

Climate Change and Gender in Canada: A Review

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Summary

This research brief examines the literature on gender and climate change in Canada published since 2000, focusing on four key areas of research: food security in the North, human health, climate change attitudes and behaviors, and climate change-related employment and governance. The evidence regarding gender and food insecurity in the North is complex, but the research is clear that climate change serves as a stressor on gendered livelihood activities for both women and men in this region. Regarding climate change and health, much of the available evidence suggests that men are likely to be more vulnerable to the effects of climate change in Canada, including heat stress and infectious disease, although a growing literature on adverse pregnancy outcomes associated with natural disasters suggests that women will face unique health impacts as well. Concerning environmental attitudes and behaviors, Canadian women are generally more likely than men to perceive climate change and other environmental hazards as a threat, and are more willing to support policies to address them. However, men are more likely to undertake certain activities (such as bicycle riding) that can facilitate climate change mitigation. Although the evidence is limited, current studies are consistent that there is a gender imbalance in environmental policy and employment in Canada, with these activities predominately undertaken by men. While there has been a great deal of gender and climate change-related research published since the turn of the millennium, important knowledge gaps remain, particularly regarding the gendered effects of climate adaptation and mitigation policies, the gendered effects of natural disasters, and gender in environmental policymaking and employment.

Table of Contents

4	Introduction
5	Methods
5	Food Security
7	Human Health
10	Climate Change Attitudes & Behaviors
12	Gender and Climate Change Employment and Governance
13	Gaps in the Literature/Areas of Future Research
14	Appendixes
16	References

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Introduction

Global climate change is one of the defining issues of the 21st century, and is already affecting human populations around the world. However, the impacts of climate change are not evenly distributed. While climate change vulnerability and adaptation capacity are likely to differ substantially between countries, variation also exists within countries. Canada is no exception to this pattern, with vulnerability and adaptation capacity varying widely throughout the country depending on a range of demographic, socioeconomic, and spatial factors. This research brief focuses on the relationship between climate change and gender, an important factor affecting vulnerability and adaptation capacity in Canada and around the world.

Globally, there is a rapidly growing body of research that explores the relationship between gender and climate change (1–3). This research is complemented by a robust advocacy movement that is advancing gender causes domestically and internationally, including at global forums such as the United Nations Framework Convention on Climate Change Conference of the Parties meetings. Through these efforts, a growing number of entities are adopting gendered approaches and policies, such as the use of gender action plans to set goals for gender equality in climate change mitigation and adaptation activities.

Canada has developed policies to address climate change and gender issues. The Trudeau government has made a commitment to reduce carbon emissions by 30% below 2005 levels by 2030 through its nationally determined contributions (NDCs) under the Paris Agreement (4). Through the Government of Canada’s new Feminist International Assistance Policy, the Government seeks to incorporate the empowerment of women and girls into all of Canada’s foreign assistance efforts, including policies pertaining to climate change (5). However, the document that will govern Canada’s domestic climate change response, the Pan-Canadian Framework on Clean Growth and Climate Change, does not directly discuss gender issues (6).

This brief discusses published research concerning gender and climate relationships in Canada, examining a variety of gendered differences in climate change vulnerability, adaptation capacity, and attitudes towards climate change. Most of the research in Canada centers on a few key areas.



First, there is concern among researchers and policymakers about the effects of climate change on food security, particularly in the North. In general, supplies of traditional foods are shrinking and becoming more costly and difficult to obtain.

There is mixed evidence that women in northern communities have less access to traditional foods than men.



Second, researchers are paying attention to the relationships between climate change and human health. Health effects associated with climate change, including from extreme heat events, more severe storms, and growing ranges of infectious diseases may disproportionately impact one gender over the other. The gendered nature of these effects varies depending on the particular threat and other factors.



Third, attitudes and behaviors concerning the environment and climate change vary between men and women, which can in turn affect support for mitigation and/or adaptation efforts.



Fourth, there are substantial differences between men and women in terms of their participation in environmental governance and employment activities. Natural resource management activities in Canada are largely undertaken by men, which has implications for social and environmental outcomes. Moreover, as renewable energy industries become more important for Canada’s economy, it is important that women and men have equal opportunities to excel in this field.

Methods

This brief reviews research addressing climate change and gender issues in Canada, including research on food insecurity, human health, climate change attitudes, and employment and governance. With a few exceptions, all of the research collected is peer-reviewed from academic journals, and was published during or after the year 2000 in order to ensure that only the most recent information is reported (although some studies may have used data from prior to 2000). Searches were restricted to English language publications. Though study methodologies vary, in general, research that measures gender differences in outcomes, such as access to food or health impacts of climate change, also accounts for other factors that may influence differences, such as age or income. Thus, the gender effects described in this brief are often additional to any socioeconomic or

demographic differences that exist between men and women.

In order to locate research for this paper, the author followed a three-step process:

1. Using the search terms contained in Appendix 1, the author used the Web of Science academic database to locate articles relevant to climate change and gender issues in Canada.
2. The author reviewed the reference lists of the articles found to identify additional literature of interest.
3. Where gaps in information existed, the author identified high-quality government and non-profit statistics, surveys, and reports to incorporate as appropriate.



Food Security

Food security, particularly in the North, is a pressing climate challenge in Canada. The statistics on household food insecurity are stark — according to a 2014 national survey, nearly half (47%) of households in Nunavut and one-quarter (24%) of households in the Northwest Territories were considered food insecure — meaning that households have inadequate access to food due to insufficient finances (7). Rates of household food insecurity in the North far exceed those in the rest of Canada, and a great deal of research has taken place to better understand this phenomenon, including its gender dimensions. Though food security literature relevant to climate change and gender is reviewed briefly below, readers interested in a more extensive treatment of food insecurity in the North are directed to a 2014 Council of Canadian Academies report, which is the most comprehensive review of this issue to date (8).

Researchers seeking to understand gendered aspects of food insecurity in the North have found mixed evidence as to whether women are at greater risk of food insecurity than men. Some small-scale surveys in Inuit communities have found greater levels of food insecurity among women, particularly single mothers (9, 10). Women were more likely to use community food programs in Inuvik, Northwest Territories (11), but were no more likely than men to use a similar program in Iqaluit, Nunavut (12). Additional research exploring the general Inuit population in Iqaluit also found women as likely to be food insecure as men (13).

Given these mixed results, some researchers argue that

vulnerability to food insecurity is less tied to gender *per se*, but rather to being single, as single adults — male or female — tend to have weaker social ties, which preclude food sharing and are also less likely to hunt or fish. For instance, among Inuit in Ulukhaktok, Northwest Territories, households with single males were found to be slightly more vulnerable to food insecurity than households led by single women due to weaker social ties and lower levels of employment (14). However, in this study, households led by single adults — of either gender — were more vulnerable to food insecurity than households with multiple adults. Other research incorporating communities across Nunavut and Nunatsiavut has also found that households with single adult heads are at greater risk of food insecurity than households with multiple adults (15). In Nunavik, food insecurity was found to be less common in households with two or more hunters or fishers (16).



Researchers have identified many reasons for high rates of food insecurity in the North, including: lack of access to fishing and hunting supplies and skills, the high cost of fishing and hunting trips (including fuel, time, and other expenses), lack of knowledge among younger generations about harvesting traditional foods, poverty and limited income generating opportunities (making purchased food unaffordable), lack of knowledge concerning store-purchased foods, weakened food sharing networks (within and between communities) due to scarcity, as well as substance abuse problems (10, 12, 17–20). Thus, while climate change serves as an important stressor on food systems by contributing to supply scarcity and increasing the risks associated with

hunting and fishing, it is not the sole cause of food insecurity in the North. Moreover, the effects of climate change on food systems vary throughout communities in the North based on local consumption patterns. For instance, research from Arviat, Nunavut suggests that the role of climate change in fostering food insecurity is lower than in some other northern communities as Arviat residents are less reliant on sea ice for hunting, instead undertaking more land-based activities (18).

While some of these barriers to food security affect men and women roughly equally, researchers have also noted climate challenges associated with particular gender roles. For instance, Inuit women have noticed fewer opportunities for berry picking and a reduction in the quality of sealskins that are used in sewing, reducing income earning potential and forcing them to adapt their livelihood activities (21, 22). However, men also face particular challenges as they are typically charged with hunting, which has become more difficult in many communities. There is evidence from Inuit and Cree communities that the declining importance of subsistence hunting in these communities (due to both socioeconomic and environmental changes) has resulted in lower rates of transmission of hunting and survival skills from older generations of hunters to younger generations, making it more challenging for younger men to actively and effectively hunt (23, 24).

Studies that examine gendered patterns of traditional food consumption in the North find mixed results as to whether women are less likely than men to consume traditional foods. A study using the Inuit Health Survey, a large 2007–2008 survey covering Inuit communities in the Inuvialuit Settlement Region, Nunavut, Nunavik, and Nunatsiavut, found no statistically significant difference between men and women in the likelihood of consuming traditional foods (25). Another study using data from the same survey found that women are about as likely as men to consume key traditional foods (beluga whale, ringed seal, and caribou), though generally in smaller amounts (26). Studies examining specific northern populations find varying results in gendered traditional food consumption. Among First Nations in the Yukon, researchers note differences in levels of consumption of traditional foods between men and women, with the former consuming more birds and land animals, and the latter more berries (27, 28). In Nunavut, women were more likely than men to consume marine traditional foods, but less likely to consume birds (29). A similar study among Inuvialuit communities also found higher rates of marine traditional food consumption among women relative to

men (30). Despite some evidence showing lower levels of consumption of traditional foods among women, researchers emphasize that such foods remain important for both nutritional and sociocultural reasons, and policies to promote gendered climate adaptation should emphasize traditional food systems (31).

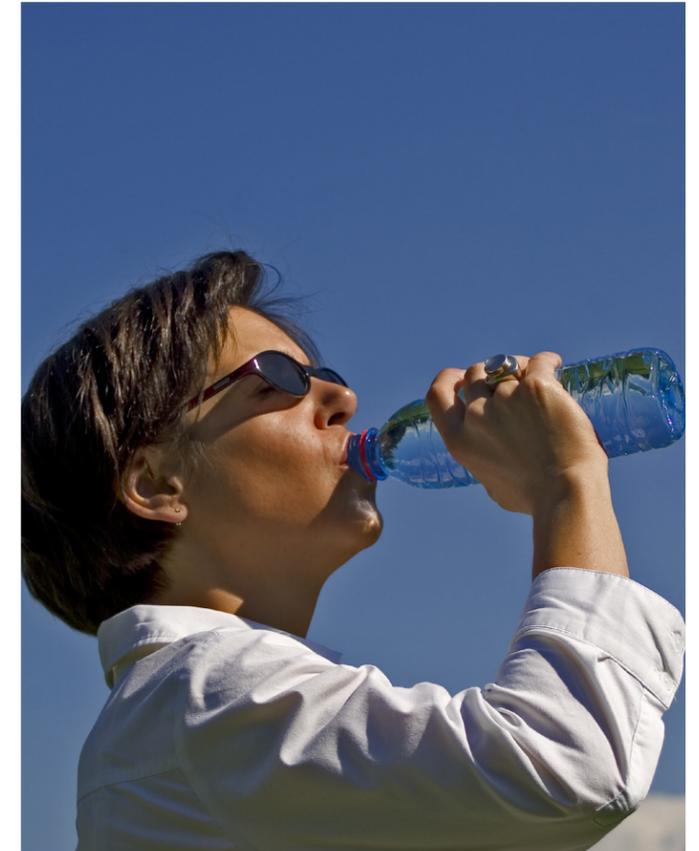
Additionally, food insecurity can adversely impact nutrient intake, and these impacts vary by gender. Based on Inuit Health Survey data, when experiencing food insecurity, individuals of both genders had lower intakes of folate, vitamin C, iron, and magnesium. However, food insecure men also took in less energy and zinc than their food secure counterparts, while food insecure women took in less calcium and vitamin D (32). The inadequacy of northern diets has particularly worrisome implications for women in particular as micronutrient deficiencies extend to pregnant and lactating women, which has adverse impacts on maternal and child health outcomes (33). However, a study examining recently pregnant women from Nunavut found no relationship between food insecurity and breastfeeding duration (34).

Policies to address food insecurity in the North can also help improve food security for women and girls in particular. For instance, an evaluation of the Healthy Foods North program, territorial-led initiative designed to promote the consumption of traditional foods and healthy store bought foods, found that women participants increased their vitamin A and vitamin D intakes relative to nonparticipants (35). A community-led effort to promote snow goose sharing in Cree communities had a particularly strong impact in increasing consumption among girls relative to boys (36).



Human Health

Climate change is likely to have numerous effects on human health in Canada, including through thermal extremes (particularly more extremely hot days), growth in the ranges of infectious diseases, mental health challenges, unintentional injuries, and adverse pregnancy outcomes (37). Gendered impacts vary by health outcome and type of exposure, although in general, it appears that men are more vulnerable to the environmental exposures associated with climate change than women.



HEAT

Heat exposure presents numerous morbidity and mortality risks, particularly for individuals exposed to high temperatures at work. In Canada, work-related heat exposure is largely correlated with industry and work environment. As men are more likely to hold jobs in sectors where outdoor work or exposure to hot surfaces is common, such as agriculture, construction, and manufacturing, they tend to have greater exposure to heat (38). Thus, not only are men more likely to experience heat-related illnesses or injuries from work activity, but as temperatures rise and the risks of heat become more acute, the risks may increase faster for men than for women because of their greater exposure.

Research examining hospital records and lost time claims from Ontario found that from 2004–2010, men were substantially more likely than women to be admitted to the emergency department or submit a lost time claim because of a heat-related injury (even after accounting for differences in hours worked between men and women) (39). In Quebec, from 2003–2010, men experienced a higher rate of work-related injuries as the temperature rose, while no such



increase was found for women, suggesting that men have a greater risk of occupational injuries with high temperatures (40). However, a similar study found no difference between genders in the effect of temperature increases on work-related illnesses (as opposed to work-related injuries) (41).

Heat studies focusing on the general population in Canada have found mixed results regarding gendered differences in vulnerability to heat stress. Researchers examining the effects of heat on adverse health outcomes among low-income populations in Quebec found that women were more likely to report health problems as a result of heat exposure than men (42). However, researchers examining mortality in Vancouver during a 2009 heat wave found men were at slightly greater risk of death during the heat wave than women, though the difference was not statistically significant (43). Researchers examining populations with mental or behavioral illnesses in Toronto note that while hospital admissions among this population increase during periods of high temperatures, no significant differences between genders exist in their likelihood of being admitted (44).

In addition to direct effects from heat exposure, indirect effects of exposure can be deadly. For instance, researchers examining drowning deaths in Ontario discovered that drowning is substantially more likely to occur during hot weather (30 °C and above), as people flock to swimming pools and lakes to cool off. However, the risks associated with heat and drowning are disproportionately borne by men and boys—from 1999-2009, 82% of unintentional drowning victims in Ontario were male (45).

In contrast to exposure from heat, climate change may have the positive effect of reducing deaths and injuries associated with extreme cold, which is likely to disproportionately improve men's health. A study examining heat- and cold-related deaths and injuries from 1992-1999 in Montreal found that cold-related conditions (generally frostbite), were more prevalent than conditions such as heatstroke, and that men were more likely than women to be affected (46). A study examining emergency department visits in Ontario from 2010-2016 found that more than seven out of ten cold-related visits were from males (47).

INFECTIOUS DISEASE

As temperatures climb, the range of certain disease vectors is expanding, increasing the risk to Canadians. One of the biggest threats is Lyme disease, as the range of ticks that carry the disease is likely to expand northward with a warming climate, resulting in a larger portion of eastern Canada being at risk of the disease, including parts of Manitoba, Ontario, Quebec, and the Maritimes (48). Health Canada surveillance data from 2009-2015 shows that men appear at slightly greater risk of Lyme disease than women (representing 56% of all cases during this period) (49). A likely contributor to this disparity is that women in Canada are more likely than men to take protective measures, such as wearing protective clothing and using tick repellent (50, 51).

Researchers have also expressed concern about an increase in the range of *Culex* mosquitoes in Canada, which serve as vectors for the West Nile Virus, due to warming temperatures (52). However, the impacts of this expansion

on particular demographic groups are unclear, as publicly available Health Canada West Nile surveillance data do not currently disaggregate cases by gender or age (53).

MENTAL HEALTH AND GENDER-BASED VIOLENCE

In addition to heat and infectious disease, climate change can also have important gendered effects through impacts associated with natural disasters, particularly on mental health and sexual violence, although the amount of research on these effects in Canada is currently much smaller than in other industrialized countries. One of the few Canadian studies to examine gendered mental health impacts and disasters notes that after 2013 floods in southern Alberta, a sharp rise in anti-anxiety and sleep aid prescriptions was reported among women in the affected region (54). Moreover, a sharp rise in sexual assaults was also reported during the same period (54).

Some researchers argue that climate change has contributed to mental health challenges in the North, where suicide rates are substantially higher than the rest of Canada (55). While more men and boys die as a result of self-harm than women and girls (56), there is some evidence that females are more likely to have attempted suicide than males (57). Various researchers have noted that because climate change makes traditional subsistence livelihood activities such as hunting and fishing more challenging, it has eroded the connection to natural resources that many aboriginal Canadians feel, creating a sense of despair and hopelessness (58–61). It is important to acknowledge, however, that the causes of suicidal ideation in the North are complex, and involve the interaction of multiple factors, many of which are tied more closely to historical legacies of disenfranchisement of indigenous communities or to socioeconomic changes than to climate change, including family instability, substance abuse, and a lack of role models among youth (56, 62, 63). There continues to be robust debate and discussion within the research community about the contribution of climate change in exacerbating mental health problems in this region.

In addition to suicide, researchers have also explored emotional stress associated with environmental change. A 2010 survey in Rigolet, Nunatsiavut found that women were more likely than men to experience emotions such as being angry, scared, or frustrated by environmental changes affecting their communities (64). However, other research from Nunatsiavut notes that there is generally consensus among young men and women about the factors that can

prevent mental health challenges in their communities, including stronger ties with their land, culture, and communities, as well as close family relationships (60).

UNINTENTIONAL INJURIES & DEATHS

Indigenous communities in Canada have substantially higher injury rates than other parts of the country, and climate change is likely to exacerbate these disparities (65–67). In general, men are at substantially greater risk of injury than women, due both to their greater exposure to livelihood activities, such as hunting, that are increasingly risky as sea ice thins or becomes less stable, increasing the risk of drowning, as well as risk factors that increase the risk of unintentional injury, such as heavy alcohol use (67). Changes in ice conditions, combined with severe wind and flooding can exacerbate hazards for hunters (68). For instance, a study examining risks associated with hunting in Nain, Nunatsiavut found that 82% of search and rescue calls were for male victims, many of whom were delayed due to bad weather conditions (69). Efforts to prevent water-related injuries in northern communities have been hampered by the high costs of flotation and safety gear relative to local incomes and the lack of use of traditional knowledge in developing and promoting safety equipment and messaging (70).



PREGNANCY OUTCOMES

Climate change can uniquely affect women through its impacts on pregnancy outcomes as temperatures get warmer. Studies examining births in Quebec noted that high temperatures in the days preceding birth increased the risk of early delivery (71) and stillbirth (72). Another study from

Quebec found that exposure to high temperatures (32 °C and above) during the first trimester increased the risk of certain types of congenital heart defects (73).

Moreover, climate change may have adverse impacts on pregnancy outcomes by increasing the intensity of storms, making natural disasters more stressful and increasing the risks of subsequent health harms. One of the world's landmark studies exploring the interactions between natural disasters and pregnancy is taking place in Canada: Project Ice Storm. The study, led by Dr. Susanne King at McGill University, uses the severe January 1998 Quebec ice storm, which left millions without electricity for up to 45 days, and resulted in 35 deaths, to understand the relationship between stress during pregnancy and child health outcomes (74). Following the storm, King and her colleagues surveyed a group of women identified as being pregnant or soon-to-be-pregnant during the storm and measured their stress levels, which varied based on exposure to the storm. Since 1998, King's team has followed up with these mothers, finding numerous linkages between higher levels of maternal stress immediately following the disaster and adverse child health outcomes, including higher levels of obesity (75, 76), eating disorders (77), and autism traits (78), as well as lower levels of cognitive functioning (79, 80).

Climate Change Attitudes & Behaviors

In addition to effects on food security and health, gender also is predictive of attitudes towards climate change as well as responses to climate change threats in Canada. Various surveys suggest that women are more likely than men to perceive climate change as being a significant personal risk. A 2006 survey from Alberta showed that women were more likely to believe climate change is driven primarily by human causes as well as perceive climate change as a threat to the province and their families, which researchers largely attributed to women being less likely to hold conservative political views (81). A 2001-2002 survey among Prairie province populations found women were more likely to perceive climate change as a threat, largely because they held views more supportive of environmental protection generally (82). General perceptions of climate change as a concern extend to local problems that may exacerbate climate threats. For instance, a 2011-2012 survey from New Brunswick found

that women were more likely than men to view dyke failure associated with rising sea levels and more intense storm surges associated with climate change as a severe personal risk (83).

Gendered adaptation strategies is an emerging area of research as climate change creates more severe natural disasters and economic threats to livelihoods. However, there is very little published research in Canada about these issues. Regarding disasters, the available evidence suggests that while disasters may reinforce traditional gender roles,



men and women are not necessarily bound by these roles in response to disasters. For instance, a study exploring youth responses to devastating wildfires in Alberta noted the pressures on young men to take on gendered roles (manual labour in the recovery effort, as well as providing emotional support to women and girls), but also non-traditional roles such as caring for children (84). In response to 2010 storms in Atlantic Canada, researchers found that men appeared to be more engaged than women with community affairs

following the event, whereas women were more likely to focus on domestic matters (85). Research on farmers coping with drought in Saskatchewan noted that men, who generally are responsible for many of the farming tasks, typically experienced greater psychological distress than women. To help adapt to the challenges posed by drought, women often responded by reinforcing their "provider" or "support" roles, such as emotionally supporting their husbands, adopting additional household responsibilities, or taking off-farm jobs to help their families (86).

There is limited evidence on gendered differences in responses to climate adaptation policies in Canada. One study examining the effects of a program in Montreal that generates emergency alerts and increases surveillance for vulnerable populations during periods of extreme heat found



that the program likely contributed to a reduction in heat deaths. However, the decrease in deaths occurred at roughly the same rate among men and women (87).

Women and men also have different attitudes and practices towards climate change mitigation, although the evidence on gendered differences in mitigation preferences is mixed. Recent national polling suggests that women are more supportive than men of carbon pricing efforts. According to a 2017 poll, only 38% of women want their province to fight implementation of a federal carbon tax, compared with 48% of men (88). This is despite the fact that carbon taxes may disproportionately harm women, because such taxes are economically regressive and women tend to earn

lower incomes than men (89). A 2010 nationwide survey found that Canadian women are no more likely than men to support development or investment in carbon capture and sequestration technology (90). However, a 2006 survey noted that when examining willingness to pay to improve environmental conditions, Canadian men are more willing to make financial sacrifices than women (91).

When it comes to taking steps to mitigate the effects of climate change, such as through changes in transport use, there are gendered differences in the steps that women and men take. On the one hand, men tend to drive more than women. A 2006 national survey showed that men drive more kilometers than women, producing more greenhouse gas emissions that contribute to climate change (92). However, women are less likely than men to take other steps to reduce

their automotive-related emissions. For instance, a 2005 study in Quebec found that women are significantly more likely than men to use remote car starters, which increase emissions through idling (93).

Despite driving more, national data also show that men are more likely than women to ride bicycles. According to the 2013/2014 Canadian Community Health Survey (CCHS), 47% of men, compared to only 34% of women, had ridden a bicycle within the past 12 months (94). However, men and women appear to use bicycles for different purposes. Based on an earlier edition of the CCHS, women are half as likely as men to cycle for commuting or running errands (95). However, more recent data from Montreal suggest that



women are more likely than men to cycle for pleasure (96). In the Greater Toronto Area, women are more likely to use active forms of transport (biking and/or walking) or public transport to go to school or work, while men are more likely to drive (97).

Another key area where personal behavior can help to mitigate climate change is diet, particularly increased fruit and vegetable consumption and reduced livestock consumption. Globally, researchers note that livestock production accounts for roughly 18% of global greenhouse gas emissions, making this a key area for mitigation activity (98). In Canada, meat consumption is heavily gendered. According to the 2015 CCHS, men consumed roughly 70% more fresh red meat per capita, and nearly twice as much processed red meat (such as bacon or ham), and processed poultry as women (99). Based on 2016 CCHS data, women were 60% more likely than men to eat at least five servings of fruit and vegetables per day (100).

Gender and Climate Change Employment and Governance

Current data on gender and environmental employment and governance in Canada is limited. However, the available evidence suggests at present, many resource management institutions are largely controlled by men, while a majority of the jobs in renewable energy and other environmental

sectors are also done by men. At the same time, males are disproportionately more vulnerable to policy changes designed to improve sustainability, as men hold a majority of jobs in extractive industries.

Research on gender and resource management suggests that women are largely underrepresented in resource management activities, particularly at the most senior levels. Research from the forestry sector finds that women are underrepresented in both public and private organizations in technical and leadership roles (101). Co-management boards, which enable Aboriginal governments to manage natural resources jointly with federal, provincial, and/or territorial governments, are also dominated by men. As of 2012, 84% of co-management board members in Yukon, Northwest Territories, and Nunavut were men (102). Research exploring women co-management board members finds that while women generally feel they have equal opportunities to participate in decision making, their voices are often not sufficiently valued by male board members. This is especially true as women often have different experiences with natural resource management than men due to gendered patterns of livelihood activities in the North (103). Increasing the proportion of women on co-management boards can reduce barriers to women's participation in resource management (104). Research from various settings abroad shows that greater participation of women in natural resource management can lead to more equitable and ecologically sound governance (105, 106).

Due to the emerging nature and small size of many environmental fields in Canada, gender breakdowns on

environmentally-focused employment, such as in renewable energy, are not available from government sources, such as the Canadian Labour Force Survey. The best recent and publicly available data on gendered employment within environmental sectors comes from a 2016 ECO Canada report, which surveyed employers of environmental professionals, defined as individuals who spend at least half their work hours on activities related to environmental protection, resource management, or environmental sustainability. According to this survey, 25% of Canadian environmental professionals are women, though this varies considerably between sectors. Within construction, only 13% of environmental professionals are women, while in education, fully half (50%) of environmental professionals are women (107). Women are also greatly underrepresented at Canadian engineering training programs and within engineering firms, making it more challenging to close the gender gap in the renewable energy sector (108).

While men make up a high proportion of employees in environmental fields, they also make up a high proportion of workers in fields likely to see employment declines as climate change policies become more aggressive. According to the Canadian Labour Force Survey, as of January 2018, four out of five (80%) individuals working in mining, quarrying, and oil and gas extractive industries were men (38). This number has remained fairly constant over time—ten years earlier, the figure was 82% (38). Thus, men are likely to be disproportionately affected as jobs shift out of resource extraction into more environmentally sustainable industries.

Gaps in the Literature/ Areas of Future Research

Gender and climate change is an emerging area of study in Canada. While researchers have established some patterns regarding gendered vulnerability to climate change, particularly concerning health impacts and the labour force, there remains much more to understand. Below are a series of key gaps to consider addressing in order to better understand climate change and gender relationships in Canada. While this list reflects gaps found when conducting this literature review, it should not be read as exhaustive.

- **Linking food insecurity research with policy:** Food insecurity in the North is arguably the most extensively researched socioeconomic issue pertaining to climate change and gender in Canada. This scholarship has

provided important answers to questions regarding food insecurity, including describing which populations are most affected, what foods are typically consumed in the North, and barriers to improving food security, among other questions. Given the magnitude of the food insecurity crisis in the North, more research is needed to examine the effectiveness of small-scale interventions as well as larger-scale public policies that seek to ameliorate food insecurity in this region.

- **Broader geographical focus:** The North is one of the most vulnerable regions of Canada to the effects of climate change because of its rapidly warming climate and high dependency on natural resources to support livelihoods. However, southern Canada is also being affected by climate change, but there is comparatively little research on how farmers, fishers, and others who rely on natural resources for their livelihoods are affected by climate change outside of the North. Such research is necessary to better understand gendered drivers of vulnerability and provide insight for policy options to address these challenges.
- **Emphasizing gender in disaster research:** Climate change is increasing the magnitude and/or frequency of extreme weather events around the world, including in Canada (109). A large body of research from the United States, Australia, and other developed countries highlights that disasters often affect men and women differently (110–113). However, there is very little research on these issues in the Canadian context, which is a key gap in the knowledge base.
- **Understanding gendered employment in environmental sectors:** Employment is growing in many fields that are designed to help Canadians mitigate climate change, such as in renewable energy or sustainable transport. However, as noted above, relatively little is known about the gender breakdown of employment in these sectors.

Appendixes

There are three appendices to this research brief. Appendix 1 contains the search terms used to locate articles for this review. Appendix 2 provides a list of key gender and climate change researchers working in Canada. Appendix 3 provides a list of major nongovernmental organizations in Canada working on gender and climate change issues. Neither of the lists in Appendices 2 and 3 should be read as exhaustive.

APPENDIX 1: SEARCH TERMS USED IN REVIEW

Initial search results contained at least one term in each of Category 1-3. After searching through these results, additional searches were conducted using other terms (listed under Additional Terms) in combination with the Category 1 terms in order to better capture the literature on food insecurity in the North. Note: * indicates use of a wildcard term (permitting any ending). For instance, a search using “hunt*” captures “hunt”, “hunter”, and “hunting”.

Category 1: Gender OR sex OR woman OR women OR female OR girl OR man OR men OR male OR boy

Category 2: “Climate change” OR “global warming” OR disaster OR temperature OR heat OR drought OR flood OR blizzard OR storm OR weather

Category 3: Canada OR “British Columbia” OR Alberta OR Saskatchewan OR Manitoba OR Ontario OR Quebec OR “Prince Edward Island” OR Newfoundland OR Labrador OR New Brunswick OR “Nova Scotia” OR Yukon OR “Northwest Territories” OR Nunavut OR Vancouver OR Victoria OR Calgary OR Edmonton OR Whitehorse OR Yellowknife OR Iqaluit OR Saskatoon OR Regina OR Winnipeg OR “Thunder Bay” OR Toronto OR Mississauga OR Ottawa OR “Quebec City” OR Montreal OR Gatineau OR Laval OR Charlottetown OR Moncton OR Fredericton OR “Saint John” OR “St John’s” OR Halifax

Additional Terms: Inuit OR Innu OR Dene OR Métis OR Cree OR Inuvialuit OR Nunavut OR Nunavik OR Nunatsiavut food OR hunt* OR fish*

APPENDIX 2: LEADING CANADIAN-FOCUSED GENDER AND CLIMATE CHANGE ACADEMIC RESEARCHERS

NAME	INSTITUTION	RESEARCH SPECIALTIES
Nathalie Auger	Université de Montréal	Adverse pregnancy outcomes
Ashlee Cunsolo	Memorial University of Newfoundland	Indigenous communities, health, and the environment
Caroline Desbiens	Université Laval	Feminist geography in the North
Grace Egeland	University of Bergen (Norway)	Indigenous nutrition
Sherilee Harper	University of Guelph	Environmental health in indigenous communities
James Ford	University of Leeds (UK)	Indigenous food security, health and climate adaptation
Lea Berrang Ford	University of Leeds (UK)	Indigenous food security, health and climate adaptation
Susanne King	McGill University	Health effects of prenatal exposure to stress
Michael Kral	Wayne State University (USA)	Suicide in the North
Harriet Kuhnlein	McGill University	Indigenous nutrition
David Natcher	University of Saskatchewan	Natural resource management in the North
Maureen Reed	University of Saskatchewan	Gender and environmental governance/climate adaptation

APPENDIX 3: ORGANIZATIONS RELATED TO THE INTERSECTION OF GENDER, WOMEN’S RIGHTS AND CLIMATE CHANGE ACTIVITIES IN CANADA

ORGANIZATION NAME	WEB ADDRESS	DESCRIPTION
Canadian Research Institute for the Advancement of Women	http://www.criaw-icref.ca/en/	CRIAW supports feminist research on a variety of topics, including the environment. CRIAW also sponsors the Feminist Northern Network (FemNorthNet), which is focused on the gendered impacts of social, economic, and environmental change in the North.
Climate Action Network Canada	https://climateactionnetwork.ca/	CAN Canada serves as a membership network for the climate change community in Canada, including entities focused on gender and climate change issues.
Idle No More	http://www.idlenomore.ca/	Idle No More is a women-led initiative designed to advance the sovereignty of Indigenous communities while promoting gender-just and sustainable forms of development.
Nobel Women’s Initiative	http://nobelwomensinitiative.org/	The Nobel Women’s Initiative uses the prestige of the Nobel Peace Prize and six courageous women peace laureates to magnify the power and visibility of women working in countries around the world for peace, justice and equality.
Oxfam Canada	https://climateactionnetwork.ca/	Oxfam Canada conducts research and advocacy activities related to gender, poverty, and the environment.
Women for Nature	http://naturecanada.ca/initiatives/women-for-nature/	Women for Nature is the collaborative voices of Canadian women with vision – women of influence who chose to demonstrate their passion for nature and pass their values on to others to drive change. Women for Nature is a philanthropic initiative comprised of professional women from across Canada – this unique partnership of motivated and influential women champion Nature Canada’s work to their network of colleagues and friends.
Women in Renewable Energy	http://www.womeninrenewableenergy.ca/	WiRE seeks to advance the capacity and recognition of women in the Canadian renewable energy sector.

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GENDER IN CANADA: A REVIEW
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