STUDENT ESSAY COMPETITION WINNER

VALUING TRADITIONAL ECOLOGICAL KNOWLEDGE: INCORPORATING THE EXPERIENCES OF INDIGENOUS PEOPLE INTO GLOBAL CLIMATE CHANGE POLICIES

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I. Introduction 804
II. The Science of Climate Change 809
A. Present and Future Impacts of Global Climate Change 809
B. Climate Change in the Arctic 811
C. Inequitable Distribution of the Negative Impacts of Climate Change 815
III. Climate Change as Experienced by Arctic 819
A. Loss of Subsistence Lives and Culture 819
B. Loss of Villages and Lands in Coastal Arctic Indigenous Communities 821
IV. The Value of Traditional Ecological Knowledge 824
A. Scientists and Policymakers Often Ignore and Dismiss Traditional Ecological Knowledge 824
B. The Benefits of Incorporating Traditional Ecological Knowledge into Science and Policy 827
C. Incorporating Traditional Ecological Knowledge into Decision Making 831

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V. Making Their Voices Heard: Arctic Indigenous Attempts to Defend Their Way of Life Against Human-Induced Climate Change 837
A. Violations of Arctic Indigenous People's Human Rights 837
B. Potential Plaintiffs in Tort-Based Climate Change Litigation 841
C. Outreach Education 844
VI. Conclusions 846

> *Climate change is gradually divorcing us from our land and eroding our subsistence way of life. Please think for a moment how you would react if climate change threatened your very existence as a distinct people.*
>
> – Sheila Watt-Cloutier, Chair, Inuit Circumpolar Conference[2]

I. INTRODUCTION

Indigenous people in the Arctic have experienced the potentially catastrophic impacts of human-induced climate change over the last few decades and are struggling to survive and to preserve their way of life in a diminishing landscape. Climate change is recognized as a major threat to the Arctic environment,

[2] Sheila Watt-Cloutier, Chair, Inuit Circumpolar Conference, Remarks at Climate Change in the Arctic: Perspectives of Indigenous Peoples, Informal Meeting to Discuss the Arctic Climate Impact Assessment, Svalbard, Norway (Aug. 6, 2003) [hereinafter Watt-Cloutier Remarks], *at* http://www.inuitcircumpolar.com/index.php?ID=81&Lang=En (on file with journal). The Inuit Circumpolar Conference (ICC) is a nongovernmental organization representing 150,000 Inuit people from Alaska, Canada, Greenland, and Chukotka, Russia. *See* Inuit Circumpolar Conference-Alaska, *About Us*, *at* http://www.iccalaska.org/aboutUs.html (last visited Mar. 28, 2005) (on file with journal). The goals of the ICC are to "strengthen unity among Inuit of the circumpolar region," to "promote Inuit rights and interests on an international level," to "develop and encourage long-term policies which safeguard the Arctic environment," and to "seek full and active partnership in the political, economic, and social development of circumpolar regions." *See* Inuit Circumpolar Conference-Alaska, *About ICC* [hereinafter ICC-Alaska, *About ICC*], *at* http://www.iccalaska.org/aboutICC.html (last visited Mar. 28, 2005) (on file with journal). The Inuit are an indigenous people with their homelands in the Arctic. The name "Inuit" comes from the language Inuit-Inupiaq and literally means "the people" or "real people." Digital Collection Program, Industry Canada, *Canadian Arctic Profiles: Indigenous People*, *at* http://collections.ic.gc.ca/arctic/inuit/people.htm (last visited Mar. 28, 2005) (on file with journal).

where its effects are felt with particular intensity.[3] While Arctic indigenous people[4] are known for their ability to adapt, these changes are likely to be so rapid and severe that, without mitigation, they will not be able to continue subsistence living in their Arctic home.[5] The experiences of Arctic indigenous people and observations of their own environment have historically been ignored by both policymakers and the scientific community.[6] While respect for the value of indigenous experience has been increasing, the policies of Arctic countries, particularly the United States, have not recognized the immediacy of global climate change in the Arctic environment.[7]

The experiences and observations of a group of indigenous people accumulated over generations are collectively known as "traditional ecological knowledge" (TEK). TEK is broadly defined as "the culturally and spiritually based way in which indigenous peoples relate to their ecosystems."[8] The combined local knowledge of the community functions as the basis of local-level decision making.[9] This traditional knowledge includes systems of indigenous environmental ethics as well as groups'

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[3] *See* SUSAN JOY HASSOL, ARCTIC CLIMATE IMPACT ASSESSMENT (ACIA), IMPACTS OF A WARMING ARCTIC: ARCTIC CLIMATE IMPACT ASSESSMENT 8 (2004) [hereinafter ACIA], *available at* http://amap.no/acia/.

[4] "Arctic indigenous people" refers to indigenous people with their homelands in the Arctic regions that encompass all or part of eight Arctic countries, Norway, Sweden, Finland, Denmark, Iceland, Canada, Russia and the United States. *See id.* at 6. Within these territories, there are distinct subgroups and communities of Arctic indigenous people. *Id.*

[5] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), CLIMATE CHANGE 2001: IMPACTS, ADAPTATION, AND VULNERABILITY 826–27 (James J. McCarthy et al. eds., 2001) [hereinafter IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY], *available at* http://www.grida.no/climate/ipcc_tar/wg2/index.htm.

[6] *See infra* text accompanying notes 138–47. For purposes of this article, the term "scientific community" or "scientists" refers to researchers conducting studies of the Arctic environment using academic scientific methods of observation, experimentation, or modeling; the term "scientist" does not include an Arctic indigenous person who obtains data from traditional ecological knowledge or traditional monitoring methods.

[7] *See infra* notes 230–37 and accompanying text.

[8] Winona LaDuke, *Traditional Ecological Knowledge and Environmental Futures*, 5 COLO. J. INT'L ENVTL. L. & POL'Y 127, 127 (1994).

[9] United Nations Educational, Scientific and Cultural Organization (UNESCO), *Best Practices On Indigenous Knowledge*, *at* http://www.unesco.org/most/bpindi.htm (last visited Mar. 28, 2005) (on file with journal).

"scientific knowledge about environmental use," based on the experience of generations of people with the land.[10] For example, Arctic indigenous hunters and fishermen collect data about seasonal patterns and changes in species abundance and migration, weather patterns, and sea ice conditions.[11] Elders are the main knowledge-keepers in the community, capable of identifying subtle patterns and ecosystem changes.[12] Their knowledge base consists of general guiding principles and specific rules that govern the interactions of humans with both the natural and spiritual worlds.[13] These observations and principles are preserved and passed down from generation to generation through songs, stories, and memorized experiences.[14] TEK is locally, culturally, and contextually specific.[15] The knowledge is holistic in nature, usually orally transmitted and not formally documented, and it is closely related to the survival and subsistence of the people.[16] Because a system of monitoring changes in the local environment over a period of many generations is one aspect of the TEK of Arctic indigenous groups, TEK interpreted by these groups can be an extremely valuable tool available to scientists and policymakers

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[10] Rebecca Tsosie, *Tribal Environmental Policy in an Era of Self-Determination: The Role of Ethics, Economics, and Traditional Ecological Knowledge*, 21 VT. L. REV. 225, 272–73 (1996).

[11] *See, e.g.*, Tero Mustonen et al., *Environmental Change Interviews*, *in* SNOWSCAPES, DREAMSCAPES: SNOWCHANGE BOOK ON COMMUNITY VOICES OF CHANGE 136–44 (Elina Helander & Tero Mustonen eds., 2004) [hereinafter SNOWCHANGE].

[12] Environment Canada, *Aboriginal Knowledge and Environmental Management*, SCI. & ENV'T BULL. (Environment Canada), Sept./Oct. 2002, http://www.ec.gc.ca/science/sandesept02/article1_e.html (on file with journal).

[13] *Id.*

[14] Arctic Native Science Commission, *What is Traditional Knowledge?*, *at* http://www.nativescience.org/html/traditional_knowledge.html (last visited Dec. 11, 2004) (on file with journal). The Arctic Native Science Commission describes the passage of TEK from generation to generation:

> Most indigenous people have traditional songs, stories, legends, dreams, methods and practices as means of transmitting specific human elements of traditional knowledge. Sometimes it is preserved in artifacts handed from father to son or mother to daughter. In indigenous knowledge systems, there is usually no real separation between secular and sacred knowledge and practice—they are one and the same. In virtually all of these systems, knowledge is transmitted directly from individual to individual.

Id.

[15] UNESCO, *supra* note 9.

[16] *Id.*

to more fully assess the local impacts of climate change in the Arctic.[17]

A close relationship with the environment is central to indigenous people's way of life, as it is tied to their religious beliefs, social traditions, and language.[18] Arctic indigenous people, for example, see themselves as belonging to the land rather than owning the land.[19] The duty to take care of the environment for the benefit of future generations is fundamental to the Arctic indigenous worldview, as it is to other Native American people in the United States and Canada.[20] This indigenous concept of sustainability should be valued and recognized in developing global climate change policies and other policies that directly impact the Arctic environment.

From an environmental justice perspective, the climate change crisis in the Arctic presents two major problems. First, ignoring TEK and failing to consult Arctic indigenous groups in policy decisions robs them of meaningful participation in the development of climate change policies that directly affect Arctic indigenous people and their lands. Despite their long history of experience with the land and adaptation to change, Arctic indigenous people have had little power to influence decisions about what should be done to mitigate and adapt to climate change. With their voices silenced, they will be forced to assimilate and abandon the environment that defines their way of life.[21] Arctic indigenous people need to be involved in the dialogue about policies that affect their environment—including climate change policies and, in particular, those policies that deal with *adaptation* to the impacts of climate change—because they may not buy into policies on which they are not consulted.[22] Incorporating TEK into policymaking provides one critical way for Arctic indigenous people to participate in the development of policy. It would lead to increased understanding of actual changes and better mitigation strategies that do not require cultural assimilation. Second, climate change poses a distributive justice problem because indigenous people living in the Arctic bear a disproportionate share of the

[17] *See* discussion *infra* text accompanying notes 158–86.
[18] Tsosie, *supra* note 10, at 274–75.
[19] *See, e.g.*, *id.* at 291.
[20] *Id.* at 228–29.
[21] *See* discussion *infra* Part II.C.
[22] *Cf.* discussion *infra* text accompanying notes 183–85.

negative consequences of the carbon-producing activities of the industrialized world that are largely responsible for human-induced climate change.[23]

Problems associated with climate change in the Arctic have an effect upon climate change worldwide.[24] Properly valuing TEK can help to demonstrate that climate change already occurs and can provide a voice to those people most severely affected by the change. Arctic indigenous people, based upon their unique knowledge of the local ecosystem, can provide substantive knowledge about changes in the Arctic environment that is not available to scientists, particularly in remote areas where traditional scientific monitoring methods may be prohibitively costly or impractical.[25] Recently, several scientific and policy studies have begun to recognize the validity of Arctic indigenous knowledge and to utilize the long-term observations and adopt the sustainable values that it provides.[26] The success of these programs demonstrates that Arctic indigenous knowledge should be highly valued in global climate change policies.

This Article will assess the critical need for governments to put greater value on the experiences of the indigenous people in the Arctic in developing climate change policies. Part II describes the science[27] of current and predicted climate change impacts as well as the causes of climate change and its disproportionate effects on the most sensitive groups, particularly poor communities and resource-dependent groups. Part III examines the changes seen by Arctic indigenous people and their struggle to maintain their way of life in the face of this change. Part IV evaluates the

[23] Distributive justice can be defined as "the equitable distribution of the burdens resulting from environmentally threatening activities or of the environmental benefits of government and private-sector programs," and in the context of environmental justice "[it] most commonly involves addressing the disproportionate health and environmental risks borne by people of color and lower incomes." Robert R. Kuehn, *A Taxonomy of Environmental Justice*, 30 Envtl. L. Rep. (Envtl. L. Inst.) 10,681, 10,684 (2000).

[24] *See, e.g.*, ACIA, *supra* note 3, at 8–9.

[25] *See infra* text accompanying notes 158–63.

[26] *See* discussion *infra* Parts IV.C. and V.C.

[27] Throughout this article, the terms "science" or "western science" refer to research studies of the Arctic environment that include use of the scientific methods of observation, experimentation, or modeling that do not rely on data obtained from TEK or Arctic indigenous people. For purposes of this article "science" is distinguished from the observations and ecological data gained from the TEK of Arctic indigenous people.

usefulness of TEK, including studies that currently incorporate TEK principles and observations. Part V addresses attempts by Arctic indigenous people to make their voices heard on climate change issues, including human rights violation claims, possible litigation, and outreach education.

II. THE SCIENCE OF CLIMATE CHANGE

A. *Present and Future Impacts of Global Climate Change*

In 1988, the United Nations Environment Programme and the World Meteorological Association recognized the threat of global climate change and established the Intergovernmental Panel on Climate Change (IPCC) to assess the scientific, technical, and socioeconomic aspects of human-induced climate change.[28] The assessment reports of the IPCC are based mainly on "peer reviewed and published scientific/technical literature."[29] In its most recent report, the Third Assessment Report released in 2001, the IPCC concluded that "there is new and stronger evidence that most of the warming observed over the last fifty years is attributable to human activities."[30] The majority of the warming of the last twenty years is due to increased emissions of carbon dioxide in the atmosphere from fossil fuel burning, exacerbated by land use changes, especially deforestation.[31] Consequently, there is substantial evidence that regional climate changes have already affected physical, biological, social, and economic systems.[32] Global average temperatures have increased 0.6ºC during the twentieth century, and the IPCC predicts that global temperatures will continue to increase between 1.4ºC and 5.8ºC over the next hundred years.[33] This rapid rate of warming is likely to be

[28] IPCC, *About IPCC*, *at* http://www.ipcc.ch/about/about.htm (last visited Dec. 11, 2004) (on file with journal).

[29] *Id.*

[30] IPCC, SUMMARY FOR POLICYMAKERS: A REPORT OF WORKING GROUP I OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 10 (2001) [hereinafter IPCC, SUMMARY FOR POLICYMAKERS], *available at* http://www.ipcc.ch/pub/spm22-01.pdf.

[31] *Id.* at 7.

[32] INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2001: SYNTHESIS REPORT 6 (2001) [hereinafter IPCC, SYNTHESIS REPORT], *available at* http://www.grida.no/climate/ipcc_tar/vol4/english/.

[33] IPCC, SUMMARY FOR POLICYMAKERS, *supra* note 30, at 2, 13.

unprecedented during the last 10,000 years of ecological record.[34] In addition to increased temperatures, sea level and carbon dioxide concentrations are also predicted to increase during the next hundred years with severe consequences for the human environment.[35] Current levels of carbon dioxide are the highest in 420,000 years, and they have increased over 30 percent since 1750; additionally, the current rate of increase of carbon dioxide in the atmosphere is the highest in the last 20,000 years.[36]

The present and projected effects of these changes are substantial. Humans are facing and will continue to face increasing health risks including temperature stress; spread of diseases; poor water, air, and food quality; and lack of food availability.[37] In addition, climate change causes significant disruption of ecosystems, extinction of vulnerable species, and "substantial damage to or complete loss of some unique ecosystems."[38] Rising sea level will put many human settlements at risk due to coastal flooding and erosion, with an expected sea level increase between 0.09 and 0.88 meters by 2100.[39] Increasing concentrations of greenhouse gases will result in "changes in frequency, intensity, and duration of extreme events, such as more hot days, heat waves, heavy precipitation events, and fewer cold days."[40] Ultimately, local environmental conditions and socioeconomic factors influence the severity of the effects of climate change on particular communities.[41]

Mitigation, defined as reducing greenhouse gas emissions to stop or reduce climate change, can delay and lessen the severity of these harmful impacts. Slowing the rate of increase of global average temperatures and sea level will allow more time for humans to adapt to their effects. Adaptation, on the other hand, refers to "the process of reducing a region's vulnerability to climate change."[42] Some level of adaptation to climate change is

[34] *Id.* at 13.
[35] *See id.* at 13–14.
[36] *Id.* at 7.
[37] IPCC, SYNTHESIS REPORT, *supra* note 32, at 9.
[38] *Id.* at 11–12.
[39] IPCC, SUMMARY FOR POLICYMAKERS, *supra* note 30, at 16.
[40] IPCC, SYNTHESIS REPORT, *supra* note 32, at 14.
[41] *See id.* at 11.
[42] World Wildlife Fund, *What Can Be Done About Climate Change?*, *at* http://www.wwfpacific.org.fj/climate_change/cc_pacific_info_watcanbedone.html (last visited Dec. 11, 2004) (on file with journal).

necessary because mitigation, even if successfully implemented, will not be able to prevent all damages, since several of these changes will occur even after stabilization of greenhouse gas emissions because many greenhouse gases are long-lived and will continue to alter the climate for centuries after they are released.[43] The ice sheets, for example, are predicted to continue to contribute to sea level rise for thousands of years after greenhouse gas emissions have been stabilized.[44] Adaptation, however, is costly[45] and only works to a certain point, as it is impossible to adapt to all future climate change impacts.[46]

B. *Climate Change in the Arctic*

The impacts of climate change are predicted to be particularly severe in the Arctic region.[47] Some experts conclude that "[c]limate change and its effects in the Arctic may be the most serious environmental issue threatening the Arctic environment."[48] The annual average temperatures in the Arctic have increased by twice as much as the increase of annual average global temperatures.[49] Arctic sea ice has thinned by 40 percent in late summer to early autumn in recent decades, and the extent of the sea ice in spring and summer has decreased by 10 to 15 percent since the 1950s.[50] Snow cover has decreased in area by 10 percent in the middle and high latitudes of the Northern Hemisphere since the late 1960s.[51] Snow cover, permafrost, and sea ice extent are all predicted to rapidly decrease further in the Northern Hemisphere over the next hundred years.[52] The continued warming and

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[43] IPCC, SUMMARY FOR POLICYMAKERS, *supra* note 30, at 17.

[44] *Id.*

[45] *See, e.g.*, *infra* text accompanying notes 124–25; *see also* IPCC, SYNTHESIS REPORT, *supra* note 32, at 23.

[46] World Wildlife Fund, *supra* note 42.

[47] *See, e.g.*, ACIA, *supra* note 3, at 8.

[48] Center for International Environmental Law, *Climate Change and Arctic Impacts*, *at* http://www.ciel.org/Climate/Climate_Arctic.html (last visited Dec. 11, 2004) (on file with journal).

[49] *Id.*

[50] IPCC, SUMMARY FOR POLICYMAKERS, *supra* note 30, at 4.

[51] *Id.*

[52] *See* ACIA, *supra* note 3, at 22 (indicating an observed thawing of permafrost in the Arctic), 30 (projecting declines of 10 to 50 percent in annual average sea-ice extent by 2100), 31 (indicating that snow cover will decrease an additional 10 to 20 percent before the end of this century); *see also* IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 5, at 803 (predicting a

melting of the permafrost will make much of the Arctic land vulnerable to subsidence and landslides that affect infrastructure, watercourses, and ecosystems.[53]

In addition, climate change disproportionately affects the indigenous people that make up 1.5 million of the ten million people who live in the Arctic because of their subsistence way of life and unique difficulties in adapting to climate change without significant negative impacts on their ability to maintain their culture and communities.[54] For Arctic indigenous people, climate change is predicted to have serious negative health effects, including "changes in diet and nutritional health and exposure to air-, water-, and food-borne contaminants."[55] The health of people dependent upon marine resources from the Arctic Ocean, especially Arctic indigenous people whose traditional diet is significantly composed of marine resources such as walrus, whales, seals, and fish, is particularly at risk.[56] Reductions in sea ice, for example, may result in the release of persistent organic pollutants that have been trapped for years in bubbles in the ice—

substantial loss of sea-ice), 804 (reporting an expected thaw of existing permafrost terrain).

[53] IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 5, at 801–41. Climate change has weakened permafrost, affecting its capacity to support buildings, pipelines, and roads. *Id.* at 828. IPCC gives the example of the Yakutsk region where a 2°C rise in the soil temperature due to warming caused a 50 percent decrease in the bearing capacity of frozen ground. *Id.* This, in turn, leads to increased costs of building in these affected areas. *Id.*

[54] IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 5, at 827. The "Arctic" includes part or all or the territories of "Norway, Sweden, Finland, Denmark, Iceland, Canada, Russia, and the United States, as well as the homelands of dozens of indigenous groups that encompass distinct sub-groups and communities." ACIA, *supra* note 3, at 6.

[55] IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 5, at 827. These negative health effects can also be attributed to economic development associated with oil extraction, fish farming, and mining. *Id.*

[56] *See id.* According to the United States Global Change Research Program,

> Alaska's 117,000 rural residents collect about 43 million pounds of wild food annually, equivalent to 375 pounds per person each year. In some remote communities, the subsistence harvest is as high as 800 pounds per person. Fish comprise 60% of the wild harvest, but there is substantial regional variation: west coast communities rely principally on fish, while northern ones rely more on marine mammals, and interior ones on both fish and land mammals.

U.S. Global Change Research Program, *Alaska*, *in* CLIMATE CHANGE IMPACTS ON THE UNITED STATES: THE POTENTIAL CONSEQUENCES OF CLIMATE VARIABILITY AND CHANGE 75, 78–79 (2000) [hereinafter USGCRP, *Alaska*], *available at* http://www.usgcrp.gov/usgcrp/Library/nationalassessment/overview.htm.

such as the insecticide hexachlorocyclohexane.[57] These pollutants could enter the food chain through marine consumers that accumulate these contaminants and which in turn may eventually be consumed by humans.[58] In addition, the current generation of young people in the Arctic will be exposed to a lifetime dose of 30 percent more ultraviolet radiation than the previous generation.[59] This increased radiation has been linked to "skin cancer, cataracts, and immune disorders."[60] The level of exposure to increased radiation will be significantly greater for those individuals, such as indigenous hunters and fishermen, who spend long periods of their average day outdoors.[61]

In November 2004, the Arctic Council released the Arctic Climate Impact Assessment (ACIA) report, concluding that impacts of climate change in the Arctic are even more severe and occurring more rapidly than previously reported.[62] Climate change is occurring in the Arctic at almost twice the rate as in the rest of

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[57] Hexachlorocyclohexane is more commonly known as lindane. "Excessive exposure to hexachlorocyclohexane may affect the blood, brain, breastfed babies, eye, liver, reproductive system and skin, and may cause cancer. Lindane is harmful to insects and fish and releases to water are therefore expected to harm wildlife. Lindane can accumulate in the fatty tissue of fish." Pollution Database, *Hexachlorocyclohexane (HCH)*, *at* http://pollution.unibuc.ro/?substance=31 (last visited Mar. 15, 2005) (on file with journal). According to the U.S. Environmental Protection Agency (EPA), most uses of lindane were restricted in the United States in 1983, but it "is currently used primarily for treating wood-inhabiting beetles and seeds. It is also used as a dip for fleas and lice on pets, and livestock, for soil treatment, on the foliage of fruit and nut trees, vegetables, timber, ornamentals and for wood protection." U.S. EPA, *Consumer Factsheet on: LINDANE*, *at* http://www.epa.gov/safewater/dwh/c-soc/lindane.html (last updated Feb. 14, 2005) (on file with journal).

[58] IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 5, at 828–29. *See generally* ARCTIC MONITORING AND ASSESSMENT PROGRAMME, AMAP ASSESSMENT REPORT: ARCTIC POLLUTION ISSUES 183–371 (1998) (providing data on persistent organic pollution in the Arctic), *available at* http://amap.no/documents/index.cfm?dirsub=/AMAP%20Assessment%20Report:%20Arctic%20Pollution%20Issues&sort=default.

[59] ACIA, *supra* note 3, at 11.

[60] *Id.*

[61] *Cf.* Charles S. Cockell et al., *Exposure of Arctic Field Scientists to Ultraviolet Radiation Evaluated Using Personal Dosimeters*, 74(4) PHOTOCHEMISTRY & PHOTOBIOLOGY 570, 570 (2001) (study of the level of daily ultraviolet radiation exposure of scientists working in the field in the Arctic showing an approximate doubling of their level of ultraviolet radiation exposure as compared to individuals who spent the majority of their time in tents during the experiment period).

[62] *See* ACIA, *supra* note 3; discussion *infra* notes 200–216.

the world.[63] The Arctic is experiencing these impacts first and most severely because of its thinner atmosphere and the fact that the amount of its land and sea covered by ice is decreasing, which increases heat absorption.[64] The ACIA study involved hundreds of scientists over a four-year period to create a comprehensive assessment of present and future Arctic climate change impacts and to make that information accessible to policymakers and the public.[65] The ACIA predicts that the Arctic could see a temperature increase of 3ºC by 2080.[66] Summer sea ice is reported to have decreased by 3 percent every decade during the last thirty years.[67] The climate change impacts may result in the disappearance of certain plants due to temperature and weather changes as well as to increasing population of insects and more frequent forest fires.[68] The lack of sea ice will have a profound effect on animals, including seals, walruses, and polar bears that use the ice for giving birth, resting, and hunting.[69] Changes in temperatures are also likely to cause many stocks of fish to move from Arctic waters, which in turn will impact the larger animals that depend on them as a food resource.[70] The ACIA highlights the importance of recognizing that climate change in the Arctic is very real, and that, because the Arctic climate affects many of the

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[63] *Id.* at 8.

[64] *See id.* at 20.

[65] *Id.* at Preface.

[66] Indigenous Peoples' Secretariat, Fact Sheet #1: The Arctic Climate Impact Assessment—Changes in Climate (Nov. 7, 2004) [hereinafter Fact Sheet #1], *available at* http://www.amap.no/acia/ (Press Information, Indigenous Peoples Media Package) (on file with journal).

[67] *Id.*

[68] Indigenous Peoples' Secretariat, Fact Sheet #2: The Arctic Climate Impact Assessment—Changes to Animals and Plants (Nov. 7, 2004) [hereinafter Fact Sheet #2], http://www.amap.no/acia/ (Press Information, Indigenous Peoples Media Package) (on file with journal). The warming climate and insect infestations make forests more susceptible to fire. *See* Center for International Environmental Law, *supra* note 48.

> Since 1970, the acreage subjected to fire has increased steadily from 2.5 million to more than 7 million acres per year. A single fire in 1996 burned 37,000 acres of forest and peat, causing $80 million in direct losses and destroying 450 structures, including 200 homes. As many as 200,000 Alaskan residents may now be at risk from such fires, with the number increasing as outlying suburban development continues to expand.

Id.

[69] Fact Sheet #2, *supra* note 68.

[70] *Id.*

world's climate processes, the world's climate will also be affected.[71]

C. *Inequitable Distribution of the Negative Impacts of Climate Change*

According to some environmental justice advocates, equity in emissions must be considered in international climate change negotiations on the reduction of emissions of greenhouse gases.[72] The impacts of climate change are felt disproportionately by poorer countries and resource-dependent settlements, such as indigenous groups,[73] despite the fact that they are the least responsible for greenhouse gas emissions. This is in part due to the fact that the ability of humans to adapt to climate change is based on factors such as "wealth, technology, education, information, skills, infrastructure, access to resources, and management capabilities."[74] The result of the lack of equity in international negotiations is that:

> the international response to the global crisis of climate change has reproduced the patterns of advantage and disadvantage that plague the global community of nations. Within the international negotiations to address climate change, the interests of the world's poorer nations and of the environment itself have taken second place to the dominant economic interests of the richer nations and corporations.[75]

The atmosphere is a "global commons," a resource that is owned by no one and available for use by everyone.[76] Global commons present particular challenges for global sustainability

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[71] Fact Sheet #1, *supra* note 66.

[72] Anil Agarwal et al., *The Global Commons and Environmental Justice—Climate Change*, *in* 8 ENVIRONMENTAL JUSTICE: DISCOURSES IN INTERNATIONAL POLITICAL ECONOMY: ENERGY & ENVIRONMENTAL POLICY 171, 187 (John Byrne et al. eds., 2002).

[73] IPCC, SYNTHESIS REPORT, *supra* note 32, at 12.

[74] Union of Concerned Scientists, *Key Findings of Working Group II, Climate Change 2001: Impacts, Adaptation, and Vulnerability*, *at* http://www.ucsusa.org/global_environment/global_warming/page.cfm?pageID=521 (last visited Apr. 3, 2005) (on file with journal).

[75] Agarwal, *supra* note 72, at 171.

[76] A.R. Palmer, Boulder Area Sustainability Information Network (BASIN), *What Do We Mean by Global Commons?*, *in* TOWARD A STEWARDSHIP OF THE GLOBAL COMMONS: ENGAGING "MY NEIGHBOR" IN THE ISSUE OF SUSTAINABILITY, *at* http://bcn.boulder.co.us/basin/local/sustainin0.html (last visited Apr. 4, 2005) (on file with journal).

and equity because one group may monopolize or exhaust the entire resource to maximize its own profits.[77] Some environmental justice advocates argue that industrialized countries should have the initial responsibility to mitigate their actions by reducing their present and future emissions levels since they have used more than their proportional share of the absorptive capacity of the atmosphere by emitting high levels of greenhouse gases that have accumulated in the atmosphere and created the human-induced climate warming problem.[78] The IPCC recognizes that "[p]olicies that lessen pressures on resources, improve management of environmental risks, and increase the welfare of the poorest members of society can simultaneously advance sustainable development and equity, enhance adaptive capacity, and reduce vulnerability to climate and other stresses."[79] Industrialized countries, therefore, should consider adopting new policies or amending their existing policies to reflect the IPCC's recommendations. Recommendations include mitigating the climate change impacts created by their accumulated greenhouse gas emissions, particularly because these impacts are often inequitably distributed across poorer countries and resource-dependent settlements, such as most Arctic indigenous groups.[80]

The United States, however, which is responsible for the largest percentage of the world's carbon dioxide emissions, has yet to adequately address the climate change issue that is already negatively affecting many people in the world, particularly indigenous people in the Arctic, including Alaska.[81] For example, although some critics of the United States' climate change policies recognize that the United States has supported research and development of new "climate-friendly" technologies,[82] they take

[77] This theory is known as the "tragedy of the commons." Tsosie, *supra* note 10, at 292 (discussing Garrett Hardin, *The Tragedy of the Commons*, 162 SCIENCE 1243 (1986)).

[78] Agarwal, *supra* note 72, at 173.

[79] IPCC, *Summary for Policymakers: Climate Change 2001: Impacts, Adaptation, and Vulnerability: A Report of Working Group II of the Intergovernmental Panel on Climate Change*, *in* IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 5, at 1, 8, *available at* http://www.grida.no/climate/ipcc_tar/vol4/english/pdf/wg2spm.pdf.

[80] *See generally* discussion *supra* text accompanying note 73.

[81] *See* discussion *infra* text accompanying notes 230–37.

[82] PEW CENTER ON GLOBAL CLIMATE CHANGE, CLIMATE CHANGE ACTIVITIES

issue with the United States' lack of any established policy that would create a market for these technologies, such as tax-incentives to purchase the new technologies or "cap and trade" programs that would set an overall greenhouse gas emissions limit to encourage use of the cleaner technologies.[83] In addition, voluntary greenhouse gas emission target levels set by the United States will allow emissions to increase by 12 percent by 2012 and lack any mechanisms to ensure that the targets will even be met.[84]

Resource-dependent communities are particularly vulnerable to climate change because their economic livelihoods depend on natural resources and are consequently vulnerable to any changes in the availability of these resources.[85] Arctic indigenous groups are one of the most vulnerable resource-dependent communities because they lead subsistence lives.[86] The traditional Arctic indigenous way of life is based upon hunting and gathering animals such as whales, caribou, and seals.[87] Thus, Arctic indigenous groups are highly susceptible to changes in sea ice, changes in the abundance of hunted species, and changes in the migration routes of hunted species, all of which might occur as a result of climate change.[88]

The rapid changes expected in the Arctic will force indigenous people to adapt and leave behind their traditional lifestyles unless drastic measures are implemented to reduce climate change.[89] The 2001 IPCC report predicted that "[Arctic

IN THE U.S.: 2004 UPDATE 3 (2004), http://www.pewclimate.org/what_s_being_done/us_activities_2004.cfm. For example, in response to President Bush's Climate Change and Hydrogen Fuels Initiatives, the Department of Energy (DOE) announced the FutureGen Sequestration and Hydrogen Research Initiative. DOE describes the project as a "$1 billion government/industry partnership to design, build, and operate a nearly emission-free, coal-fired electric and hydrogen production plant. The 275-megawatt prototype plant will serve as a large scale engineering laboratory for testing new clean power, carbon capture, and coal-to-hydrogen technologies." DOE claims that it will be "the cleanest fossil fuel-fired plant in the world." DOE, *FutureGen—A Sequestration and Hydrogen Research Initiative*, Feb. 2003, at 1, *available at* http://www.energy.gov/engine/doe/files/import/FutureGenFactSheet.pdf.

[83] *See* PEW CENTER ON GLOBAL CLIMATE CHANGE, *supra* note 82, at 3.

[84] *Id.*

[85] IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 5, at 392.

[86] *See id.* at 394.

[87] *Id.* at 394.

[88] *Id.*

[89] *See id.* at 831.

indigenous people's] homelands and hunting habitats will be directly affected, and they cannot easily retreat to less affected areas."[90] According to the IPCC report:

> For indigenous communities following traditional lifestyles, opportunities for adaptation to climate change appear to be limited. Long-term climate change, combined with other stresses, may cause the decline and eventual disappearance of communities. Technologically developed communities are likely to adapt quite readily to climate change by adopting altered modes of transport and by increased investment to take advantage of new commercial and trade opportunities.[91]

Additionally, adaptation of the Arctic ecosystem to climate change includes changes in the migration patterns of species and the types of species found within particular areas, changes that further erode Arctic indigenous people's way of life by altering the availability of game and other resources.[92]

Adaptation for indigenous people may mean eventual assimilation because the homelands that define their way of life will be lost. According to the Inuit Circumpolar Conference (ICC),[93] Arctic indigenous people must be able to adapt on their own terms and understand the consequences of their actions, or adaptation will be "a very slippery slope to assimilation."[94] The ICC encourages climate change policy recommendations from Arctic countries that deal with both mitigation and adaptation.[95] However, for successful adaptation, the ICC calls for "enlightened

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[90] *Id.*

[91] *Id.*

[92] *See, e.g.*, *id.*

[93] The ICC is an organization whose members include some of the over 150,000 Arctic indigenous people from the United States, Canada, Greenland, and Russia. *See* ICC-Alaska, *About ICC*, *supra* note 2. For a description of goals of the ICC, see *supra* text accompanying note 2.

[94] Watt-Cloutier Remarks, *supra* note 2. The IPCC further recognizes:

> Although most indigenous peoples are highly resilient, the combined impacts of climate change and globalization create new and unexpected challenges. Because their livelihood and economy increasingly are tied to distant markets, they will be affected not only by climate change in the Arctic but also by other changes elsewhere. Local adjustments in harvest strategies and in allocation of labor and capital will be necessary. Perhaps the greatest threat of all is to maintenance of self-esteem, social cohesion, and cultural identity of communities.

IPCC, IMPACTS, ADAPTATION, AND VULNERABILITY, *supra* note 5, at 805.

[95] Watt-Cloutier Remarks, *supra* note 2.

policies and programmes by national governments, firm commitments to work closely with [indigenous people], and a willingness to provide Indigenous people and all northerners with decision-making tools, that is, authority to make decisions."[96] For the ICC, adaptation by relocation of Arctic indigenous people from their homelands cannot be the only solution to climate change-related problems affecting their communities. Many Arctic indigenous people may not be persuaded to leave their homelands.[97] The ICC calls for policies that expand the ability of Arctic indigenous people to maintain their traditional culture and community identity, particularly policies geared towards mitigation through reduction of greenhouse gas emissions.[98]

III. CLIMATE CHANGE AS EXPERIENCED BY ARCTIC INDIGENOUS PEOPLE

A. *Loss of Subsistence Lives and Culture*

One of the most significant impacts of climate change on Arctic indigenous people is the forced change to the way of life that defines them. The changing climate is altering the availability of the food resources on which they rely.[99] Berries, which are traditionally collected, may not thrive in the changing climate, and animal populations relied on as food resources, such as seals and walruses, will disappear with the diminishing sea ice, further limiting traditional food options.[100] When Arctic indigenous people are deprived of traditional foods, they often suffer both physical and mental consequences.[101] Physically, Arctic indigenous people who rely on hunting and fishing for their present diet may experience increased diet-related diseases such as

[96] *Id.*
[97] *See id.*
[98] *See id.*
[99] Indigenous Peoples' Secretariat, Fact Sheet #3: The Arctic Climate Impact Assessment—Effects on Indigenous Peoples (Nov. 7, 2004) [hereinafter Fact Sheet #3], *available at* http://www.amap.no/acia (Press Information, Indigenous Peoples Media Package) (on file with journal); *see also* Cindy Dickson, *The Impact of Climate Change on Traditional Food*, POLAR ENVTL. TIMES, Oct. 2003, at 3, *available at* http://www.environmenttimes.net/_documents/poltimesp3.pdf.
[100] *See* Fact Sheet #3, *supra* note 99.
[101] *Id.*; *see also* Dickson, *supra* note 99, at 3.

heart disease and diabetes.[102] Arctic indigenous people may also suffer from intense grief when deprived of traditional foods because such foods are important aspects of cultural identity.[103]

The changing landscape frustrates traditional means of economy and subsistence, threatening the future of fishing, hunting, and reindeer herding.[104] Animal populations, migration routes, and the safety of travel have all been affected by climate change.[105] The ACIA report concludes that "warming is likely to disrupt or even destroy [the Arctic indigenous people's] hunting and food-sharing culture as reduced sea ice causes the animals on which they depend to decline, become less accessible or possibly become extinct."[106] Interviews with Arctic indigenous elders reveal that they notice fewer seals now than when they were young, while the numbers of species of animals from the south such as insects, geese, and musk ox are increasing.[107] The elders explain that the weather was much colder and more predictable when they were young, and the ice was also thick and safe for travel.[108] Now they are concerned for younger hunters traveling on the ice, as many hunters are killed by falling through thin ice that was safe to travel across during the same time of year only a few years before.[109] The elders further explain that they no longer use igloos as they did in the past because there is not enough snow.[110] One hunter, reflecting on the later snows in the winter, noted that, "When we go hunting now, we go into areas where there is snow, but we have to look for snow. When we were young we didn't have to wait long for the snow to come."[111] Waiting for the snow often means waiting for the ability to travel safely to fishing and hunting grounds. Arctic indigenous people have observed, in some cases, that the lack of snow, along with changes in wind patterns and warmer winters, results in the loss of traditional sea ice travel routes and increases concern for the safety of those

[102] Joseph Tigullaraq, *The View from Nunavut*, *in* SNOWCHANGE, *supra* note 11, at 194–96.
[103] *See* Fact Sheet #3, *supra* note 99.
[104] *See, e.g.*, *id.*
[105] *See, e.g.*, *id.*
[106] ACIA, *supra* note 3, at 16.
[107] Mustonen, *supra* note 11, at 139–41.
[108] *Id.* at 136–44.
[109] *See, e.g.*, ACIA, *supra* note 3, at 97.
[110] Mustonen, *supra* note 11, at 137, 139.
[111] *Id.* at 137.

traveling on potentially weakened sea ice.[112] In interviews with indigenous elders, hunters, and fishermen, reflecting on their way of life in the past and how it has changed with the changing climate, the safety of the youth in the community, as well as their ability to continue their cultural traditions, emerged as a foremost concern.[113]

The language and spiritual culture of Arctic indigenous people is so closely tied to the land that their contextual meaning may be lost to the changes brought on by human-induced climate change.[114] Once the ecological character of the land is altered, there may be a "great chasm" between the land and the knowledge that is based upon that land.[115] TEK is based upon an intimate knowledge of the land built by many generations; therefore, it may be impossible to maintain TEK if the environment changes so rapidly that it essentially becomes "another ecosystems [sic] with different plants, animals, and spiritual forces."[116] Consequently, indigenous people frequently view attempts to disconnect them from their lands as "cultural genocide."[117]

B. *Loss of Villages and Lands in Coastal Arctic Indigenous Communities*

Sea level rise and coastal erosion are the most significant factors contributing to the alteration of the lands of Arctic indigenous communities living along the coast. Globally, the combined effects of sea level rise and coastal erosion have had significant and dramatic effects on the physical character of many villages and lands of Arctic indigenous people. As an example of this global problem, in Alaska where most of the native villages are located on the coast and along riverbanks, almost the entire 6600 miles of coastline is inundated by severe flooding and erosion.[118] In 2003, the United States Congress directed the

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[112] *See, e.g.*, Tigullaraq, *supra* note 102, at 195.

[113] *See* Mustonen, *supra* note 11, at 136–44.

[114] Leanne Simpson, *The Colonial Context for the Indigenous Experience of Human-Induced Climate Change*, *in* SNOWCHANGE, *supra* note 11, at 25, 27.

[115] *Id.*

[116] *Id.*

[117] *Id.*

[118] General Accounting Office (GAO), Highlights of GAO-04-142: Alaskan Native Villages: Most Are Affected by Flooding and Erosion, but Few Qualify for Federal Assistance, Dec. 2003, *available at* http://www.gao.gov/highlights/d04142high.pdf.

General Accounting Office (GAO) to study the effects of flooding and erosion on Alaskan native villages to determine the extent to which villages are affected, identify federal and state flooding and erosion control programs, determine the status of efforts to respond to flooding and erosion problems in nine particularly affected villages, and recommend alternatives for Congress to consider when providing assistance for these problems in native villages.[119]

The GAO report highlighted the inadequacy of the government's response to the flooding and erosion problems of Arctic indigenous people in Alaska and the inefficiency of a government system that does not include direct communication with those indigenous people directly affected by policy decisions in the decision-making process.[120] The GAO report concluded that despite the fact that flooding and erosion affect 184 of 213, or 86 percent, of native villages in Alaska to some extent, very few of the villages actually qualify for federal assistance.[121] In addition, the report linked the increased susceptibility of native villages to flooding and erosion in part to rising temperatures in the Arctic.[122]

Often, the government response to serious flooding and erosion problems in Arctic indigenous communities is relocation of the village. For example, nine of the villages reviewed by the GAO report are considered in "imminent danger" from flooding and erosion, and four of these villages have been forced to relocate.[123] Relocation is a lengthy and costly process.[124] Cost estimates for relocation of one of these villages range from $100 to

[119] *Id.* The GAO, working with federal and state officials as well as village representatives, identified alternatives that Congress should consider to improve the ability of these agencies to provide assistance to native communities. The report recommended expansion of the Denali Commission, which was created in 1998 to assist with economic development and infrastructure needs of rural Alaskan communities. The GAO suggested that the Denali Commission adopt policy guidelines to specifically deal with the future infrastructure needs of native villages affected by flooding and erosion. *Id.*

[120] *See* GAO, GAO-04-142, ALASKA NATIVE VILLAGES: MOST ARE AFFECTED BY FLOODING AND EROSION, BUT FEW QUALIFY FOR FEDERAL ASSISTANCE 2–6 (Dec. 2003), *available at* http://www.gao.gov/new.items/d04142.pdf.

[121] *Id.* at 2–3.

[122] *See id.* at 3.

[123] The four villages that have current plans to relocate are Kivalina, Koyukuk, Newtok, and Shishmaref. The other five villages studied are in various stages of addressing flooding and erosion problems. *Id.* at 4.

[124] *See id.*

$400 million.[125] Even if the government response of relocation is adequate, relocation isolates indigenous people from the homelands that define their culture and community, further pushing them towards assimilation.[126] The impact on some villages, however, is so severe that they are left with no choice but to relocate. For example, in Shishmaref, one of the four identified villages undergoing relocation, the small indigenous community is experiencing devastating damages from coastal erosion due to climate change.[127] Rising seawater has caused three homes to fall into the sea and seven more homes to be relocated.[128] In the next few decades, the entire village could be inundated.[129] In addition, the encroaching seawater has contaminated the village's drinking water supply.[130] With their village dump now located only eight feet from the sea, there is potential for long-term pollution of the surrounding marine environment if the dump becomes breached by the seawater.[131]

The GAO report illustrated examples of the consequences of governments making policy decisions that affect indigenous communities without giving the people living in the communities an opportunity to voice their interests and concerns regarding the problem and potential solutions. The report identified the need for enhanced communication between policymakers and those living in native villages in Alaska. In particular, it related instances in which the federal government had allocated federal resources to build infrastructure in villages where the native people had already planned to relocate.[132] Such incidents of miscommunication

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[125] *Id.*

[126] *See generally* Watt-Cloutier Remarks, *supra* note 2. *See* discussion *supra* text accompanying notes 89–98.

[127] Center for International Environmental Law, *supra* note 48.

[128] *Id.*

[129] *Id.*

[130] *Id.*

[131] *Id.*

[132] For example, in the village of Newtok, the Denali Commission and the Department of Housing and Urban Development agreed to pay $1.1 million for a health clinic despite the fact that residents no longer wanted to live in the village. *See* GAO, *supra* note 120, at 4–5, 39–40. The report stated that "[h]ad the agencies known of the village's relocation plans they could have explored other, potentially less costly, options for meeting the village's needs, until it is able to relocate." *Id.* at 5. In the village of Koyukuk, the Federal Aviation Administration sought a $10.3 million bid to improve the airport runaway, despite the fact that villagers and state officials knew of the plans to relocate the

further suggest the need to incorporate indigenous people directly affected by policy decisions into the decision-making process.

IV. THE VALUE OF TRADITIONAL ECOLOGICAL KNOWLEDGE

A. *Scientists and Policymakers Often Ignore and Dismiss Traditional Ecological Knowledge*

Nonindigenous people have generally viewed indigenous people as problematic "obstacles to the progress of [modern] civilization."[133] Indigenous people in Canada, for example, have had and continue to have little control over the destructive environmental practices of outside industrial development that is occurring on or affecting their lands.[134] Over centuries, indigenous people have fought for their sovereignty and land rights in the face of a dominant culture that promotes these industries that threaten their way of life.[135] Some indigenous people see human-induced climate change as a direct result of the western worldview "that has supported the destruction of the environment and the destruction of Indigenous national territories in order to promote unfettered industrialization and globalization."[136] Therefore, to address climate change in a manner that is inclusive of indigenous viewpoints, policymakers must acknowledge the actual ecological damage that indigenous nations suffer from industrial development and pollution.[137]

Through colonization and adaptation to modern times, indigenous people have often been forced to leave behind their traditional values for those of the dominant society.[138] Some

village. *See id.* at 35.

[133] Taiaiake Alfred, *Peace*, *in* PEACE, POWER, AND RIGHTEOUSNESS (1999), *reprinted in* SNOWCHANGE, *supra* note 11, at 42, 43.

[134] *See, e.g.*, Simpson, *supra* note 114, at 26.

[135] *See, e.g.*, Curtis Rattray, *Tahltan Observations of Climate Change, Speech Delivered at Snowchange 2002 Conference*, *in* SNOWCHANGE, *supra* note 11, at 98, 99 (discussing one example of how indigenous sovereignty has been questioned and how indigenous land rights are seen as inferior to those of the colonizing state sovereign).

[136] Simpson, *supra* note 114, at 26.

[137] *Id.* These industrial developments include, for example, large logging, mining, and oil exploration projects that bring intensive deforestation and pollution to indigenous lands. *Id.*

[138] Tsosie, *supra* note 10, at 244 (referencing the arguments in Robert A. Williams, Jr., *Large Binocular Telescopes, Red Squirrel Pinatas, and Apache Sacred Mountains: Decolonizing Environmental Law in a Multicultural World*,

environmental justice advocates argue that western science and economic policies have often worked to disenfranchise indigenous people by disregarding their tribal sovereignty and special interests.[139] The dominant environmental ethic sometimes results in decision making that is contrary to indigenous environmental ethics.[140] Professor Robert Williams, for example, argues that American environmental law has a set of values that is antithetical to achieving environmental justice for indigenous people because it privileges human values over environmental values and does not incorporate the view commonly held by indigenous people that these values are interconnected.[141] Indigenous people are consequently "forced to conduct themselves within the framework of the dominant value and legal systems, thereby preventing indigenous visions of environmental justice from guiding human conduct toward the environment."[142]

One aspect of the colonization of indigenous people is that TEK has historically been dismissed as valueless.[143] Western science, for example, has generally rejected the TEK of indigenous people as "anecdotal, non-quantitative, without method, and unscientific."[144] The difference in worldview between the dominant society and indigenous people also leads to the difficulty scientists and policymakers have with fully understanding TEK. For example, they often view TEK as a single body of knowledge and focus on its ecological aspects; however, it is important to recognize that indigenous people view TEK as their way of life and that the spiritual and sustainable aspects of TEK cannot be separated from the ecological knowledge.[145] Those who hold knowledge are viewed merely as "conduits to knowledge that is controlled by spirits and ancestors."[146] Critics argue that because TEK is spiritually based

96 W. VA. L. REV. 1133 (1994) [hereinafter Williams, *Large Binocular Telescopes*]); *cf.* LaDuke, *supra* note 8, at 137.

[139] *See* Tsosie, *supra* note 10, at 245–46.

[140] *See generally id.* at 243–44.

[141] *Id.* at 244 (referencing Williams, *Large Binocular Telescopes*, *supra* note 138).

[142] *Id.*

[143] *See*, *e.g.*, discussion *supra* text accompanying notes 138–42.

[144] George Hobson, *Traditional Knowledge Is Science*, 20 N. PERSP. (1992), http://www.carc.org/pubs/v20no1/science.htm (on file with journal).

[145] *See* Simpson, *supra* note 114, at 27.

[146] *Id.*

there is no way to evaluate the correctness of the precepts of TEK.[147] Indigenous people argue that TEK is stronger and broader than traditional science, including a spiritual connection to the environment; therefore, it is not proper to identify traditional science as the equivalent of TEK.[148] However, because monitoring and observation of the environment is an integral part of TEK as it is of many scientific research methods, the two can be incorporated and work to strengthen each other.[149] The special connection that indigenous people have to the environment, often explained in spiritual terms, also includes a unique intellectual knowledge about that environment and its history that has been developed over thousands of years and passed down through generations.[150] TEK, therefore, offers valuable observations and principles that are essential for a comprehensive understanding of the Arctic environment and history that can be beneficial to enhancing the data available to scientific research in the Arctic.

Scientists and policymakers have recently begun to recognize that TEK does have validity.[151] It is necessary to study and document TEK to learn how it can be interpreted and used in conjunction with the scientific framework to achieve research objectives in the North.[152] Scientists should involve indigenous people in all aspects of research projects in which their TEK is used; however, they should also be careful not to adversely affect the culture of indigenous people through imposition of western science.[153] According to one TEK scholar, "[t]raditional knowledge *is* science, and the sooner southern scientists make use

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[147] Terry Fenge, *Ecological Change in the Hudson Bay Bioregion: A Traditional Ecological Knowledge Perspective*, 25 N. PERSP. (1997), http://www.carc.org/pubs/v25no1/change.html.

[148] *See* Arctic Native Science Commission, *supra* note 14.

[149] *Id.*

[150] U.S. Global Change Research Program, *Native Peoples and Homelands*, *in* CLIMATE CHANGE IMPACTS ON THE UNITED STATES, *supra* note 56, at 84, 87 [hereinafter USGCRP, *Native Peoples and Homelands*], *available at* http://www.usgcrp.gov/usgcrp/Library/nationalassessment/13NA.pdf.

[151] Hobson, *supra* note 144; *see, e.g.*, USGCRP, *Native Peoples and Homelands*, *supra* note 150; Henrik Moller et al., *Combining Science and Traditional Ecological Knowledge: Monitoring Populations for Co-Management*, 9 ECOLOGY & SOC'Y (2004), *at* http://www.ecologyandsociety.org/vol9/iss3/art2; Canadian Environmental Assessment Act, R.S.C. ch. 37, § 16.1 (2003) (Can.).

[152] *Id.*

[153] *Id.*

of that traditional knowledge, the better it will be for their research."[154] Additionally, policies based on studies that take TEK into account will be more informed reflections of the realities of the northern environment.

TEK is an important tool which can be used to document and analyze some of the changes that are occurring in the Arctic environment, and it should not be dismissed as valueless on its face. It is one important tool to understand the full impacts of climate change, but not an exclusive tool to analyze all aspects of climate change.[155] TEK is limited in its ability to explain or prove causation of human-induced climate change or to specifically distinguish its impacts from natural climate variability;[156] however, TEK should be incorporated where the information that it provides on the impacts of climate change can enhance the findings of science or policy. Incorporating TEK in this way is important because it expands the collective knowledge of the Arctic environment, and such collective knowledge can be used to enhance research in the area and to increase understanding of the environmental changes in order to develop more informed policies.[157]

B. *The Benefits of Incorporating Traditional Ecological Knowledge into Science and Policy*

TEK has many unique advantages to offer climate change policies and science. The most significant benefits that the use of TEK can provide are more complete information about the local environment, an opportunity for Arctic indigenous people to have a voice in the decision-making process so that they will be more likely to support and follow policies, and the ability to detect some early impacts of climate change that might elude scientists and policymakers. First, TEK includes continuous, long-term observations of local climate change effects that are not otherwise available to scientists and policymakers.[158] Because climate change is variable in time and space, and changes at a regional or local level may be very different than the global pattern, the observations of local changes that TEK provides are

[154] *Id.*
[155] *See generally* ACIA, *supra* note 3, at 92–93, 122.
[156] *See, e.g.*, Moller et al., *supra* note 151.
[157] *See, e.g.*, ACIA, *supra* note 3, at 122.
[158] Moller et al., *supra* note 151.

important for a complete picture of the impacts of climate change in the Arctic.[159] This increased local knowledge base can be used to assess local or regional vulnerability to climate change and to aid policymakers in developing adaptation strategies to deal with specific local impacts of climate change.[160] Science can offer better tests for potential causes of change over large spatial scales, but since science is expensive, often requires special skills or technology, and is less practicable in remote places such as the Arctic, the scope of scientific endeavors is often limited.[161] Because scientists are often constrained to short periods of time for data collection, they may miss extreme events that are observed by Arctic indigenous people.[162] By working with Arctic indigenous people, therefore, scientists can often benefit from a great depth of temporal data not otherwise available to them.[163]

Combining TEK with science can help scientists achieve a more accurate assessment of the whole ecosystem.[164] Case studies of how Arctic indigenous people use TEK to monitor changes they observe in the environment show that "although traditional monitoring methods may often be imprecise and qualitative, they are nevertheless valuable because they are based on observations over long time periods, incorporate large sample sizes, are inexpensive, invite the participation of harvesters as researchers, and sometimes incorporate subtle multivariate cross checks for environmental change."[165] These studies show that while different fundamental assumptions about the world and spiritual beliefs can lead scientists and indigenous people to different conclusions about what is causing problems and how to solve them, they overwhelmingly agree as to the nature of problems. TEK is particularly useful to inform scientific studies of local ecology.

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[159] *See* Elina Helander, Global Change—Climate Change Observations Among the Sámi, Address before the Snowchange Conference, Tampere, Finland (Feb. 22–24, 2002), *in* SNOWCHANGE, *supra* note 11, at 302–06.

[160] *See, e.g.*, SIRI ERIKSEN & LARS OTTO NAESS, PRO-POOR CLIMATE ADAPTATION: NORWEGIAN DEVELOPMENT COOPERATION AND CLIMATE ADAPTATION: AN ASSESSMENT OF ISSUES, STRATEGIES, AND POTENTIAL ENTRY POINTS 14–15 (Nov. 2003), *available at* http://www.cicero.uio.no/media/2465.pdf.

[161] *See* Moller et al., *supra* note 151.

[162] *Id.*

[163] *Id.*

[164] *See generally id.*

[165] *Id.*

For example, monitoring for wildlife studies can benefit from the knowledge of Arctic indigenous hunters and fisherman.[166] By providing detailed, informed observations of both the dramatic and subtle changes that have taken place over generations in the Arctic, the TEK of Arctic indigenous people can be extremely valuable to science, and ultimately to policy decisions based on the science.[167]

Arctic indigenous people's experiences adapting to climate change are also valuable because "[a]daptation to current climate variability and extremes can serve as a guide for future adaptation and can produce present-day benefits."[168] TEK is particularly useful for this kind of information because it is developed and lived in practice and therefore is constantly evolving based upon the changing environment.[169] In addition, one author has noted, "TEK is considered and reformed in relation to new information at each moment in relation to what happens in nature and people's plans and activities."[170] A recent scientific article that analyzed TEK methods determined that, because TEK is based upon learning by doing, it is similar to the environmental management practice of "adaptive management."[171] Adaptive management is a systematic process for continually improving management policies by assessing the outcomes of those policies and making adjustments accordingly.[172] Because Arctic indigenous people must adapt to changes in their surrounding environment to survive, they have a strong ability to detect subtle changes in the environment, and documenting these changes as they experience them is an integral part of TEK. Since TEK can provide this knowledge of the changing environment that might not otherwise be available, it is useful in the development of strategies to adapt

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[166] *See* Moller et al., *supra* note 151.

[167] *See, e.g.*, Henry P. Hunting, *The Changing Arctic: Indigenous Perspectives*, CICERONE, June 2004, http://www.cicero.uio.no/fulltext.asp?id=3250&lang=en.

[168] Union of Concerned Scientists, *supra* note 74.

[169] *See, e.g.*, Helander, *supra* note 159, at 302.

[170] *Id.*

[171] Moller et al., *supra* note 151. The article looks at the use of TEK for monitoring wildlife populations and suggests that combining TEK with science can be of great use for "co-management for sustainable customary wildlife harvests for indigenous people." *Id.* The article adds that TEK is also useful because science may not be trusted by those actually using the wildlife. *Id.*

[172] *See, e.g.*, Forest Practices Branch, British Columbia, *Definitions of Adaptive Management, at* http://www.for.gov.bc.ca/hfp/amhome/Amdefs.htm (last visited Mar. 30, 2005) (on file with journal).

to these changes.[173]

Most importantly, from an environmental justice perspective, incorporating TEK into decision-making provides a voice for Arctic indigenous people to describe their experiences and be heard in their own words. Interviewing indigenous elders and hunters about their experiences in the Arctic provides them with an opportunity to explain the changes in their environment as they see them and not merely to be told what is happening by policymakers or scientists.[174] Indigenous people may not trust scientists using methods unfamiliar to them; therefore, some scientists now accept indigenous people as equal partners, recognizing that "[r]etaining traditional monitoring methods is potentially crucial because they provide one of the few channels through which customary users can scrutinize science. If scientific methods cannot be tested, they are less likely to be trusted, and their findings will probably not be acted upon."[175] In addition, because TEK is part of indigenous people's way of life, it loses its meaning when separated from the source;[176] thus, indigenous people should be actively involved in decision making that interprets TEK.

Decision makers should not dismiss the concerns and observations of local people living in the affected environment merely on the basis that their concerns are "paranoid or misinformed."[177] It is important for decision makers to recognize the value of assessing the environment as it is experienced by those who actually live in it in order to make decisions about that environment that will directly affect those people.[178] "The concerns of local people must be given full and respectful treatment because it is the environment as they conceive it that, as far, as they are concerned, will be affected, and it is in terms of these understandings that they will respond to proposed initiatives."[179] It is essential for decision makers to realize that,

[173] *See supra* text accompanying notes 159–63.

[174] *See generally supra* text accompanying notes 21–23.

[175] Moller et al., *supra* note 151.

[176] Environment Canada, *supra* note 12.

[177] Roy A. Rappaport, *Human Environment and the Notion of Impact*, *in* ENVIRONMENTAL JUSTICE: DISCOURSES IN INTERNATIONAL POLITICAL ECONOMY 161 (Energy & Envtl. Policy Series, vol. 8, John Byrne et al. eds., 2002).

[178] *See generally id.* (discussing problems with evaluating impact of the environment on human beings).

[179] *Id.* at 161.

"[i]n defining the human environment, in predicting and assessing the potential adverse consequences of a proposed development or event, . . . it is necessary to recognize that other considerations, often decisive ones, lie beyond the reach of plausible metrical representation."[180]

Another benefit that TEK can provide is detection of climate change's early impacts.[181] Scientists generally look at average patterns, but indigenous observers take notice of unusual patterns and occurrences that scientists may miss.[182] Knowledge of these early impacts can be extremely useful as a warning and to allow time to predict the future impacts and develop possible adaptation strategies. However, it is often difficult for a locally impacted group to convince those with decision-making authority to acknowledge that such early impacts are actually occurring because such impacts are not easily quantifiable.[183] The only impacts that are considered are usually those that are readily quantifiable.[184] Because of this impediment to full discussion of the impacts, local people often distrust decisions that fail to consider all of the impacts they have observed.[185] TEK's qualitative identification of early, local impacts that science is not yet able to quantitatively define[186] could therefore be extremely useful not only because it would increase the available information on which to base policy decisions, but also because it would make indigenous people more receptive to those policy decisions.

C. *Incorporating Traditional Ecological Knowledge into Decision Making*

Over the last several years, the awareness of TEK among scientists[187] and policymakers has been increasing. Principle 22 of

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[180] *Id.*

[181] *See generally* Moller et al., *supra* note 151.

[182] *See id*.

[183] *See* Rappaport, *supra* note 177, at 162.

[184] *Id.*

[185] *See id.*

[186] *See generally* Moller et al., *supra* note 151 (discussing how TEK's "observation of extreme events and long-term adaptive strategies based on these observations" can complement science's quantitative information).

[187] *See* Milton M. R. Freeman, *The Nature and Utility of Traditional Ecological Knowledge*, 20 N. PERSP. (1992) (discussing how TEK adds to scientific understanding of ecological complexity), http://www.carc.org/pubs/v20no1/utility.htm.

the 1992 Rio Declaration on Environment and Development recognized indigenous people's right to participate in environmental management, stating:

> Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.[188]

Since then, some studies have utilized the information provided by TEK to enhance understanding of the natural world and the socioeconomic impacts of climate change. For example, in 1998, Native American people—including all "those living on and associated economically, culturally, and spiritually, with reservations and Native homelands" within the United States—were asked to participate in the United States Global Change Research Program's national assessment of climate change through workshops focused on the impact of climate change on native people and their lands.[189] The workshops recognized that "[n]ative communities are repositories of valuable human and natural resources with significant implications for addressing climate change issues," providing information on local effects and past climate variability.[190] The United States Global Change

[188] *Rio Declaration on Environment and Development*, *in* REPORT OF THE U.N. CONFERENCE ON ENVIRONMENT AND DEVELOPMENT, U.N. GAOR, U.N. Doc. A/CONF.151/26, Annex I (1992). *But see* Tsosie, *supra* note 10, at 318–19. Rebecca Tsosie argues that this recognition in fact may be more of a limitation on tribal sovereignty because it premises the value of indigenous people in environmental decision making on the idea that they will support policies of sustainable use, not on the inherent right to be heard on environmental issues. She argues: "[Indigenous groups are] thrust into the vanguard of policy development toward 'sustainable' use and environmental protection. However, they must also overcome the severe underdevelopment on the reservations which has resulted in some of the worst conditions of poverty and deprivation to be found in the United States." *Id.* Essentially, Tsosie sees this limited view of indigenous environmental policy as a stereotype.

[189] USGCRP, *Native Peoples and Homelands*, *supra* note 150; *see also Native Peoples/Native Homelands Climate Change Workshop*, ACCLIMATIONS, Sept.–Oct. 1998, http://www.usgcrp.gov/usgcrp/Library/nationalassessment/newsletter/1998.10/native.html (on file with journal). The first workshop was entitled "Native Peoples/Native Homelands Climate Change" and was conducted in Albuquerque, New Mexico, in 1998. *Id.*

[190] *Native Peoples/Native Homelands Climate Change Workshop*, *supra* note 189.

Research Program released a final report in 2000 on climate change impacts in the United States that included an overview of impacts on Native Americans. That report specifically recognized that natives of Alaska are already experiencing negative impacts from climate change, including melting permafrost and sea ice that is altering their subsistence lifestyles.[191] Despite this increased recognition, however, it is unclear to what extent, if any, TEK and the interests of indigenous people have influenced the climate change policies of the United States.

Canada has made attempts to incorporate TEK more formally into its environmental management policies. Canada's 1997 Oceans Act requires the Minister of Fisheries and Oceans to cooperate with aboriginal organizations and allows for the use of TEK to understand marine ecosystems.[192] The Oceans Act helped Canada set up mechanisms to allow access to local knowledge and TEK for use in coastal resource management plans.[193] Furthermore, Canada recently amended the Canadian Environmental Assessment Act (CEAA) to give authorities the discretion to consider community knowledge and "Aboriginal traditional knowledge" in any environmental assessment and at any step in the assessment process.[194] The Canadian Environmental Assessment Agency will establish the Aboriginal Advisory Committee to develop guidelines to assist responsible agencies in obtaining knowledge from indigenous groups in an ethical manner that respects the rights of the communities.[195] Interim principles for use of this knowledge in the CEAA require that a community must give prior informed consent to the use of their knowledge and that assessors should conduct research with

[191] USGCRP, Alaska, *supra* note 56.

[192] Canada Oceans Act, R.S.C., ch. 31, §§ 29, 33, 42(j) (1996) (Can.), http://www.canlii.org/ca/sta/o-2.4/whole.html.

[193] *See* Pacific Region, Fisheries and Oceans Canada, *Lessons Learned in Oceans Act Implementation from the Central Coast Land and Coastal Resource Management Plan*, *at* http://www.pac.dfo-mpo.gc.ca/oceans/im/lessons_e.htm (last updated Feb. 25, 2005) (on file with journal).

[194] Canadian Environmental Assessment Act, R.S.C. ch. 37, § 16.1 (2003) (Can.); Canadian Envtl. Assessment Agency, *Considering Aboriginal Traditional Knowledge in Environmental Assessments Conducted Under the Canadian Environmental Assessment Act—Interim Principles*, *at* http://www.ceaa-acee.gc.ca/012/atk_e.htm (last updated June 7, 2004) (on file with journal).

[195] *See* Canadian Envtl. Assessment Agency, *supra* note 194.

the assistance of the community.[196] In addition, the community may request an "access agreement" that defines how research of their knowledge should be conducted.[197] All research must respect the culture and tradition of indigenous people, and protection must be given to aboriginal intellectual property rights and sensitive information such as sacred sites.[198] The interim principles state that aboriginal and western knowledge often complement each other; however, where they differ, the report should include the recommendations of both knowledge systems and descriptions of how both were considered in the assessment.[199]

The involvement of indigenous people in the development of the ACIA report also signaled the value of TEK. Indigenous knowledge helped to inform scientists and policymakers in almost every chapter of the ACIA, and indigenous people helped write some of the chapters.[200] The ACIA report was requested by the Arctic Council,[201] which is an intergovernmental forum that addresses the concerns of Arctic people and governments consisting of the eight Arctic states (Canada, Denmark/Greenland/Faroe Islands, Finland, Iceland, Norway, Russia, Sweden, and the United States) as well as six indigenous people's organizations (the Aleut International Association, Arctic Athabaskan Council, Gwich'in Council International, Inuit Circumpolar Conference, Russian Association of Indigenous Peoples of the North, and Saami Council).[202] The indigenous people's organizations wanted the eight Arctic states to implement the recommendations from the ACIA report, which would have made the Arctic states world leaders on climate change issues.[203]

The use of TEK in the development of the ACIA report enhanced findings and provided additional evidence indicating that

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[196] *Id.*

[197] *Id.*

[198] *Id.*

[199] *Id.*

[200] *See* Press Release, Indigenous Peoples' Secretariat, Arctic Climate Assessment Proves Threat to Indigenous Peoples (Nov. 8, 2004) [hereinafter IPS, Arctic Threat], *available at* http://www.amap.no/acia/ (Press Information, Indigenous Peoples Media Package) (on file with journal); *see also* John Crump, *Why the Arctic Matters*, 3 POLAR ENVTL. TIMES 3 (2003), http://www.environmenttimes.net/_documents/poltimesp3.pdf.

[201] ACIA, *supra* note 3, at Preface.

[202] *Id.*

[203] *See* IPS Arctic Threat, *supra* note 200.

predicted changes in the Arctic were in fact already taking place.[204] For example, elders informed scientists that, despite their skills at predicting weather, annual events are occurring at different times of the year than in the past so that weather is unpredictable.[205] The quality of ice and snow has changed, making travel much more difficult for indigenous people, particularly hunters, because it is more difficult to build temporary shelters, use snowmobiles, and travel on rivers and streams in some areas where water levels have dropped significantly.[206] Furthermore, Arctic indigenous communities have observed freezing rains blocking animals from their food sources in the ice, causing death to animals such as reindeer and caribou, as well as the arrival of many new species of animals and plants that migrated from the south.[207] Indigenous people's role in the ACIA was to be the voice for their environment. As one indigenous community member stated: "The world can tell us everything we want to know. . . . [T]he world's indicators are there. They are always talking to us."[208]

However, despite the drastic effects of climate change noted by the scientists incorporating TEK who authored the ACIA report, the Arctic Council failed to make strong policy recommendations on combating the impact of climate change in the ACIA policy document released on November 24, 2004.[209] The seven-page ACIA policy document, developed in negotiations by the eight Arctic states based upon the findings of the preceding ACIA report, has been criticized as weak, given the findings of the ACIA report on the severity of warming in the Arctic and its predicted consequences for Arctic residents.[210] The policy

[204] *See* Indigenous Peoples' Secretariat, Fact Sheet #4: The Arctic Climate Impact Assessment—Traditional Knowledge of Indigenous Peoples (Nov. 7, 2004), *available at* http://www.amap.no/acia/ (Press Information, Indigenous Peoples Media Package) (on file with journal).

[205] *Id.*

[206] *Id.*

[207] *Id.*

[208] ACIA, *supra* note 3, at 13.

[209] Associated Press, *Arctic Council Shies from Warming Recommendations*, Nov. 24, 2004, WL ASSOCPR; *see* FOURTH ARCTIC COUNCIL MINISTERIAL MEETING, ARCTIC CLIMATE IMPACT ASSESSMENT POLICY DOCUMENT (2004), *available at* http://www.acia.uaf.edu/PDFs/ACIA_Policy_Document.pdf.

[210] Canadian Broadcast Ass'n, *Arctic Nations React to Climate Change with 'Modest Document,' at* http://north.cbc.ca/regional/servlet/PrintStory?filename=arctic-council-11242004&region=North (last updated Nov. 24, 2004) (on file with journal); *see* Associated Press, *supra* note

document makes general recommendations for both mitigation and adaptation, recognizing the need for further research, monitoring, observations, and modeling to refine and extend the findings of the ACIA report.[211]

The United States initially attempted to delay release of any policy recommendations from the ACIA, which the indigenous people's organizations involved in the ACIA report development process opposed.[212] A State Department spokesman stated that the United States would only support those policies that are consistent with the Bush administration's broader climate change policies and that the findings of the ACIA report would be considered along with other climate change studies to inform future policies.[213] In September 2004, Sheila Watt-Cloutier, chair of the ICC, testified before the Senate Committee on Commerce, Science, and Transportation to urge the State Department to consider its role in the ACIA and to stop "minimizing and undermining the effectiveness of this assessment process by refusing to allow policy recommendations to be published in a stand alone form just like the assessment itself."[214] Indigenous people's groups and environmental organizations see the weak recommendations as a "missed opportunity" for the Arctic Council to be a leader in climate change policy and recommend more stringent cuts in carbon dioxide emissions.[215] Watt-Cloutier, speaking for indigenous groups, described the recommendations as a "modest document," stating that "[i]t is less than what we wanted but it is more than what we expected."[216]

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[211] ARCTIC CLIMATE IMPACT ASSESSMENT POLICY DOCUMENT, *supra* note 209, at 4–6.

[212] *See* Letter from Michael Zacharof, President Aleut International Association, et al., to Ambassador Gunnar Palsson, Chair, Senior Arctic Officials, Arctic Council Secretariat 1 (Dec. 8, 2003), http://www.arcticpeoples.org/Newsletter/Documents/Letter_to_G._Palsson.pdf.

[213] Statement by Richard Boucher, Spokesman for the U.S. Dept. of State, U.S. Preparing with Others for Arctic Council Ministerial: U.S. Committed to Working Within U.N. Framework on Climate Change (Nov. 8, 2004), http://www.usembassycanada.gov/outreach/e1109a.htm (on file with journal).

[214] *Impacts of Climate Change: Hearing on S.R. 253 Before the Senate Comm. on Commerce, Science, and Transp.*, 108th Cong. (2004) (testimony of Sheila Watt-Cloutier, Chair, Inuit Circumpolar Conference).

[215] Canadian Broadcast Association, *supra* note 210.

[216] *Id.*

V. MAKING THEIR VOICES HEARD: ARCTIC INDIGENOUS ATTEMPTS TO DEFEND THEIR WAY OF LIFE AGAINST HUMAN-INDUCED CLIMATE CHANGE

A. *Violations of Arctic Indigenous People's Human Rights*

The ICC claims that the drastic changes imposed on Arctic indigenous people's ways of life by the impacts of human-induced climate change are violations of their fundamental human rights. More specifically, the ICC seeks accountability for the failure to take remedial actions by those countries most responsible for the negative impacts of human-induced climate change.[217] They hope to use certain international law conventions to publicize the effects of climate change upon their communities. According to the ICC, human-induced climate change violates the human rights of indigenous people under various provisions of the 1948 American Declaration on the Rights and Duties of Man, including the right to the preservation of health and to well-being under Article XI,[218] the right to the benefits of culture under Article XIII,[219] as well as the "long-standing right of all peoples to their own means of subsistence."[220] The ICC claims that the rights of Arctic indigenous people to "life, health, culture, means of subsistence,

[217] Sheila Watt-Cloutier, *Climate Change and Human Rights*, HUM. RTS. DIALOGUE, Spring 2004, at 10.

[218] American Declaration of the Rights and Duties of Man, May 2, 1948, O.A.S. Official Rec., Res. XXX, art. XI, adopted by the Ninth International Conference of American States (1948), *reprinted in* Basic Documents Pertaining to Human Rights in the Inter-American System, OAS/Ser.L/V/I.4 Rev. 9 (2003), *available at* http://www.cidh.org/Basicos/Basic.htm. "Every person has the right to the preservation of his health through sanitary and social measures relating to food, clothing, housing and medical care, to the extent permitted by public and community resources." *Id.*

[219] *Id*. art. XIII. "Every person has the right to take part in the cultural life of the community, to enjoy the arts, and to participate in the benefits that result from intellectual progress, especially scientific discoveries." *Id.*

[220] Watt-Cloutier Remarks, *supra* note 2 (also referring to guarantees of the Declaration: "article 9 [sic]-preservation of health and well being; and article 11 [sic]-benefits of culture"). In an article presented at the 98th American Society of International Law Meeting, Donald Goldberg and Martin Wagner recognized that global warming threatens Arctic indigenous communities' fundamental human rights, including "the rights to life and personal security; to use and enjoyment of property; to residence and movement; to inviolability of the home; to preservation of health; to the benefits of culture; to work and fair remuneration; to means of subsistence; and to free disposition of natural resources." Donald Goldberg & Martin Wagner, *Human Rights Litigation to Protect the Peoples of the Arctic*, 98 AM. SOC'Y INTL L. PROC. 227, 227 (2004).

and property" have been violated.[221] In addition, the ICC argues that "[c]limate change will erode the value and meaning of harvesting rights" granted to Arctic indigenous people in agreements such as the Alaska Native Claims Settlement Act (1971), James Bay and Northern Quebec Agreement (1975), Inuvialuit Final Agreement (1984), and the Nunavut Agreement (1993).[222]

With the release of the ACIA report, Arctic indigenous people have strong evidence backed by both science and TEK to support their claims.[223] The ICC plans to use the conclusions of the ACIA as a basis for a petition to the Inter-American Commission on Human Rights (IACHR),[224] to seek a declaration that the destruction of an indigenous way of life brought about by climate change violates fundamental human rights.[225] The IACHR is an independent body of the Organization of American States (OAS) that receives its mandate from the OAS Charter and the American Convention on Human Rights[226] to promote and defend human rights in the Inter-American system.[227] Some commentators

[221] Watt-Cloutier, *supra* note 217, at 10.

[222] Inuit Circumpolar Conference, ICC EXEC. COUNCIL RES. 2003-01, http://www.inuit.org/textonly.asp?lang=eng&num=244 (last modified Mar. 15, 2005) (on file with journal).

[223] Watt-Cloutier, *supra* note 217, at 10.

[224] The IACHR is one of two bodies, along with the Inter-American Court of Human Rights, that promote human rights in the inter-American system. IACHR is headquartered in Washington, D.C., and consists of seven members appointed by the Organization of American States (OAS) General Assembly and not representing any country. Inter-American Commission on Human Rights, *What is the IACHR?*, *at* http://www.cidh.oas.org/what.htm (last visited Mar. 31, 2005) (on file with journal).

[225] Watt-Cloutier, *supra* note 217, at 10.

[226] Inter-American Commission on Human Rights, *supra* note 224. The American Convention on Human Rights entered into force in 1978 and has since been ratified by 25 countries: Argentina, Barbados, Brazil, Bolivia, Chile, Colombia, Costa Rica, Dominica, Dominican Republic, Ecuador, El Salvador, Grenada, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, and Venezuela. These countries have agreed to respect the human rights defined in this convention. In addition, the Convention establishes the Inter-American Court of Human Rights (the Court) and establishes the duties and procedures of the Commission and the Court. *Id.*

[227] *Id.* The IACHR hears petitions from "[a]ny person, group of persons or nongovernmental organization" against any member state of the OAS that alleges violations "of the rights protected in the American Convention and/or the American Declaration." *Id.* Both parties to the petition present their legal and factual arguments, and, at the conclusion of these arguments, the IACHR issues

suggest that Arctic indigenous communities may be successful with such a petition because of the severity of the present and future impacts from global warming they experience, the fact that human rights systems are less constrained by procedural requirements that could bar claims in domestic courts, and the perception that the IACHR "appears to recognize the relationship between environmental health and human rights."[228]

With this petition, the ICC aims to bring attention to the effects of global climate change on Arctic indigenous people and to persuade governments, particularly the United States, and nongovernmental organizations of "the need for concerted and coordinated global action to pre-empt the ACIA's dire projection" of the potentially devastating impacts of climate change in the Arctic and elsewhere.[229] The United States is the focus of the petition because the United States is the world's largest producer of the carbon dioxide emissions that cause human-induced climate change, and the United States government has not made significant attempts to curb its emissions and has not recognized the immediacy of the climate change issue.[230] The United States is a party to the 1992 United Nations Framework Convention on Climate Change (UNFCCC), which has the objective to stabilize "greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[231] These levels are to be achieved "within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."[232] However, the United States did not ratify the 1997

an initial report to the member state, not disclosed to the public, with its recommendations and conclusions. The member state is allotted a period of time within which to address the recommendations and resolve the situation. If the situation is not resolved during the time period, the Commission may choose to prepare a second report for the member state, which is usually made public, or send the case to the Inter-American Court of Human Rights. *Id.*

[228] Goldberg & Wagner, *supra* note 220, at 228.

[229] Watt-Cloutier, *supra* note 217, at 10; ACIA, *supra* note 3.

[230] *See generally* Associated Press, *Bush Stands by Rejection of Kyoto Treaty*, Nov. 6, 2004, WL ASSOCPR.

[231] United Nations Framework Convention on Climate Change, May 9, 1992, art. 2, S. TREATY DOC. NO. 102-38 (1992), 1771 U.N.T.S. 107, 31 I.L.M. 849 (1992) (entered into force Mar. 21, 1994).

[232] *Id.*

Kyoto Protocol[233] to the UNFCCC, which set specific targets for reductions in greenhouse gas emissions for individual countries.[234] The United States emitted 36 percent of the world's total carbon dioxide emissions in 1990, and, from 1990 to 2002, its greenhouse gas emission increased by more than 13 percent.[235] In 2001, President George W. Bush withdrew the United States from the Kyoto Protocol, citing the large costs of reducing emissions, potential loss of jobs, and exclusion of the major polluting developing countries of China and India from the strict requirements of the Kyoto Protocol.[236] On November 4, 2004, Russia ratified the Kyoto Protocol, supplying the necessary votes for it to come into force in 2005 without the participation of the United States.[237] Because of the United States' roles as a major contributor to greenhouse gas emissions and as a nonparticipant in the Kyoto Protocol, the ICC plans to target it in its petition to the IACHR.

Although any conclusions of the IACHR are not enforceable against the United States,[238] the ICC seeks through the hearings to draw the attention of decision makers to their struggle.[239] In addition to increasing awareness of the threats to Arctic indigenous communities among policymakers, the petition may increase the likelihood that the culture of these communities will be protected and provide an opportunity for compensation for harms that cannot be prevented or have already occurred.[240] A decision by the IACHR in favor of the ICC would constitute a recognition by a legal tribunal of the causal link between human activities and global warming that will alert governments and corporations to

[233] The Kyoto Protocol was negotiated and signed for the United States by former Vice President Al Gore but was never ratified by the United States, so it is not enforceable against the United States. *See* Associated Press, *supra* note 230.

[234] Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 3, U.N. Doc. FCCC/CP/1997/L.7/Add.1 (1997), 37 I.L.M. 22 (1998).

[235] Associated Press, *supra* note 230.

[236] *Id.*

[237] *See* Steven Lee Myers, *Putin Ratifies Kyoto Protocol on Emissions*, N.Y. TIMES, Nov. 6, 2004, at A10; Mark Landler, *Mixed Feelings as Kyoto Pact Takes Effect*, N.Y. TIMES, Feb. 16, 2005, at C1.

[238] *See* Goldberg & Wagner, *supra* note 220, at 229.

[239] Watt-Cloutier, *supra* note 217, at 10. *See generally* ICC EXEC. COUNCIL RES. 2003-01, *supra* note 222.

[240] Goldberg & Wagner, *supra* note 220, at 229.

their potential liability for their contributions to human-induced climate change and may incentivize participation by countries in international climate change response programs.[241]

B. *Potential Plaintiffs in Tort-Based Climate Change Litigation*

Another potential, but as yet untested, means to seek redress for indigenous people in the Arctic is tort-based climate litigation. A 2003 law review article identified potential plaintiffs in Alaskan villages who are suffering from increased temperatures, melting permafrost, and shrinking sea ice due to climate change.[242] The author of that article notes that while many critics argue that climate change requires a political rather than legal solution, litigation may be the best tool currently available in the face of the United States' "lack of meaningful political action" to address climate change issues.[243] There are, however, three main challenges to bringing this type of litigation. Plaintiffs must have sufficient resources to cover the large costs of litigation, be able to identify defendants whose actions have contributed to their harms, and be able to prove specific causation.[244]

As associations of indigenous nations have already proven their dedication and willingness to bring attention to the environmental issues affecting them,[245] they are prime candidates to be leaders in tort-based climate change litigation. An indigenous association or village may be a better plaintiff than an individual[246] because indigenous people can aggregate harms

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[241] *Id.* "A decision by the Commission [IACHR] finding the United States in violation of international human rights law would establish a legal basis for assigning responsibility to countries and corporations that have profited from inadequate or nonexistent greenhouse gas regulation." *Id.*

[242] *See* David A. Grossman, *Warming Up to a Not-So-Radical Idea: Tort-Based Climate Change Litigation*, 28 COLUM. J. ENVTL. L. 1, 8 (2003). Other identified potential plaintiffs include those suffering from sea level rise damages in "coastal U.S. states, counties, or communities, or in island states and nations," as well as international plaintiffs experiencing negative impacts from climate change. *Id.*

[243] *Id.* at 6.

[244] *Id.* at 6–7.

[245] *See, e.g.*, Tsosie, *supra* note 10.

[246] An association has standing on behalf of its members when "(1) its members would otherwise have standing to sue in their own right; (2) the interests it seeks to protect are germane to the organization's purpose; and (3) neither the claim nor the relief requested requires the participation in the lawsuit of each of the individual members." Hunt v. Wash. State Apple Adver. Comm'n, 432 U.S. 333, 342–43 (1977).

across longer periods of time and broader swaths of territory to prove present damages and specific causation that an individual would not be able to prove.[247] To bring this litigation, the groups must be able to show that their members would have standing to sue. To establish standing, a plaintiff must show:

> (1) it has suffered an "injury in fact" that is (a) concrete and particularized and (b) actual or imminent, not conjectural or hypothetical; (2) the injury is fairly traceable to the challenged action of the defendant; and (3) it is likely, as opposed to merely speculative, that the injury will be redressed by a favorable decision.[248]

Some of the actionable damages that Alaskan plaintiffs may be able to show include lost land; destroyed sea walls; damage to property, buildings, and infrastructure; expenditures to maintain and repair roads; and expenditures for preventative and adaptive measures.[249] Compared to other states, Alaskan plaintiffs suffer "early, severe, and unique" harms from climate change.[250] These damages are concrete and actual or imminent, and because melting permafrost and sea ice are unique in the United States to Alaska, the harms are particularized.[251] In addition, indigenous plaintiffs can satisfy the redressability requirement of standing with the award of damages to compensate for the actions they have taken and will be forced to take to adapt to the impacts of climate change.[252] The high cost of this type of litigation may be the biggest obstacle to bringing a suit, especially as many indigenous reservations currently experience some of most severe poverty in the United States.[253] However, the potential for award of damages and attorney fees may overcome this obstacle.

A significant problem that Arctic indigenous plaintiffs must overcome is finding a defendant against which to bring a legal claim for damages from the negative impacts of climate change. Although climate change is a global problem, and no defendant can be solely responsible for its negative impacts, indigenous

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[247] *Cf.* Grossman, *supra* note 242, at 24–25.

[248] Friends of the Earth v. Laidlaw, 528 U.S. 167, 180–81 (2000) (citing Lujan v. Defenders of Wildlife, 504 U.S. 555, 560–61 (1992)).

[249] Grossman, *supra* note 242, at 18–20.

[250] *Id.* at 40.

[251] *Id.*

[252] *Id.* at 41.

[253] Tsosie, *supra* note 10, at 318–19.

people can still bring suit against those parties whose actions are a "substantial factor" in causing their harms.[254] Potential defendants may be representative defendants responsible for the largest amounts of greenhouse gas emissions such as automobile manufacturers and electric power generators.[255]

Bringing climate change litigation against representative defendants is not without precedent. In July 2004, eight U.S. states and New York City brought a lawsuit in federal court against five of the largest power companies in the United States.[256] The suit alleges under federal and state law that the utilities maintain a public nuisance by emitting carbon dioxide that significantly contributes to global climate change.[257] The plaintiffs allege further that the five defendants are substantial contributors to their injuries because their combined 650 million tons of carbon dioxide emissions account for 10 percent of the total United States' carbon emissions created by human activities.[258] Rather than seeking money damages, the plaintiffs in the suit are asking that the power companies be required to reduce their current carbon dioxide emissions at 174 plants by 3 percent per year for the next ten years.[259] The plaintiffs contend that the companies have the ability to reduce their carbon dioxide emissions significantly by

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[254] *See* Grossman, *supra* note 242, at 25; *see also* RESTATEMENT (SECOND) OF TORTS § 431 (1965).

[255] *Id.* at 28–31. For example, in his law review article, Grossman identified American Electric Power as "the largest emitter of carbon dioxide, mercury (Hg), nitrogen oxides (NO_x), and sulfur dioxide (SO_2), accounting for 7–10% of [electric power] industry emissions." *Id.* at 30–31.

[256] The Climate Group, *States File Suit Against Major US Utilities*, *at* http://www.theclimategroup.org/index.php?pid=490 (last visited Mar. 22, 2005) (on file with journal). The suit was brought by the states of California, Connecticut, Iowa, New Jersey, New York, Rhode Island, Vermont, and Wisconsin and New York City against Cinergy Corp., Southern Company, Xcel Energy, American Electric Power, and the Tennessee Valley Authority. *Id.*

[257] VanNess Feldman, *Issue Alert: Climate Change Lawsuits Target Five Utilities* (July 26, 2004), *available at* http://www.vnf.com/content/articles/climatecases072604.pdf (last visited Mar. 22, 2005); *see* Elizabeth E. Hancock, *Red Dawn, Blue Thunder, Purple Rain: Corporate Risk of Liability for Global Climate Change and the SEC Disclosure Dilemma*, 17 GEO. INT'L ENVTL. L. REV. 233 (2005) for a discussion of the potential liability of corporations for their contributions to human-induced climate change; *see also* J. Kevin Healy & Jeffrey M. Tapick, *Climate Change: It's Not Just a Policy Issue for Corporate Counsel—It's a Legal Problem*, 29 COLUM. J. ENVTL. L. 89 (2004).

[258] VanNess Feldman, *supra* note 257.

[259] The Climate Group, *supra* note 256.

using readily available technologies and processes.[260] The injuries due to climate change alleged by the plaintiffs include increased deaths due to heat waves; increased ground-level smog and respiratory problems; coastal erosion; salinization of water supplies due to sea level rise; reduction of mountain snow pack that provides a critical source of water in California; lowered lake water levels in the Great Lakes that impair shipping, recreation, and hydropower generation; increased droughts and floods leading to human health hazards and property damage; and widespread loss of species and biodiversity.[261]

C. *Outreach Education*

One of the most powerful and successful tools used by indigenous people in the Arctic to bring worldwide attention to their struggles with climate change has been the use of outreach education. Arctic indigenous people are sharing their TEK to educate the world about what is happening to them and the implications of climate change for other areas of the world. The publicity from the announcement of legal actions, such as suits brought in domestic courts or proceedings in international legal tribunals, are one way that Arctic indigenous people can get their message out to the public. This is evidenced by the substantial media response to the ICC's announcement of their intention to bring a claim to the IACHR for violations of their fundamental human rights due to human-induced climate change.[262] Such legal avenues are, however, only one small part of Arctic indigenous communities' public outreach. Arctic indigenous people have worked in collaboration with governments, nonprofit organizations, and scientists to distribute their message through involvement in activities such as documentary films, press conferences, interviews, and studies of their environment and subsistence lifestyles in the changing Arctic.[263] Because indigenous communities often do not have a meaningful voice in climate change negotiations, they have attempted to tell their

[260] *Id.* These technologies include "changing fuels, improving efficiency, increasing generation from zero- or low- carbon energy sources, and demand-side management." VanNess Feldman, *supra* note 257.

[261] The Climate Group, *supra* note 256; VanNess Feldman, *supra* note 257.

[262] Goldberg & Wagner, *supra* note 220, at 229.

[263] *See, e.g.*, discussion *infra* text accompanying notes 265–72.

stories through media in an effort to educate the general public.[264]

One example of an Arctic indigenous community that is reaching out to the world is the village of Sachs Harbour on Banks Island in Canada.[265] During a one-year study, the Hunters and Trappers Committee of Sachs Harbour worked with the International Institute for Sustainable Development, a nongovernmental organization, to document the impacts of climate change from an indigenous perspective in order to educate the international community about the negative consequences of climate change and how local people have adapted in response.[266] The project was innovative in developing a method to record and share local observations; the method included interviews, community meetings, and fieldwork.[267] In addition, by developing a film featuring the voices and stories of people in Sachs Harbour and their diminishing homelands,[268] the community was able to convey a powerful message of the realities of climate change. The project also resulted in the publication of academic papers that assessed the usefulness of incorporating TEK in scientific studies.[269]

Other projects have also worked to tell the story of indigenous people in the Arctic by documenting traditional practices and obtaining firsthand local accounts. The Snowchange project started in 2001 to document a culturally indigenous perspective on the changing climate as it is experienced locally and to provide a source of environmental education that recognizes that indigenous knowledge is "true and valid in terms of its own discourse."[270] To this end, in 2004 Snowchange published a collection of interviews

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[264] *See id.*

[265] John Keogak, *Inuvialuit Observations On Climate Change, Speech from the Snowchange 2002 Conference*, *in* SNOWCHANGE, *supra* note 11, at 131.

[266] *Id.*

[267] International Institute for Sustainable Development, *Inuit Observations on Climate Change*, *at* http://www.iisd.org/casl/projects/inuitobs.htm (last visited Apr. 16, 2005) (on file with journal). The local people observed thunderstorms for the first time, new species including insects, thinner sea-ice that makes travel even by experienced hunters dangerous, melting permafrost, and increased erosion due to higher waters. *Id*.

[268] *Id.*

[269] *Id.*

[270] *A Note From the Editors*, *in* SNOWCHANGE, *supra* note 11, at 12. Snowchange is a project under Finland's Tampere Polytechnic, Department of Environmental Management and Engineering; however, it was developed with the assistance of networks of other organizations and concerned people. *Id.*

with elders, hunters, fishermen, reindeer herders, and other indigenous people that records the stories of the changing Arctic climate.[271] These stories are juxtaposed with indigenous art, essays, photographs, and poetry that relate the cultural and spiritual lives that are wrapped up in the changing environment, expressing the full breadth and strength of TEK.[272]

VI. CONCLUSIONS

TEK can be extremely valuable to science and the policies based on that science, especially in monitoring and assessing the rapid climate changes that are occurring in the Arctic. Global climate change policymakers, particularly those in the United States, should look to the experiences of the indigenous people in the Arctic as a valid signal that climate change is real and that action must be taken now to mitigate its impacts and plan for adaptation. In utilizing TEK, policymakers and scientists must respect the source of the knowledge and the cultural and spiritual base from which it has evolved. In order to achieve this, indigenous people should be involved as partners in climate change studies that use their knowledge.[273]

Indigenous people in the Arctic have been successful in getting their message to the international community, despite their relative lack of political power. However, policymakers need to respond to this local knowledge by developing enforceable policies to mitigate the impacts of climate change, as well as to help communities adapt to the inevitable changes. Industrialized nations should take responsibility for the inequitable consequences of their actions and address the problems facing the Arctic indigenous people who are disproportionately bearing the negative impacts of human-induced climate change.

Recognizing the validity of TEK is essential to addressing the needs of indigenous people locally as identified by their own communities and culture. Environmental justice scholars insist that such local knowledge is crucial to an understanding of how to address environmental issues in an affected community.[274] Indigenous people need to be more formally involved in the

[271] *See generally id.*

[272] *See generally id.*

[273] See, e.g., *supra* text accompanying notes 196–99 for a discussion of the CEAA's interim principles regarding the ethical use of traditional knowledge.

[274] *See supra* text accompanying notes 174–80.

decision-making process that affects their way of life, lands, and future as a distinct people. Through sharing their TEK, indigenous people can gain the ability to help shape global climate change policies. In turn, the international community gains a deeper awareness of the real and imminent dangers of human-induced climate change and the consequences of maintaining current unsustainable climate control policies.