional infrastructure, services and programs. Another participant expressed how they should support research.

Interestingly, one participant stated that no action should be taken on behalf of local government, and that the responsibility should be placed on the federal government; whereas another participant quipped as to whether the federal government was even playing a role in climate change action.

As noted earlier, the most critical thing that these findings denote is the fact that participants recognized the importance of the local level for climate change planning. The finding that a participant did not feel local government should play a role in adapting to climate change, though only reported by one participant from 21, illustrates that this opinion exists in the Region and may possibly be reflective of other planning officials in the area. As also noted earlier, a closer examination is warranted in future research endeavors.

Compared to the findings from Measham et al. (2011) regarding the role of local government, there was notable overlap on themes surrounding educating the public, considering climate impacts in municipal activities (i.e. adaptation planning), and interpreting local implications from climate assessments (i.e. integrating science and knowledge into policy). The responses for the current study were also similar to the results from Measham et al. (2011) with respect to recognizing institutional limitations (i.e. higher levels of governments imposing constraints for municipalities given their constitutional power).

4.7.1.2 Local councils and climate change adaptation

To understand the role of local government requires also understanding what local councils need to do differently, as the latter plays a role in shaping and evaluating local policies and addresses the daily issues that cities must deal with (City of Kitchener, 2010c). Asking this question can also shed light on the factors that challenge the policy implementation process and the sources of conflict on the local political level.

Item 62 asked participants to report what local councils need to do differently in order to effectively adapt to climate change. The following table presents the questionnaire findings.

Table 15 Response summary for things local councils need to do differently

Response Category	Response Count
Be bold/daring/ challenge popular opinion	4
Doing great as is	3
More integration/ embed climate change into day-to-day planning	3
Upstream solutions/ long term strategies	3
Collaboration with federal and provincial government	2
Leadership	2

See business case in adaptation	2
Keep strategic pillars in mind	1
Support proven initiatives	1
Communicate local action being undertaken/efforts	1
Funding for mitigation and adaptation plans	1
Take matter more seriously	1
Be reflective of values of constituents	1
Consider externalities	1

As the table shows, participants did not share a strong consensus on a main activity that local councils needed to do differently. A variety of responses were offered, with the most common response being referenced only four times. This category described how local council needs to be “bold, daring, and to challenge popular opinion”. For example, one participant described how local councils need to stop favouring “low hanging fruit” projects, whereas another mentioned how they need to support green initiatives despite the “politics of the day”. The next three categories, which were each referenced three times, can be grouped into distinct themes - one suggesting that no change was needed, the second advocating for higher integration of climate change into day-to-day planning, and the third advocating for more up-stream and long-term solutions. More specifically, the first category included responses that suggested that ‘local council is doing great as is’. Interestingly, two participants reported that local council is on the right track in terms of “implementing the things they need to do”, while another participant praised the Region for trying and having a “competent and forward thinking staff”. The second group described how climate change needed to be considered in day-to day planning; for example, providing policy and embedding climate change mitigation and adaptation into strategic plans, or keeping adaptation in mind when proceeding with new projects. The third group dealt with issues of having more upstream solutions and long-term strategies; specifically, not thinking about only the four-year election period, but more long term. One participant pointed out that it takes leadership to think about the longer term in the horizon instead of business interests.

Two responses were offered for each of the following issues: ‘collaborating with Federal and Provincial government’, ‘showing leadership’, and ‘seeing the business case in adaptation’. For the

latter, one participant stated that it is not until a dollar value is placed on adaptation, that action will be taken.

In terms of other individual responses, participants talked about how local councils need to keep the strategic pillars of the Strategic Plan in mind (i.e. sustainability and the living environment, public engagement, a healthy and safe community, vibrant neighbourhoods, getting around and economic vitality); support proven initiatives, communicate which local actions are being taken, approve sufficient funding for mitigation and adaptation plans; take the matter more seriously; be reflective of the values of constituents, and consider externalities in decision-making (both positive and negative impacts).

With the exception of the few responses that suggested that council is doing great as is, there were a number of responses which suggests that there is not a great deal of backing to push climate change issues on the policy agenda. For example, suggesting that local councils need to be bold and to stop favouring ‘low-hanging fruit’ projects demonstrates that these particular projects and other decisions that favour the status-quo are given preference by local councils. Likewise, responses surrounding the need for leadership, seeing the business case in adaptation, taking the matter more seriously, and being reflective of the values of constituents, suggest that the opposite is in fact happening. In other words, adaptation is pushed aside in policy agendas because of budgetary and resource constraints, whereas if the business case was presented, or if the matter was taken more seriously, local councils would more readily support related initiatives (these findings further help answer the next research sub-question on agenda setting).

That said, although there was no consensus on a direction for local council, the breadth of responses can be meaningful with regards to providing recommendations for the Region, in turn, strengthening the position that local government has in acting on climate change. There are indeed many benefits from integrating climate change into planning documents, as there are in seeking more upstream and long-term solutions. At the same time, recognizing that municipalities can be bounded by the constraints from provincial mandates, efforts to encourage greater collaboration with federal and provincial governments can also have positive outcomes. With regards to the findings from Measham et al. (2011), there were somewhat comparable results from the current study with respect to reaching consensus on the need for climate adaptation (i.e. being bold and daring enough about the need for action), collaborating with higher levels of government, and enshrining climate change into all policies (i.e. integrate and embed climate change into day-to-day planning).

4.8 RSQ7: Is climate change regarded as an issue that requires policy attention (Items 62-65)

Climate change is considered in decision making but economic development priorities render that the issue is pushed aside in policy agenda settings. Responses on the role of local councils also suggests that there is not a lot of backing for climate change initiatives.

4.8.1 Questionnaire evidence

4.8.1.1 Decision making and local councils

Given the large number of participants that confirmed that mitigation (90%) and adaptation (65%) were considered in decision making, it can be established that climate change is acknowledged and given consideration in developing policy. However, a lack of agreement on what local councils need to do differently, and the particular note on the need for councils to be bold, see the business case in adaptation, take the matter more seriously, and reflect on the values of constituents, suggests that there is some conflict in seeing climate change initiatives through to the policy implementation stage.

Moreover, when participants were asked to identify which issues they felt were given higher priority in local and municipal policy-making, as opposed to climate change, there was more agreement that economic development issues were given preference (see Table 16).

Table 16 Response summary for other higher priority issues

Response Category	Response Count
Economic development/growth /business and job creation	13
Budgets, taxes and taxpayers	6
Infrastructure and development	5
Health care	3
Education	3
Day to day planning	3
Catering to car driving culture	2
Quality of built environment	1
Social issues	1
Reuse of brownfields	1

Not sure	1
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As the table shows, the largest proportion of responses fell into the category of “economic development, growth, business and job creation”. The second largest category dealt with issues around “budgets, taxes and taxpayers”. For example, one participant reported how it is only the issues that have already been included in the budget, or the issues that receive greater media coverage, that are given higher propriety in local and municipal policy making. The third largest category dealt with issues around infrastructure and development; and in terms of the fourth most common issue, health care, education and day-to-day planning (i.e. providing daily services) each received three responses. “Catering to a car driven culture” was referenced twice. For example, one participant reported how there is a greater focus on increasing the capacity of gas powered vehicles. Individual responses were offered for the issues, ‘quality of the built environment’, social issues in general, and the reuse of brownfield sites. One participant said they were not sure, since both climate change mitigation and adaptation are already given priority. Finally, one response did not properly address the question and was hence removed.

The view that economic development issues are given preference over climate change in local/municipal policy-making warrants closer examination. It is an issue which has come up in other parts of the questionnaire and will be examined in depth in the next section on economic barriers for policy implementation. For now, it is worth noting that these finding further support the idea of presenting the business case in adaptation, as was introduced in Item 62. Doing so may also assist in pushing climate change higher on the policy agenda.

4.9 RSQ8: What barriers or constraints prevent policy implementation for climate change? (Items 66-68)

Participants noted there being economic barriers such as budget thresholds and competing priorities, diverse social barriers, and political barriers such as a limited capacity to attend to all issues, and backlash for proposing change, that prevent policy implementation for climate change.

4.9.1 Questionnaire evidence

4.9.1.1 Economic barriers

When asked whether participants perceived there to be any economic barriers or constraints that prevent policy implementation for climate change, an overwhelming majority reported yes (90%), whereas only 10% reported no. The following table provides a list of the specific economic barriers or constraints reported by participants.

Table 17 Response summary for economic barriers

Yes	
Response Category	Response Count
Budget threshold/ competing priorities	9
Justifying cost of mitigation or adaptation planning (short term expense for long term benefits)	7
Perception of climate change mitigation/ adaptation in and of itself, a barrier to economic development	3
Lack of experts	1
Preference for certain technologies despite effectiveness	1
No	
Small wins	1

As Table 17 shows, participants identified, ‘budget threshold/competing priorities’ as the most common economic barrier for policy implementation (referenced 9 times). For example, participants talked about how there was already a large infrastructure deficit and little money to address the issue; initiatives come at a cost in a time of constraint; and that there is a lack of financial resources and a lack of capital capacity on behalf of the city and provincial government. Participants also talked about there being competing priorities, such as having to provide only the basics and sustain current programs given ‘current economic times’; how changes in the built environment to accommodate active transportation are considered as a second thought only if there is money left over; and how certain issues such as road-building and maintenance are ‘givens’ in municipal budgets, whereas trails and cycling lanes are considered as ‘extras’.

The second most common economic barrier or constraint noted by participants was the issue of ‘justifying the cost of mitigation or adaptation planning’. That is, justifying the short term expense for the long term benefit. This category was referenced 7 times by participants. For example, one participant talked about how there exists a premium to implement adaptation despite proven initiatives that show how certain actions can deliver ‘millions of dollars in benefits’ in comparison to the alternative (i.e. cost of treatment). As the participant commented, the challenge is comparing the long term picture with the short term cost.

Other participants noted how the return on investment for mitigation and adaptation is difficult to rationalize if it takes longer than 30+ years; how ‘soft currency benefits’ from green initiatives are not quantifiable; how it costs more in the short term to buy energy efficient vehicles and buildings; and how it is difficult to nail down indicators linked to climate change or determine what effects it will have on programs (in turn, preference is given to issues that have more immediate and straightforward solutions).

The third most common economic barrier or constraint noted by participants was the perception that mitigating and adapting to climate change, in and of itself, is a barrier to economic development. This category was referenced 3 times by participants. For example, participants talked about how climate change is perceived as an expensive issue to deal with, hence, a barrier to economic growth, and how there is persistently a tension within industry and between sectors in terms of dealing with the issue at hand. The preference is often to move forward with economic development. One participant commented that ‘policy might advocate for cleaner energy or water, but it is not likely that industry would be turned away’.

Another participant noted a distinct economic barrier, the lack of subject matter experts; while another participant felt that a lot of money was being spent on inefficient technologies that are more ‘show-case’ rather than effective (i.e. a preference for certain technologies over others).

As noted above, two participants did not perceive there to be any economic barriers or constraints that prevent policy implementation for climate change (i.e. answering ‘no’ for item 66). Although participants were not required to provide a reason for their answer if answered no, it is worth noting that one participant did not perceive there to be any economic barriers or constraints because there still existed ‘small wins’. The participant described how actions such as the shade policy have ‘great bang for the buck’ (i.e. easy and cost-effective to implement with great benefits) and receives wide

public acceptance. It is hence important to consider the scale at which a plan is being implemented and not lose sight of how far reaching some initiatives may be.

Together, these findings demonstrate that there is a rather strong attitude in the Region of Waterloo that climate mitigation and adaptation is a costly initiative for which there are not enough resources to address, there are many other pressing issues that are given precedence, there are few short-term returns to justify costs, and it is counter-intuitive for economic development and growth. These findings are similar to those of Robinson and Gore (2005), particularly in noting that ‘budget restrictions’, and staff training are significant barriers to municipal climate action. Moreover, the responses highlight a need to communicate climate change in a way that is connected to ‘other pressing issues’.

4.9.1.2 Social barriers

When participants were asked whether they perceived there to be any social barriers or constraints that prevent policy implementation, 78.9% answered yes, while 21.1% answered no. This demonstrates that participants perceived there to be fewer social constraints in comparison to economic constraints (90%). The following table provides a summary of the questionnaire findings.

Table 18 Response summary for social barriers

Response Category	Response Count
Lack of awareness and understanding	3
Resistance to public or active transportation	3
Public interest/engagement	3
Limited capacity to attend to all issues	2
Climate change and uncertainty	2
Opportunities or benefits from climate change	2
Relationship between actions and effects	1
Territoriality between departments in municipal setting	1
Belief that climate change isn't happening, humans are not responsible	1
Cost to taxpayer from green initiatives	1
Bias in media	1
Difficulty of changing behaviour	1
Lack of personal impact	1

Perception of having already done as much as could be done	1
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As seen from the table above, participants did not share a strong consensus on a main social barrier for policy implementation. A variety of responses were offered, with the most common response being referenced only three times. The three most common social barriers were a lack of understanding and awareness, resistance to public or active forms of transportation, and a lack of public interest and engagement. For example, participants talked about how in order to change human behaviour, there needs to be an understanding of what the impacts will be, not everyone understands what climate change is and as a result are less likely to participate in programs, and there is a lack of understanding and awareness among the majority of the population. In terms of resistance to public and active transportation, participants noted how there exists a perception that the bus is for poor people and students, and how some parents do not let or encourage their children to use active transportation over fears of safety and abduction.

In terms of a lack of public interest and engagement for climate change issues, participants noted that climate change would not even fall within the ‘top ten’ for most people on the street, and how issues like water conservation are emphasized for their rebate (financial) and health dimensions, not for their relevance to climate change. Other participants noted how there is a limited capacity to attend to all issues, for example, taking away resources for certain strategies (infrastructure as a basic need for the city), results in losing those resources for other strategies, and how there is not enough funding to address other problems in the city that may be regarded as more pressing. Some participants described the challenge of uncertainty with climate change impacts, for example how some people may not believe in the effects of climate change, and how there is an absence of local scale information on impacts. Other participants described how the opportunities or benefits from climate change (e.g. positive impacts for local farmers from longer growing seasons), can serve as a buffer and prevent climate action.

Individual responses were offered for the relationship between actions and effects, for example, one participant talked about how people may find it difficult to change behaviour when they cannot see the effects of those changes (i.e. knowing how those changes will make a difference); there exists territoriality between departments in a municipal setting (‘there is policy but implementation does not always happen’); there is a belief that climate change is not happening and that humans are not responsible; the cost to tax payers for green initiatives is seen as a barrier; there exists bias in the

media (e.g. articles that deny the importance of changes that were made in the city); human behaviour is difficult to change without a cohesive environment; there is a lack of personal impact (neither positive or negative) to motivate people to take action; and there is a perception that everything that could be done to prevent climate change has already been done.

It is important to point out that there was not only a lack of one main social barrier, but also that some of the responses provided by participants actually contradicted each other. For example, recall that one participant emphasized that it is the fact that Canada will benefit from climate change which serves as a buffer and prevents action; yet another participant stated that there were no personal impacts (neither positive nor negative). One participant commented that certain people do not believe in climate change, yet another participant reflected on people’s perception that everything that could be done for climate change, has already been done. These findings support previous research on the cognitive challenges with climate change, and specifically the perception of barriers identified by Lorenzoni, Nicholson-Cole and Whitmarsh (2007).

4.9.1.3 Political barriers

Similar to the previous findings, participants perceived there to be fewer political barriers in comparison to economic barriers. When participants were asked whether they perceived there to be any political barriers or constraints that prevent policy implementation, 78.9% reported yes, while 21.1% reported no. The following table presents the questionnaire findings.

Table 19 Response summary for political barriers

Response Category	Response Count
Limited capacity to attend to all issues/backlash for proposing change	5
Justifying cost for strategies or increasing taxes	2
Misguided beliefs and strong biases	2
Lack of interest/engagement	1
Economics	1
Political Leadership	1
Inter-governmental collaboration	1
Benefits from use of resources	1
Uncertainty	1

As the table shows, the most common political barrier or constraint was the limited capacity to attend to all issues and likelihood of backlash for proposing change. One participant described how there will be backlash for pulling away from central services and proposing change, albeit this is a problem for many issues (not just climate change). Another participant noted that decision makers are influenced by different sectors and issues, and while there may be talk of balancing interests, in reality there are often trade-offs. One participant commented that there are competing priorities, other issues appear to have more immediate and straight forward solutions, and decision makers often look for the popular vote. Another participant added that the priority is on sustaining current programs due to economic uncertainty.

Other reported but not as popular political barriers include: the challenge of justifying the cost for strategies or increasing taxes (i.e. there is political will to reduce taxation which conflicts with front-end costs for strategies); there are misguided beliefs and strong biases (e.g. belief that climate change is not happening, predominate conservative leaning political landscape in the Region); there is a lack of public interest and engagement; economics in general; there is a lack of political leadership; and a lack of inter-governmental collaboration. One participant suggested that federal and provincial governments should work together to support regional and local governments. Individual responses also highlighted the benefits for Canada from climate change, noting that as an energy superpower, the country will benefit from use of resource; while another participant listed various uncertainties relating to the political realm. These included uncertainty of the role of local government, the need for action, and whether certain actions will have an impact.

Given that the issue of ‘competing priorities’ and need for integration has been addressed in other summaries, it will not be discussed here. What is important to note however, is the surprising finding that no participant addressed institutional limitations; that is, the view that municipalities are limited in their ability to implement climate change mitigation or adaptation strategies due to the constraining legislative power of provinces over municipalities. Measham et al. (2011) found this to be a quite strong limitation expressed in the adaptation literature, as well as found this to be true in their case study on local councils. Robinson and Gore (2005), and Gore (2010) wrote extensively about the barriers surrounding Canadian municipal response to climate change and both articles note challenges with municipal autonomy and being ‘creatures of the province’.

The fact that participants did not acknowledge this barrier can be held in a positive light, as it may suggest that local planning officials view themselves as having the autonomy or ability to take climate

action. The bigger challenge is to justify the cost for adaptation strategies, address uncertainties and demonstrate how climate change is connected to the other issues that are perceived as being more pressing.

4.10 RSQ9: Are there differences in climate change risk perceptions between different departments (Item 70)

This research sub-question was not addressed, as it was not possible to evaluate differences between departments given limited representation (see Figure 15).

70. Please indicate which category below best describes your profession/industry (check the box that applies).

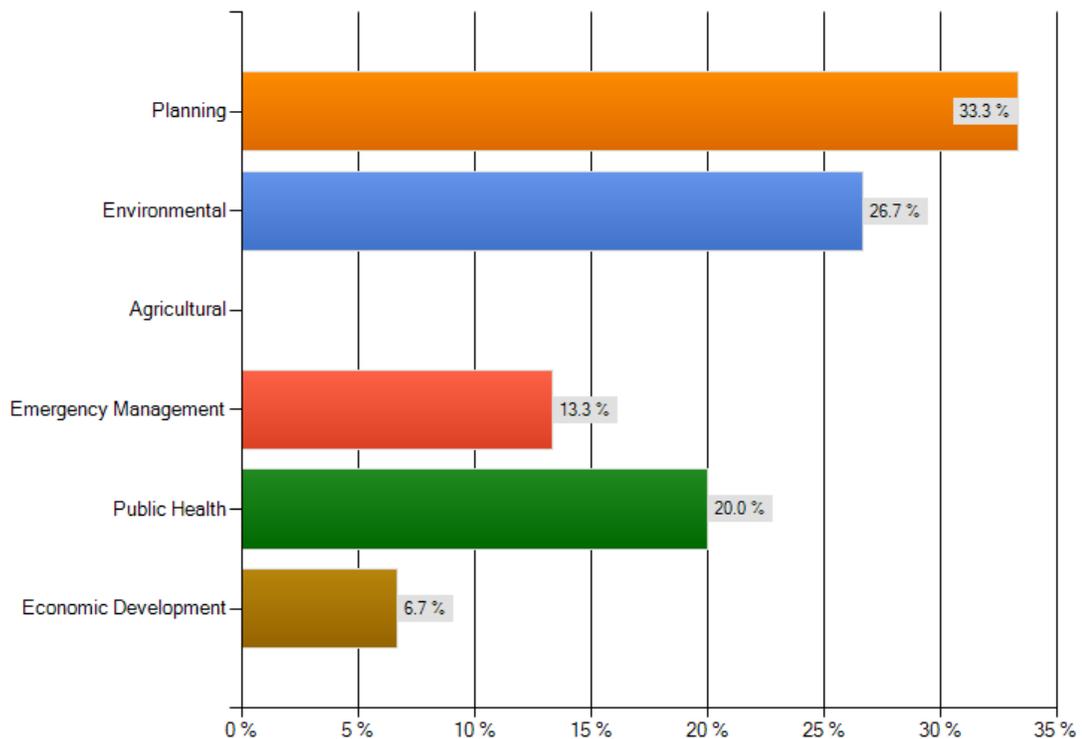


Figure 15. Distribution of participants amongst different sectors

As the figure shows, there was not a lot of representation amongst the different departments, hence it was not possible to perform an analysis comparing participant responses from each department. Instead, the data collected from the 21 participants was analyzed uniformly to represent the responses of local planning officials more generally.

4.11 RSQ10: Are there differences in climate change risk perceptions related to work experience? (Item 72)

There were notable differences in responses from participants with over 10 years of work experience, compared to participants with less work experience, across several categories.

4.11.1 Questionnaire evidence

Item 72 asked participants to report the number of years they have held their current position. There was a balanced distribution between participants who had 1-3 years of experience (n=7), 4-9 years of experience (n=7), and those who had over 10 years of experience (n=7) (see Table 20).

Table 20 Work experience categories

Work experience category (number of years)	Individual responses	Total for category
1 – 3	3, 3, 1, 2, 2, 2,2	7
4 – 9	8, 7, 6, 4, 4.5, 4, 5	7
10 +	12, 12, 10, 20, 21, 32, 22	7

4.11.1.1 Survey responses

Interestingly, participants with 10+ years of experience had noticeably different responses in several categories, compared to those with less years of experience (see Table 21 below).

Table 21 Total and mean calculations for survey responses

	Years of work experience			Summary
	1 – 3 years	4 – 9 years	10 + years	
Knowledge of climate change (items 1-12)				
<i>Total</i>	377	415.53	300.98	
<i>Mean</i>	53.857	59.361	42.997	10+ year group had less confidence in responses, 4-9 year group most confident
Self-perception of knowledge (items 13-14)				
<i>Total</i>	44	46	39	
<i>Mean</i>	6.286	6.571	5.571	10+ year group perceived they knew less

Source of information (items 15-24)				
<i>Total</i>	167	167	156	
<i>Mean</i>	23.857	23.857	22.386	10+ year group consulted fewer sources
Climate change impacts (items 28-36)				
<i>Total</i>	131	138	132	
<i>Mean</i>	18.714	19.714	18.857	10+ year group had more agreement on statements related to climate change compared to 4-9 year group (Note: reverse scoring)
Severity of climate change (items 38-43)				
<i>Total</i>	299	304	336	
<i>Mean</i>	42.714	43.429	48	10+ year group viewed impacts as being more severe
Efficacy and climate change (items 44-46)				
<i>Total</i>	41	38	34	
<i>Mean</i>	5.857	5.429	4.857	Slightly lower score for 10+ year group indicated more likely to agree with statements on efficacy and climate change (Note: reverse scoring)
Select measures of efficacy (items 47-59)				
<i>Total</i>	400	394	421	
<i>Mean</i>	57.143	56.286	60.143	10+ year group viewed actions as being more helpful and would perform them

*Note1: For responses left blank, the average score for the particular item was calculated using data from all participants. In cases where the participant marked two boxes, the average score of two boxes was calculated and inserted in the space.

*Note2: Concern in items 25 d) and 26 c) was not assessed given that the rating relates to the personal experience reported by the participant (e.g. weather event experienced, news report heard on radio, etc.).

As Table 21 shows, participants in the 10+ years group reported greater uncertainty on average, when answering questions relating to the possible causes of climate change. Those with 4-9 years of experience on the other hand, were most confident in their knowledge. The 10+ year group also had lower ratings of perceived knowledge, consulted fewer sources of information, had less agreement in

statements relating to climate change impacts, compared to the 4-9 years group, and viewed impacts as being more severe. At the same time, responses from the 10+ years group suggested that participants had slightly more agreement with statements relating to self-efficacy and climate change, viewed actions as being more helpful, and were more likely to perform actions. These findings can be summarized as having less confidence in knowledge of climate change, higher risk perceptions, but also a higher sense of self-efficacy.

According to Rimal and Real’s (2003) Risk Perception Attitude (RPA) framework, and further supported by research in the context of climate change by Mead et al. (2012), individuals with higher risk perceptions and high self-efficacy are characterized as having a more responsive attitude. That is, the group has a higher awareness of risk, perceives they have the required skills to avoid a threat, and are more motivated to perform self-protective behaviours (Mead et al., 2012). This would explain why the 10+ year group had more agreement with statements on self-efficacy and climate change, viewed actions as being more helpful and were more likely to perform them. That said, the above authors did not measure knowledge, which may explain why the finding for lower levels of certainty and consulted sources of information were observed and how they do not reflect a responsive attitude.

4.11.1.2 Other questionnaire responses and skipped items

There were also some interesting findings for the 10+ years group with regards to considerations in decision making, and the number of questions that were skipped. These were mainly seen in the open-ended responses. At the same time, the 4-9 years of experience group had noticeably different responses with respect to the benefits and opportunities associated with climate change (see Table 22).

Table 22 Questionnaire response summaries for three work experience groups

	Years of work experience			Summary
	1 – 3 years	4 – 9 years	10 + years	
Benefits or opportunities with climate change (item 37)				
<i>Yes</i>	4	7	3	
<i>No</i>	3	0	4	4-9 year group unanimously agreed on there being benefits or opportunities with climate change

Mitigation considered in decision making (item 63)				
<i>Yes</i>	7	7	4	
<i>No</i>	0	0	2	
<i>Did not respond</i>	0	0	1	10 + year group less likely to consider mitigation in decision making
Adaptation considered in decision making (item 64)				
<i>Yes</i>	4	5	4	
<i>No</i>	3	2	2	
<i>Did not respond</i>	0	0	1	No noticeable difference
Barriers to policy implementation (item 66-68)				
<i>No economic barriers</i>	0	2	0	
<i>No social barriers</i>	2	1	1	
<i>No political Barriers</i>	0	3	1	
<i>Number of skipped responses</i>	1	0	3	4-9 years group saw slightly fewer barriers overall, 10+ year group skipped the most questions

The table above demonstrates that participants with 4-9 years of experience unanimously agreed of there being benefits or opportunities related to climate change. The table also shows how consideration of mitigation in decision making was less likely from the perspective of those in the 10+ years group. There were no noticeable differences in the responses for adaptation in decision making. In contrast, there were some interesting findings regarding barriers to policy implementation. Generally all participants reported there being some form of barrier or constraint. When evaluating the results from a work experience framework, it can be seen that the 4-9 years group saw slightly fewer barriers overall to policy implementation. Participants in the 1-3 years group typically saw slightly fewer social barriers; the 4-9yrs group saw fewer political barriers, and the 10+ years group noted no social or political barriers in some cases. The 10+ years group also appeared to skip the most questions.

Taken together, these findings are in line with Guariguata, Locatelli and Haupt's (2012) findings on how work experience influences climate change risk perceptions. The current study supports earlier findings that individuals who have over 10 years of work experience are more likely to agree that climate change is a serious threat. The current study adds to the existing literature with respect to certainty of knowledge and sources of information consulted, as well as consideration for mitigation in decision making. At the same time, this study sheds light on the types of questions that may receive lower response rates in future research endeavors.

These findings also shed light on the importance of assessing individual differences in climate change risk perceptions and behaviours, which lends support to the psychometric theory rather than a cultural or organizational theory of risk perception, or social amplification theory.

4.12 Validity check and outstanding items

As a reminder, an objective of the current study was to interview individuals in senior or managerial type positions, given the likelihood that these individuals would play a stronger or more direct role in policy-making. As such, item 71 asked participants to report their current position or professional title, to serve as a form of verification that participants in fact, held these positions. Table 23 presents a list of the different positions.

Table 23 List of positions currently held by participants

Current position/ Professional title
Program manager
Project manager
Executive director
Engineer
Policy coordinator
Senior services
Chief
Public health planner
Environmental planner
Senior Environmental planner
Registered Nurse
Sustainability Planner
Director
Architect
Manager

The table shows that some, but not all participants held senior or managerial type positions. While this reduces some of the validity in inferring that the results reflect those in senior or managerial positions, the findings still reflect the views of those who play a direct role in policy-making, as this was clarified by the researcher in the recruitment process (see sample profile section at the beginning of this chapter).

Item 69 asked participants to list any noteworthy climate-related policies their department has implemented to mitigate or adapt to climate change impacts. Given that this item pertains to the policy review section, a more detailed discussion can be found in the next chapter.

4.13 Bringing it all together – summary of questionnaire findings

Before moving on to the policy review, the findings from the interview responses are summarized below.

1. Participants had a strong understanding of climate change causes and fairly strong self-perception of their knowledge. Internet was the most consulted source of information. However, almost all participants also had exposure to weather changes that were indicative of climate change (most in the last 6 days), heard or saw media coverage on climate change (most within the last 10 days), or knew of a climate-related initiative taking place in another municipality. These latter sources serve to also inform knowledge on climate change.
2. There appeared to be a quite favourable organizational culture for climate action. Participants perceived there to be a very high capacity to take action, almost all participants considered mitigation (90%) and over half considered adaptation (65%) in decision making; and the role of local government in helping to address climate change was realized by participants.
3. Participants perceived climate change to be a temporally and geographically distant issue. There was a higher risk perceived for the environment, in comparison to personal health or financial situations. Interestingly, participants viewed that public health, in contrast to economic development in the Region, will be more significantly impacted by climate change in the next 30 years. Over half of the participants also viewed there being opportunities or benefits related to climate change, with most participants specifically noting increased agricultural productivity and longer growing seasons.
4. There was not a strong sense of self-efficacy for climate change but additional comments reflected a need for collective efficacy.

5. Participants viewed transportation-related strategies as being the most critical action for climate change mitigation and adaptation.
6. Participants noted that local government should play a leadership role and 'lead by example'. There was not a strong consensus on what local councils needed to do differently in order to effectively adapt to climate change.
7. Climate change is considered in decision making but economic development priorities render that the issue is pushed aside in policy agenda setting. Responses on the role of local councils also suggest that there is not a lot of backing for climate change initiatives.
8. Participants noted there being economic barriers such as budget thresholds and competing priorities, diverse social barriers, and political barriers such as a limited capacity to attend to all issues, and backlash for proposing change, that prevent policy implementation for climate change.
9. The research sub-question relating to departmental differences was not addressed, given limited representation in certain departments.
10. There were notable differences in responses from participants with over 10 years of work experience, compared to participants with less work experience, across several categories.

Chapter 5 – Policy Review

The main research sub-question this component of the thesis aimed to address was “is climate change recognized in public policy” (RSQ10). The following sections will outline the provincial, regional and municipal policy framework, an overview of the documents selected, and results of the policy review.

5.1 Provincial framework

Key provincial legislation such as the Planning Act, and Provincial Policy Statement were reviewed given the importance of understanding the overarching legal framework set by provincial policy, and the recognition that municipalities are ‘creatures of the province’ (Gore, 2010).

The Planning Act was selected because it is the principal tool which guides land use decisions in the province of Ontario. It outlines how different land uses can be controlled, and who may control them (MMAH, 2013). The Planning Act also sets the basis for the development of Official Plans in municipalities. The Provincial Policy Statement on the other hand, provides a clear direction on issues that are of Provincial interest (MMAH, 2013). It is a document which encourages policy initiatives to consider the complex and inter-related challenges related to environmental, social and economic factors. The Planning Act also requires that decisions “shall be consistent with the Provincial Policy Statement”, hence all land-use planning decisions must reflect the mandates set forth by the province (MMAH, 2013).

5.1.1 Provincial policy summary

The Ministry of Municipal Affairs and Housing provides an informative document, outlining the ways in which the Planning Act can be used as tool to help municipalities deal with climate change. For this reason, a detailed summary is not provided here. Among the key Planning Act tools, the document lists the use of official plans, protection of settlement area boundaries, completion of application requirements, development of community improvement plans, use of zoning by-laws, height and density bonusing, site plan controls, parkland dedication, planning of subdivisions, and the development of permit systems (for a full review, see MMAH, 2010, ‘Planning for Climate Change’). With regards to the current study criteria, the Planning Act did not include the term climate change, but mentioned promoting coordination, supporting public transit and pedestrian-oriented environments, encouraging the use of renewable energy sources in line with the Green Energy Act,

and using energy efficiently; providing adequate provisions for waste management, protecting ecological systems, and being consistent with the Provincial Policy Statement.

The Provincial Policy Statement (2005) only mentioned climate change once, but there was a significant increase in the recognition of the term in the 2012 draft policies. The term appeared a remarkable 10 times, with recognition of the need for both mitigation and adaptation. There was a particularly strong focus on building resilient communities for climate change, found in sections on inter-organizational coordination, development and land-use patterns (specifically in promoting a compact form); infrastructure and public service facilities, green building and green infrastructure standards, active transportation strategies, and energy efficiency strategies.

5.2 Regional and municipal framework

Key documents reviewed at the regional and municipal levels included official plans, strategic plans, master plans, environmental strategies, green procurement policies and greenhouse gas inventories. The rationale for selecting these documents is provided below.

5.2.1 Official Plans

Official Plans are important planning tools given that they outline the long-term goals, visions, and objectives for communities, typically planning for 15-20 year timeframes (Hodge & Gordon, 2008). They can guide development, growth, and change; reduce uncertainty for future land-use decisions (City of Guelph, 2013), and identify important environmental, social and economic challenges that a community may be presented with. As Hodge and Gordon (2008) write, these types of plans are an expression from communities to say ‘in these kinds of situations, we will act this way for these reasons’ (p. 207). They guide communities and act as basis for discussions and debates on current and future land use decisions.

Moreover, climate change issues such as adaptation can either be directly incorporated into a plan by devoting a special section on the topic, or by embedding details throughout various policy components (e.g. transportation strategies). Plans can also encourage municipalities to conduct risk and vulnerability assessments, create an overarching climate action plan, incorporate climate action into municipal operations, assign higher priority for environmental and climate considerations, and encourage that more critical information and technical data be utilized for decision making (Richardson & Otero, 2012).

5.2.2 Strategic plans

Strategic plans have much shorter timeframes. These plans outline where a city aims to go in the next few years, the measures they will take to reach that goal, and how they will assess whether they were successful in reaching the goal or not (City of Burlington, 2013). These plans have a more specific or directed focus, and can be more closely oriented to the functioning of the built and natural environment or community context (Hodge & Gordon, 2008). They typically have five year timeframes and are updated or reviewed on an annual basis (Hodge & Gordon, 2008). Strategic plans also reflect changes in demography, political and social factors, and changes in the natural environment, whereby goals and objectives are developed to address these concerns. The planning process for strategic plans also typically requires consultation and collaboration with a diverse range of stakeholders from both within and outside local government (Hodge & Gordon, 2008). With respect to the directed focus, and orientation to the natural environment, there may be more of an opportunity to integrate discussions on climate change in strategic plans in comparison to official plans.

5.2.3 Master plans and other secondary plans

Master plans and other secondary plans provide a more detailed direction for aspects such as land-use, transportation, parks and heritage planning, and community design (City of Brampton, 2012). They are also developed as an amendment in the Official Plan, for issues that are deemed as requiring more specific provisions (Town of Richmond Hill, 2013). In having a more detailed focus, these plans might also have more information on climate change than official plans would.

5.2.4 Environmental strategies

Environmental strategies provide a more targeted approach to ensure that environmental considerations are incorporated into different aspects of government decision-making. This broadly considers impacts to air, water, and land, but can also strive to promote stewardship and sustainable practices, create an ecologically sound environment and improve the health and well-being of residents (ROW, 2009; City of Kitchener, 2010d). With an emphasis on the environment, it would make more sense to find climate change content in these types of planning documents.

5.2.5 Green procurement policies

Green procurement policies have a stronger emphasis on reducing energy and waste aspects related to municipal operations. These policies typically encourage the adoption of more cost-effective and efficient materials, expand markets for green services and products, reduce waste, and recommend best practices. With regards to climate change, green procurement policies may have a strong focus on energy efficiency and waste strategies, but may be limited in other areas such as vegetation protection and creating walkable environments. In other words, while these documents may integrate more information about climate change by providing a rationale for adopting ‘greener’ or more sustainable practices, they may not be as comprehensive as some of the other planning documents.

5.2.6 Greenhouse gas emission inventories

Greenhouse gas inventories are encouraged for members of the Federation of Canadian Municipalities (FCM) Partners for Climate Protection (PCP) program. This is a national initiative involving about 240 municipalities, where a commitment is made to reduce greenhouse gas emissions in the interest of climate change mitigation (FCM, 2013a). A five-milestone framework is adopted for municipalities to 1) create a greenhouse gas emission inventory and forecast, 2) set emission reductions, 3) develop a local action plan, 4) implement the local action plan or set of activities, and 5) monitor progress and report results (FCM, 2013b). The program also differentiates between community and corporate inventories. The latter deals with municipal government operations and facilities, while community inventories deal with institutional, commercial, transportation, residential waste and industrial sectors (FCM, 2008). The City of Cambridge joined on April 2012 and has reached the first corporate and community milestones. The City of Kitchener joined on January 1997, and has also reached the first corporate and community milestones. The City of Waterloo joined on June 1999, having only reached the first community milestone and no corporate milestone as of yet; whereas the Region joined on April 2010 and has reached the third corporate milestone and first community milestone (FCM, 2013c).

The Regional Carbon Initiative developed by Sustainable Waterloo, also encourages members to reduce greenhouse gas emissions against a measured baseline and report results. Together these two programs advance greenhouse gas emission reductions in the Regional Municipality of Waterloo, which provides a foundation for climate action in the study site. In terms of the policy review, it is expected that these documents will have the strongest focus on climate change, but again, this may be limited to only certain categories (e.g. air quality, reporting, energy efficiency, etc.).

5.3 Regional and municipal policy review findings

For the current study, specific documents reviewed at the regional level included the draft Regional Official Plan, Strategic Plan, Environmental Sustainable Strategy, Corporate Greenhouse Gas Inventory and Action Plan, and Transportation Master Plan. At the municipal level, key pieces included Official Plans, Strategic Plans, green procurement policies, environmental or sustainability strategies, relevant master plans, and other documents as recommended by participants. These documents are presented below, along with the additional items as noted in item 69. The following table also presents the key findings and missed opportunities related to each summary, which will be discussed in length in the following sections.

Table 24 Policy review summary 1: official plans, strategic plans and environmental strategies

	Official Plans				Strategic Plans				Environmental Strategies			
Relevant document reviewed	Region (draft)	Waterloo	Kitchener (draft 2)	Cambridge	Region	Waterloo	Kitchener	Cambridge CSP	Region	Waterloo	Kitchener	Cambridge CSP
No. of times term “climate change” appeared	6	17	1	0	0	1	3	1	6	7	3	1
No. of indicators with explicit reference	15	17	2	2	1	4	9	2	9	11	6	2
Emphasis on mitigation/adaptation	adaptation	adaptation	both	mitigation slightly	neither	neither	neither	both	adaptation	adaptation slightly	neither	both
Key findings	<ul style="list-style-type: none"> - City of Waterloo OP had most recognition of climate change compared to all other documents reviewed, although Region addressed many indicators - Great difference in air quality actions - Growing recognition in Kitchener plan - OPs overall appeared to be most comprehensive planning document for climate action 				<ul style="list-style-type: none"> - Weaker focus on climate change for Region and Waterloo plan, but stronger for Kitchener and Cambridge plans (short vs. long term issue identified) - Climate change most readily recognized by Kitchener plan - All plans connect climate change with air quality issues 				<ul style="list-style-type: none"> - Regional and City of Waterloo strategies had most recognition of climate change - Inconsistency with timeframes - Air quality again emphasized - Somewhat stronger awareness for methane capture strategies from landfills compared to other plans 			
Missed opportunities	<ul style="list-style-type: none"> - Kitchener and Cambridge OPs had much room for improvement - Recognize change in weather patterns for greater flexibility 				<ul style="list-style-type: none"> - Level of detail in some plans can be improved 				<ul style="list-style-type: none"> - Connections to transportation and resource management strategies can be strengthened - Consistency in structure and detail can be improved 			

Table 25 Policy review summary 2: GHG inventories, stormwater management documents and transportation plans

Relevant document reviewed	Greenhouse Gas Emission Inventories			Stormwater Management Credits, Bylaws and Master Plans					Transportation Master Plans			
	Region	Kitchener	Cambridge	Waterloo bylaw	Waterloo follow up report	Kitchener credit policy	Cambridge master plan	GRCA plan	Region	Waterloo	Kitchener	Cambridge bikeway/network plan
No. of times term “climate change” appeared	4	13	1	0	1	0	9	8	8	0	3	1
No. of indicators with explicit reference	17	8	11	0	5	0	4	6	8	2	8	6
Emphasis on mitigation/adaptation	mitigation	neither	Neither	neither	adaptation	neither	adaptation slightly	adaptation	both	adaptation slightly	both	neither
Key findings	<ul style="list-style-type: none"> - City of Kitchener had highest use of term, but Regional and City of Cambridge documents had most recognition across indicators 			<ul style="list-style-type: none"> - Great inconsistency in type of planning document published - Exceptional recognition of climate change in Cambridge plan - Most participants regarded stormwater management as an important action for climate change (provides context), and policy documents reflect importance - Issue of reactive vs. proactive planning identified 					<ul style="list-style-type: none"> - Regional plan had most recognition of climate change - Strong connection typically made to air quality - Stronger emphasis on environmental business initiatives compared to other documents reviewed - Transportation-related strategies deemed most critical action for climate change by participants, yet not reflected in some plans - Date of publication irrelevant for recognition - Disconnect identified for social barriers 			
Missed opportunities	<ul style="list-style-type: none"> - Integrating climate change within diverse strategies 			<ul style="list-style-type: none"> - Having more consistency between documents that are from partnerships - Cambridge plan can serve as an example for other municipalities 					<ul style="list-style-type: none"> - Integrating climate change within diverse strategies - Critical absence of climate change in Waterloo plans can be improved - Having more active voice on climate change 			

Table 26 Policy review summary 3: other related documents as recommended by participants

Initiative or strategy related to climate change	Key findings
Region Carbon Initiative and Climate Action Plan (to be published)	<ul style="list-style-type: none"> - Most frequently referenced initiative or strategy by participants - Strong emphasis on business case for climate action - Question raised on role of non-governmental partnerships or collaborations in advancing climate change initiatives
Green procurement policies	<ul style="list-style-type: none"> - Respective municipal or regional procurement policy noted by three participants - Little recognition of climate change in reviewed documents - Region has mention of procurement guideline on website, in Environmental Strategy, and sustainability progress website but document could not be located - City of Waterloo procurement policy addresses economic barriers identified by participants
Green building policies	<ul style="list-style-type: none"> - The City of Waterloo had a one-page policy document published on it's website, mandating that all new or renovated municipal buildings (greater than 500m²) must be designed and certified to meet a minimum Silver LEED standard. - Two participants commented on their silver and gold LEED standard achievements
Air quality and anti-idling policies	<ul style="list-style-type: none"> - Strong awareness especially in Kitchener Air Quality Report - Highlights role of academic institutions as source of information and non-profit organizations in advancing environmental initiatives
Economic development strategies	<ul style="list-style-type: none"> - Participant noted greenhouse emission reduction is in line with strategy, but document reviewed had little information pertaining to climate change
Vector-borne disease surveillance program	<ul style="list-style-type: none"> - No mention of climate change but very easy to understand relevance
Local food system	<ul style="list-style-type: none"> - Presents example of integration in planning context - Highlights challenges with policy implementation process
CarShare programs	<ul style="list-style-type: none"> - Highlights role of non-profit organizations in advancing environmental initiatives

5.4 Official Plan summary

5.4.1 Summary

As seen in Table 24, the City of Waterloo had a much stronger recognition of climate change in their Official Plan. The term appeared in the document a total of 17 times, and explicit reference was made across 17 of the indicators. There was a stronger emphasis on adaptation compared to mitigation (referenced six times versus one relevant reference, respectively). The Region's draft Official Plan contained the term 'climate change' only 6 times, however explicit reference was made across 15 of the indicators. There was an emphasis on adaptation strategies (referenced 3 times versus only once for mitigation). Together, this demonstrates that while climate change may not be clearly stated, the Regional plan still incorporates issues that reflect a climate change component.

With regards to the City of Kitchener, the first draft of the Official Plan did not contain the term 'climate change' and made no explicit reference. The second draft however, introduced the term once, and made an explicit reference to two of the variables. This suggests that climate change is increasingly being recognized, however there is still room for improvement in comparison to the Region and City of Waterloo Official Plans. Both mitigation and adaptation were referenced twice, suggesting no bias.

Relative to the other locations, the City of Cambridge had the lowest recognition of climate change in its Official Plan, with no appearance of the term throughout the document, and an explicit reference relating to only two indicators (energy efficiency and flooding). There was also one reference to mitigation, and no mention of adaptation. There were minor differences in the timeframe in the various plans. The Region and Kitchener OPs state 2029, whereas Waterloo and Cambridge state 2031.

Of interest, all locations discussed air quality with explicit reference, except for the City of Cambridge where reference to air quality was not evident. Although an in-depth evaluation of each initiative is beyond the scope of this research, it is worth noting that there were some differences in air quality actions. Mainly, the City of Waterloo plan calls for the potential development of an Air Quality and Climate Change Management Plan, as well as encourages setting targets for greenhouse gas emissions and local air pollutants. The Region presents air quality as an important health and livability issue, but in terms of addressing poor air quality and climate change, makes only a general reference to 'the land use planning process'. The City of Kitchener also makes a general reference,

stating that it will “develop and implement climate change initiatives” (City of Kitchener, 2013b, p.104).

While adding the health and livability dimension in the Regional plan may be effective for communicating personal relevance, the approach from the City of Waterloo is arguably most effective given that planning officials have a more directed focus on which actions to take. The ultimate outcome for the City of Waterloo could be a plan dedicated to air quality and climate change management. The outcomes for the Region and City of Kitchener plans are much more ambiguous.

On a separate note, and as it will become clear later on, the Official Plan summary (compared to the other planning documents) revealed the fewest ‘NE’ scorings (see Appendix B). This suggests that the Official Plans provided the most comprehensive document for addressing climate change. While corporate greenhouse gas inventories and action plans may offer a more defined approach for mitigating climate change, several sub-categories were left largely unaddressed (e.g. land-use policies, resources management strategies). With this in mind, it would be beneficial to ensure that Official Plans have the strongest focus on climate change or highest level of integration, given their comprehensive nature.

5.4.2 Missed opportunities

It is worth noting that there were some sections of the plans where climate change could have easily been discussed, however there failed to be any mention of it. For example, the Region of Waterloo OP discusses the importance of Regional Recharge Areas for their hydrological functions and providing rich groundwater resources in the Grand River watershed. The Plan notes that large quantities of snowmelt and rainfall are infiltrated through these areas, given the substantial level of sand and gravel deposits (Region of Waterloo, 2010a). Given the importance of this source of groundwater, it would have been arguably better to discuss possible changes in the amount of rainfall or snowmelt that could result from climate change, thereby acknowledging the possibility that changes to the groundwater source may occur, and providing the opportunity and foresight for adaptation measures.

Although the second draft of the City of Kitchener OP (2013b) introduced the word climate change, the first draft had no mention of it. The Plan acknowledges being ‘environmentally viable and sustainable’ (p.9), ‘incorporating environmental considerations and goals into all levels of community plans and strategies’ (p. 12), ‘providing support and local solutions to help protect and improve air

and water quality’ (p. 12), and ‘support initiatives to reduce and/or eliminate idling times’ (p. 105). That said, there was a missed opportunity to integrate climate change in these discussions, as the plan could have further stressed the importance of why these actions needed to be considered. For example, ‘providing support and local solutions to help protect air quality’ could have acknowledged the possibility of a changing climate. Similarly, ‘supporting initiatives to reduce and/or eliminate idling times’ could have been improved by acknowledging the amount of greenhouse gas emissions released in Kitchener from vehicle sources. This would allow for a more informed understanding of why anti-idling measures are needed.

The Grand River Conservation Authority recently held a workshop on ‘increasing resiliency and adapting to climate change’, and presented some of the data collected from climate change scenario models, as well as the organization’s plan for watershed management (see: GRCA Partners Workshop Jan. 10, 2013 on ‘developing resiliency and adapting to climate change’). One of the findings discussed in the workshop was that scenario models predicted an increased frequency of intense storm events, higher flow rates in winter months and more melts in mid-winter. In few words, there is a likelihood that the Region will experience warmer, wetter winters. Generally speaking, where flooding is discussed in any plan, one to two words acknowledging the likelihood of increased flooding or at minimum, change in water levels, would again provide opportunity and foresight for adaptation measures. The key word here being to acknowledge that change is likely, hence providing flexibility for preparation.

5.5 Strategic plan summary

5.5.1 Summary

As Table 24 shows, the City of Kitchener strategic plan most readily recognized climate change. The term appeared 3 times in the planning document, while explicit reference was made across 9 of the indicators. The City of Cambridge did not have a strategic plan, but there was a ‘Corporate Sustainability Plan’ which serves as an overarching document to guide other master and strategic plans (City of Cambridge, 2011a). As such, this document was reviewed in place of a strategic plan for the City of Cambridge. The term did not appear in the Regional Strategic Plan; but appeared once in the City of Waterloo document, and once for the City of Cambridge document. There was no clear reference to mitigation or adaptation in any of the documents except for the City of Cambridge’s plan (each referenced once). All locations used the same 3-year timeframe for the years 2011-2014.

Despite some recognition, strategic plans generally had little information on climate change. Overall, there was a much weaker focus on climate change in Regional and City of Waterloo documents (in comparison to the stronger focus found in the Official Plans for these locations). This suggests that for these locations, climate change may be viewed as a more long-term issue, rather than something that can be addressed with short-term initiatives. On the other hand, the City of Kitchener had more information on climate change in their plan, in comparison to what was found in the OP. This may suggest that the City of Kitchener regarded short-term initiatives as being a priority. This said, these documents were also often shorter in length than the OPs, so given the finding that climate change was recognized at all is noteworthy.

Reflecting on these findings, it was interesting to see that each of the locations noted the relationship between climate change and air quality, as all plans made explicit reference to climate change when discussing this issue. This can be seen as a strong point for each location and given that the relationship is already established or recognized, this section can perhaps be further expanded on in future revisions. On the other hand, there should be more of an effort to discuss climate change impacts and opportunities in other areas of the planning document (e.g. resource management programs, transportation policies, energy strategies, etc.).

5.5.2 Missed opportunities

One of the challenges in reviewing the strategic plans was that at times, the information provided was too vague to relate to indicators in the different sub-categories. For example, the City of Kitchener plan talked about protecting the environment which could arguably reflect the ‘creation of conservation zones or protect areas’, or ‘vegetation protection’ indicators. However, it was ultimately determined that the discussion was far too general and the issue was scored as NE. Given that strategic plans generally strive to implement more specific objectives (Hodge & Gordon, 2008), the simplistic and vague reference to ‘protecting the environment’ is concerning. It may be more effective to have recommendations on more specific and directed policies.

5.6 Environmental strategy summary

5.6.1 Summary

As the environmental strategy summaries show, the term ‘climate change’ appeared fairly frequently in the Regional and City of Waterloo documents, but not as frequently in the Kitchener

Strategic Plan for the Environment. The City of Cambridge did not have a strategic plan for the environment, but the Cambridge Corporate Sustainability Plan can be substituted in its place.

The term ‘climate change’ appeared most frequently (7 times across 11 indicators) in the City of Waterloo plan, with no particular mention of mitigation, but one reference to adaptation. The Region used the term 6 times, across 9 indicators, with reference to mitigation only once but adaptation 6 times. The City of Kitchener used the term 3 times, across 6 indicators, with no particular reference to either mitigation or adaptation. As already noted, the City of Cambridge plan included the term once, referenced two indicators, with mitigation and adaptation each stated once.

There was inconsistency with the timeframes. The Regional plan noted being updated every five years, while the CSP only noted the timeframe between 2011 and 2014. The plans for the cities, Waterloo and Kitchener did not specify a timeframe.

One of the most surprising findings was the fact that none of the documents discussed transportation policies with an explicit reference to climate change. As a strategic plan for the environment, discussions relating to transportation strategies are perhaps the easiest areas where greenhouse gas emissions can be talked about, as the connection between vehicle emissions and climate change is well established. It was anticipated that this category would have more explicit references, which was unfortunately not the case.

Another quite surprising finding was how little information there was about climate change when reviewing resource management strategies. Again, as a plan that has a specialized focus on the environment, it would be expected that discussions on ecosystem management, tree planting, or watershed planning would recognize climate change more readily. This was once again not the case. With the exception of the City of Waterloo plan (which made explicit reference when discussing vegetation protection issues), all other documents made mainly implicit references, with a few issues left unaddressed entirely. These findings highlight an important need to address climate change as a more multi-faceted problem (not just a problem for air quality, and not only develop solutions in the form of reducing greenhouse gas emissions – e.g. consider stormwater management to minimize flooding risk).

That said, there seemed to be more of an emphasis on climate change when discussing communication and collaboration policies (i.e. public awareness, education and participation; inter-organizational collaboration), and monitoring practices in the environmental strategies. The stronger

focus on partnerships and public responsiveness was not seen in other plan summaries and may suggest that environmental strategies identify these sources as being more valuable or meaningful. In other words, municipalities and regions recognize that in order to achieve or advance environmental goals, it is critical to work with the public and other governmental or non-governmental groups. The stronger emphasis on monitoring practices was also not observed in the other plans, and possibly suggests a greater awareness for the unpredictability of the environment, or need for up-to-date information in these plans.

There also appeared to be a somewhat stronger focus on methane capture strategies from landfills, which was something not readily addressed in the official plans or strategic plans (albeit the Kitchener OP mentions focusing on methane gas from landfills, but does not connect the issue to climate change). This may possibly suggest that the environmental strategies are used as a document to introduce more creative or innovative means for climate change mitigation and adaptation.

5.6.2 Missed opportunities

There was a great deal of inconsistency between plans in terms of the structure. While not so much a missed opportunity, but rather a caveat, it is important to consider how different information is presented and what aspects are emphasized. For example, some plans had an emphasis on already achieved initiatives (City of Cambridge, City of Waterloo), while other plans presented more philosophical frameworks and overall program priorities (City of Kitchener). This is important to consider because the nature of the discussion can be construed differently by the reader and may result in different action priorities. Does the planning official aim to replicate successful initiatives, or strive to take novel action that reflects the overarching philosophy? This is not to say that all plans should have the same structure, but that planning officials need to be cognizant of how certain types of communication can be interpreted differently and result in different outcomes.

Another issue with the environmental strategies surrounded the simplistic nature of some plans. Some plans were very minimalist in nature (City of Waterloo), while others provided more depth (Region of Waterloo). Particularly, the City of Waterloo Environmental Strategy presented information almost entirely in the form of bullet points. While this may make the document easier to read, it lacks the ability to inform the reader on why action needs to be taken, or how the action may relate to climate change. More importantly, these are key components for forming risk perceptions and motivating behaviour. While the City of Waterloo document does a great job in recognizing alternative energy sources and solar power initiatives, climate change is not acknowledged in the

note. Although the issue is integrated into other parts of the document, it would still be more meaningful to have a well-rounded discussion explaining objectives, rationale and implications. Despite having the more frequent use of the term ‘climate change’ compared to some of the other plans, the simplistic nature and limited information from some study sites render that these documents did not have a comprehensive focus (i.e. Official plans maintain their lead position).

5.7 Greenhouse gas inventory summary

5.7.1 Summary

As seen in Table 25, climate change was readily recognized in the City of Kitchener Corporate Greenhouse Gas Inventory with the term appearing 13 times, across 8 categories. There was no particular reference to mitigation or adaptation. The Regional plan on the other hand only included the term 4 times but made explicit reference across 17 indicators. There was an emphasis on mitigation with the term being referenced 3 times, and no reference to adaptation. The City of Cambridge forecast included the term only once, but made explicit reference across 11 indicators. There was no particular reference to mitigation or adaptation. Reflecting on the number of indicators addressed with explicit reference to climate change, the Regional plan and Cambridge plan seem to also readily recognize climate change. The City of Waterloo has yet to publish a corporate greenhouse gas inventory but in an April 2013 note, expressed intention to develop an inventory. In terms of the timeframe, the Region and City of Cambridge plans extend from 2010 to 2019, whereas there was no mention of a timeframe for the City of Kitchener plan, other than the date of publication in 2010.

These findings suggest that while the City of Kitchener document included the term the most frequently, the other plans addressed more of the indicators, demonstrating that they were more comprehensive. This may lend to the latter plans being more effective, as they approach greenhouse gas emission reduction from a more multi-faceted angle (i.e. considers encouraging the use of renewable energy sources, adopting zero waste and high recycling strategies, public education and engagement, tree planting strategies, etc.). Moreover this can further assist in branching away from only air quality aspects.

5.7.2 Missed Opportunities

There were a few noteworthy gaps in the planning documents where issues were left largely unaddressed. These included financial tools, land-use policies, transportation policies (to a lesser extent), and resource management strategies. These gaps demonstrate areas where the plan can be improved in future revisions, and where municipalities can direct efforts to achieve emission reduction targets. For example, municipalities can consider implementing a greenhouse gas emission reduction fee or carbon tax in efforts to reduce emissions. Similarly, encouraging compact development and transit-oriented development, protecting green and open spaces, planting trees and promoting local food, can all create opportunities for mitigating climate change and should be considered in plans relating to greenhouse gas emissions.

5.8 Stormwater management credits, programs, and master plans

5.8.1 Overview

The following section deals with stormwater management plans and programs. It should be noted that the policy review summary was not carried out in the same format as the other summaries were before, given that there was a great deal of inconsistency with regards to the types of plans or initiatives being implemented (e.g. master plan, credit program, by-law, action plan). Stormwater management was also a topic which came up in many of the interview responses; it was an action noted by a number of participants with respect to item 69, and efforts from the Grand River Conservation Authority can be considered in this category. With this in mind, the following sections provide a background on the questionnaire responses relating to stormwater management, followed by the policy review findings.

5.8.2 Summary of relevant questionnaire response findings

Stormwater management appeared to be a particularly important issue, as it frequently came up in the interviews and questionnaire responses from a number of participants. To illustrate:

- Stormwater management was the fourth most common action noted by participants when asked to list the most critical actions for mitigation and adapting to climate change in the Region;

- Stormwater management was regarded as a responsibility of local government by a participant from the City of Cambridge, when asked, ‘overall what role should local government play’;
- A participant from the City of Waterloo reported addressing stormwater (low impact design implementation, retrofits, etc.) when asked ‘ what do local councils need to do differently’;
- A participant from the City of Waterloo reflected on the stormwater credit program which ‘encourages citizens to augment how much they are contributing to system run off’. This was in reflection of whether their department could implement a similar initiative as was done in another municipality;
- A participant from the City of Cambridge commented that there seems to be more of a focus on corporate facilities and fleet (i.e. mitigation), but adaptation measures are starting to appear, albeit not under the framework of ‘climate adaptation’ (e.g. stormwater master plans);
- No participant from the Region recognized stormwater management as an action that is currently addressed, or one which needs to be addressed; and
- A participant from the Grand River Conservation Authority listed this as one of the most critical actions that needed to be taken to mitigate or adapt to climate change.

5.8.3 Policy review

With regards to the Policy Review, there was a great deal of variation in terms of the types of documents released publically by the various locations. Specifically, the Region had no plan or program, or no plan or program that could be easily discovered by internet searches for stormwater management. The City of Waterloo had a by-law to impose a stormwater charge and implement a stormwater credit program, as well as a fairly recent follow up report on the stormwater credit program. The City of Kitchener had a stormwater credit policy, and the City of Cambridge had a stormwater management master plan. Furthermore, the Grand River Conservation Authority aims to create an action plan for water management by 2013 (noted by a participant for Item 69), which explicitly lists ‘increasing resiliency to deal with climate change’ as one of the four goals (GRCA, 2010). Given that this plan has not been published yet, review is not possible. That said, the Project

Charter has been published and can be reviewed in place of the plan, as it describes the goals and objectives, issues surrounding governance, and other aspects of the plan.

It goes without saying that these documents cannot be compared on an equal level. Some of the documents provide a significant amount of detail, are much longer in length, include background information, or assess alternatives. Others are sparse in detail and provide only actions. Moreover, by-laws generally do not go into the same level of detail as master plans, and follow-up reports serve different purposes than plans. As mentioned, a comparison between the different locations was not made. Instead, each document was evaluated individually, with important aspects highlighted in the section below. Where the recommended initiative was extremely limited in content (e.g. City of Waterloo's and City of Kitchener's stormwater credit policies), a secondary document was reviewed for relevant information. In this case, the most recent follow up report was reviewed for the City of Waterloo, and Memo 1: introduction, background and purpose, was reviewed for the City of Kitchener.

Finally, it is worth noting that the City of Waterloo and City of Kitchener formed a partnership to develop and implement a stormwater management credit program. As a result, it is likely that there will be overlap between the objectives and actions in the programs for these two locations, even if not explicitly addressed in the document. For example, the follow up report for the City of Waterloo does not discuss public awareness, education or participation, however, an education credit is one component of the program.

5.8.4 City of Waterloo

As noted previously, the City of Waterloo's 'Bylaw to impose a stormwater charge and implement a stormwater credit program' had very little information pertaining to climate change action. The term made no appearance in the by-law and no indicators were explicitly addressed, however the term was quoted once in the 2012 follow up report, across 5 indicators. Similarly, the term 'mitigation' was introduced once in the follow up report, and 'adaptation' was introduced three times (suggesting an emphasis on adaptation). Taken together, the follow up report addressed climate change more readily.

The by-law reported that the stormwater charge will be effective as of January 1, 2011, and the credit program will be effective as of January 1, 2013. The follow-up report on the other hand, did not include a clear timeframe.

Most notably, the report noted how certain practices like green roofing, runoff capture and storage, and urban forestry can help build adaptive capacity for climate change, and reduce climate-related vulnerabilities (City of Waterloo, 2012e). It also highlighted how trees are an important component of the program as they can ‘absorb and store carbon’ (p. 4), and can be ‘readily incorporated into the program with little administration required’ (City of Waterloo, 2012e). The report also noted that staff have recognized this important role. These aspects are noteworthy because they can help to minimize some of the perceived barriers to taking climate change action. Specifically, recognizing the ease in which certain actions can be taken, how they relate to climate change (i.e. absorbing and storing carbon), and how there is already support for these practices can facilitate their uptake.

5.8.5 City of Kitchener

There was very little information pertaining to climate change in either the City of Kitchener by-law or Memo 1. There was no use of the term in either document, and none of the indicators were explicitly addressed. In some cases, the Memo provided more detail on certain issues, allowing for an opportunity to talk about aspects of climate change mitigation or adaptation. This is evident by the shift from ‘NE’ to ‘I’ in a number of the categories between the by-law and memo (see Appendix B). However, the absence of relevant climate change information remains troubling given that stormwater management was recognized as an important action for climate change. Moreover, given that this initiative is a coordinated effort with the City of Waterloo, and considering the fact that ‘climate adaptation’ was recognized as one of the benefits of the program in the City of Waterloo follow-up report, there should be consistent information in the documents released by the two cities in order to carry-out the intended purpose of the program and achieve the same benefits.

5.8.6 City of Cambridge

Compared to the other study sites, the City of Cambridge, by far, had the most impressive plan for connecting stormwater management and climate change. Granted, a master plan cannot be compared to a by-law or credit program (given the scope, purpose, depth, etc.), however, the mere fact that the City has developed a master plan for stormwater management, on its own, is deserving of credit.

The plan is admirable for a number of other reasons. It acknowledges an increase in the frequency and severity of storm events and in fact, comments that the plan was developed ‘in response to this apparent increase’ (City of Cambridge, 2011c, p. 1). The plan adopts a ‘climate change scenario’, in addition to the provincial 100-year storm or ‘Hurricane Hazel’ standard, when considering impacts to

city infrastructure – a consideration that was not observed in any of the other plans reviewed. The plan incorporates an evidence-based approach for monitoring climate change (i.e. Rainfall Intensity Duration Frequency (IDF) rates), which is critical when considering some of the challenges noted by participants including, uncertainty with climate change, belief that climate change is not happening, and absence of information on localized effects; and the plan acknowledges that understanding of climate change is not complete, hence as more research develops on the effects of climate change, relevant data sets need to also be updated.

The plan also considers inconsistencies in data sets, which can compromise monitoring efforts and assessments of the potential impacts of climate change. For example, it points out a notable discrepancy in rainfall levels recorded at the Environment Canada station, from those recorded in the City of Cambridge. As such, it recommends that IDF updates apply local rainfall data from the City of Cambridge.

Together, these specific elements found in the City of Cambridge master plan render that it has a strong potential to be an effective tool, and address perceptions of climate change that may prevent mitigation or adaptation action.

5.8.6.1 Sub-category and variable summary

In terms of the criteria guiding the policy review, the term ‘climate change’ appeared in the document a total of 9 times, across 4 indicators. Although there was no direct mention of ‘mitigating’ or ‘adapting’ to climate change, the plan talked about ‘accounting for the influence of climate change and more frequent occurrences of severe events’, and indirectly mentioned ‘mitigating the impacts of flooding’ (i.e. which can be regarded as adaptation) (City of Cambridge, 2011c).

Most notably, the plan acknowledged the importance of an integrated and coordinated approach for stormwater management and specifically recognized that the City would struggle to meet drainage needs of businesses and residents if there was not a balanced and integrated plan in place. The plan also recognized an increase in the frequency and severity of storm events when discussing the need for a city-wide plan. For this reason, the inter-organizational coordination category received an ‘explicit’ scoring.

Climate change was also explicitly addressed when discussing ‘disaster resistant land use and building code’. The plan described different design standard requirements for storm sewer systems

and discussed these requirements under a 'climate change perspective'. For example, in section 5.1.2, the document states:

In effect, these results indicate that, potentially, storm sewers would need to be designed to the current (2003) 10 year design standard in order to provide capacity for a 5 year storm event under a Climate Change perspective for the longer duration storm events. Similarly, the results suggest that stormwater management facilities which are currently designed to a 100 year standard would be sufficient for approximately a 50 year return period under a Climate Change for the 24 hour duration storm. Clearly the datasets used in this assessment are too short to definitively conclude that the Climate Change influences are absolute. Notwithstanding, these types of trends are widely speculated to become more pronounced and common over time. (City of Cambridge, 2011c, p. 16)

The plan also explicitly discussed climate change with respect to updating IDF relationships and monitoring flooding sites. In section 5.21, the plan describes how preference is given to certain modelling methods which allow for flood frequency or risk to be evaluated (see: XP-SWMM methodology, City of Cambridge, 2011c, p. 18). This is in contrast to using historic rainfall data which would allow for more long-term estimations for multiple storm events. The plan comments on the benefits of using this preferred method, but also discusses the limitations (i.e. sewer networks cannot be modeled with the same level of design precision).

Of relevance to the policy review, it is in light of this limitation that the plan recommends acquiring additional information to determine the cause of flooding at various sites, and inspecting (or monitoring) these sites during severe storm events to determine issues with, and causes of flooding.

It is also worth noting that the plan carried out an assessment on the cost for upgrading the minor drainage system to the 100 year storm event standard. The assessment determined that the cost would be more than 3 times the cost of mitigating incidences of surcharge and flooding. Upgrading the minor system to mitigate flooding issues associated with a 100 year storm event was hence considered 'overly cost-prohibitive'. This is an important aspect of the plan because it recognizes some of the financial barriers related to climate change mitigation and adaptation that were brought up in the interviews with local planning officials. That said, the plan also listed a number of alternatives for mitigating flooding impacts to private property in the event of a 100 year storm, which can help to minimize perceived financial barriers for adapting to, or mitigating climate change (see City of Cambridge, 2011c, p. e4).

The plan also described how a challenge in maintaining stormwater systems was that actions tended to be more 'reactive' than 'proactive'. This was concluded after interviewing city staff

members. Of relevance to the current study, this same challenge of reactive planning was also acknowledged by participants. When asked if the department considers adaptation in their decision making, one participant responded yes, but the action is more reactive rather than fixing the problem. Similarly, in response to item 27c), another participant commented that action is always dependent on political will and resources, and that normally ‘we are more reactive than proactive’. While encouraging proactive planning may seem challenging, given the uncertainty of weather events and justifying the cost of adaptation strategies, the fact that both the master plan and current study results recognize this problem warrants the need for more pro-active planning.

Taken together, the strong integration of climate change with stormwater management issues, and explicit reference for the categories, inter-organizational coordination, disaster resistant land use and building code, waste and stormwater management, and continuously monitor, evaluate and update, make the City of Cambridge plan particularly noteworthy.

5.8.7 GRCA

As seen from the table, the GRCA project charter included the term 8 times, with explicit reference across 6 indicators, and made particular reference to adaptation 5 times. In terms of the timeframe, the project kick-off began in September 2009 and the implementation launch was anticipated for March 2013.

Explicit references were made with respect to inter-organizational coordination issues, disaster-resistant land use and building code efforts, watershed based and ecosystem based land management, and almost all of the implementation and monitoring strategies. All other issues were either not addressed (most issues), or had implicit reference (5 issues).

Given that the plan has a specific goal of increasing resiliency to climate change, it is likely that the final water management plan will have more detail and actions relating to climate change, in comparison to what was observed in the project charter. At the time of this policy review however, the document had limited information.

5.8.8 Stormwater management summary

In summary, there was a great deal of variation in the planning documents to make a comparative assessment. That said, the importance of stormwater management, as noted from the questionnaire findings; the partnership formed between the cities Waterloo and Kitchener to develop a credit

program; the exceptional integration of climate change in the City of Cambridge master plan; and the strong commitment to increase resiliency to climate change from the GRCA, all point to the importance of this action. Not only is the value of stormwater management recognized, but the master plan developed by the City of Cambridge demonstrates how climate change can be highly and effectively integrated into a plan, which can serve as an example for other municipalities.

5.9 Transportation master plans summary

As seen from the table, the Regional Transportation master plan most readily addressed climate change with the term appearing 8 times and explicit reference made across 8 indicators. Reference was made once to both mitigation and adaptation. The recently published Kitchener Transportation Master Plan only included the term 3 times, but also made explicit reference across 8 indicators and also reflected once on both mitigation and adaptation. The Cambridge Bikeway Network Plan only had the term once, with explicit reference across 6 indicators, and no particular reference regarding the direction. The Waterloo Transportation Master Plan on the other hand did not have any mention of climate change, made explicit reference to two indicators, and only one reference to adaptation. Timeframes were all fairly consistent. By this standard, the Region had the most recognition of the climate change.

As was expected, there was less of a focus on climate change for certain categories (e.g. waste strategies) over others (e.g. air quality). Most troubling however, was the minimal number of explicit references made for the transportation strategies sub-category. In comparison to the other plans however, the transportation master plans had a stronger focus on green business initiatives, which is likely facilitated by the TravelWise initiative in the Region, which encourages employees to adopt more active and sustainable modes of transportation (see: Region of Waterloo, 2010c).

In reflecting on the interview findings, recall that the transportation related activities category was the most frequently referenced category when participants were asked to list the most critical actions needed for climate change mitigation and adaptation (Item 60). While all other categories were referenced less than 10 times, transportation activities were referenced 25 times. This would suggest that transportation master plans would have a strong integration of climate change issues, as transportation-related activities were deemed as the most critical action for climate change by local planning officials. However this was not really the case.

Although an in-depth evaluation of the different plans was beyond the scope of this study, the minimal consideration of climate change in the transportation plans, warrants a closer review. The recent publication of the City of Kitchener Transportation Master Plan raised the question of whether newer publications might have more integration of climate change in comparison to older publications. This is given the notion that there may be more acceptance for climate change as time passes; it may be regarded as a more pressing issue as communities are impacted by extreme weather events, or as more people have personal exposure to these weather events. At the same time, the inclusion of the term 10 times in the Provincial Policy Statement 2012 draft policies, with only one reference in the 2005 document, would not only suggest that the issue is becoming more recognized as time passes, but also suggests a stronger provincial mandate to consider climate change in decision making.

With this question in mind, transportation master plans were evaluated to assess whether the minimal reference to climate change in some of the plans was a result of it being an older publication. Regrettably, the date of publication turned out to be irrelevant. The City of Waterloo plan was published in April 2011, had no mention of climate change and did not have mention of greenhouse gas emissions for that matter. There was one instance where carbon emissions were discussed in the context of unnecessary driver delays, but in all other cases, there was only a general reference to 'vehicle emissions'. Given that reducing vehicle emissions can be motivated out of health reasons, and be included in a plan for the intent of improving air quality and not for mitigating climate change, this description will not suffice.

The Regional plan in contrast, had the strongest integration of the term and was published in January 2011. What is more, the City of Cambridge plan had an even earlier publication date (July 2008), and still included the term, with explicit reference made across six indicators.

These findings further illustrate the importance of understanding the decision making framework and the factors that lead to climate change becoming considered in the policy process. These findings also demonstrate that there is much room for improvement in terms of integrating climate change issues into various planning documents.

On another note, it was interesting to find that the Region of Waterloo plan addressed one of the social barriers identified by a participant from the Region during the interview phase, and in fact challenged it. The participant talked about there being a perception that the bus is for 'students and poor people', yet the plan describes how most residents in the Region agree that public transit is 'not

just for those who cannot afford a car' (ROW, 2011b, p. 3-3). Although it is not clear whether the participant was referring to community members or certain groups (e.g. professionals working in the region), this may suggest disconnect between what planning officials perceive and what residents perceive.

5.9.1 Missed opportunity

A missed opportunity, aside from the rather critical absence of climate change and greenhouse gas emission details in the City of Waterloo plan, was in describing the planning context but not referring to climate change. For example, the City of Kitchener plan had a section on the planning context and identified challenges with an aging population and population growth. However, there was no mention of climate change. As described earlier, there are opportunities to integrate these discussions with other problems as there will be overlapping impacts. Population growth presents the challenge of having more people impacted by severe weather events. A growing population of seniors presents a more vulnerable population to heat waves and poor air quality. This in turn, places a higher demand on municipalities to provide adequate services and healthcare.

Another missed opportunity was that some of the plans seemed to talk about climate change in a passive context. For example, where climate change was presented in the City of Kitchener plan, it was mentioned in a secondary reference to other documents or from surveys of community residents' opinions. Maibach et al. (2008) raise the important point that key players in the planning context can have an influential role in guiding the perceptions and values of community members, and promote activities that help to address the issue. Specifically the authors propose that the reason for why most people view climate change as having a bigger impact on the natural environment and species (rather than people and public health), is because the voice of public health professionals have been silent on issue and have failed to make the case for how people can be impacted (Maibach et al. 2008). These findings work in the same way. Local planning officials have the opportunity to make the case for how climate change is impacted by vehicle use. While reference to a secondary document is better than no reference at all, the passive reflection on community attitudes can be improved by standing behind these values, making the case for how issues relate, and demonstrating that municipal officials also share a concern for climate change.

5.10 Regional Carbon Initiative and Climate Action Plan

Sustainable Waterloo's Regional Carbon Initiative and ClimateActionWR's Climate Action Plan were unique strategies. These were the only planning document or initiative to be referenced by multiple participants in distinct jurisdictions. This raises the question of whether municipalities must work with other organizations in order to advance climate change initiatives – an issue that will be addressed in the analysis and recommendation chapter.

To provide a background, the Regional Carbon Initiative brings together industry, local government, NGOs and academia in order to help organizations set voluntary targets and reduce greenhouse gas emissions. This is prompted by an awareness on climate science (recognizing that carbon emissions are the primary driver for climate change), a motivation to create healthy communities (improve air quality) and accounting for political pressures (the Government of Ontario's plan to impose a cap-and-trade system as part of the Western Climate Initiative) (Sustainable Waterloo, 2010). The initiative creates friendly competition between organizations to meet targets, has a very strong focus on community engagement, but also has a notably strong approach in presenting the business case for greenhouse gas emission reductions – a critical issue realized from the questionnaire responses. For instance, the "Guide to the Regional Carbon Initiative" document describes how businesses can save money but also profit from incorporating environmental sustainability strategies. At the same time, there are other benefits including employee satisfaction, risk mitigation from upcoming policy, and positive publicity (Sustainable Waterloo, 2010).

The Climate Action Plan on the other hand is guided by the FCM Partners for Climate Protection (PCP) program. The plan will assist municipalities in reaching the five milestones described at the beginning of this chapter, with a particular focus on the community-oriented goals. Specifically, current efforts are directed toward Milestone 2 (setting emission reduction targets) and 3 (developing a local action plan) (ClimateActionWR, 2013).

While the plan has yet to be published (hence, the specific contents of the plan cannot be reviewed at this time), the initiative is noteworthy for its rather strong awareness of climate change mitigation. It also has a noticeably strong focus on public participation and community engagement, as well as in collaborating efforts with members across the region.

The document reviewed for the Regional Carbon Initiative on the other hand, included the term 15 times, with one specific reference to mitigation. The initiative strives to set 10 year carbon emission

targets. Explicit reference was made across 11 indicators including: public participation, inter-organizational coordination, incentives, both energy strategies, all implementation and monitoring strategies, air quality and environmental business initiatives. Overall, this document had a very strong awareness for climate change.

5.11 Vector-borne disease surveillance program

This program was recommended by a participant, however the summary document that was published on the study site webpage had no mention of climate change. Upon reviewing the document however, it became very easy to see the relevance. The document describes how the incubation period for mosquitos (the period for which West Nile Virus is ingested by a mosquito and appears in the salivary glands), is largely influenced by seasonal and climatic variations (ROW, 2012). Specifically, warmer temperatures can speed up development and incubation periods, in turn, increasing the probability for virus transmission. At the same time, increased precipitation plays a role in increasing the risk and viral load for human transmission, but the relationship differs depending on the mosquito species (ROW, 2012). Of particular interest, the program mandates temperature and precipitation monitoring and provides a summary of the average temperatures in Waterloo compared to a baseline from the years 1971 to 2000. The summary illustrates that the region experienced a warmer than normal season compared to previous years. It also concludes that variations in precipitation and temperatures may have supported West Nile Virus activity in the mosquito population for 2012, as well as partially explains why so many “pools” (female mosquito specimen groups, belonging to the same species), tested positive for the virus (ROW, 2012). While there was no explicit mention of climate change, this document can be highly useful for presenting evidence of weather changes and implications for the local level. Recognizing the risk associated with the West Nile Virus becoming more prevalent, further speaks to the urgency of addressing climate change, and the imperative need to integrate the issue into daily planning decisions.

5.12 Other participant responses and miscellaneous initiatives

This section presents a summary of other initiatives or strategies that were recommended by participants. While they were given strong consideration, and reviewed in depth where publications could be found, the policy review was difficult to carry out due to somewhat limited or inconsistent information. As such, a comparative assessment could not be made in the same way. Instead, some of

the key points are raised for each document or initiative, as well as some of the challenges experienced in performing the policy review.

5.12.1 Green procurement policies and energy efficiency strategies

A number of participants commented on the respective green procurement policy for their jurisdiction. The City of Waterloo document mentioned climate change only once, across three indicators, however it was most noteworthy for acknowledging membership in the PCP, noting an increased frequency of smog days, and recommending the development of an Energy Management Plan to explicitly reduce greenhouse gas emissions by 20%. Most interestingly, the plan also addressed one of the economic barriers raised in the questionnaire interviews, which dealt with perceptions of budget constraints. Specifically on page 5, the policy notes:

There is a general perception that the initial cost of purchasing Green Products or services is greater than the cost of conventional products. However, there may be reduced operating or end of life costs which may offset any initial purchase premium. In order to properly present a fully developed financial analysis, life cycle costing methodologies will have to be developed and presented during the decision making process. (City of Waterloo, 2012b, p. 5)

The recognition of perceptions, and particularly, the recommended course of action in light of these perceptions, are commendable as they can help to address economic barriers that may prevent the adoption of certain strategies, in turn, facilitating greater action.

The Regional Green Procurement Guideline was referenced by a participant, noted on the Regional website, and discussed in the Regional Environmental Strategy, but no publication could be located. A link to the publication on the Regional Sustainability Progress website was located however (see: <http://sustainabilityprogress.regionofwaterloo.ca>), but the link directed the user to an error page. Furthermore, a contact was emailed to request further information, but no response was received. This document could ultimately not be reviewed.

Similarly, the City of Kitchener did not have a green procurement policy, or has not published one that could be located. The City of Cambridge on the other hand had a sustainability procurement policy which was reviewed. The policy had no mention of climate change, but mentioned reducing greenhouse gas emissions in the context of air quality.

Some participants talked about the green building initiatives and other green energy strategies in their jurisdiction. For example, one participant noted how there is a Gold LEED standard policy for

all new city facilities, whereas another noted how the Green Building Policy mandates at least LEED Silver for new buildings. When reviewing the policy from the City of Waterloo, there appeared to only be a one-page document which accurately noted mandating a Silver LEED standard, but no additional details that were relevant to climate change. One participant listed the Green Energy Act, and noted efforts to comply with the GEA reporting. Another participant noted participation in a carshare program and that their department was investigating opportunities with the electric car.

Reflecting on the nature of participant responses thus far, it becomes clear that green purchasing and energy efficiency initiatives are a common practice for municipalities in acting on climate change.

One participant identified an economic development strategy, and noted that “80% of agenda is on reurbanization, creating more compact, transit-oriented, and pedestrian-oriented communities; hence, reducing greenhouse gas emissions is in line with this strategy”. However when the relevant document was reviewed, there appeared to be very limited information on climate change.

One participant noted that there was work on developing a local food system, but that there were challenges with implementation given that it was difficult to justify explicit health outcomes. The participant commented that “[there was] work on encouraging a local food system but given that their mandate is health, their power and jurisdiction was limited given that it is difficult to justify work that does not have explicit health outcomes, despite obvious environmental benefits”. When reviewing the relevant document, climate change was mentioned 4 times, explicit reference was made across 5 indicators, and there was a slight emphasis on mitigation. What was most interesting however, was the fact that the document considered climate change in the planning context – something that has not been readily addressed in a number of the other planning documents. Specifically, the plan noted challenges with a growing population but added that there may be additional challenges that can disrupt the food system. These additional challenges make the current system unsustainable, including things like rising fuel costs, climate change, water supply threats and other economic disruptions. The fact that a participant recommended this document demonstrates that climate change can be considered in the planning context as it can be integrated into considerations for local food systems and public health. At the same time, the reflection on the difficulty experienced when justifying outcomes, speaks to the factors and realities that make policy implementation challenging.

5.12.2 Air quality and anti-idling policies

A number of participants identified the anti-idling efforts of their department. The Waterloo Idling by-law had no mention of climate change but discussed education campaigns; exempts public transit during stop overs; encourages support for alternative energy sources and energy conservation strategies in facilities; promotes naturalizations and tree planting; and was developed with the aim of improving air quality. These components address some, but not all of Tang et al.'s (2010) sub-categories.

Most notably, it was mentioned that the by-law was developed out of consultation with academic institutions (i.e. the 'Knowledge, Attitude and Behaviour Relating to Vehicle Idling in the Waterloo Region survey, developed at the University of Waterloo) (City of Waterloo, 2009). This raises concern in finding that academic sources (Schools and Universities) were the second least consulted source of information by participants in the current study. There was also a noticeable emphasis in the by-law with regards to the issue of leadership. On page 392, the document states "as leaders in the community, it is important that frontline staff lead by example to the public to set a higher standard of behaviour". This issue also raises concern given the questionnaire responses in the current study which suggested a need for more leadership.

On the Region's website, there was mention of a 'tradition of air quality and energy initiatives', including an anti-idling protocol (see: Region of Waterloo, 'Air and Energy'). Similarly, one participant listed an 'anti-idling campaign' for item 69, however a relevant document for the policy review could not be located.

The City of Kitchener does not have an anti-idling by-law. However, in October, 2003, The City's Environmental Committee recommended that staff should investigate the feasibility of incorporating no-idling zones in the City's Parking By-laws. However, these recommendations were deemed as being 'problematic from a legal perspective' (City of Kitchener, 2010a, p. 3). The request was hence deferred but the committee was instead encouraged to develop a long-term, comprehensive air quality plan for the City. In 2006, the Air Quality in Kitchener Plan was developed, with an update report in 2010. With regards to the latter document, climate change appeared a commendable 11 times, across 8 indicators. There was no emphasis on mitigation or adaptation, but the plan appeared to have a strong focus on air quality as a health issue. In contrast to the 2006 report, there was a stronger emphasis on resource and waste management strategies (which explicitly referenced climate change) and green space provisions. Most impressively, the plan recommended that the City should consider

implications of air quality and global climate change during the development of long-range plans. The 2006 document more specifically recommended that these considerations should be included in the Official Plan, Master Transportation Plan and Community Plans. In addition, the 2010 document made particular reference to the role of local government in addressing poor air quality and specifically how practices related to the Ontario Building Code, land-use and zoning bylaws and transportation policy, can provide municipalities leverage in reducing emissions. This acknowledges the important role of local governments in climate change and communicates the ways in which action can be taken.

The City of Cambridge published a number of resources on their website relating to idling. This included an idle-free kit for schools, anti-idling by-law brochure, resources for schools to implement a no-idling zone, and as recommended by a participant, an anti-idling by-law. Most notably, the by-law did not have any mention of climate change or greenhouse gas emissions, but notes demonstrating “leadership by designating City Hall and associated properties, parking lots and surrounding streets as a ‘No Idling Zones’” (City of Cambridge, 2009). The by-law brochure on the other hand had one mention of climate change, and interestingly, also points out that the selected approach for achieving the best idling reductions in the community was supported by research conducted at McMaster University (City of Cambridge, 2011b). This again speaks to the importance of consulting academic sources. Moreover, the brochure demonstrates collaboration with two non-profit organizations, Reduce the Juice and Dads Against Dirty Air (DADA); lists recommended actions to reduce vehicle emissions, as well as addresses myths on idling (which can be useful for informing awareness and addressing misperceptions). This reaffirms the question on the role of non-governmental organizations in advancing environmental initiatives.

5.13 Bringing it all together – policy review findings

Coming back to the question, “Is climate change recognized in public policy” (RSQ11), the obvious answer is yes, but there is much room for improvement. Official Plans appeared to be the most comprehensive document to address climate change, with the City of Waterloo OP having the most use of the term (17), and explicitly addressed climate change across the highest number of indicators (17). Sustainable Waterloo’s Regional Carbon Initiative had the second highest use of the term (15), across 11 indicators, and was one of the most frequently referenced documents by participants regarding their climate change initiatives.

Air quality was consistently the most readily connected issue to climate change, demonstrating a strong access point to integrate relevant discussions in plans that may lack any recognition. At the same time, the often narrow focus on this issue demonstrates a need to present climate change as more multi-faceted problem - not just relating to air quality, and not just mandating emission reduction strategies.

Stormwater management credit programs, by-laws and plans demonstrated that stormwater management is an important action for addressing climate change impacts. Particularly the City of Cambridge master plan presented a noteworthy example of how other municipalities can effectively integrate climate change planning into stormwater management activities. There were minor issues with regards to the type of initiatives recommended (e.g. developing air quality and climate change management plans versus addressing the general land use process). This was an important consideration for the types of outcomes that can be anticipated or achieved. There were also minor issues with the level of detail and structure in certain plans which negates opportunities to provide understanding and reasoning for why certain strategies should be adopted.

Troublingly, plans that were thought to have a strong focus on climate change across several categories (e.g. environmental strategies), turned out to not always be the case. However these plans had a particularly stronger focus on certain strategies (communication and collaboration policies, monitoring practices, and more creative initiatives), than what was observed in other plans. These plans also suggested that some jurisdictions may think of climate change as a more long-term problem, rather than a short-term concern. Certain documents that were anticipated to have a strong focus also raised the question of whether date of publication was an important determining factor for integrating climate change information. This turned out to not be the case.

Finally, some of the more surprising findings were where information in the plans contradicted or acknowledged barriers reported by participants and where plans reflected on climate change in a passive context (mandating the need for a more active voice).

Taken together, these findings demonstrate that yes, climate change is recognized in public policy, most notably and comprehensively in certain official plans, and in the form of collaborative initiatives with non-profit organizations. That said, there is much room for improvement. The following chapter presents the analysis and recommendation component of this thesis, and most importantly addresses the main research question, “what is the relationship between climate change risk perceptions and the implementation of climate related policies”.

Chapter 6 – Analysis and Recommendations

The main research question this study sought to address was “what is the relationship between climate change risk perceptions and the implementation of climate-related policies”. This research was guided by the three following objectives:

- How do local planning officials view climate change and how does this relate to the types of policies that are being implemented;
- Is climate change recognized as an issue that requires policy attention;
- What is the current state of climate action at the regional and municipal level.

The questionnaire responses suggested that there is a perception that climate change is a temporally and geographically distant issue. There is a limited sense of self-efficacy, but a higher need for collective action. Participants recognized a high adaptive capacity in the region and autonomy to take action on climate change. However, there is a need for leadership, a business case approach to action, and a dire need to integrate climate change in the context of other planning issues.

The policy review findings highlighted that climate change is recognized in some planning documents, with the highest and most comprehensive recognition found in some Official Plans. The findings also shed light on the important role of collaborative initiatives for advancing environmental goals. Municipalities appeared to most readily adopt energy efficiency and green purchasing practices, along with air quality improvement practices. The relationship between climate change and air quality is also understood and well-established by municipalities.

In terms of the first research objective, there are four overarching frameworks that reflect this relationship.

1. Need for collaboration: perceptions indicate a need, policy demonstrates feasibility
2. Need for leadership: perceptions suggest it is critical but somewhat limited in practice, policy suggests it already exists
3. Need for integration of climate change in the planning context and other planning issues: perceptions suggest disconnect, policy suggests disconnect
4. Need for presenting climate change as a local issue: perceptions demonstrate a need, policy provides a supporting document

6.1.1 Need for collaboration

The need for collaboration should be taken in the general sense as it relates to several different distinctions. Given that climate change presents a grandiose challenge, it is easy to feel as though individual action cannot contribute to such a large and demanding problem. This was clear from the questionnaire responses showing low ratings on the helpfulness of different activities, the low rating for the ability to encourage others in the community to take action, and the comments that reflected on the need for collective action. At the same time, the feasibility of adopting collaborative initiatives was demonstrated in the policy review. Particularly, the involvement in the Regional Carbon Initiative by multiple jurisdictions and the strong recognition the planning document had for climate change, demonstrates how these collaborations can be formed and supported, how the business case for climate action can be promoted and welcomed by municipalities and organizations, and how climate change can remain prominent in guiding the activities of all those involved. At the same time, partnerships with non-profit organizations like Community CarShare, ClimateActionWR, Reduce the Juice, and DADA, demonstrate how municipalities can achieve environmental initiatives, especially with regards to improving air quality, and meeting national mandates like the Partners for Climate Protection 5-milestone framework. The partnership between the cities of Waterloo and Kitchener for the stormwater credit program further demonstrates how neighbouring communities can pool resources and work together to manage areas that transcend boundaries.

Collaboration can also be taken in another sense with respect to increasing knowledge and providing more informed understandings. Given the uncertainties and complexities with climate change, we need to have humility to accept that we do not have all of the answers, yet be assertive enough to push forward and try to find solutions. The stark scenario-modelling findings from the Grand River Conservation Authority workshop, the Intensity Duration Frequency rate evidence from the Environment Canada stations, and the updates from the vector-borne disease surveillance program on climatic variations and prevalence of West Nile Virus, all attest to the fact that there is a valid data set to work with. The larger problem is that this information needs to be utilized more readily and integrated into planning documents. This would help to inform communities on why action needs to be taken, while also diminish perceptions and social barriers that assert that there is not a strong understanding or awareness of climate change.

Moreover, the high levels of knowledge and self-perception of knowledge amongst local planning officials in the current study, demonstrates that those that play a direct role in public policy have a

good understanding of the causes of climate change. Yet the limited consultation with academic sources, especially when realizing that two idling policies have been developed out of consultation with universities, highlights a critical need for more collaboration with schools and universities. At the same time, the high awareness of initiatives taking place in other municipalities and the strong agreement that respective departments can implement something similar, further sheds light on the need for this knowledge dispersal. Municipalities should collaborate with other communities, share best-practices and be reflective of the specific local factors that facilitate or inhibit the planning process; ultimately leading to a plan or program's success.

Finally, collaboration can also refer to inter- and intra- departmental practices. While the current study could not assess differences in risk perceptions between department sectors, previous literature has shown that those in certain departments hold different risk perceptions, based on their position in the policy process (Stedman, 2004, Brody et al., 2010). The current study however gained a glimpse of these possible differences, as one participant noted that there was territoriality between departments in a municipal setting, which serves as a social barrier for implementing policy. The current study also found that work experience was an important consideration, as participants with over 10 years of experience responded differently across several categories compared to those with less experience. This calls to attention the need for diversity in departmental settings to reflect differences in attitudes and risk perceptions on climate change. At the same time, collaboration between individuals from diverse backgrounds can assist in creating a dialogue on how the planning process can be improved, and how the process of implementing climate-related policies can be further facilitated. Where one group may be hesitant to take action, another group can communicate the urgency to address climate change, while another can present alternatives for action.

6.1.2 Need for leadership

The need for leadership was a slightly more difficult issue to address. The questionnaire findings demonstrated that participants viewed this as being necessary for climate change, but it appeared to be somewhat limited in practice. The policy review findings on the other hand, suggested that there already existed a strong leadership quality in the Region.

For example, with regards to the questionnaire responses, 'leadership' and 'leading by example' were the most referenced category when participants were asked to describe the role of local government in climate change. Specifically participants noted 'being leaders on climate change', 'being leaders in green activities', 'set examples for other municipalities', 'lead by example and do

everything within the power of one’s jurisdiction’, ‘show leadership’, and ‘play a leadership role in concert with communities and organizations, while also being responsive to residents’. Leadership was also noted amongst the most critical actions needed for climate change in the Region, as one participant reported ‘being leaders in the community on green initiatives’.

That said, there was some indication that this leadership might be limited in practice. One participant reflected on the initiatives taking place in another municipality, and felt that their department could do the same but will need the political will. When asked what local councils needed to do differently, some participants noted ‘showing leadership’, while the most common category of ‘being bold, daring, and challenging popular opinion’ could arguably also reflect a need for leadership qualities. The issue was further identified when participants were asked to describe some of the political barriers to policy implementation, with one participant noting a lack of political leadership.

Together these findings suggest that leadership is deemed as an important quality, but may be somewhat limited in practice. The policy review findings on the other hand, depict a different story. The table below presents a snap-shot of how leadership was emphasized in several of the documents reviewed.

Table 27 Emphasis on leadership in various planning documents

City of Cambridge	
Corporate Sustainability Plan	- “Cambridge, as a community of opportunity, encourages business growth and transition, entrepreneurial spirit, strong leadership , efficient government and the provision of municipal services, personal growth and civic pride.” (p. 1)
City of Waterloo	
Official Plan	- “The City will play a leadership role in energy conservation” (sec. 8.5.2) - “Promotes and exemplifies leadership in environmental initiatives” (p. 100) - “...City’s commitment to act as an effective environmental leader ” (p. 103) - “Demonstrate environmental leadership through sustainable design” (p. 108)
Strategic Plan	- “As a council, we are committed to demonstrating leadership ”... (p. 3)
Green Procurement Policy	- “The City of Waterloo is committed to becoming a leader in Green Procurement” (p. 1) - “As identified in this report, the City has already demonstrated leadership in Green Purchasing” (p. 5)
Anti-idling bylaw	- “Idling is a community issue and requires broad participation. As leaders in the community, it is important that frontline staff lead by example to the public to set a higher standard of behaviour” (Agenda page 392 of 426)

City of Kitchener	
Official Plan	<ul style="list-style-type: none"> - “To lead by example, build public awareness, educate and encourage the community to reduce energy use and/or switch to alternative energy sources” (p. 15) - “While the city accepts a leading role, it must work in partnership with both public and private interests within the community in order to achieve broad participation by the community and, thus, the maximum benefit to the environment” (p. 5) - “To monitor and publicize city initiatives to improve air quality – i.e. lead by example” (p. 11) - “To have the city administration lead by example with respect to environmentally friendly initiatives” (p. 19)
Strategic Plan for the Environment	<ul style="list-style-type: none"> - “BE A LEADER! The city has an opportunity to step up and lead the way through coordinating partnerships where resources will be shared and new and exciting integration opportunities explored!” (p. ii) - “Residents are asking the city to step up and be a leader in environmental stewardship by becoming a positive example of an environmentally-friendly organization in terms both of our internal and external practices. In particular, they want to see the city moving forward on environmental strategies - such as the cycling master plan, parks master plan and transportation demand management Plan - and provide the necessary resources to carry out “green” initiatives (p. 19) - “LEAD BY EXAMPLE: The City of Kitchener can be a model of environmental stewardship and citizen engagement in that effort. Sometimes that will mean taking a hard line...citizens support that!” (p. ii)
Transportation Master Plan	<ul style="list-style-type: none"> - “Leadership and community engagement” identified as goal in strategic plan” (p. 6)
Region	
Corporate GHG Inventory and Action Plan	<ul style="list-style-type: none"> - “Leadership - the need “to walk the talk” by demonstrating environmental leadership within our Regional operations, planning and daily activities” (p. 3)
Environmental Sustainability Strategy	<ul style="list-style-type: none"> - “Environment Leadership Committee” established” (p. 22) - “Regional staff have been leaders in developing innovative environmental initiatives over the years, This strategy will provide us with a framework to build on these past accomplishments and continue our tradition of environmental leadership in the future” (Message from the Chief Administration Officer) - “The call to action is targeted everyone, although there is an expectation that governments should do more than other sectors and show leadership in pursuing sustainability in their own actions and facilitating sustainable behaviour by the private sector and individual citizens” (p. 2-3) - “The focus of this category is to create a corporate culture that is aware of the environmental implications of routine actions and desirous of continuous environmental improvement to demonstrate leadership and environmental stewardship such as zero waste meetings, electronic versus paper records and reduction of vehicle idling” (p. 20)
Strategic Plan	<ul style="list-style-type: none"> - “We foster an environment of leadership, excellence and creativity” (p. 9)
Regional Transportation	<ul style="list-style-type: none"> - “Identify strategies to —lead by example and reduce the environmental impacts of government fleets, contractor operations, business travel and staff commuting” (p. 1-5) - “Be a leader in the implementation of greenhouse gas emission and carbon reduction measures

Master Plan	to meet the challenge of current and emerging climate change issues” (p. 4-5)
Official Plan	<ul style="list-style-type: none"> - “Promote Waterloo Region as a leader in environmentally friendly business practices and as a centre of environmental consulting, products, research and services expertise” (p. 54) - “The Region will be a leader in corporate environmental sustainability through implementation of the Regional Environmental Sustainability Strategy and associated community outreach programs” (p. 57)

As the table shows, leadership appeared to be a rather strong and consistent component in the documents reviewed. However the questionnaire responses suggested that there might be some disconnect in terms of practicing leadership. It is important to note that most of the plans seemed to have a clear definition on what leadership implies, and in most cases discussed the specific activities that decision makers can adopt. For example, the Regional Environmental Strategy describes how leadership can be practiced in the form of “zero waste meetings, electronic versus paper records and reduction of vehicle idling” (p. 20). In contrast, participants often discussed leadership in very vague or general terms; for instance, in “being leaders in green initiatives”, or “showing leadership”. This suggests a limitation in inferring that there is in fact disconnect.

Given that the current study did not explicitly seek to measure leadership, and that this quality came to light only after data was collected, it would not be appropriate to make a conclusion on the relationship. More rigorous research methods and instruments that have a higher reliability and validity in exclusively measuring leadership would provide a better understanding. That said, the obvious importance the issue had in regards to climate change and policy implementation, certainly warrants a closer examination. Further research is hence recommended to understand the relationship between leadership in theory and practice.

For example, Meijerink and Stiller (2013) demonstrate that there can be an assortment of leadership qualities which enable climate change adaptation. There are the enablers, connectors, and knowledge disseminators, as there are policy entrepreneurs and environmental leaders. The different functions, objectives and tasks associated with leadership can address different challenges in implementing adaptation policies such as 1) having an influence over which policies are accepted and adopted; 2) enhance the connectivity between stakeholders and multi-level governments; 3) enhance community capacity and learning; and 4) enhance adaptive capacity across government networks (Meijerink & Stiller, 2013).

At the same time, it should be noted that a city or a corporation cannot be considered a leader as the planning documents would suggest, without recognizing the efforts of the individuals that advocate for, and advance city initiatives; or recognizing the political champions and policy entrepreneurs that strive to help cities attain their ‘leadership’ status. Olsson et al. (2006) raise the important point that political champions help to identify ‘windows of opportunity’ for policy development – which is an extension of Kingdon’s (1995) seminal work on agenda setting. According to Kingdon (1995), policy change takes place when three streams in the political realm (i.e. problems, solutions and politics) work together in a complementary way. For instance, governments recognize that there is a problem to address, a consensus is reached on an appropriate alternative or solution to address the problem, and there is a conducive political climate to put the solution into action (Kingdon, 2001). Olsson et al. (2006) suggest that political champions can help bring these three streams into alignment as they can communicate which issues should be considered ‘problems’, as well as bring together and engage key individuals across sectors.

Given the finding that participants recognized a lack of leadership, it is rather crucial to assess the ways that political champions can be supported in municipalities. At the same time, in recognizing the financial constraints and policy preferences for economic development interests, as identified in the current study, it becomes clear that there is need for political champions to push climate change issues onto the policy agenda. Not only can these individuals place the spotlight on climate change, but they can engage and communicate why action needs to be taken. For example, policy champions can lead the charge on conveying how sustainable economic development cannot be achieved if municipalities are at risk from a changing climate. In the same regard, they can help other municipal members see the business case in certain initiatives.

The International Council for Local Environmental Initiatives (ICLEI) in fact, recently hosted a webinar titled, “leading climate action: supporting political champions at the local level” (ICLEI, 2013, March 16). In the webinar, they recognized the special role that local elected officials can play in helping communities prepare for climate change impacts, and outlined a toolkit that individuals must possess to take on champion positions. Among the items, the webinar discussed needing vision, passion and determination, good research, good policy as a framework to take action on, and a committed staff. The webinar also suggested that those in senior or executive positions (e.g. Chief Administrative Officers), can play a particularly important role in setting the tone for municipalities and creating a culture for climate action. This again highlights the ways in which key individuals can

reconceptualize issues, and help other council members, staff and the public come to understand these ‘issues’ as ‘problems’. The current study adds to the literature on climate change risk perceptions and policy implementation as it not only provides a glimpse of how those in senior or executive positions view and respond to climate change, but it also offers an informed understanding for how policy can be improved (i.e. providing one perspective in research for which political champions can utilize).

Interestingly, the webinar also made the recommendation that individuals should anticipate questions that might come up in council settings, and prepare answers to minimize some of the backlash that may follow. This can be an important tool given that ‘backlash for proposing change’ was one of the top responses in the questionnaire when participants were asked to describe political barriers to policy implementation. Together, these examples present just some of the ways in which political champions can be supported in municipalities, and how these key individuals can play a critical role in pushing climate change onto municipal agendas. Examining the construct of ‘leadership’ more closely and assessing how different forms of leadership might further assist policy implementation for climate change, would indeed be a meaningful research direction.

6.1.3 Need for integration of climate change in the planning context and other planning issues

With regards to the questionnaire responses, the economic, social and political barriers described by participants, largely painted a picture of how climate change is seen as a separate issue from other planning matters. Items concerning other priorities in policy-making, also suggested this disconnect. At the same time, the policy review revealed an absence of the issue when describing the planning context, and in some cases, only referenced climate change in a passive voice. This demonstrates that perceptions indicated disconnect, while policy also indicated disconnect. With this in mind, there is a critical need to connect climate change to other priorities and demonstrate how the matter is in-line with other ‘pressing issues’. The high number of indicators that were only implicitly addressed (i.e. the issue was discussed but made no specific reference to climate change), provides evidence to suggest that there is room for more detail and stronger integration in plans. Indeed municipalities may face challenges like infrastructure deficits, and providing daily urban services will certainly require a great deal of financial resources. However, more frequent storms and flooding will only exacerbate the capacity to provide these services, in turn, requiring even more resources if action is not taken. Likewise, population growth presents a quite demanding challenge for municipalities and will require careful planning and allocation of resources. But at the same time, having a larger population that can

be impacted by climate change impacts (e.g. poor air quality, power-outages from severe weather events, water shortages, outbreak of vector-borne diseases, etc.) presents a much greater challenge.

More specifically, integration would help to reduce social barriers to implementation such as a limited capacity to attend to all issues, and economic barriers like justifying costs. In these cases, climate-related initiatives can be communicated in a way which emphasizes how co-benefits can be achieved. This would further help to provide the business case in adopting certain strategies. For example, green infrastructure and design standards, as well as fleet efficiency standards will not only have environmental benefits (e.g. improved air quality, reduced greenhouse gas emissions), but can also create cost-saving opportunities across municipal operations.

The finding that most of the planning documents had a strong focus on air quality, further illustrates why climate change needs to be connected to other issues. This would allow for more creative mitigation and adaptation strategies, such as adopting more sustainable design standards, promoting alternative forms of transportation, creating walkable- or bicycle-friendly communities, increasing public participation and engagement, promoting renewable energy sources, and conserving natural heritage resources. At the same time, this may allow for more opportunity to demonstrate how climate change can relate to other issues, especially where there was limited focus in the documents reviewed (see Appendix B). In Appendix B, it can be seen that climate change was surprisingly rarely explicitly addressed across indicators like promoting mixed-use and compact development, remediation of brownfield sites, and to a lesser extent, waste management strategies. The literature on how these strategies can support climate change mitigation is rich (see: Ewing et al. 2007, Bulkeley & Betsill, 2005, Bogner et al., 2008). Moreover, as Maibach et al. (2008) would likely agree, it is a matter of local planning officials playing an active role, and ‘making the case’ for how these issues relate.

6.1.4 Need for communicating climate change as a local problem

This recommendation is somewhat similar to the one above, however the current section looks more closely at the temporal and geographical challenges with climate change. Given the finding that most participants perceived climate change to be a temporally and geographically distant issue, it is important to provide local information on climate change impacts and initiatives, and communicate the issue as being a more local problem. This recommendation is further motivated by research from Parker, Rowlands, and Scott (2003) stating that “local action is essential” (p. 181); and acts on the call from Robinson and Gore (2005) stating that “municipal council and staff recognition of climate

change as a municipal priority is contingent upon their recognition of climate change as a matter of local concern” (p. 107). Recall that the Region of Waterloo and surrounding areas have recently experienced multiple severe weather events. Acknowledging these cases can help frame future policy directions. The massive power outage caused by the April 12 ice storm in the Region, and the severe levels of flooding in the Toronto area in July, can provide support for revising emergency management plans to have a higher consideration for climate change impacts – at least to recognize the fact that these weather patterns are changing, in turn, providing municipalities with greater foresight to respond. The City of Cambridge stormwater management plan recognizes that considering only historical trends will no longer suffice, and that infrastructure needs must be evaluated with particular consideration for future climate scenarios. This is in line with Baynham and Steven’s (2013) recommendation that flood plain zones need to not only reflect past flooding experiences, but also incorporate possible sea level rise, changes in river flow from seasonal variations, increased intensity and frequency of storms, and the like. Boswell et al. (2012) also attest that historic trends on the occurrence of natural hazards are no longer suitable for predicting future occurrences (as cited by Baynham & Stevens, 2013, p. 16). The fact that the Cambridge master plan addressed this issue, further demonstrates how the document can serve as a good example for other municipalities.

In terms of providing local data, the Cambridge master plan also pointed out inconsistency between Environment Canada station rainfall data, and data recorded at the City level. As such, it recommended using local data from the City of Cambridge for more accurate information. This demonstrates how policy can support efforts to present climate change as a local issue.

Reflecting on the questionnaire responses, a number of participants also commented on the need for a more local focus. For instance, one of the social barriers for policy implementation was the challenge of uncertainty with climate change impacts. Some participants noted that people may not believe in climate change, and how there is an absence of local scale information of impacts. In terms of the role of local government, some participants noted that local government should be responsible for raising awareness on local efforts, which can provide a consistent message for the Region, public and staff. Likewise, another participant noted how local government should integrate science and knowledge into policy, and in efforts to mitigate climate change, should develop strategies based on predictive models of how climate change will affect regional infrastructure, services and programs.

Importantly, vulnerability assessments were among the three most common recommended critical actions, as noted by participants in item 60. With this in mind, having a more local perspective may also allow for a more accurate vulnerability assessment, which can then be integrated into climate change action plans, and other planning documents. Together, these findings demonstrate that participants recognized the need for a more local focus, and even encouraged that this information should be reflected in policy.

On a separate note, recall that when participants were asked to reflect on changes experienced in the environment that may be indicative of climate change, many made particular reference to places or activities of personal interest. Where there is personal relevance to climate change impacts, it is much more likely that there would be personal interest and an incentive to take action in the interest of climate change mitigation and adaptation. Indeed, not everyone will assign the same level of importance to specific activities, places or objects. However, understanding what is important to certain individuals, or in terms of a municipality, understanding what community's value, provides just one of the many ways that climate change actions can be facilitated. The Regional and municipal strategic plans did a fairly good job of surveying community interests and developing visions or goals in line with the data collected. However, improvements can be made. For instance, local planning officials can survey community members to specifically find which seasonal activities residents take part in, or which local parks and natural heritage sites residents frequent the most. Plans can then reflect these interests and develop sections or integrate detail noting how climate change may impact them. In a similar vein, if ice skating or related winter activities are most commonly practiced, information on annual rink closures may provide a more effective means in engaging communities and incentive to consider climate change in daily decisions. Taken together, these findings illustrate how the need for a more local focus is recognized and encouraged by participants, and how policy can provide the supporting document.

6.2 Climate change risk perception in practice – the next step for municipalities

Given the second research objective, “is climate change recognized as an issue that requires policy attention”, there certainly appeared to be some recognition and awareness of the issue, and participants perceived that their departments can take responsive action. Specifically, they perceived that their department possessed a high capacity for action and had autonomy from provincial constitutional powers. They reported considering both mitigation and adaptation (to a lesser extent) in

decision-making and were aware of climate-related initiatives taking place in other municipalities. At the same time, the majority of participants agreed that local government had a role to play in climate change planning. The larger challenge appears to be in demonstrating political leadership and having key individuals in a communities step forward to ‘make the case’ for why climate change requires greater attention. As demonstrated by Meijerink and Stiller (2013), there can be different types of leaders in communities, each possessing different qualities, working toward different goals or objectives, and each helping to achieve outcomes related to climate change in their own way. This research does not aim to assert that one form of leadership will be more effective than another, but rather to realize that there appears to be a gap in what the policy documents are communicating, and what participants identified as being necessary for climate action.

With this in mind, municipalities need to identify where weaknesses exist that challenge the implementation process for climate-related policies. Where political barriers may be most prohibitive, leadership can be demonstrated in helping to reduce fears over ‘backlash for proposing change’. As the ICLEI webinar recommended, one way to do this is to anticipate questions that may raise conflict in council settings. If social barriers such as uncertainty present the greater challenge, leadership can be demonstrated by developing evidence-based policy or framing initiatives around recent local events. Where economic barriers like budget thresholds impede policy implementation for climate change, leadership can be demonstrated by having key individuals communicate how co-benefits can be achieved in accord with active or already supported initiatives. Where there are cognitive limitations, with most people perceiving climate change to be a distant issue, leadership can be demonstrated by communicating how the issue is of local concern, and how individuals can be personally impacted. Wheeler (2008) suggests that plans are neither sufficient nor necessary for climate action, but they demonstrate that systematic consideration has been dedicated to an issue – enough so that the issue reaches the policy development stage. Where there is limited recognition in policy documents, leadership can be demonstrated by having key individuals make an effort to sustain the issue in daily discussions. The key thing to take away from this is to realize that there can be different forms of leadership, but what may be most needed or effective for a municipality, should be determined by assessing where the weaknesses or limitations exist.

Municipalities should also recognize that risk perceptions indeed appear to interact with personal, social, cultural and political factors, which can influence the decision-making process and determine where climate change will fall on the policy agenda. Reflecting on the different theories on risk

perception, the current study provided findings which mainly supported the psychometric theory, and cultural theory to a lesser extent. Specifically, finding that there were different responses across several categories for participants that had over 10 years of experience, demonstrates that there exist individual differences in terms of how climate change risk is perceived (i.e. psychometric theory). With regards to the cultural theory on risk perception on the other hand, there appeared to be some indication that the organizational culture was an important consideration. For example, one participant spoke about the risk perceptions of senior managers in their department, while multiple participants commented on aspects of information diffusion (i.e. the information that is being discussed in one's department). In contrast, social amplification of risk theory was not as strongly supported, however this may be a result of methodological limitations.

While participants were surveyed for the sources of information they consulted to inform their knowledge of climate change, and while there was some indication that participants did not share the same level of concern for information from media sources as opposed to personal experiences, the specific content from the various sources (e.g. internet, radio reports, newspaper articles, etc.) was not evaluated in depth for possible fear appeals or bias. For the current study, the theory provided a framework to suggest that various types of information can convey climate change risk differently, in which case the range of sources should be examined. In future studies, a stronger method of measuring social amplification of risk would be to evaluate the content of information consulted, perhaps to assess whether climate change is presented as a 'wicked' problem and what effect this might have on behaviour (Lazarus, 2009). Similarly, participants can be divided into study conditions, whereby differences in risk perceptions can be examined between a control group (information presented without bias) and a fear appeal condition (information presented with bias). With this said however, this research also demonstrated that almost all participants perceived there to be some form of economic, social, or political constraint for policy implementation. This suggests that while personal factors such as perceptions, levels of concern, or personal experiences with severe weather may play a strong role for motivating behaviour, understanding that local planning officials operate in a municipal setting also mandates substantial consideration for situational factors. Municipalities should carefully evaluate things like barriers to policy implementation, what resources are available to strengthen adaptive capacity, what is the level of staff expertise, and what best-practices exist in other municipalities that can potentially be replicated, as these factors may also have an influential role.

Given the third research objective, what is the current state of climate action on the regional and municipal level, the current study found that there is much room for improvement and identified some of the ways in which various plans can be improved. Municipalities should take note of these missed opportunities and consider them in future revisions. While the current study found that the Official Plan appeared to be the most comprehensive document for addressing climate change (i.e. OPs addressed the most issues with explicit and implicit references), it should be kept in mind that Official Plans generally do not have strong legal power in municipal settings and implementation may not always take place. Rather they present an opportunity to outline long-term goals, and create a dialogue on which issues require greater consideration. An alternative to improving Official Plans would be to strengthen master plans or secondary plans, as they identify areas of an Official Plan that require more specific provisions, and as an amendment to the Official Plan, can be more legally binding.

Finally it is worth noting that there appears to be ‘change in the air’, which may lend to more efforts in the coming months for climate action in the Region of Waterloo. For example, ClimateActionWR is in the process of implementing a climate action plan for the Region; the City of Waterloo will soon join the other municipalities and develop a Greenhouse Gas Emission Inventory, and the GRCA is in the process of releasing their Water Management Action Plan, where the fourth goal overtly aims to increase resiliency in the watershed to deal with climate change. There is also change happening at the provincial level, as the Provincial Policy Statement 2012 draft policies had a much stronger recognition of climate change compared to the 2005 document. This demonstrates that there is not only increasing awareness at the provincial level, but that there might also be a stronger provincial mandate for municipalities to consider the issue in decision-making. Moreover, it is likely that there will also be additional severe weather events that may change perceptions of climate change risk, or change the urgency to address the issue. With these considerations in mind, municipalities should continue to explore the ways in which climate action can be facilitated and be cognizant of how various factors might influence risk perceptions and policy implementation.

6.3 Conclusion

The aim of this thesis was to examine the relationship between climate change risk perceptions and the implementation of climate-related policies. Recognizing that climate change is a global problem but that the impacts will be felt acutely at the local level, there is a critical need to understand what actions are being taken at the local level. It is also imperative to understand how local planning

officials view climate change, whether climate change is recognized as an issue that requires policy attention, and whether action is being taken to mitigate or prepare for impacts.

This research found that participants had a strong understanding of climate change causes, and strong self-perception of knowledge. Internet was the most frequently consulted source of information, however personal exposure, media coverage and awareness of initiatives in other municipalities, also informed this understanding. There was a favourable organizational culture for climate action, with participants perceiving there to be a high capacity to take action, considered mitigation and adaptation in decision-making, and saw local government as playing an important role in addressing climate change impacts.

Climate change was viewed as a temporally and geographically distant issue, with there being more of an impact on environmental aspects rather than personal health or financial situations. Public health in the Region was also seen as being more vulnerable to climate change impacts in contrast to economic development, which may be explained by perceptions of benefits or opportunities. There was also not a strong sense of self-efficacy, however additional comments from participants reflected a need for collective-efficacy.

In terms of the types of actions that needed to be taken and the role of local government, participants felt that transportation-related strategies were the most critical, and that local government should play a leadership role. There was not a strong consensus on what local councils should do differently.

In terms of whether climate change is viewed as an issue that requires policy attention, the majority of participants noted that both mitigation and adaptation were considered in decision-making. However, economic development priorities render that the issue is pushed aside in the policy agenda setting, and there may not be a lot of support for encouraging climate change initiatives. There were also several economic barriers (budget thresholds and competing priorities), diverse social barriers, and political factors (limited capacity to attend to all issues and backlash for proposing change), which may further challenge policy implementation. The study could not assess differences between departments, but found differences with regards to work experience.

In terms of the policy review, it was determined that climate change is recognized in public policy, however there is much room for improvement. Official Plans had the highest recognition and were the most comprehensive document to address climate change, but collaborative initiatives also

provide a strong level of support. Air quality was readily connected to discussions on climate change and stormwater management master plans provided a noteworthy example for other municipalities. Minor issues were found with the level of detail and structure in certain plans, while documents that were anticipated to have a strong recognition of climate change, left several categories unaddressed. Date of publication was not a relevant factor in terms of level of recognition. Notably, some plans addressed and even contradicted responses by participants, whereas others referenced climate change in a passive voice.

With respect to the main research question, ‘what is the relationship between climate change risk perceptions and implementation of climate-related policies’, this study found there to be four guiding frameworks. These were 1) the need for collaboration: perceptions indicated a need, while policy demonstrated feasibility; 2) the need for leadership: perceptions suggested leadership is critical, but somewhat limited in practice, while policy suggested it already exists; 3) the need for integration of climate in the planning context and other planning issues: perceptions suggested disconnect, while policy also suggested disconnect; and 4) the need for presenting climate change as a local issue: perceptions demonstrated a need, while policy can provide the supporting document.

Together these findings highlight the important factors that can influence decision-making and considerations for climate change, the actions that need to be taken on the local level, what barriers might prevent the issue from becoming a top priority in policy-making, and where missed opportunities exist in various plans, which can be considered and addressed in future revisions. This study ultimately aimed to better understand how local planning officials view and respond to climate change, in hopes that this information can be used to facilitate the policy implementation process for climate change mitigation and adaptation.

Appendix A- Questionnaire Instrument

Title of Project: Examining the Relationship between Climate Change Risk Perceptions and the Implementation of Climate-Related Policies

Faculty Supervisors: Dr. John Lewis, Faculty of Environment – School of Planning, 5198884567 ext. 33185, j7lewis@uwaterloo.ca

Student Investigators: Shireen Aslam, Faculty of Environment – School of Planning, s2aslam@uwaterloo.ca

You are invited to participate in a research study conducted by Shireen Aslam, under the supervision of Dr. John Lewis, Faculty of Environment – School of Planning of the University of Waterloo, Canada. The objective of the research study is to understand how climate change risk is perceived amongst local planning officials and how this relates to the implementation of mitigation and adaptation strategies and initiatives. The study is for a Master of Environmental Studies thesis.

This survey will take approximately 30 minutes to complete. Survey questions focus on risk perceptions of climate change, intentions to act, and public policy. For example, questions will ask about your knowledge of climate change, source and availability of information, perceived susceptibility to, and severity of climate change impacts, and personal feelings of efficacy. There will also be questions regarding what actions can be taken in your city with respect to climate change, what are the perceived barriers to implement policy, whether there are any noteworthy climate-related policies implemented by your organization, and general demographic information.

Participation in this study is voluntary. You may decline to answer any questions that you do not wish to answer and you can withdraw your participation at any time by not submitting your responses. There are no known or anticipated risks from participating in this study.

It is important for you to know that any information that you provide will be confidential. All of the data will be summarized and no individual could be identified from these summarized results.

If you prefer not to submit your data through this questionnaire, please inform the researcher so you can participate using an alternative method (such as through an online survey). The alternate method may increase anonymity but does not provide many opportunities to elaborate on responses, engage in two-way communication, or to clarify questions if misunderstood.

The data, with no personal identifiers, collected from this study will be maintained at a secure off-campus location where only the researcher has access to the data. As well, the data will be archived after completion of the study and maintained for five years and then shredded.

Section I – KNOWLEDGE OF CLIMATE CHANGE

A) Knowledge of Climate Change

The following sentences relate to the possible causes of climate change. Indicate whether they are true or false, and your level of certainty.

[True, False, Very uncertain, Fairly uncertain, More uncertain than certain, More certain than uncertain, Fairly certain Very certain]

1. Climate change is mainly caused by an increased concentration of greenhouse gases

2. Climate change is mainly caused by the ozone hole

3. Climate change is mainly caused by a natural variation in sunbeam and volcanic eruption

4. The carbon dioxide concentration has increased between 20% and 30% in the atmosphere during the last 250 years

5. The carbon dioxide concentration has increased more than 30% in the atmosphere during the last 250 years

6. Methane has increased more than 20% in the atmosphere during the last 250 years

7. Carbon dioxide is responsible for approximately 80% of the emissions of greenhouse gases

8. Carbon dioxide is emitted in the use of fossil fuels

9. Methane is emitted mainly from the use of fossil fuels

10. The increase of greenhouse gases is mainly caused by human activities

11. The increase of greenhouse gases is mainly caused by a surplus of heat from tempered buildings

12. The increase of greenhouse gases is mainly caused by air pollutions from the industry

B) Self-Perception of Knowledge

13. How much do you think you know about climate change?

[Nothing, Some, Quite a bit, A lot]

14. How often do you find yourself thinking about climate change?

[Never, Less than once a month, Several times a month, Several times a week, Everyday]

C) Source of Information

In general, how often do you receive information about climate change from the following sources (check the box that applies):

[Never, Less than once a month, Several times a month, Several times a week, Everyday]

15. Experts, scientists, and/or scientific publications

16. Family and/or friends

17. Internet

(specify main site for information:(_____))

18. Magazines

19. Newspaper

20. Peers, co-workers, and/or government officials

21. Radio

22. Schools and/or universities

23. Television shows and/or movies

24. Television news

D) Availability Heuristic

25. a) Have you experienced any changes in your environment that may be indicative of climate change? (If No, go to question 26).

Yes No

25. b) When did you experience these changes? (i.e. provide the most recent date MM/DD/YYYY).

25. c) What changes did you experience?

25. d) On a scale from 1-10 (1 being not at all concerned, 10 being extremely concerned), how would you rate your level of concern for these changes?

1 2 3 4 5 6 7 8 9 10

26. a) Recall the most recent media coverage you heard or saw about climate change. If you cannot recall any media coverage, go to question 27. When was the last time you heard or saw this media coverage? (i.e. provide the most recent date MM/DD/YYYY).

26. b) What was the medium of the coverage? (e.g. newspaper, television show, movie, scientific publication, etc.).

26. c) On a scale from 1-10 (1 being not at all concerned, 10 being extremely concerned), how would you rate your level of concern for this coverage?

1 2 3 4 5 6 7 8 9 10

27. a) Are you aware of any policy initiatives taking place in other municipalities that may be directly related to mitigating or adapting to climate change? (If No, go to question 28).

Yes No

27. b) When did you last hear about these initiatives? (i.e. provide the most recent date MM/DD/YYYY).

27. c) Do you feel your department can implement something similar? Why or why not?

****End of Section I****

Do you have any additional comments or reflections on your responses for section I?

Section II – RISK PERCEPTION

E) Personal relevance of climate change

The following statements relate to your personal relevance to climate change. Please check the box that applies.

[Strongly agree, Agree, Neither agree or disagree, Disagree, Strongly disagree]

Climate Change will have a noticeably negative impact on...

28. ... my health in the next 10 years

29. ... my health in the next 30 years

30. ... my financial situation in the next 10 years
31. ... my financial situation in the next 30 years
32. ... the natural environment in my immediate surroundings in the next 10 years
33. ... the natural environment in my immediate surroundings in the next 30 years

Climate Change will exert a significant impact on...

34. ... public health in the Region of Waterloo in the next 30 years
35. ... economic development in the Region of Waterloo in the next 30 years
36. ... the natural environment in the Region of Waterloo in the next 30 years
37. Do you perceive there to be any benefits or opportunities (personal or otherwise) with climate change (e.g. warmer temperatures)? If yes, please explain.

F) Severity of threat for climate change

On a scale of 1-10, 1 indicating no threat and 10 indicating severe threat, rate your current perception of severity for the following statements:

38. How serious of a threat is climate change to you?
1 2 3 4 5 6 7 8 9 10
39. How serious of a threat is climate change to your family?
1 2 3 4 5 6 7 8 9 10
40. How serious of a threat is climate change for the Region of Waterloo?
1 2 3 4 5 6 7 8 9 10
41. How serious of a threat is climate change to people in Canada?
1 2 3 4 5 6 7 8 9 10
42. How serious of a threat is climate change to people in other countries?
1 2 3 4 5 6 7 8 9 10
43. How serious of a threat is climate change to plants and animals?
1 2 3 4 5 6 7 8 9 10

End of Section II

Do you have any additional comments or reflections on your responses for section II?

Section III – INTENTION TO ACT – Part 1

G) Efficacy and climate change

The following statements are about efficacy and climate change. Please check the box that applies.

[Strongly agree, Agree, Neither agree or disagree, Disagree, Strongly disagree]

44. I believe my actions have an influence on climate change

45. My actions to reduce the effects of climate change in my community will encourage others to reduce the effects of climate change through their own actions

46. Human beings are responsible for climate change

H) Selected Measures of Efficacy

The following statements relate to your personal contribution to future climate change. On a scale of 1 – 7 (1 being would not help, and 7 being would help a lot), indicate how much each action would help reduce your personal contribution to future climate change.

Response efficacy

[1=Would not help

7=Would help a lot]

47. Changing the light bulbs at your home to more energy saving ones

1 2 3 4 5 6 7

48. Shutting off your home computer when you are not using it

1 2 3 4 5 6 7

49. Turning down the thermostat during night or when gone

1 2 3 4 5 6 7

50. Driving less and using more public transportation

1 2 3 4 5 6 7

51. Recycling paper, beverage containers, and other recyclable products

1 2 3 4 5 6 7

52. Using cold water to wash clothes

1 2 3 4 5 6 7

53. Purchasing energy efficient home appliances

1 2 3 4 5 6 7

Taking into consideration the costs and inconvenience for each action, how likely is it that YOU PERSONALLY would do each of these? Rate your answers on a scale of 1 – 5 (1 being not at all likely, and 5 being very likely).

Voluntary Actions

[1=Not at all likely

5=Very Likely]

54. Choose a car that gets good gas mileage

1 2 3 4 5

55. Install more insulation and weatherize homes and apartments

1 2 3 4 5

56. Carpool or drive less by using more public or active forms of transportation

1 2 3 4 5

57. Replace older appliances with more energy efficient models (refrigerators, furnaces, dishwashers and others)

1 2 3 4 5

58. Use less air conditioning in the summer and less heat in the winter

1 2 3 4 5

59. Buy more local foods

1 2 3 4 5

End of section III – Part 1

Do you have any additional comments or reflections on your responses for section III thus far?

Section III – INTENTION TO ACT – Part 2

I) Climate Change and Actions

60. What are the most critical actions that should be taken in the Region of Waterloo in order to mitigate or adapt to climate change? (List as many as you feel are relevant up to a maximum of 10 actions).

- i. _____
- ii. _____
- iii. _____
- iv. _____

- v. _____
- vi. _____
- vii. _____
- viii. _____
- ix. _____
- x. _____

61. Overall, what role should local government play in adapting to climate change (relative to provincial and federal government)?

62. What do local councils need to do differently in order to effectively adapt to climate change?

63. If ‘mitigation’ is defined as human intervention to reduce the sources of greenhouse gases, is mitigation something your department considers in its decision making?

Yes No

64. If ‘adaptation’ is defined as adjustments in natural or human systems in response to climate change conditions or effects, is adaptation something your department considers in its decision making?

Yes No

65. Which issues do you feel are currently given higher priority in local/municipal policy-making than climate change?

66. Do you perceive there to be any economic barriers or constraints that prevent policy implementation for mitigating or adapting to climate change on the local level? If yes, please explain.

67. Do you perceive there to be any social barriers or constraints that prevent policy implementation for mitigating or adapting to climate change on the local level? If yes, please explain.

68. Do you perceive there to be any political barriers or constraints that prevent policy implementation for mitigating or adapting to climate change on the local level? If yes, please explain.

****End of Section III****

Do you have any additional comments or reflections on your responses for section III?

Section IV – POLICY REVIEW

Implemented mitigation and adaptation strategies

69. Are there any noteworthy climate-related policies your department has implemented to mitigate or adapt to climate change impacts?

Note: this includes any mitigation or adaptation strategies and initiatives, sustainability-related challenges, partnerships between partners to reduce greenhouse gas emissions.

****End of Section IV****

Do you have any additional comments or reflections on your responses for section IV?

Section V – DEMOGRAPHIC INFORMATION

70. Please indicate which category below best describes your profession/industry (check the box that applies).

Planning

Environmental

Agricultural

Emergency Management

Public Health

Economic Development

Other _____

71. What is your current position (or professional title)?

72. How many years have you held this current position?

****End of Section V****

Do you have any additional comments or reflections on your responses for section V?

Thank you for your time and participation!

Appendix B – Policy Review Indicator Scoring

		Official Plans					Strategic Plans			
		Regional OP – Draft	Waterloo OP	Kitchener OP Draft 1	Kitchener OP Draft 2 (changes)	Cambridge OP	Region Strategic Plan	Waterloo Strategic Plan	Kitchener Strategic Plan	Cambridge CSP
"climate change"		6	17	0	1	0	0	1	3	1
"mitigation"		1	1	2		1	0	0	0	1
"adaptation"		3	6	2		0	0	0	0	1
time frame		To 2029	2012 to 2031	To 2029		To 2031	2011-2014	2011-2014	2011-2014	2011-2014
Communication and collaboration policies	i. Public awareness, education, and participation	I	E	I		I	I	I	E	I
	ii. Inter-organizational coordination Procedures (business, government, IPCC, CCP, etc.)	E	E	I	E	I	I	I	I	I
Financial tools	i. GHG reduction fee	NE	NE	NE		NE	NE	NE	NE	NE
	ii. Establish a carbon tax	NE	NE	NE		NE	NE	NE	NE	I
	iii. Financial Incentives	I	I	I		I	NE	NE	I	I
Land use policies	i. Disaster-resistant land use and building code	I	E	I		I	NE	NE	NE	NE
	ii. Mixed Use and compact development	E	E	I		I	I	I	I	I
	iii. Infill development and reuse of remediated brownfield sites	E	I	I		I	I	I	I	I
	iv. Green building and green infrastructure (i.e. urban forests, parks and open spaces, natural drainage systems) standards	E	E	I		I	I	I	E	E
	v. Low-impact design for impervious surface	I	I	I		I	NE	NE	NE	NE
	vi. Control of urban service/growth boundaries	I	I	I		I	I	I	E	I
Transportation policies	i. Alternative transportation strategies	E	E	I		I	I	E	E	I
	ii. Transit-oriented development and corridor improvements	E	E	I		I	I	I	E	I
	iii. Parking standards adjustment	I	I	I		I	NE	I	NE	I

	iv. Pedestrian/ resident-friendly, bicycle-friendly, transit-oriented community design	E	E	I		I	I	I	E	I
Energy strategies	i. Renewable energy and solar energy	E	E	I		I	I	E	I	I
	ii. Energy efficiency and energy stars	E	E	I		E	I	E	NE	I
Waste strategies	i. Landfill methane capture strategy	NE	NE	NE	I	NE	NE	NE	NE	NE
	ii. Zero waste reduction and high recycling strategy	I	E	I		I	I	NE	NE	I
	iii. Waste and storm water management	I	I	I		E	I	NE	I	I
Resources management strategies	i. Creation of conservation zones or protect areas	I	E	I		I	I	I	NE	NE
	ii. Watershed-based and ecosystem-based land management	E	E	I		I	NE	NE	NE	I
	iii. Vegetation (forest/woodlands) protection	E	E	I		I	I	NE	NE	I
	iv. Local food/ community gardens	E	I	I		I	NE	I	E	I
Implementation and monitoring strategies	i. Establish implementation priorities for actions	I	I	I		I	NE	NE	E	I
	ii. Financial/budget commitment	I	I	I		I	I	I	I	I
	iii. Identify roles and responsibilities among sectors and stakeholders	E	I	I		I	NE	I	I	I
	iv. Continuously monitor, evaluate and update	E	E	I		I	I	I	I	I
Air Quality	i. Smog days, GHG emissions	E	E	I	E	NE	E	E	E	E
Green Economy	i. Environmental jobs	NE	NE	NE		NE	NE	NE	NE	I
	ii. Environmental business initiatives	I	E	NE		NE	I	I	I	I
'E' count		15	17	0	2	2	1	4	9	2

		Environmental Strategies				Greenhouse Gas Emission Inventories		
		Region Environmental Sustainability Strategy 2009	Waterloo Environmental Strategy 2013	Kitchener Strategic Plan for the environment	Cambridge Corporate sustainability plan	Region of Waterloo Corporate Greenhouse Gas Inventory and Action Plan May 2011	City of Kitchener Corporate Greenhouse Gas Inventory 2010	City of Cambridge Corporate Greenhouse Gas Inventory and Forecast Dec. 2012
"climate change"		6	7	3	1	4	13	1
"mitigation"		1	0	0	1	3	0	0
"adaptation"		6	1	0	1	0	0	0
time frame		Updated every 5 years	Not specified	None specified	2011-2014	2009-2019	2010	2009-2019
Communication and collaboration policies	i.	E	E	E	I	NE	E	NE
	ii.	E	E	E	I	E	NE	E
Financial tools	i.	NE	NE	NE	NE	NE	NE	NE
	ii.	E	E	NE	I	NE	NE	NE
	iii.	E	I	NE	I	NE	NE	NE
Land use policies	i.	NE	NE	NE	NE	NE	NE	NE
	ii.	NE	I	NE	I	NE	NE	NE
	iii.	NE	I	I	I	NE	NE	NE
	iv.	I	E	I	E	E	E	NE
	v.	NE	E	NE	NE	NE	NE	NE
	vi.	I	I	I	I	E	NE	NE
Transportation policies	i.	I	I	I	I	E	E	E
	ii.	I	I	NE	I	NE	NE	NE
	iii.	NE	I	NE	I	NE	NE	NE
	iv.	I	I	I	I	E	NE	NE
Energy strategies	i.	E	I	I	I	E	NE	E
	ii.	E	E	E	I	E	E	E
Waste strategies	i.	E	NE	NE	NE	E	NE	NE
	ii.	I	I	I	I	E	NE	E
	iii.	I	E	I	I	E	E	E
Resources management strategies	i.	I	I	I	NE	NE	NE	NE
	ii.	NE	I	I	I	NE	NE	NE
	iii.	I	E	I	I	E	NE	NE
	iv.	I	I	NE	I	NE	NE	NE
Implementation and monitoring strategies	i.	I	NE	NE	I	E	E	NE
	ii.	I	E	NE	I	E	E	E
	iii.	I	I	E	I	E	NE	NE
	iv.	E	E	E	I	E	NE	E
Air Quality	i.	E	E	E	E	E	E	E
Green Economy	ii.	NE	NE	NE	I	NE	NE	E
	iii.	I	I	I	I	E	NE	E
'E' count		9	11	6	2	17	8	11

		Stormwater Management Credits, Policy, and Master Plans						Transportation Master Plans			
		Waterloo bylaw	Waterloo program follow up report	Kitchener - Stormwater credit policy	Kitchener Memo 1	Cambridge-stormwater management master plan Aug. 2012	GRCA water management plan - project charter	Region Transportation master plan	Waterloo Transportation master plan	Kitchener Transportation master plan June 2013	Cambridge bikeway network plan
"climate change"		0	1	0	0	9	8	8	0	3	1
"mitigation"		0	1	0	0	0	0	1	0	1	0
"adaptation"		0	3	0	0	1	5	1	1	1	0
time frame		Credit program effective Jan. 2013	Follow up report Feb. 2012	Not specified	July 7, 2011	August, 2011	Implementation launch March 2013	To 2031	To 2031	To 2031	To 2028
Communication and collaboration policies	i.	I	NE	I	I	I	I	I	I	E	E
	ii.	NE	I	NE	I	E	E	I	I	E	I
Financial tools	i.	NE	NE	NE	NE	NE	NE	I	I	NE	NE
	ii.	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	iii.	I	I	I	I	I	I	E	I	I	E
Land use policies	i.	NE	I	NE	NE	E	E	NE	NE	NE	NE
	ii.	NE	NE	NE	NE	NE	NE	I	I	I	NE
	iii.	NE	NE	NE	NE	I	NE	I	I	I	NE
	iv.	NE	E	NE	I	I	NE	I	I	NE	I
	v.	I	E	NE	NE	I	NE	NE	NE	NE	NE
	vi.	NE	NE	NE	I	I	NE	I	I	I	NE
Transportation policies	i.	NE	NE	NE	NE	NE	NE	E	I	E	E
	ii.	NE	NE	NE	NE	NE	NE	I	I	E	I
	iii.	NE	NE	NE	NE	NE	NE	I	I	I	I
	iv.	NE	NE	NE	NE	NE	NE	I	I	E	I
Energy strategies	i.	NE	NE	NE	NE	NE	NE	NE	I	NE	NE
	ii.	NE	NE	NE	NE	NE	NE	E	E	NE	I
Waste strategies	i.	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	ii.	NE	NE	NE	NE	NE	NE	I	NE	NE	NE
	iii.	I	E	I	I	E	I	I	I	NE	NE
Resources management strategies	i.	NE	NE	NE	NE	I	NE	E	I	I	I
	ii.	NE	I	NE	I	I	E	NE	I	NE	I
	iii.	NE	E	NE	I	I	I	I	I	NE	NE
	iv.	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
Implementation and monitoring strategies	i.	NE	NE	NE	NE	I	I	E	I	I	I
	ii.	I	I	I	I	I	E	I	I	I	E
	iii.	I	I	I	I	I	E	I	I	I	I
	iv.	NE	NE	NE	I	E	E	E	I	E	I
Air Quality	i.	NE	E	NE	NE	NE	NE	E	E	E	E
Green Economy	ii.	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
	iii.	I	NE	I	I	NE	NE	E	I	E	E
'E' count		0	5	0	0	4	6	8	2	8	6

		Green Procurement and Air Quality Initiatives			Collaborative Initiatives and Miscellaneous Initiatives		
		Waterloo green procurement policy	Kitchener Air quality Report 2010	Cambridge sustainability procurement	Regional Vector borne disease surveillance	Local Food System	Regional Carbon Initiative
"climate change"		1	11	0	0	4	15
"mitigation"		0	0	0	0	1	1
"adaptation"		0	0	0	0	0	0
time frame		Strategies to 2010	Update every 5 years	Meet requirements by Jan. 2013	Initiatives to 2013	Projections to 2046	10 year carbon emission target
Communication and collaboration policies	i.	I	E	NE	I	I	E
	ii.	I	E	NE	I	I	E
Financial tools	i.	NE	NE	NE	NE	NE	NE
	ii.	NE	NE	NE	NE	NE	NE
	iii.	NE	I	NE	NE	I	E
Land use policies	i.	NE	I	NE	NE	NE	NE
	ii.	NE	I	NE	NE	I	NE
	iii.	NE	NE	NE	NE	NE	NE
	iv.	I	I	NE	I	E	NE
	v.	NE	NE	NE	NE	NE	NE
	vi.	NE	I	NE	NE	NE	NE
Transportation policies	i.	I	E	NE	NE	I	NE
	ii.	NE	I	NE	NE	E	NE
	iii.	NE	NE	NE	NE	NE	NE
	iv.	NE	I	NE	NE	E	NE
Energy strategies	i.	I	E	I	NE	I	E
	ii.	E	E	I	NE	I	E
Waste strategies	i.	NE	NE	NE	NE	NE	NE
	ii.	I	E	I	NE	I	NE
	iii.	NE	I	NE	I	I	NE
Resources management strategies	i.	NE	NE	I	NE	I	NE
	ii.	NE	I	NE	NE	I	NE
	iii.	I	I	NE	NE	I	NE
	iv.	I	I	NE	NE	E	NE
Implementation and monitoring strategies	i.	I	I	I	NE	NE	E
	ii.	I	I	I	I	I	E
	iii.	I	E	I	NE	NE	E
	iv.	I	I	I	E	NE	E
Air Quality	i.	E	E	E	NE	E	E
	ii.	NE	NE	NE	NE	NE	NE
Green Economy	iii.	E	I	I	E	I	E
	'E' count	3	8	1	2	5	11

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*note: some planning documents removed from reference list to ensure participant anonymity.