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Arctic Climate Impacts: Environmental Injustice in Canada and the United States

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ABSTRACT The current and projected future physical impacts of climate change are most extreme in the northern latitudes. The indigenous peoples in the North American arctic and sub-arctic rely on the availability of natural resources in mixed subsistence economies for nutritional and cultural survival and thus experience disproportionate burdens with respect to our changing climate. Arctic climate impacts exemplify how global phenomena and activities can significantly affect people locally in remote regions. These impacts are largely consistent throughout the region, irrespective of national boarders; however, indigenous peoples in Canada are better positioned than those in the United States to shape policy in a way that would ensure their adaptation to climate change. Political and industrial activity on national and global scales can have significant environmental, social and cultural repercussions on the local scale in remote areas. Remedies for environmental injustice will thus require strong cross-scale political and institutional linkages.

Introduction

The problem of environmental injustice, conceived more broadly as environmental inequality, is one in which some people bear disproportionate

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environmental burdens of industrial by-products or otherwise have inequitable access to environmental goods and services (Pellow, 2000). Many instances of environmental injustice cut across multiple scales; impacts are documented on a local scale, but are driven by activities at regional and global scales (Williams, 1999). La Duke (1994) highlights cases of environmental injustice in Canada, such as impacts of the James Bay hydroelectric project on the Cree of Quebec and opposition by the Innu of Labrador to the construction of a North Atlantic Treaty Organization (NATO) military base, in which indigenous people have resisted industrial development projects that threaten the resources upon which they depend and fought for their rights to local and regional land management.

The impacts of the global phenomenon of climate change on the indigenous peoples of the North American arctic and sub-arctic is a case of environmental injustice that underscores the importance of understanding and developing cross-scale linkages. There is abundant evidence, acquired via both Western science and traditional knowledge, that indigenous peoples and ecosystems of northern Canada and the United States are experiencing rapid and notable ecological, social and cultural impacts from a changing climate (Berner & Furgal, 2005; Chapin et al., 2005a; Huntington & Fox, 2005; Krupnik & Jolly, 2002; McCarthy & Martello, 2005). These Inuvialuit, Gwich'in, Dene, Inuit, Innu and other groups rely on an intimate relationship with their local ecosystem for physical and cultural sustenance; they are dynamic, learning entities and have adapted to many changes. The extent to which Northern indigenous communities and cultures will be able to adapt to the rapid changes related to climate change remains unclear (Duerden, 2004). Even so, the impacts of climate change affect not only people today, but the continued existence of a way of life into the future.

There is strong scientific consensus that the rapid increase in fossil fuel combustion associated with the industrial revolution has contributed significantly to the direction and strength of the climate signal (Crowley, 2000; National Research Council, 2001). Although the bulk of fossil fuel combustion occurs in temperate and tropical regions, the warming is amplified at high latitudes, where changes vegetation and reductions in sea ice, snow cover and glaciers have increased absorption of solar energy and atmospheric heating (Anisimov et al., 2001; Chapin et al., 2005a; McBean et al., 2005). Thus, when considering impacts on the immediate time horizon (i.e. the next 2–20 years), fossil fuel combustion and international climate policy on a global scale currently impact Northern people disproportionately.

Indigenous peoples in the North have a long cultural history and strong identity linked to the landscape of the region. They rely on mixed subsistence economies with few opportunities for wage-earning and live in remote locations that are off the road and rail system with accompanying limited transportation options and high transportation costs. As a result they have fewer geographic and economic choices than non-indigenous people and their mobility to seek opportunity in population centres in the south is financially and culturally confined (Freeman, 2000). As such they have few alternatives beyond local adaptation to change. While some climate

impacts may be advantageous, indigenous peoples in the North are likely to gain less and lose more than non-indigenous people and are therefore the relative, if not absolute, 'losers' in terms of current impacts of climate change (O'Brien & Leichenko, 2003).

This paper presents a comparative analysis of the formal, institutional dimensions of national-scale governmental responses to arctic climate impacts in Canada and the United States which illuminates the following two key findings. First, political and industrial activity on national and global scales can have significant environmental, social and cultural repercussions on the local scale in remote areas. Second, remedies for environmental injustice may thus require strong cross-scale community, political and institutional linkages.

The case of arctic climate impacts raises an additional important issue of *intra*-national equity with respect to climate change, upon which very little work has been done. The vast majority of work on equity and justice related to climate change discusses national scale issues and *inter*national negotiations on green house gas emissions between First and Third World nations. Arguments revolved around equitable global distribution of green house gas emissions in the context of population and economic development the Third World (see, for example, Agarwal et al., 2002; Jamieson, 2001; Pinguelli-Rosa & Munashinghe, 2002).[1] In contrast, the issue of climate impacts in the Canadian and American arctic and sub-arctic raises the question of unequal distribution of burdens and benefits *within* more developed, or First World, countries. These impacts can be characterized as aspects of 'internal colonialization' (Osherenko & Young, 1989).

Given the cultural demography of the North, arctic climate impacts thus raise two interrelated aspects of environmental injustice. First, Northern indigenous peoples still living a more traditional lifestyle in close connection with the land and sea and those in smaller coastal communities are disproportionately impacted upon by climate change. Not only are the biophysical impacts of climate change most extreme in northern latitudes, but indigenous peoples in these situations rely directly on plants, animals, weather patterns and natural systems for their mobility, nutrition and cultural survival (Chapin et al., 2005a; McCarthy & Martello, 2005).

Second, especially in the United States, these Northern indigenous people are poorly positioned to affect change in the policy of the south. In northern Canada, co-management bodies established as per the Inuvialuit Final Agreement of 1984 provide cross-scale linkages through space (horizontal) and levels of organization (vertical) that build adaptive capacity by connecting people on the local level to regional, territorial and federal resource decision-making institutions (Berkes & Jolly, 2001). Much of the pressure placed on national governments regarding environmental injustice in the arctic is exerted via indigenous actors united on an international level (Downie & Fenge, 2003; Inuit Circumpolar Conference, 2003; 2005). However, on the whole in both the Canadian and Alaskan arctic with respect to climate change there remains an institutional disconnect that prevents effective feedback from the Northern indigenous people who are most strongly affected by climate change to the forces that are driving this change (Fenge, 2001).

Arctic Climate Impacts

The earth's climate is changing. The biophysical manifestations of these changes are most prominent in high latitudes and the rate of arctic change is projected to increase over time. In the past few decades, the average arctic temperature has risen at nearly twice the rate of the rest of the world. On the ground, this has been observed as warmer spring and autumn temperatures that are associated with earlier ice thaw and later freeze-up. In some cases, these phenomena pose significant hazards for transportation in hunting as well as diminishing habitat for marine mammals and polar bears. Diminished shore-fast and sea ice has led to increased storm intensity causing severe coastal erosion and requiring the relocation of homes and communities. Lakes are drying up and water temperatures in lakes and rivers are increasing, affecting fish populations. Weather patterns that have for generations served as cues for hunters in accessing game and travelling safely are no longer familiar or predictable. The physical, social and cultural impacts from climate change are projected to intensify over time, as the climate continues to warm (Chapin et al., 2005b; Hinzman et al., 2005; Krupnik & Jolly, 2002; Lynch et al., 2004; Serreze et al., 2000).

Climate change is impacting on the cultural and economic activities of indigenous peoples in the arctic, which are closely tied to physical and biological aspects of the arctic environment. Arctic people have survived for generations in close relationship with their environment through keen observation, flexibility and adaptation. While forces internal to Northern communities also generate social and cultural change and not all change is detrimental or unwanted (e.g. arrival of new species might provide new food sources), the relatively rapid rate of biophysical change associated with a changing climate challenges people's capacity to respond and adapt (Kofinas et al., 2005). The resilience of Northern indigenous communities and of the social ecological system in the arctic is thus strongly influenced by climate change (Berkes & Jolly, 2001; Chapin et al., 2004).

For example, the Inuit of Nunavut, Canada rely on the ringed seal as a staple food source year-round. Ringed seals and polar bears depend upon stable shore-fast sea ice for breeding. Over the past 30 years, the average extent of sea ice has declined by 15–20% (Serreze et al., 2000). Modest climate change scenarios project an acceleration of this melting with a nearly ice-free Arctic Ocean within the next 100 years (Overpeck et al., 2005). As the Arctic Climate Impact Assessment describes,

> To hunt, catch, and share these foods is the essence of Inuit culture. Thus the decline in ringed seals and polar bears threatens not only the dietary requirements of the Inuit, but also their very way of life ... Because ringed seals and polar bears are very unlikely to survive in the absence of summer sea ice, the impact on indigenous communities that depend on these species is likely to be enormous. (Arctic Climate Impact Assessment [ACIA], 2004, pp. 94, 13)

Peter Irniq, Commissioner of Nunavut, describes climate change impacts on the Inuit in his territory:

> Our cultural, physical and economic survival depended on the availability of abundant and healthy stocks of wildlife and fishes. We were always aware of the need to protect our environment and aware of what consequences there could be if we did not do just that. Since time immemorial we have harvested and at the same time managed wildlife according to our own laws of wildlife and conservation based on respect of nature.
>
> Our whole structure depended on the passing of the seasons, the predictability of the weather, the direction of the wind, and the thickness of the ice, the *nuuttuittuq*, the North Star.
>
> We adapted to changes that occurred over long periods of time, like natural migration changes. What we are facing today are drastic changes, happening within decades.
>
> There is a real threat to our way of life because of climate change and global warming. As Inuit, we are already experiencing both positive and negative impacts of climate change. (Irniq, 2004)

The Inuvialuit of the western Canadian arctic initiated a study of climate change impacts in the village of Sachs Harbour to document the significant environmental changes that are occurring and their social and cultural impacts. These impacts include:

- lakes draining into the sea from permafrost thawing and ground slumping
- less sea ice in summer and accompanying rougher water
- weather, storms and spring break-up are difficult to predict
- unpredictable sea ice and excessive broken ice make winter travel dangerous
- less ice cover in summer means rougher, more dangerous storms at sea
- unstable ice makes hunting more difficult in winter
- it is harder to hunt geese because the spring melt happens so fast
- fish and bird species are observed that have never been seen before
- there is an increase of biting flies and mosquitoes (ACIA, 2004, p. 95)

Climate change has similar impacts on Iñupiat in northern Alaska and the Yupik in western Alaska (Krupnik & Jolly, 2002). The National Assessment Synthesis Team of the United States Global Change Research Program describes:

> Because the edge of the sea ice is further out to sea in deeper water, walrus—which rest on the ice and feed on the bottom—must dive deeper to feed and find less food, causing their weakened condition. Because sea ice is melting back earlier in the year, the seal pups being

> raised on the edge are smaller when they must leave the ice, worsening their chance of survival. With fewer seal pups, sea otters become an alternative food source for whales. Because a favorite food of sea otters is sea urchins, fewer sea otters will mean more sea urchins. Sea urchins' favorite food is the kelp that provide the breeding grounds for the fish, so more sea urchins will mean less kelp and thus fewer fish. And with walrus and seal populations declining, it is these very fish that the Yupik need more than ever to feed themselves.
>
> It may seem like only a little warming in a very cold place, but for the Yupiks, the warming is significantly disrupting their traditional food sources because as Caleb Pungowiyi says, in their environment, like all environments, 'everything is tied to everything else'. (National Assessment Synthesis Team, 2000)

Indigenous people in the sub-arctic boreal forest of Canada and the United States have also experienced recent climate changes that impact on their subsistence harvest (Turco & Huntington, 2005). In both Canada and the United States indigenous people are documenting the biophysical, nutritional, cultural and social impacts of climate change. These observations are consistent with the findings of Western science-based climate change research (Hinzman et al., 2005).

Canada and the United States: Governments, Policies and Arctic Climate Impacts

The physical, social and cultural impacts of climate change throughout the North American arctic and sub-arctic are functionally and structurally similar. However, there are marked differences between Canada and its northern territories (Northwest Territories, Yukon Territory and Nunavut) and the United States and Alaska in governmental response to climate change, in the institutional mechanisms that allow for direct involvement in resource decision-making, and in the adaptive capacity of indigenous people. Several similarities between these countries and their northern regions make this comparison feasible. First, they are both remote regions of developed (First World) countries. The ecosystems in the northern latitudes of both countries are similar and the indigenous peoples in the northern regions exist within similar socio-political contexts, and have developed similar social organization and adaptation to ecological constraints. The regional economies of both countries are based on natural resource extraction, and lands within northern latitudes are economically as well as strategically important.

While the US is not signatory to the Kyoto Protocol, raising concern for Canada regarding economic competitiveness, Canada signed the treaty in 1997 and ratified it in 2002, thereby agreeing to reduce carbon dioxide (CO_2) emissions by 6% of 1990 levels.[2] The Aboriginal and Northern Community Action Program (ANCAP), established in 2003 by

the government of Canada, provided C$30.7 million over four years for capacity-building, training and implementation of energy efficiency and renewable energy initiatives.[3] Municipalities and major industry in Canada have, respectively, cut and pledged to stabilize or reduce greenhouse gases to between 10–65% of 1990 levels (Bruce & Russell, 2004). The federal and provincial/territorial governments had an official programme dedicated to taking action on climate change and many Canadian provinces and territories have developed individual climate action plans.[4] While it remains unclear how much priority the government of Canada will continue to place on upholding the Kyoto Protocol and reducing greenhouse gas emissions (Gorrie, 2006), initiatives implemented around the turn of the 21st century demonstrated an action-oriented approach and at least symbolic concern for the global commons.

In contrast, as of this writing the response of the United States government has consistently put forward policy based explicitly in national economic interests with actions almost exclusively limited to a commitment for continued scientific research (Jamieson, 2001; National Research Council of the National Academies, 2004; United States Government, 2005). For example, as a member of the Arctic Council the United States provided strong financial support for the scientific Arctic Climate Impact Assessment, yet the Bush administration resisted policy suggestions based on these findings (Eilperin, 2004). While there is growing awareness of the social and economic costs of climate change in the US, little political or legislative action has been taken to curb greenhouse gas emissions (Mills, 2005). While Alaska is not among them, many US states and municipalities have enacted legislation and adopted policies that effectively reduce emissions of greenhouse gases while preserving economic viability. These include implementing renewable portfolio standards and mandatory greenhouse gas reporting (Betsill, 2001; Pew Center on Global Climate Change, 2004). In Alaska to date, policy related to climate change has been limited to the establishment of the Climate Impact Assessment Commission in May 2006.

In summary, while on the national level the United States shows strong commitment to continued research into risks and uncertainties related to climate change, Canada has at least historically been more proactive in acknowledging and formally acting to address the problem of climate change.

Canada and the United States: Indigenous Rights and Policy

Historically, indigenous policy in both Canada and the United States originated with the 1763 Royal Proclamation, which recognized the independence of indigenous peoples and the legitimacy of traditional tribal governments, as good relations with the Indians were in the best interest of the colonies (Fleras & Elliot, 1992). Both countries formally adopted policies of acculturation and exploitation of resources in the 18th and 19th centuries (Deloria, 1985; Fleras & Elliot, 1992; Hoffman, 2002). However, in the late 20th century there has been a significant divergence in the evolution of indigenous policies of Canada and the US (Brock, 2000).

Indigenous concerns are more visible in Canada and indigenous peoples are on more equal footing with the federal government, have greater opportunity for direct involvement in natural resource decisions, are a larger percentage of the population as a whole and represent the country's largest minority group (Brock, 2000; Deloria, 1985; Fleras & Elliot, 1992).[5] The aboriginal population of Canada is projected to double in the next twenty years (Woodrow & Portundo Campa, 2001). Furthermore, for their own cost savings, the poorer western and northern Canadian provinces and territories have a 'vested interest in ensuring that the federal government attends to Aboriginal (i.e. indigenous) concerns and socio-economic problems' (Brock, 2000, p. 341).

Amendments to the Canadian constitution in the 1980s and 1990s and the Canada Act of 1982 granted formal recognition of indigenous tribal rights and acknowledged distinct indigenous identity. In addition, four national conferences in the mid-1980s between Canadian officials and representatives of Canadian indigenous organizations set a precedent for formal dialogue and put indigenous rights and issues forefront in the public view (Brock, 2000; Fleras & Elliot, 1992; Hoffman, 2002). The territory and public administration of Nunavut was established in 1999 as recognized in indigenous land claims settlement and in response to recommendations from the Inuit Tapirisat of Canada (ITC) for a split of the Northwest Territories.[6]

In the US, public and political attention to indigenous people and their concerns is overshadowed by issues specific to other minority groups such as African, Latino and Asian Americans (Brock, 2000). In contrast to the constitutional liberties provided in Canada, 20th-century indigenous governance in the United States has largely been established through legal precedence (Brock, 2000). A series of Supreme Court cases in the 1920s and 1930s known as the 'Marshal Trilogy' established the unique legal status of Native Americans as 'domestic dependent nation(s)' and 'wards of the Government under its guardianship and care' (Case & Voluck, 2002, p. 97). While a government-to-government relationship is now officially required, these cases (which continue to define the indigenous/federal relationship in the US) instituted a federal 'trust responsibility' for indigenous people in the US, codifying a legal relationship of paternalism that limits the autonomy of tribal governments (Case & Voluck, 2002; Deloria, 1985; Fleras & Elliot, 1992; Holt, 1992). The United States government is thus under a legal obligation to protect the lands, resources and traditionally used areas of indigenous peoples, and government agencies are required to consult with tribal governments and Alaska Native Corporations in natural resource decision-making (United States Department of Agriculture, 1992). While some view this form of representation as the best and only practical means of influencing Northern policy (Selin et al., 1997), the actual involvement of tribal governments has been limited, and seen as perfunctory, and may be precluded by the procedural and structural mandates of federal law and legal precedent (Brittel, 1991; Deloria, 1985; Fleras & Elliot, 1992).

This fundamental difference in the Canadian and US federal relationship with indigenous peoples lays the foundation for differences in indigenous

involvement in natural resource decisions on regional and local scales. Through the negotiation and settlement of comprehensive land claims and the subsequent devolution of self-governing responsibility in Canada, indigenous representatives on local and regional scales are gaining self-governing authority, direct involvement in natural resource planning, and greater control over the lands and resources that continue to sustain their cultures, economies and distinctive ways of life (Natcher, 2000). Co-management agreements for fish and wildlife that allow for power-sharing, such as the Canadian Porcupine Caribou Management Board and the Inuvialuit Wildlife Management Advisory (Northwest Territories), have been negotiated and implemented in Canada. These agreements contribute to the vertical and horizontal integration of local people into regional- and national-level decision-making and, by enhancing these cross-scale channels of communication, potentially increase the adaptive capacity of hunters (Klein et al., 2004; Roberts, 1996; Young, 2002).

In contrast, while efforts are made to include Alaskan Natives in natural resource decisions, their role in decision-making in Alaska is not on equal footing with non-native institutions. On the whole, the federal government has the same trust relationship with Alaska Natives as with other American Indians in the United States. However, the Alaskan Native Claims Settlement Act of 1971 extinguished indigenous claims to lands, fish, game and resources, establishing native corporations with title to certain lands, and institutionalized a fundamentally commercial and commodity-driven relationship between Alaskan Natives and the land and resources. Without legal claim to lands and resources, Alaskan Natives are 'sovereigns without territorial reach' and lack institutional standing (Berger, 1985; Case & Voluck, 2002, p. 31; Haycox, 2002).[7] Nonetheless, there are isolated cases of successful joint commissions for natural resource management which engage Alaskan Natives together with the federal agencies. The best known and most successful of these is the Alaska Eskimo Whaling Commission. Indigenous representatives also serve on the Federal Subsistence Advisory Boards, but these boards have advisory rather than regulatory powers. While co-management is 'garnering acceptance' in fish and game management throughout Alaska (Case & Voluck, 2002, p. 315), on the whole, direct involvement of indigenous peoples in land and natural resource decision-making is more prevalent in northern Canada than in Alaska.

In summary, Canada and the US have similar histories of territorial expansion without regard for indigenous presence or historical use and relationship with the land. However, since the latter half of the 20th century, indigenous peoples in Canada have had more extensive representation in government, been more visible in the public eye and had more direct rights and responsibilities in terms of resource management and decision-making.

Environmental Justice and Climate Change: Canada and the United States

In light of disproportionate impacts on cultural and physical means of subsistence, arctic and sub-arctic climate impacts on indigenous people in North

America can be characterized as environmental injustice. Comparison between Canadian and American governmental responses to this problem in the past quarter-century shows that Canada is more responsive to climate policy solutions that require collective consideration on a global scale and that indigenous people in Canada have more direct access to control of land and resources (e.g. Theriault et al., 2005).

The Canadian government is based on a Charter that emphasizes collective goals and values, and 'protects the collective rights of linguistic minorities, aboriginal (sic.) peoples and multicultural groups' (Manfredi, 2000, p. 315). The political structure of Canadian territories is closely tied to the federal government. In contrast, the United States government is established upon a constitutional framework that is heavily based on individual rights (Manfredi, 2000). The libertarian political tenor and public sentiment in Alaska are especially strong. Raynor et al. (1999) propose a two-dimensional, tripartite map of institutional and individual values with market, hierarchical and egalitarian spheres at each apex. In this framework, principle of welfare economics, that tend to dominate policy in the United States, are located halfway between a market and a hierarchical sphere. In this conceptualization, Canadian policy would be situated between the egalitarian and hierarchal spheres.

To what extent are environmental justice issues and needs different in Canada from in the United States? With respect to arctic and sub-arctic climate impacts, the two countries share common cultures, landscapes and ecosystems. While local and regional differences do exist, arctic and sub-arctic climate impacts are not substantially different between the arctic regions of Canada and the US.

However, important differences exist in terms of government responses to this problem and the institutional framework for building power-sharing of indigenous people and the state. Canada has more land area in the arctic and sub-arctic than the US, in both absolute and percentage terms. Canada has both a more visible indigenous population and a greater and larger percentage of indigenous people living in the arctic and sub-arctic region. On the whole, while differences exist in territorial response to climate change, Canada is more proactive with respect to climate change policy and mitigation implementation and, while not without problems (Hoffman, 2002), there are more mechanisms in place that allow indigenous Canadians more equitable participation in the management of natural resources upon which they rely for their mixed subsistence livelihood.

What does all of this say about concepts of justice in Canada and the United States? It is difficult to substantiate that Canada's climate policy and actions by the Canadian government to reduce greenhouse gas emissions are motivated by or demonstrative of a sense of justice for indigenous peoples in northern latitudes or normative concerns beyond national self-interest. Victor (1999) suggests that, especially in the context of climate change, issues of fairness or justice are necessarily secondary to issues of national willingness to pay in international negotiations. In fact, Smith and Victor (2004) argue that the Canadian ratification of the Kyoto Protocol is motivated by

political self-interest, as it protects international relations with the European Union and Asia, responds to public concern about climate change, provides an opportunity to lobby in favour of clean energy export credits and can be implemented entirely via accounting provisions. There is evidence, however, that the Canadian system is one that accounts for a collective whole and is more communitarian minded than the individualistic, laissez-faire views that tend to dominate US policy and characterize the US position toward climate change policy.

Adaptation and the Importance of Cross-Scale Linkages

Disproportionate burdens of environmental change and degradation, toxic exposure and health risks occur because either harmful impacts could not have been predicted or because decision-making structures cannot or will not account for the needs and priorities of the politically and economically disenfranchised. Beyond simply identifying when injustice occurs, communities that experience environmental injustice face a myriad of challenges in reducing their exposure to toxins, cleaning up their degraded environment or, in the case of climate impacts, finding ways to maintain cultural traditions and physical survival in the face of physical and ecological changes over which they have little or no control. This analysis underscores the significance of the institutional role in rectifying environmental injustice and it emphasizes the need for development of cross-scale institutional linkages that provide local communities a role in decision-making (Berkes, 2002).

The scale of analysis is critical in determining and assessing who benefits and who pays with respect to climate impacts (O'Brien & Leichenko, 2003). The case of arctic and sub-arctic indigenous climate impacts is one in which a global phenomenon, negotiated at an international level and sensitive to industrial and political activities worldwide, impacts on people and communities on a local scale, in similar ways throughout an entire sub-global region (McCarthy & Martello, 2005). Responses to arctic climate impacts will require both local adaptation and institutional mitigation efforts on regional and national scales.

Nations with arctic lands account for 40% of global CO_2 emissions and could thus make substantial steps toward reducing rates of climate change if institutions were in place that provided effective feedback from climate impacts to energy policy. However, given the long residence time of greenhouse gases in the atmosphere and the resultant inertia of the climate system, institutions related to mitigation and adaptation to climate change are arguably more immediately important for Northern people than policies directly related to reduction of greenhouse gas emissions.

Indigenous peoples in the North have adapted to change for centuries. However, the extent, scale and nature of current and projected climate change present new and different challenges of uncertainty, risk and threat to livelihood and culture (Krupnik & Jolly, 2002; Nuttall et al., 2005). Their ability to adapt will depend on their capacity to adapt, which will be determined by a range of political, social, economic and cultural factors,

including available money, leadership and desire to continue current established traditions (McCarthy & Martello, 2005). Enriching local adaptive capacity must include accounting for these specific local factors, the local intricacies of impact (i.e. dependence on marine mammals, caribou, fish and coastal erosion), local leadership and local needs (Chapin et al., 2004). It will also depend on a combination and interaction of local measures with national and territorial/state policy actions that establish the larger institutional framework (Young, 2002).

Thus, cross-scale linkages are important, both across geographic space (horizontal linkages) and across levels of organization (vertical linkages) (Young, 2002). The physical, social and cultural amplification of climate change in the arctic and sub-arctic are thus not the only injustice in this case. One of the most significant impediments to moving forward in developing strategies for mitigating and adapting to arctic climate impacts is the absence of strong cross-scale institutional linkages between local impacts and regional, national and international climate policy (AHDR, 2004).

While more cross-scale institutional networking is needed (Berkes, 2002), currently existing linkages can serve as exemplars and building blocks for further development. With diverse institutional structures, integration of traditional knowledge, partnering with local indigenous groups, and successful implementation, northern Canadian resource co-management institutions are building and strengthening cross-scale interaction. Lessons from cross-scale linkages in negotiations of persistent organic pollutants (POPs) mitigation include (a) the role of key organizations and individuals in linking scientific, governmental and indigenous epistemic communities and (b) the involvement of arctic indigenous people and organizations at every level (Berkes et al., 2005). The Inuit Circumpolar Conference (ICC), an international indigenous organization, is beginning to raise the political profile of regional and local arctic climate impacts, benefiting Inuit peoples in the US as well as in Canada (Inuit Circumpolar Conference, 2003; 2005; Watt-Cloutier et al.). While largely lacking the ability to implement policy change, the Arctic Council, an international organization with strong indigenous participation, has produced multiple rigorous scientific reports that provide scientific foundation for policy, raise awareness of pertinent local issues and influence problem-framing (Young, 2005).

However, this analysis raises at least as many questions as it answers: How will the US and Alaska, Canada and its northern territories respond to mounting evidence that climate change is occurring at a rate never before seen in the arctic? What role will local Northern indigenous people and representative international organizations play in affecting policy change? What government policies will be implemented if indigenous peoples of the arctic face exceptional challenges in adapting to climate change?

Conclusion

In both Canada and the United States the indigenous peoples in northern latitudes are currently experiencing a disproportionate burden of impacts

from our changing climate; a case of intra-national inequity. These disproportionate impacts are projected to intensify over time, as the climate continues to warm. The Canadian federal and territorial governments, through their policies and doctrine, have explicitly acknowledged the problems of climate change and discrimination against indigenous peoples and have historically worked to mitigate these problems. In the United States, the absence of those rights and policies suggests that indigenous people may have greater difficulty in responding to those changes. While, it is difficult to demonstrate that Canada's actions are motivated by a deliberate commitment to rectify the environmental injustice that indigenous peoples experience via climate impacts in northern latitudes, indigenous peoples in Canada are better positioned to shape policy in a way that might ensure that they are able to adapt to climate change. Arctic and sub-arctic climate impacts demonstrate the importance of cross-scale linkages as the impacts of a necessarily global phenomenon have significant local and regional implications and adaptation to these impacts will require local, territorial/state and national cooperation.

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Notes

[1] Exceptions include Nishioka (1999) and the Environmental Justice and Climate Change Initiative, <http://www.ejcc.org/>.

[2] Even with this commitment, Longergan notes that 1998 Canadian emissions were 13.5% higher than in 1990 and continue to rise: Lonergan (2004).

[3] <http://www.ainc-inac.gc.ca/clc/index_e.html> (accessed 28 July 2006).

[4] <http://www.climatechange.gc.ca/english/> (accessed 15 September 2005, but no longer available). See links at <http://www.environmentandresources.ca/default.asp?lang=En&n= EEF6792A-1> (accessed 7 August 2006).

[5] Just over 30% of the Canadian population lives in the northern latitudes (Yukon Territory [YT], Northwest Territories [NWT] and Nunivut) and indigenous peoples comprise only 3% of total Canadian population. However, more than 50% of the people who live in the Canadian arctic and sub-arctic are indigenous (Inuit, American Indian or Metis). In the United States, roughly 1% of the total population is American Indian or Alaskan Native. Indigenous people in Alaska comprise 16% of the population state-wide and 21% of the population in the arctic and sub-arctic. 2000 US Census, <http://quickfacts.census.gov/qfd/states/02000.html>. This figure includes the urban area of the Fairbanks North Star Borough and is therefore comparable with the Canadian statistics, which include major population centers. If the urban centre of the Fairbanks North Star Borough is excluded, 74 of the population in the Alaskan arctic and sub-arctic are American Indian or Alaskan Native. We take the arctic and sub-arctic regions in Alaska to include the North Slope Borough, the Northwest Arctic Borough and the Yukon–Koyukuk census area. <http://factfinder.census.gov/>.

[6] <http://www.gov.nu.ca/Nunavut/English/about/road.shtml> (accessed 15 October 2005). However, in spite of these legal and constitutional improvements, aboriginal people in Canada still face elevated rates of infant mortality, infectious disease (e.g. tuberculosis and hepatitis), youth suicide, overcrowding and unemployment (Hoffman, 2002).

[7] *Alaska* v. *Native Village of Venetie Tribal Government*. There are two tribes in Alaska that did not agree to relinquish land claims in exchange for corporate status under The Alaska Native Claims Settlement Act (ANSCA) and therefore own land fee-simple in reservation status. These are the Venetie and Metlakatla reservations.

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