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The Backyard Effect

How the Experience of Impacts of Climate Change Affects Opinion and Discourse

A Capstone Project Submitted in Partial Fulfillment of the Requirements of the Renee
Crown University Honors Program at Syracuse University

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Honors Capstone Project in Political Science

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Abstract

“The Backyard Effect” hypothesizes that for an issue as potentially abstract, complex, and vast-in-scope as climate change, it will take experiential evidence of impacts in order for people to change and view the problem as urgent – and take action. In order to test this hypothesis, this project set out to interview citizens in climate change-impacted regions around the world in order to explore any connections between personal experience and personal opinion and action. The methodology involved personal interviews with residents, analysis of poll numbers, and use of media reports in locations currently experiencing the impacts of climate change.

Based on case studies in Switzerland, Iceland, Montana, and Alaska, this report argues that a backyard effect indeed exists when it comes to one’s personal relationship to climate change. Except, instead of a quantifiable impact on polling results on climate change credibility, a geographically proximate climate impact can affect different communities in less quantifiable ways. For example, one group may view the changes as part of a grander natural cycle, and another may focus on economic impacts as evidence of the reality of the threat, which much dependent on a community’s culture and economic dependencies. In all, it can be concluded that the visible impacts of climate change do impact community views of the climate change phenomenon, especially when impacts have direct financial consequences to the community.

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Introduction

Climate change is a problem of unprecedented complexity and scope. It challenges the way we, as a species, think about the world we inhabit. The causes of climate change are sensually imperceptible – and thus abstract – and involve the emission of gasses which cannot be seen, and results in changes in climate which are difficult to directly associate. There is much grey area over what is and what is not a “result” of climate change. It is a systemic problem, one that will become more evident over time. Climate change often manifests itself like old age – on a day to day basis changes may be minute or unnoticeable, but after the passage of years the change is not only obvious, but sometimes shockingly so. Except, while old age is likely inevitable, climate change is not, but containment will require action before the effects are fully perceptible. To take such action – preventive action – requires a different form of thinking, one in which problems are predicted and corrected before they are manifest. It requires a societal ability to think in abstract terms.

The citizen of the 21st century is no stranger to problems requiring (or being said to require) preventative action. In 2002, Spielberg and Cruise introduced movie-goers to preventive policing in the sci-fi thriller “Minority Report.” In 2003, President George W. Bush introduced America – an introduction which required a drawn out public relations campaign – to “preemptive war” with his controversial foray into Iraq. The entire first decade of the 21st century consisted of attempts to prevent nuclear proliferation to so-called rogue states. None of these introductions to globally coordinated preventative action were particularly promising or successful.

When it comes to the “threat” of climate change, it is difficult to forget the abstract “threats” pushed in the recent past – the “threat” of overpopulation, the “threat” of widespread starvation, the “threat” of mass extinctions – that never really came to be. Writer Michael Crichton, in a lecture on Complexity Theory and Environmental Management, noted the problem of overblown predicted threats:

I began to recall other fears in my life that had never come true. The population bomb, for one. Paul Ehrlich predicted mass starvation in the 1960s. Sixty million Americans starving to death. Didn't happen. Other scientists warned of mass species extinctions by the year 2000. Ehrlich himself predicted that half of all species would become extinct by 2000. Didn't happen. The Club of Rome told us we would run out of raw materials ranging from oil to copper by the 1990s. That didn't happen, either.¹

Crichton goes on to address other problems and threats that never came to pass – including the threat of “global cooling” in the 1970s and Y2K in the 1990s – and how that feeds into public distrust of the “experts” and their dire warnings. Derek Brower of *Petroleum Economist* calls the contemporary result “climate change fatigue.”² This distrust is despite the fact that, as Crichton notes, the warnings often lead to grand scale actions that perhaps prevented the dire problem from taking place (such as measures curbing population growth and massive funds spent preparing systems for “Y2K.”). Or,

¹ Crichton, Michael. “Fear and complexity and environmental management in the 21st century.” The Washington Center for Complexity and Public Policy. Washington DC. 6 Nov. 2005. <http://www.crichton-official.com/speech-complexity.html>

² Brower, Derek. “The rise of climate-change skepticism.” *Petroleum Economist* 77.2

more often, politicians will push measures *already underway* to prevent the disaster, so that when the disaster does not occur, they will get the credit. Since the catastrophe never occurred, the predictors of disaster (such as Paul Ehrlich's *Population Bomb*) are later viewed as quacks – even if the quacking did, in the end, cause society to get its ducks in a row.

America can be particularly sluggish in responding to problems *already* apparent (health care costs being one example). At the very least, the country requires massive “jolts” to bolt to action (Pearl Harbor and World War II being the pinnacle example). Problems looming, but not imminent, have not had a good track record in American democracy: there is a reason dealing with Social Security's impending financial issues is the “third rail” of politics. When it comes to climate change, it has become increasingly clear that action will require more than the abstract threat of future problems. It likely requires the manifestations of those problems in the present day, the identification of them as climate change-related, and thus the development of urgency in order to address the problem.

Why does it matter whether the everyday person understands climate change? In part, because political action on domestic matters is closely, though complexly, related to the opinion of masses of citizens, at least in modern democratic societies.³ Elected officials are not likely to push issues not important to, or supported by, their constituents. A misinformed, or uneducated, or otherwise off-topic public will impact the nature of the

(2010): 24. *OmniFile Full Text Mega*. Web. April 2010.

³ Kinder, D.R. & Sears, D.O.: “Public Opinion and Political Action.” In G. Lindzey and E. Aronson (eds.), *The Handbook of Social Psychology, Vol. II*, Third Edition. New York: Random House, 1985, pp. 659-741.

debate and the resultant public policy (however complexly) due to modern democratic processes. When it comes to major issues (particularly in America), a misinformed public can be misled into believing the problem is solved (through images, emotional rhetoric) – even when little or no actual progress is being made.⁴ In addition, when it comes to implementing climate policies, success will “require a degree of buy-in or acceptance from those who will be affected,” as Lorenzoni and Pidgeon phrase it.⁵ This is partially why public awareness and informed opinion is so vital to cultivate and to understand – especially in regards to climate change. When it comes to climate change and its over twenty-year credibility-courtship with the public, there has been a roller coaster of opinion change, and an ebb and flow of interest. Efforts to bring the world together to take collective action – Kyoto, Copenhagen – have been, at best, only partial successes with modest results, according to a UN study and more recent post-Copenhagen chatter.⁶ Overall it seems that *the people* just aren’t that invested. There is a clog in the communication pipe, a kink in the system. What seems to be the problem?

The “Backyard Effect” is the idea that on an issue as abstract, complex, and vast-in-scope as climate change, it will take experiential evidence of impacts in order for people to change and view the problem as urgent – and take action. That is, once climate-induced anomalies are experienced in one’s backyard, and successfully connected to the overall “climate change” schema, people will think differently about the issue –

⁴ Edelman, M.: “The Politics of Misinformation.” Cambridge University Press, 2001, pp. 52-70.

⁵ Lorenzoni, I., & Pidgeon, N. “Public Views on Climate Change: European and USA Perspectives.” University of East Anglia, 2006.

⁶ UNFCCC Framework Convention on Climate Change. “National greenhouse gas inventory data for the period 1990-2007.” United Nations. Accessed June 1st 2010.

becoming more invested, knowledgeable, and action-oriented. With evidence of a “Backyard Effect,” policy makers, researchers, and communicators can better understand how to communicate complex issues like climate change to a confused public, by connecting the abstract to the concrete. The idea is not just that it is important to understand *what* people think when it comes to climate change, but *how* and *why* they think it.

In order to investigate the presence (or absence) of the “Backyard Effect,” one must identify locations where there is broad expert consensus of visible environmental changes and its connection to overall climate change, and investigate how these changes have impacted residents’ views on the issue. For this investigation, melting glaciers were identified as a particularly glaring and obvious sign of climate change, and locations in Iceland and Switzerland were selected as worthy of travel, interviews, and analysis. Other instances of “The Backyard Effect” are also explored, including climate-change resulting tree die-offs in Montana, particularly pronounced climate change impacts in the state of Alaska.

Of course, these climate impacts are visible and accessible to most people around the world, due to the ubiquitous nature of the modern media. However, one can argue that there is a significant difference between experiencing climate impacts secondhand via the media and witnessing it unfold in one’s backyard. The media – as will be evident in some of the responses of interviewed citizens to follow – is not a highly trusted source of information in the contemporary world. A Pew Research Center poll from September 2009 found record high levels of distrust in the media’s accuracy with 63% of Americans

claiming news stories are “often inaccurate.”⁷ A 2008 Sacred Heart University poll found that just 19.6% of Americans believe most media reporting (down from 27.4% in 2003).⁸ On climate change specifically, according to a Yale University January 2010 report “Climate Change and the American Mind,” faith in mainstream news coverage of climate change fell to 36% of respondents in 2010, and even trust in Al Gore, fell to 47% (from 58% in 2008).⁹ According to the same report, trust in scientists – typically among the most trusted group in opinion polls – fell from 83% to 74%.⁵ Given these numbers, it can be inferred that images of events the *media* claims to be climate change related are generally not trusted – which lends more importance to the impact of the personally witnessed, concrete climate change connection. We seem to be in an age of media distrust, a reaction against the electronic screen’s viewpoint of the planet – an era in which one’s own eyes are again the most dependable windows to the world, and online social networks a new and growing way to share perspectives directly with each other.

And yet, even with the presence of climate change impacts in one’s backyard, how does one interpret and connect those impacts in the context of the larger world? The talk of climate change has lasted for decades, but if members of the media or scientists

⁷ “Public evaluations of news media: 1985 – 2009.” September 12 2009. *PEW Research Center for the People and the Press*. Retrieved from <http://people-press.org/reports/pdf/543.pdf>

⁸ Americans slam news media on believability. (2008, Jan 8). *Reuters*. Retrieved June 1 2010 from <http://www.reuters.com/article/pressRelease/idUS160770+08-Jan-2008+PRN20080108>

⁹ Leiserowitz, A., Maibach, E., & Roser-Renouf, C. (2010) *Climate change in the American Mind: Public Support for climate & energy policies in January 2010*. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change. <http://environment.yale.edu/uploads/PolicySupportJan2010.pdf>

are not trusted, a personal observer of climate change impacts may not recognize them as such. So the second question becomes: whom do personal observers trust to interpret their observations? And does this trust lead them toward further climate change understanding, or away from it?

In all, this report seeks to answer the question: how do people who witness climate change, in their backyards or an approximation thereof, think about climate change – and express those thoughts? What does the *experience* of a rapidly changing environment – such that the experience of a swiftly melting glacier allows – do to one’s view of the world, its interconnectivity, and its otherwise “abstract” events (such as climate change to most people). Whom do observers trust in order to interpret and connect their personal observations to the world at large? How do they put it into *words* (as opposed checking a box or picking a number), and what do those words mean to those of us studying public opinion and understanding of unprecedented threats and events?

With this apparent pandemic of mistrust – in authority, in media, in science – do people still believe in what they see?

Academic Summary

In the long history of the relationship between climate change and public understanding and interest, one relationship appears secure: the connection between visible manifestations of climate issues and upsurge in public interest – especially in areas geographically proximate to the events at hand.

In a general sense (this is somewhat intuitive) studies have demonstrated the connection between local public interest in an issue and geographic proximity, especially in issues the public at large may be ignorant about. David Rochefort and Roger Cobb addressed this in their 1993 study, in which they found that a problem will be more salient to the public when its impacts are projected to be both disastrous and locally connected.¹⁰ For example, Valerie Hoekstra explored the conventional thought that Supreme Court decisions could not impact public opinion of the Court because most of the public was ignorant of the decisions even taking place. She studied the local communities where various Court cases originated, and found a local populace far more invested in the case and the outcome. In her panel discussions, she found that in these communities significant numbers of people not only followed the decisions, but changed their opinion of the Court itself because of them, for the most part because they were geographically proximate to the origins of the case. And she notes that national awareness and knowledge of the Supreme Court may be higher than initially thought –

¹⁰ Rochefort and Cobb, 1993. “Problem Definition, Agenda Access, and Policy Choice.” *Policy Studies Journal* 21: 56-71.

due to an accumulation of local connections to various national cases.¹¹ In effect, when a case originated in someone's backyard, a person was more likely to care not only about the case, but about the Supreme Court in a general sense – a Supreme Court backyard effect. People cared more about an issue when it was proximate to them.

A 2006 study by Sammy Zahran, Samuel Brody, Himanshu Grover, and Arnold Vedlitz explored the relationship between climate change vulnerability and support for climate policies. Based on the scientific assessment that climate change effects vary regionally, and that residents of high-impact regions may be more willing to “absorb the costs of adaptation and mitigation policies,” the authors explored the question of how geographic risk – or perceptions of it – influenced one's climate policy support. They found a “robust” effect of risk perception on climate policy support, and “of all the variables examined, the extent to which citizens regard climate change as threatening to their material well being drives support for costly climate change policies.”¹² That is, citizens are more likely to support costly climate mitigation or adaptation policies (and, as an intuitive prerequisite, believe climate change is taking place due to human actions), when one perceives local risk of climate impacts. As such, when the threat is geographically proximate, the response is more pronounced.

In addition, the study found that “respondents with greater knowledge of the causes of the climate change problem are more likely to support policy interventions” – a

¹¹ Hoekstra, V. 2000. “The Supreme Court and Local Public Opinion *The American Political Science Review*, Vol. 94, No. 1 (Mar., 2000), pp. 89-100 Published by: [American Political Science Association](#).

¹² Zahran, Sammy, Brody, Samuel D., Grover, Himanshu and Vedlitz, Arnold (2006) ‘Climate Change Vulnerability and Policy Support’, *Society & Natural Resources*, 19: 9, 771 – 789.

finding that contradicted previous studies that apparently found no such connection, and thus serves as evidence of the importance of awareness of the problem. Since “the Backyard Effect” seeks to understand, in part, whether local manifestations of climate change consequences actually impact resident’s awareness and views on climate change, this connection between awareness and policy support serves as a key link between citizen awareness and political action.

A 2004 study addressed the issue of proximity and environmental concern directly, asking “Does Location Matter?” The authors acknowledged that environmental views and opinions typically focused on demographic factors rather than actual location, or proximity, to various landscape features. By exploring the connection between residents’ views on certain creeks in San Antonio, Texas and how close the residents actually lived to the creeks, they found that the “residential distance variable” plays a significant role in explaining familiarity with the creeks and associated pollution problems. And yet, the authors conclude:

Although this study demonstrates the importance of proximity for awareness and information on an environmental feature, further research is needed to fully understand its impact on environmental perceptions. Case study analysis involving interviews with respondents may provide additional insight into the role of proximity in forming environmental views.¹³

Indeed, understanding of a pollution problem in a creek is less challenging than

¹³ Brody, S. D., W. Highfield, and L. Alston. 2004. Does location matter? Measuring environmental perceptions of creeks in two San Antonio watersheds. *Environ. Behav.*

understanding of the role of climate change on environmental impacts in one's backyard – but the study nonetheless demonstrates, statistically, an otherwise simply intuitive connection between proximity and environmental awareness.

Other studies have found similar associations between environmental concern and proximity. In 1997, Bryan Norton and Bruce Hannon proposed a “sense of place” theory of environmental valuation, in which one's geographic connection to one's local environment makes concern more intense, due to the culture and community influences of the geographic proximity.¹⁴ In a follow-up 2002 study which tested the “place-based” theory of environmental evaluation by examining environmental views in Alaskan towns, researchers found that “some spatial relationships exist between selected ecosystem values and point of residence” -- that is, there is a connection between geographic proximity to an “ecosystem” and the intensity of one's valuation of that ecosystem. According to the authors, the findings highlight the importance of a community-based environmental analysis when it comes to understanding citizens' views of environmental issues.¹⁵

There is, indeed, a demonstrated link between geographic proximity to an issue – particularly an environmental issue – and one's awareness, understanding, or concern on the issue. However, when it comes to climate change understanding, there is an added element. Not only does one have to be aware or concerned about the impacts manifest in the “backyard,” but also somehow be aware enough to connect the local phenomenon to

36(2):229-250.

¹⁴ Norton and Hannon, 1997. B. Norton and B. Hannon , Environmental values: a place-based approach. *Environmental Ethics* **19** 3 (1997), pp. 227–245.

¹⁵ Brown, G., P. Reed, and C.C. Harris. 2002. Testing a Place-Based Theory for

global climate change (and, conversely, understand when backyard impacts are not necessarily a result of or a repudiation of climate change – such as an off-season blizzard or heat wave – that is, an understanding of the difference between weather and climate.) The question still remains – how does proximity to environmental impacts influence one’s understanding of climate change?

History of Public Opinion

Mankind's understanding of nature – and one's place in it – has evolved considerably over the 20th century, and the idea that man could impact the climate through his actions has been building for several decades. In addition, the American public's understanding of climate is inextricably linked with visible, local effects – many of which were propagated by media.

For example, in the (rather subdued, relative to other issues) environmental debates of the 1950s – when nuclear tests were agitating Americans into a more alarmed view of man's impact on nature – a series of events perpetuated, according to Spencer Weart's analysis, a public reversal on the role of human impacts on climate change. In 1953, a killer smog suffocated London, and later Los Angeles and other cities. But most effective was deadly smog in New York City in 1966 – an event that brought the pollution problem directly before the world's media headquarters.¹⁶ This connection – intuitive but noteworthy – between visible disasters and public alarm was also evident in the post-Earth day 1970s, including severe droughts in the Soviet Union in 1972, the collapse of fisheries in South America, and resulting increases in food prices. Most significant was a massive drought in the African Sahel, an event that killed hundreds of thousands, and which garnered much media attention.¹⁷

Paul Krugman, the New York Times poet of political-economic policy

¹⁶ Weart, S. 2009. *The Discovery of Global Warming: The Public and Climate Change*. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

¹⁷ Weart, S. 2009. *The Discovery of Global Warming: The Public and Climate Change*. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

perspectives, recently recalled the massive role environmental disasters played in raising the salience of environmental issues in the late 1960s and 1970s (Krugman's intent was to elicit similar sentiments regarding the 2010 BP oil disaster). In the column, he notes the momentous year 1969, when technology took mankind to the moon, but simultaneously, and visibly, threatened the safety of planet earth. In that year, a Santa Barbara oil spill, a spectacular fire that lit the Cuyahoga River in Cleveland, and a smog that smothered cities coast to coast media-meshed to form an alarming mosaic of environmental catastrophe. Krugman notes that these events made it easier to mobilize public support for some of the major environmental developments of the 1970s, from Earth Day to the founding of the Environmental Protection Agency. He declares, right out, that "environmentalism began as a response to pollution that everyone could see."¹⁸

And yet Krugman emphasizes the tragic flipside – that in recent decades, with the specter of climate change largely invisible, environmental concern in America declined. He cites Gallup's finding that "Americans are now less worried about a series of environmental problems than at any time in the past 20 years." The May 2010 survey notes that only 28% of Americans worry a "great deal" about global warming, a 5 point drop from 2009.¹⁹

Indeed, while the events of 1969 may have sparked environmental concern in a general sense, the issue of global warming took a different turn in the later 1970s, when climate scientist Reid Bryson began advocating his view of a "global cooling" event. In

¹⁸ Krugman, P. (2010, May 3). Drilling, Disaster, Denial. *New York Times*, p. A25.

¹⁹ Jones, J. (2010) In U.S., Many Environmental Issues at 20-Year-Low Concern. *Gallup*. Retrieved from <http://www.gallup.com/poll/126716/environmental-issues-year-low-concern.aspx>.

this case, the resulting media attention was able to feed off of the unusually brutal winters that gripped New York City (again, the world's media capital), during those years. In effect, while many scientists dismissed the cooling trend – and were in fact still preoccupied with global warming – the popular media created a coming-ice-age sensation that told the public otherwise, (until a marked shift toward global warming again in 1978.)²⁰

The main message that stuck with scientists, however, was not that the world was cooling or warming, or that it was perhaps possible for rapid climate change (of both warming and cooling) to take place in a matter of decades rather than centuries or millennia – but whether this was yet appropriate for media propagation and sensationalizing. The general consensus was further study. Regardless, there was a lack of public alarm on the issue – inferred by a lack of even a single poll – and most of the serious debate of the time took place at professional meteorological conferences.²¹

While climate change did not “catch on” as a serious public topic in the 1970s, another issue did – the destruction of the Ozone layer by chlorofluorocarbons (CFCs). Introduced to the public by science journalists, the debate was fueled by a public uproar that drowned out the protestations of the affected industries. Public awareness was upwards of 75%²¹, and the hubbub contributed to public wariness regarding man's ability to impact the environment. In many ways, the debate permeated the culture, and many Americans developed a general sense of unease over unseen, modern, toxic “stuff” affecting health and environments in perhaps unknowable ways.²¹ This feeling – this fear

²⁰ Weart, S. 2009. The Discovery of Global Warming: The Public and Climate Change. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

of the unknown effects of modern technology-dependent life – was perhaps best conveyed culturally in Don DeLillo’s celebrated 1985 novel *White Noise*, which centered around a freak “Airborne Toxic Event” – a model late 20th century metaphor for the pervasive mystery and menace of modern technology.

In 1981, the greenhouse effect made its front page New York Times debut²¹, and “global warming” finally warranted a major public survey. A March 1981 Opinion Research Corporation poll found that only 14% of Americans had heard much about the greenhouse effect.²² Most didn’t understand much behind the science or the actual nature of the threat. As Weart describes, in fact, the survey indicated its own environmental backyard effect:

Even those who worried most about pollution were seldom concerned with global affairs, directing their dismay at the oil spill or chemical wastes that endangered a particular neighborhood.²³

Also, in 1981, the election of Ronald Reagan contributed to the politicization of environmental debates, with the left using environmentalist causes against the pro-industry right. In 1983, the Reagan administration called an EPA report (which characterized global warming as an imminent threat) “alarmist,” creating a political conflict within the Executive Branch, which served to intensify media coverage and public awareness. In the process, belief in global warming became more closely

²¹ Sullivan, B. Study finds warming trend that could raise sea levels. *The New York Times*, Aug. 22, 1981, p. 1.

²² Yankelovich, D. (1991). *Coming to public judgment: making democracy work in a complex world*. Syracuse University Press, p. 74.

²³ Weart, S. 2009. The Discovery of Global Warming: The Public and Climate Change. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

associated with political identification. And yet, much of public concern in the early and mid 1980s centered around renewed fears of nuclear war, which served to draw attention away from climate change fears.²⁴ The environmental issue that attracted most attention was the hole in the Ozone layer, which was officially announced in 1985, and led to a successful international Montreal agreement in 1987 that gradually banned Ozone destroying substances. As Weart points out, “the agreement proved that the world could take effective action against an atmospheric threat – if the threat was sufficiently convincing, immediate, and well publicized.”²⁵ The Ozone hole also made a point to the public: human actions can impact the greater environment in previously unfathomable ways.

In contrast to the late 1970s, the summer of 1988 was hot and deadly. The Eastern United States weathered a drought and heat wave that killed an estimated 5,000 – 10,000 people and caused an estimated \$40 billion in damages. Yellowstone National Park was on fire. In parts of the country, some were declaring a second Dust Bowl. On June 23, 1988, in Washington D.C. on one of the hottest days of the decade, NASA climate specialist James Hansen testified before the U.S. Senate that according to the latest data, he could state with “99 percent confidence” that “the greenhouse effect has been detected and is changing our climate now.”²⁵ It was a time when growing scientific theory seemed to match what was happening in America’s backyard, and some scientists chose the year to present their concerns to the public – which, at the time, had about a 50% awareness

²⁴ Weart, S. 2009. *The Discovery of Global Warming: The Public and Climate Change*. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

²⁵ Revkin, A. (2008) *1988-2008: Climate Then and Now*. New York Times Dot Earth. Retrieved June 2, 2010, from <http://dotearth.blogs.nytimes.com/2008/06/23/1988-2008->

rate of “global warming.”²⁶

The “Greenhouse Effect” phenomenon set off its own firestorm in the media. If 1974 was the “summer of Watergate” and 2001 would be the “summer of the shark,” 1988 was the “summer that would never end.” On July 11th, 1988, *Newsweek* ran one of the first major cover stories on what is now referred to as climate change. Titled “The Greenhouse Effect,” it warned “Danger: More Hot Summers Ahead” and displayed a picture of a sweating American family inside a glass dome. In October, *Discover* ran Andy Revkin’s cover story “Endless Summer: Living with the Greenhouse Effect,” which further developed the “Greenhouse Effect” story.²⁷

In the *Discover* article, Revkin explained the science behind climate change, and predicted melting glaciers, rising sea levels, species extinction, and other climate impacts by the mid-21st century. He noted that it would be incredibly difficult to address climate change, politically and technically. “It is not an exaggeration to say that civilization itself is the ultimate cause of global warming,” he declared. And civilization is not something easily changed.

Nevertheless, the combination of record-breaking heat, super-hurricanes, and firestorms that manifested in the summer of 1988 contributed greatly to media fascination with climate change, and to public awareness about the problem. The number of articles covering the subject multiplied as even comic strips mentioned the global warming

climate-then-and-now/

²⁶ Weart, S. 2009. The Discovery of Global Warming: The Public and Climate Change. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

²⁷ Revkin, A. (1988, October). Special report: Endless Summer – living with the greenhouse effect. *Discover*, Retrieved June 1, 2010 from <http://discovermagazine.com/1988/oct/23-special-report-endless-summer-living-with-the->

phenomenon.²⁸ As Sheldon Ungar observed, “whether regarded as a warming signal or a metaphor of a possible future, the weather unleashed a surge of fear that brought concentrated attention to the greenhouse effect.”²⁹ In fact, according to the same study, the combination of real-world catastrophe and bubbling scientific thought created a “social scare” – a temporary global warming fascination – that diminishes as the various disasters come to pass. At the same time, some (such as climatologist Stephen Schneider) worried that the repeated media associations between weather events and climate change would confuse the public when things inevitably cooled down.

By September of 1988, the fall after the summer heat wave, the number of Americans aware of the Greenhouse Effect had risen to 58%.³⁰ This sudden spike in awareness bled into Congress, which began to explore the issue of climate change legislatively – and would continue to do so for decades.³¹ And yet, for various reasons, including a decline in media coverage as the weather returned to “normal,” 1988-1989 would also be a peak of public awareness in climate change for many years to come.

The following decades brought increased scientific interest and study of climate change as well as an increased politicization of the issue – especially evident in media coverage, which increasingly cited minority sources in opposition to climate change

greenhouse-effect/

²⁸ Weart, S. 2009. *The Discovery of Global Warming: The Public and Climate Change*. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

²⁹ Unger S (1992) The rise and (relative) decline of global warming as a social problem. *Sociol Q* 33: 483-501

³⁰ Kane, P. (1988) Poll for Parents Magazine. USKANE.88PM7.RO98 and R11. *Roper Center for Public Opinion Research*.

³¹ Weart, S. 2009. *The Discovery of Global Warming: The Public and Climate Change*. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

theory as if there were “diametrically opposed groups of scientists.”³² Still, the international community managed to come together in December 1997 for the Kyoto Climate Conference. At that time, public opinion surveys found a minor surge of interest in global warming, which receded once the conference ended. The main impact, however, was an increased politicization of the issue in the United States, with belief in the global warming problem increasingly divided between partisan opinion (with Republicans being the more skeptical party). In fact, over a decade of Gallop polling has found that the gap between democrats and republicans over global warming has only widened since this time.³³

The late 1990s brought another opportunity for a “backyard effect” in climate change when 1995, then 1997, and 1998 were named record-breaking years in average global temperatures – but the media attention was muted by the lack of specific heat wave events in major media centers.³⁴ Instead, it was visible events that made an impact, such as ice chunks breaking off of Antarctica. But, as Spencer Weart observed, it was local weather disasters that gave the media opportunities to discuss climate change, from heat waves to floods, and major weather events in other parts of the world (no matter how related to climate change they may be) were rarely reported by domestic media.³⁵ Still, polling data from the 1990s, as Spencer Weart summarizes, generally shows a trend

³² Weart, S. (2009). *The Discovery of Global Warming: The Public and Climate Change*. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

³³ Dunlap, R. (2008) *Climate-change views: Republican-Democratic Gaps Expand*. *Gallup*. Retrieved June 1 2010 from <http://www.gallup.com/poll/107569/climatechange-views-republicandemocratic-gaps-expand.aspx>

³⁴ Weart, S. (2009). *The Discovery of Global Warming: The Public and Climate Change*. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

³⁵ Weart, S. (2009). *The Discovery of Global Warming: The Public and Climate*

toward belief in climate change. While Americans weren't sure whether climate change had already taken place – or would eventually – “fewer than one in eight asserted that it would never happen.”³⁶ And many increasingly professed witnessing it in their daily lives.

The presidential election in 2000 rarely touched on environmental issues, let alone climate concerns, despite Democratic candidate Al Gore's historic passion for the subject. The early 2000s saw the release of climate change related materials in pop culture (such as Roland Emmerich's climate change disaster hit *The Day After Tomorrow* in 2004) as well as a new IPCC report in 2001. But public opinion in America continued to wane, the fraction claiming to worry “a great deal” about global warming declined, and by the 2004 Gallop poll only 51% of Americans worried much at all about global warming.³⁶

By 2006, however, a combination of events seemed to light a firecracker under the previously climate-weary public. In August 2005, hurricane Katrina struck New Orleans with deadly and devastating results and prompted media inquiries into global warming connections.^{37 38} Months later, Al Gore's Oscar-winning documentary *An Inconvenient Truth*, became a surprise hit and managed to raise the level of public debate on climate change (in one poll, 66% of viewers claimed to have “changed their mind” on

Change. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

³⁶ Saad, L. (2006) Americans still not highly concerned about global warming. *Gallup* Retrieved June 2, 2010 from <http://www.gallup.com/poll/22291/americans-still-highly-concerned-about-global-warming.aspx>

³⁷ Kluger, J. (2005, August 29). Is global warming fueling Katrina? *Time*, Retrieved June 3, 2010 from <http://www.time.com/time/nation/article/0,8599,1099102,00.html>.

³⁸ Gelbspan, R. (3005, August 31). Hurricane Katrina's real name. *New York Times*, p. A25

climate change after seeing the film).³⁹ In 2006, Gallup recorded an 11-point rise in global warming concern from 2004, reaching 62%.⁴⁰ In 2007, Al Gore and the UN Intergovernmental Panel on Climate Change shared the Nobel Peace Prize for climate change advocacy, and in 2008 Barack Obama and John McCain both addressed climate change on the campaign trail. Gallop saw slight but significant increases in public concern from 2006, with a record 61% of Americans believing climate change impacts were already taking place and a record low 13% were satisfied with the status quo on the lack of climate change action.⁴¹ The issue seemed to be congealing into an issue worthy of consistent attention and urgent action.

But from 2008 to 2010, the debate over climate change would encounter “mini-scandals” that served to reframe the nature of the debate back from what to do about climate change to whether the science was sound. There was also a lack of action on the part of the US Congress (which focused on economic and health care issues) and a failure at the Copenhagen climate summit that served to dampen the mood. According to the 2010 report *Climate Change in the American Mind*, belief that global warming should be a high or very high priority for the US government fell from 54% in 2008 to 38% in 2010

³⁹ Global consumers vote Al Gore, Oprah Winfrey and Kofi Annan most influential to champion global warming cause. (2007) *Nielsen Survey*. Oxford University Centre for the Environment, Retrieved June 2, 2010 from http://nz.nielsen.com/news/GlobalWarming_Jul07.shtml

⁴⁰ Saad, L. (2006) Americans still not highly concerned about global warming. *Gallup* Retrieved June 2, 2010 from <http://www.gallup.com/poll/22291/americans-still-highly-concerned-about-global-warming.aspx>

⁴¹ Newport, F. (2008) Little increase in Americans’ global warming worries. *Gallup*. Retrieved June 2, 2010 from <http://www.gallup.com/poll/106660/little-increase-americans-global-warming-worries.aspx>

(and belief that it should be a low priority grew from 17% in 2008 to 31% in 2010).⁴² In March 2010, Gallop reported that “Americans’ global warming concerns continue to drop” with “multiple indicators” showing less concern and increased feelings that global warming is exaggerated. In 1997, 31% believed the seriousness of global warming, in 2010 that number was up to 48%. In perhaps the most alarming statistic, fewer Americans believe that events like melting glaciers and rising temperatures are the effects of global warming, as “the average American is now less convinced that at any time since 1997 that global warming’s effects have already begun” – and 35% say they never will witness any effects at all.

The public is less sure of scientist views and less convinced humans are the cause of global warming. Gallop posits that the dramatic shift could be the result of the “climategate” scandals and their milking by conservative leaders as well as the record breaking snows and cold of the 2009-2010 winter (the record snow in DC providing a possible backyard effect for political leaders).⁴³ And yet, while a partisan divide is still pronounced, the real causes of these recent shifts are not clear, and perhaps not provable – but if even evident impacts of global warming, disseminated by the media and suggested as such – are not believed to be global warming, is there hope of a backyard effect in the future? Or is the connection simply not clear?

⁴² Leiserowitz, A., Maibach, E., & Roser-Renouf, C. (2010) *Climate change in the American Mind: Public Support for climate & energy policies in January 2010*. Yale University and George Mason University. New Haven, CT: Yale Project on Climate Change. <http://environment.yale.edu/uploads/PolicySupportJan2010.pdf>.

⁴³ Newport, F. (2010) Americans’ global warming concerns continue to drop. *Gallup*. Retrieved June 2, 2010 from <http://www.gallup.com/poll/126560/americans-global->

The Opinion Split With Europe

Europe and the United States have not always seen eye-to-eye when it comes to climate change. A 1992 Gallup survey found that 13 of 24 representative nations included a majority of residents who thought climate change was a serious problem (8 of the 13 were European), while the United States had failed to reach that threshold.⁴⁴ Of particular note in Europe is a trend of higher climate concern among more southern nations than northern ones, with Greece and Italy (in one 2002 survey) reporting significant worry over impacts and the Netherlands and the UK decidedly less concerned.⁴⁵ Indeed, studies have also shown the increased risk of deadly droughts and heat waves in the Mediterranean due to climate change.⁴⁶

On this note, an interesting 1999 study asked citizens in the UK, the Netherlands, Germany, and Italy to “recall their experiences of extreme weather events, and to relate these to potential adaptation to future climate change.” In it, particularly the Dutch responded favorably to milder future summers, and the study demonstrated that while European citizens are concerned for the national good, this concern “does not exclude them from considering the potential personal benefits deriving from future changes in the

warming-concerns-continue-drop.aspx.

⁴⁴ Brechin, S. R.: 2003, ‘Comparative public opinion and knowledge on global climatic change and the Kyoto Protocol: The US versus the rest of the World?’, *International Journal of Sociology and Social Policy* 23(10), 106-134.

⁴⁵ European Opinion Research Group (EORG): 2002, ‘*The attitudes of Europeans towards the environment.*’

⁴⁶ Schiermeier, Q. (2010, May 17). Mediterranean most at risk from European heatwaves. *Nature*, doi: 10.1038/news.2010.238. Retrieved June 2, 2010 from <http://www.nature.com/news/2010/100517/full/news.2010.238.html>

climate.”⁴⁷

And, perhaps most pertinent to the question at hand, a 2004 study of European individuals in regions potentially vulnerable to climate change impacts found that many – while aware of impacts – were not usually able to relate such impacts to day-to-day life, or even their local area. People instead were concerned about more immediate concerns, like coastal erosion, or – most interestingly – not being able to buy house insurance due to potential increased flooding risks.⁴⁸ This brings in the economic aspect of climate change impacts on human response, a factor that comes into play in analyzing the differing responses in Grindelwald, Switzerland and Helena, Montana.

2003 was a major year for climate change opinion worldwide, with America continuing a general decline in climate worry, and Europe getting kicked in the head by a brutal heat-wave that killed crops and tens of thousands of people and set Western Europe’s forests ablaze. The European heat in 2003 was deadlier and costlier (perhaps, on the whole, worse) than the hurricane that would strike New Orleans two years later, and its impact on climate opinion was significant. Shortly after the heat wave, studies showed that man’s fossil fuel emissions were quite possibly to blame – and would certainly be to blame for an increased risk of similar heat waves in the future.⁴⁹ The

⁴⁷ Palutikof, J.P., Agnew, M. D., Subak, S. and Holt, T.: 1999, ‘Weather Impacts on natural, social, and economic systems (WISE): Report of the Climatic Research Unit, University of East Anglia’, in *Weather Impacts on natural, social, and economic systems (WISE)*, final Report for the European Commission Directorate-Research General under contract ENV4-CT97-0448, pp. 79-206.

⁴⁸ Bickerstaff, K., Simmons, P. and Pidgeon, N.F.: 2004, *Public perceptions of risk, science, and governance: Main findings of a qualitative study of five risk cases*, Centre for Environmental Risk, University of East Anglia, Norwich, UK.

⁴⁹ Peter A. Stott, D. A. Stone, & M. R. Allen. (2004, December). Human contribution to the European heatwave of 2003. *Nature*, v. 432. Retrieved June 3, 2010 from

connection between the heat wave and global warming was reported by several forms of media. The disaster came at a time when the American president (George W. Bush) had just made clear his administration would not be implementing CO₂ emission reductions, and Europe was under way working out the kinks of a cap-and-trade system designed to do just that. America would lag in its climate change awareness for several years, until Katrina in 2005 and Al Gore in 2006 drove the issue back into the spotlight.

And yet, contemporary Europe is on a similar downward track as America. A February 2010 BBC poll found increasing doubts over global warming in the UK, with the number believing climate change is both manmade and happening down from 41% in November 2009 to just 26%.⁵⁰ A 2010 German magazine poll found the number of Germans who “feared” global warming dropped from 62% to 42% in just four years.⁵¹ The causes of this are unclear, but are perhaps related to the recent scandal involving climate research data or the UN report. The point is that, on both sides of the Atlantic, the post-disaster surge of interest was not sustainable, and there’s clearly still widespread doubts over the sincerity of the threat.

<http://climateprediction.net/science/pubs/nature03089.pdf>

⁵⁰ Climate skepticism ‘on the rise’. (2010, February 7). *BBC News*. Retrieved May 31st 2010 from <http://news.bbc.co.uk/2/hi/8500443.stm>.

⁵¹ Deutsche verlieren angst vor klimawandel. (2010, March 27). *Spiegel Online*. Retrieved June 1, 2010 from <http://www.spiegel.de/wissenschaft/natur/0,1518,685946,00.html>

The Brain on Climate Change

For eons, human cultures have conquered nature with little cognitive regard to how human actions affect environmental change. It was, for centuries, unfathomable that the collective activities of men could change Nature – for it was Nature that seemed to be in command of man. This mindset, of man’s utter smallness in the face of Nature’s fury, is deep, ingrained, and difficult to overcome. Man is so small, and the world is so big, that the impacts of collective action are difficult to fathom. It is a state of mind, a way of seeing the world that directly conflicts with the current climate science, and thus serves as a major barrier to changing minds on the issue of climate change.

While analyzing the massive mobilization of public – and thus political – interest in global warming in 1988, Spencer Weart commented on the giant intellectual leap the newfound focus represented for mankind:

In the long perspective, it was an extraordinary novelty that such a thing (global warming) became a political question at all. Global warming was invisible, no more than a possibility, and not even a current possibility but something predicted to emerge only after decades or more. The prediction was based on complex reasoning and data that only a scientist could understand. It was a remarkable advance for humanity that such a thing could be the subject of widespread and intense debate...discourse had grown more

sophisticated in many ways.⁵²

Of course, Weart had just spent pages detailing the connection between contemporaneous weather events, media sensationalizing, and public interest – and thus the relationship between 1988 summer heat/drought events and interest in global warming. Still, he makes a point: the public became aware of a largely invisible, highly complex problem and demanded action. Of course, that was over twenty years ago, and action has been extremely difficult to accomplish, as is sustaining public interest in the problem.

A WNYC Radiolab broadcast from November 16, 2009 explored the psychology of complex problems, like climate change, with Harvard's Joshua Green, a professor who concentrates on morality and decision making.⁵³ According to Professor Green, humanity's moral decision making process makes evolutionary sense; we have moral buttons that get pushed by experiences our ancestors would have encountered (the here-and-now emergencies we deal with on an everyday basis). For example, were one to come across a drowning person, most of us would sacrifice a new \$1,000 suit in order to jump in and save him. However, were one to receive a request in the mail to send \$1,000 to save the life of a stranger on the other side of the world, most of us would ignore the request. According to Green, "the idea of spending money to save the life of a stranger across the world is a totally new modern phenomenon, something our emotions are not prepared for." As such, the kind of "common sense" thinking we apply to modern complex problems, like global warming, is "hunter-gatherer common sense, and if we're

⁵² Weart, S. (2009). The Discovery of Global Warming: The Public and Climate Change. Retrieved on June 1 2010 from <http://www.aip.org/history/climate/index.htm>

⁵³ Greene, J. (Interviewee). (2009, November 16). Radiolab. WNYC. Retrieved from <http://blogs.wnyc.org/radiolab/2009/11/16/killing-babies-saving-the-world/>

going to face the big problems our minds were not designed to handle, then we have to learn to turn off the parts of our brain that get in the way.”⁵⁴

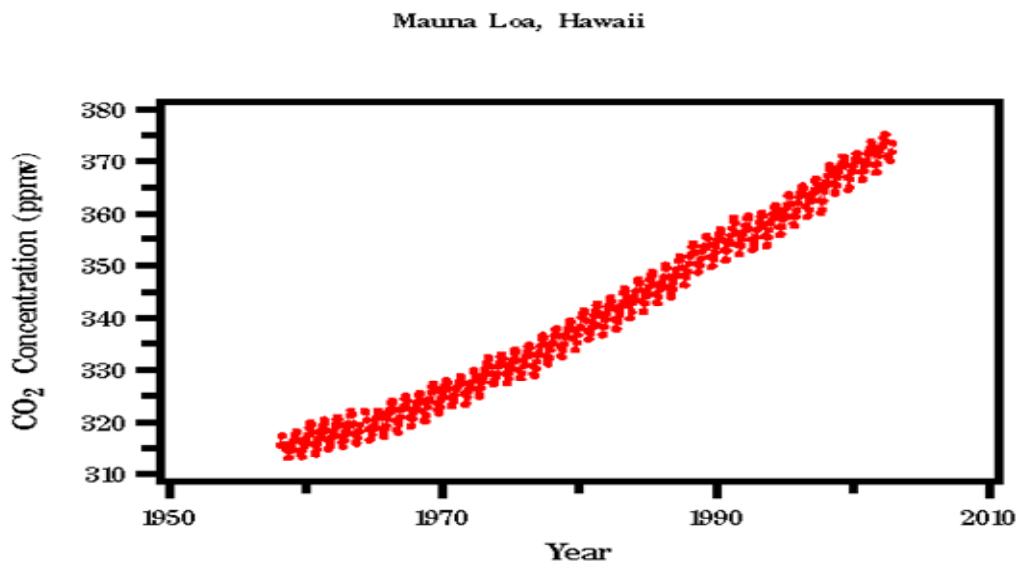
Professor Green notes one thing that “gives him hope” is the Flynn effect, discovered by political scientist James Flynn. Flynn documented that IQ scores went up consistently in the industrial world throughout the 20th century, so that a person of average intelligence in 1900 would test borderline mentally retarded today. According to Professor Green, over the past century people have learned to think more abstractly, because they’ve had to increasingly deal with abstract ideas in their daily lives (the “stock market,” prices, numbers, et cetera). In effect, there has been a cultural evolution, and the species of man has learned to better exercise rational systems. Professor Green thinks man will learn to think differently about the world through dealing with global complex issues like climate change. The problem is that mankind tends to learn through trial and error – and in the case of climate change or nuclear proliferation there is, obviously, just one planet earth.

Professor Green believes that a good chunk of mankind may not yet be mentally equipped to handle the climate change problem. While certain elite members of society – scientists, select political leaders, academics – may comprehend the problem, people en masse are not culturally primed to *think* in the way issues like climate change demand. We are, in effect, still living with the thought processes our ancestors passed down to us, and as such are more likely to respond to situations that impact us directly in our backyard. The questions left to be explored, when it comes to opinion on climate change

⁵⁴ Greene, J. (Interviewee). (2009, November 16). Radiolab. WNYC. Retrieved from <http://blogs.wnyc.org/radiolab/2009/11/16/killing-babies-saving-the-world/>

issues, involve experiencing the abstract concretely. Do those living near rapidly melting glaciers change the way they think about climate change?

In 2009, the Center for Research on Environmental Decisions (CRED) at Columbia released “A guide for scientists, journalists, educators, political aides, and the interested public” on “The Psychology of Climate Change Communication.” Chapter 3 of the guide instructs: “Translate Scientific Data into Concrete Experience.” As an example, the authors point to the famous “Keeling curve” graph, which demonstrated increasing amounts of carbon dioxide in the earth’s atmosphere from 1958 to 2006, as shown in the figure below:



Source: Dave Keeling and Tim Whorf (Scripps Institution of Oceanography)

According to the guide, while the curve alarmed the scientific community, the same graph:

does not communicate the immediacy of the climate change problem to

lay audiences. Instead, it may actually convey the message that the buildup of carbon dioxide in the earth's atmosphere has been taking place over a long period, thereby erroneously implying that climate change is not an urgent issue.⁵⁵

In addition, the authors argue, people have trouble grasping projections of higher concentrations in the future, and perhaps more importantly, a global average surface temperature increase of a few degrees does not seem like a significant issue to much of the public, given temperature changes people experience on a daily basis. Even though the 2007 UN IPCC report found observable climate impacts throughout the planet, Americans still rank climate change near the bottom of their concerns. There is still not a sense of urgency.⁵⁶ This is where the climate communication guide delves into the workings of the brain.

The brain, the authors explain, is composed of two different processing systems. There is the experiential (which deals with instincts, emotions, and the ability to survive), and the analytical (which deals with the analysis of information). While analytical communication can help one understand the science of what's happening, it rarely instills a sense of action. As the authors explain:

Most climate change communication remains geared toward the analytical processing system...anecdotal accounts of negative climate change experiences, which could easily outweigh statistical evidence, are rarely

⁵⁵ Debika Shome and Sabine Marx. *The Psychology of Climate Change Communication*. October 2009 by the Trustees of Columbia University. P. 14

⁵⁶ Fewer Americans see solid evidence of global warming. (2009). *Pew*. Retrieved June 4, 2010 from <http://people-press.org/report/556/global-warming>.

put into play, despite evidence that even a stranger's past experiences can evoke strong feelings in people, making such communications memorable and therefore dominant in processing.

A 2007 Center for Research on Environmental Decisions study on “Shrinking Glaciers and the Retention of Facts” sought to explore the effectiveness of analytical versus experiential information in changing environmental attitudes. Participants were either shown analytical, statistical information regarding the connection between shrinking glaciers and climate change, or more experiential images, news reports, and video of the shrinking glaciers. They were then surveyed on their environmental attitudes. The results showed that participants shown the “experiential” information retained more of that information, and were more worried about the situation and prepared to take action. Although, according to the study authors, this willingness to action can be “short-lived.”⁵⁷

In 2006, behavioral scientists at Princeton released a paper that outlined four basic ideas regarding people's psychological responses to global warming threats. The first point is that people are more likely to act based on feelings and personal experiences than on statistical descriptions of risks. As such, while there is relatively high public concern for global warming, personal relevance – in many instances – is not strong. Given that, there is high support for government actions that do not directly impact personal behavior, and low support for those that do. And a final challenge involves attention span. Grasping a problem like climate change involves a concept known as “the finite

⁵⁷ Debika Shome and Sabine Marx. *The Psychology of Climate Change Communication*. October 2009 by the Trustees of Columbia University. P. 17

pool of worry,” in which the public allots limited psychological space for political problems – typically focusing on no more than one problem at a time. In order to overcome these psychological challenges, the authors recommend translating the “abstract” nature of global climate change into the language of local concerns in order to make it more relative to people’s lives, to frame climate change as taking place in the backyard.⁵⁸

Given this research, one would suppose that the concrete experience of climate change offered by melting glacier floods and beetle-caused firestorm threats would have some sort of impact on the way the local populace thought about climate change. This is what the following case studies set out to explore: a backyard effect stemming from concrete experiences of climate change.

⁵⁸ Oppenheimer, M. & A. Todorov. (2006) *Global Warming: the Psychology of Long Term Risk*. Princeton University.

The Backyard Effect in Europe

One of the most prominent examples of climate change impacts today involves the rapidly melting glaciers of Europe. Two locations of particular interest are the Swiss Alps, where melting snows have impacted ski resorts and melting glaciers have threatened to flood towns, and Iceland, where rapidly melting glaciers of ice threaten – perhaps most glaringly – the national identity. In order to investigate how these backyard threats affected the local opinions, thoughts, or narratives on climate change, citizens of the nearby communities were interviewed. In some cases, these were locals enjoying a day in the park. In others they were local workers or business owners in industries particularly vulnerable to climate change, such as tourism. Their responses are analyzed in order to determine how personally witnessing climate changes (in their “backyard”) affects the way they think about, frame, and perhaps take action on the issue.

What follows is not a scientific sample of individuals. What follows, instead, is a qualitative assessment of complicated responses, a dissection of discourse rather than a scrutiny of statistics. Therefore, this will not tell us about the balance of public opinion in places where climate change impacts are evident. Instead, it seeks to convey information about how a typical, 21st century individual reacts to a global issue manifest locally – are they able to fathom it? What sort of reasoning does one use, and what information and history does one muster when pressed to explain their views of nature? Does proximity to impending calamity automatically lead to worry – or the opposite? And how does the appearance of evidence of things previously unseen impact beliefs and opinions, if at all?

Switzerland

On a 2003 episode of “The West Wing,” show writer and creator Aaron Sorkin concocted a situation involving America’s “first fatalities of global warming.” The exchange, involving “hydro-climatologist” Hillary Toobin and White House Chief of Staff Leo McGarry, went like this:

Hillary Toobin: “Mean temperatures in Alaska have risen seven degrees in the last 30 years. That’s insane. The temperature hike has caused glaciers to shrink and go backward; leaving lakes of melted glacier water in their wake. A shift in these collapsing glaciers puts pressure on the lakes, forcing them to overflow their natural limits, and killing, this morning, 14 people, not spotted owls.”

Leo McGarry: “Are you telling me that the deaths this morning are the first fatalities of global warming?”

Hillary Toobin: “They’re definitely global warming fatalities, but I doubt that they’re the first.”⁵⁹

This episode was highlighted by several groups intent on labeling the show “The Left Wing” for its supposed liberal political angle. And yet, six years later – in an alarming example of life-imitating-art – a glacier in Switzerland threatened to do exactly what Sorkin’s fictional “hydro-climatologist” was describing, only with the potential for

⁵⁹ Sorkin, A. (Executive Producer). (2003, March 26). The West Wing: Privateers, NBC.

significantly more damage.

Grindelwald, Switzerland is a small, charmingly-named municipality of just over 3,000 people, located high in the Bernese Alps on the north face of the famed Eiger peak. It is popular in the winter with skiers and in the summer with hikers, and a good number of the citizens work in the tourism industry. Indeed, most of the hotels are still family owned. The town hosts the upper and lower Grindelwald glacier, a historically popular tourist destination which flows down from the east face of the Eiger. In the 1800s, the glacier stretched deep into the valley, and the townspeople made a living selling the ice to France, where it was used in classy Parisian cocktails.⁶⁰

Since the 1980s, Alpine glaciers have been in hasty retreat – losing some one-fourth of their surface ice.⁶¹ In the case of Grindelwald, the melting is proving dangerous. In September of 2006, the BBC reported that disappearing ice from the lower Grindelwald glacier was revealing a mass of unstable limestone that was crashing into the valley. The town itself responded with a special exhibition at the Alpine Museum – *Glaciers in the Hothouse* – which highlighted the global warming connection with pictures of Europe’s glaciers melting over time. As Berne University glaciologist Martin Grosjean told the BBC, “It is completely normal for (glaciers) to retreat and then grow, in response to usual variations in climate...but what we are seeing now is extreme; an extreme reaction to climate changes – it’s a response to global warming caused by

⁶⁰ Foulkes, I. (2006, September 6). Europe’s glaciers in retreat. *BBC News*. Retrieved June 3, 2010 from <http://news.bbc.co.uk/2/hi/europe/5306818.stm>

⁶¹ Black, R. (2006, April 4). Major melt for Alpine glaciers. *BBC News*. Retrieved June 3, 2010 from <http://news.bbc.co.uk/2/hi/science/nature/4874224.stm>

greenhouse gases.”⁶²

The worry in 2006 was that the falling rock could create a dam, which could result in a massive flood that would swamp both Grindelwald and the nearby city of Interlaken (much like the fictional Alaskan disaster in *The West Wing*). In the long term, scientists worry melting glaciers will lead to drastically reduced summer river levels across Europe, which could affect crop irrigation and power stations. But the flood risk was the most immediate concern, especially for the Bernese mountain region.

By May of 2009, fears (at least in the media) were running high that a flood was imminent. On May 13th 2009, part of the nearby Stieregg moraine fell into the Grindelwald glacier lake. Following the collapse, surveyors discovered hidden pockets of water previously trapped beneath the glacier ice. Experts then feared another imminent collapse, which could trigger a massive flood. By mid May, the town of Grindelwald – as well as nearby localities – was on high alert.⁶³ The connection between climate change and glacial melting was evident, at least as far as the University experts and the local museums were concerned. And the situation seemed to have reached a breaking point: here was a place where a climate change-induced change to the environment not only threatened tourism, but actually threatened human life. Climate change was impacting life in the Grindelwald residents’ backyards, closing hiking trails and threatening their tourist industry livelihoods – and potentially their lives.

On May 14th 2009, the sky was bright blue and the streets of Grindelwald were

⁶² Foulkes, I. (2006, September 6). Europe’s glaciers in retreat. *BBC News*. Retrieved June 3, 2010 from <http://news.bbc.co.uk/2/hi/europe/5306818.stm>

⁶³ Oberland villages on flood alert. (2009, May 22). *Swissinfo.ch*. Retrieved from http://www.swissinfo.ch/eng/science_technology/index/Oberland_villages_on_flood_aler

quiet. The forty-minute train ride east from Interlaken showcased the beauty of melting glaciers in the form of dozens of small springtime waterfalls that spurted over the Alpine cliffs. But the town itself seemed to sense the danger, even if the worry was not admitted. Residents were wary of questions concerning the location of the glacier, and most of the hiking trails were closed. In fact, the only residents who dared point one in the correct direction were two children – likely blissfully ignorant of recent warnings – who were selling buttercups to passerby.

The closed hiking entrance to the Lower Grindelwald glacier displayed a series of prints explaining the connection between climate change, the glacial melts, and the flood danger. A nearby construction crew was attempting to dig a drainage tunnel in order to lessen the flood danger (the tunnel has since been completed). The situation seemed somewhat dire. In fact, if one could pinpoint one spot on the globe, on this day, where climate change should be of the utmost concern, it would likely be Grindelwald. On this day in May, Grindelwald could have been seen as climate change ground zero. Some residents however, seemed to have a different view.

The Hotel Restaurant Gletscherschlucht, nestled up against the lower Grindelwald glacier, hosts the portal to the typically popular, yet temporarily closed for safety reasons, hiking trails. It also sits next to where the B+S AG and Geotest AG companies were constructing a flood-prevention drainage tunnel in the spring and summer of 2009.⁶⁴ Ruth Meier and Werner Rubi have owned the Gletscherschlucht for over fifteen years, and have been observing the glacier's retreat over that time period. According to Ruth,

t.html?cid=7414584

⁶⁴ Tunnel protects Swiss communities. (2009, November) *TunnelTalk*. Retrieved from

the glacier has been “going back” significantly over this period of time. And yet, she’s unsure whether global warming is taking place. “I don’t know,” she confessed regarding its connection to climate change, “it’s nature at work.” On the issue of the impact on tourism – the hiking trails leading from her hotel were closed due to the flood and collapse risks – she expressed a similar lack of alarm or concern.⁶⁵

Ruth Meier had a dangerous melting glacier literally in her hotel’s backyard. She had been able to observe the retreat of the glacier for a decade and a half. Her livelihood depended on tourists visiting the glacier’s trails and stopping at her restaurant for a meal or her hotel for a place to stay. And yet, she was unsure at best on the connection between the glacial movements and climate change, and lacked alarm on the impending danger to herself or her industry. To her, it was the work of “nature.” Glaciers come, glaciers go, the earth spins round – she seemed to have a cyclical view of the whole matter. And in the town of Grindelwald, she was not the only one to feel this way.

Christiane Markle (rhymes with “sparkly”), the co-owner with her husband Peter of Grindelwald’s Hotel Derby, has lived in Grindelwald for over thirty years, and had witnessed the retreat of the glacier over that period of time. On the question of whether the retreat of the glacier was connected to global warming, she had an impression strikingly similar – if more fleshed out – to Ruth Meier’s, in particular the use of the word “natural”:

Could be, you know, but I’m not 100% sure if this global warming
is not a fact of a period that is warming now, that may be colder

<http://www.tunneltalk.com/Grindelwald-Nov09-Glacier-drainage-tunnel.php>

⁶⁵ Interview with Ruth Meier, co-owner of Hotel Gletscherschlucht, May 14th, 2009.

again in the next thirty years – a natural cycle.⁶⁶

Christiane was not worried about the flooding risks, or concerned about an impact on tourism – “for us, I’m not worried...they can adapt to the situation. They can make snow now. I’m not worried.”

Yumi Kanaka, a native of Japan (and less afflicted with the infamous Swiss reserve), had visited the Grindelwald glacier just once in her three-year stint as a shopkeeper of a sporting goods store in town. While she did not observe the melt first hand, she had “heard about it.” She said when she first moved to Grindelwald, people would show her pictures of the glacier from fifty years ago in “shock” at the scale of the melting. Even so, she claimed that nobody is overly worried about it, and that it’s “not the big issue.” On the topic of whether the glacial retreat was a result of global warming, Yumi expressed reservations:

The media says so. But is there really? The research? Who does the research? What’s the intention? If the government is funding it, I don’t know, different research may show something else.⁶⁷

With this response, Yumi indicated a distrust of the media (the same media casting the Grindelwald situation as an example of dangerous contemporary climate change impacts). She did not mention anything to do with natural cycles. Instead, she veered down a different thought track; one that exemplifies global warming’s status as an unprecedented, complex problem, one that challenges the comprehension abilities of the

⁶⁶ Interview with Christiane Markle, co-owner of Hotel Derby, May 14th, 2009.

⁶⁷ Interview with Yumi Kanaka, shopkeeper in Grindelwald, May 14th 2009.

human brain. As Yumi continued:

Personal opinion, it's happening, but in a global scale, I don't know what's going on, on a big scale. As a little human being, I guess it's happening, but I don't know about science, and the big picture.⁸

Melanie, a "Front Desk Captain" at the Eiger Hotel of Grindelwald, has lived in Grindelwald for just over six years. Part of her job consists of advising tourists and knowing about the opportunities Grindelwald has to offer. Her favorite saying, showcased on the hotel web page, is "genius without education is like silver in a mine." On the matter of the glacier she was particularly knowledgeable on the impact on the tourism:

I think when (the glacier) gets to the media, we get phone calls from tourists, "is it okay? The glacier is falling!" then it's an issue, but then its not. I'm not very worried (about impacts on tourism).⁶⁸

As for the actual melting, she has witnessed some changes in her six years, but she noted the local museum has documented the glacier's significant melting over the decades – "you hear it from the history" she says. On global warming, she believes its probably happening, but it's from something "a long way back," a statement she never clarified, but seemed to point to a cyclical view of the situation. This she expanded on later:

Not that the glacier is melting all of the time. It's always melting and

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⁶⁸ Interview with Melanie, Front Desk Captain Eiger Hotel of Grindelwald, May 14th 2009.

coming back, coming and going and coming back again. It's because of this time of living, and the ozone, and things like that.¹⁰

Of particular note in this statement is not just the emphasis on natural cycles stretching back before this current fifty-year melting period, but also the buzzword from the last Big Issue – the ozone layer – which she (falsely) attributed to the rising temperatures. “It's because of this time of living,” she offered, indicating an understanding that the modern world has impacted the environment in unprecedented ways, but a lack of understanding of what exactly is going on.

Caroline Frereres, a receptionist at the Central Hotel Wolter of Grindelwald, was also a six year veteran of Grindelwald. She, like the others, expressed a cyclical view of the melting glacier:

It's melting, yeah. Partially due to global warming, but its melting and going up always, so yes part of global warming, but I think maybe 100 or 200 years ago it was also like that, so maybe in a few years it goes up again.⁶⁹

She denied that the melting glacier issues would affect tourism, and noted that she “personally cannot do much” to change the situation.

Of all the workers and residents interviewed in Grindelwald, on a day in which flood risks were reaching a peak and media organizations were becoming more interested in the situation, no one expressed particular alarm. On the issue of global warming, most

⁶⁹ Interview with Caroline Frereres, receptionist Central Hotel Wolter Grindelwald, May 14th 2009.

acknowledged its phantom-like presence, but emphasized their understanding of natural cycles of glacial melts and expansions in order to combat the media-line that man-caused global warming was melting the glaciers at an unprecedented rate. In this case, with the effects of global warming happening in their backyard, instead of deepening understanding of the issue, the locals seemed on the defensive. No, it would not impact their tourist-based livelihoods; no, it's probably not a big deal, and yes this has probably happened before and the glacier will probably push back.

It is possible that the interviewees were simply attempting to protect their industry and not scare away tourists – there is certainly an economic incentive to do so. But such across-the-board responses so similar in their dismissal of the connection to human induced climate change is unlikely to be a coordinated community fib. In this case, a long term connection to nature and the glaciers seems to have fostered a long-term view of things, in which things retreat and come back. A few mentioned the “talk” of the town, especially those who recently moved to the region. While several directed me to the museum – which explains the connections to climate change – few admitted to visiting it. And others admitted outright distrust of climate change or media experts. This is a town where the residents seem to talk and form their views with each other, and in a place where the glaciers have gone and returned before, it makes sense to believe that they will do so again. The chilling thing about the interviewees lack of concern... is that it is understandable.

Iceland

As an island of less than half a million people, plopped in the North Atlantic about halfway between North America and Europe, it would seem Iceland is a place fated to an isolated existence. Perhaps, in the past, this was so – but in the internet age Iceland has become one of the most connected places on the planet, with upwards of 90% of its citizens connected to the internet, among which is one of the world’s highest concentration of broadband users.⁷⁰ That is to say, Icelanders are no longer living in isolation – they are connected to the world both via the internet and their financial industry. In addition, they are connected through nature. Over the past thirty years, Iceland’s glaciers have been in massive retreat, and by 2000 all non-surge glaciers in Iceland were on the wane.⁷¹ The rapidly increasing temperatures since the 1980s – particularly in polar and near polar regions such as Iceland – are to blame.

Interestingly enough, Iceland doesn’t contribute much in terms of carbon emissions, as its geo-thermal energy sources provide clean renewable energy, and so while it does have one of the highest energy consumption-per-capita rates on the planet, its CO₂-per-capita emissions are extremely low.⁷² And so the global warming induced glacial melting there is largely a result of emissions from elsewhere on the planet, which depends more carbon intensive energy sources (of note, Iceland’s output is largely a self-

⁷⁰ Iceland comes first in broadband. (2006, April 13). *BBC News*. Retrieved June 5, 2010 from <http://news.bbc.co.uk/2/hi/technology/4903776.stm>.

⁷¹ Sigurdsson, Oddur, Trausti Jonsson and Tomas Johannesson. (2007) “Relation between glacier-termini variations and summer temperature in Iceland since 1930” Hydrological Service, National Energy Authority.

⁷² Energy mix and carbon emissions, country by country. (2008, February 28). *Lightbucket*. Retrieved June 13, 2010 from <http://lightbucket.wordpress.com/2008/02/28/energy-mix-and-carbon-emissions-country->

serving adaptation to an accident of geography and has little to do with any uniquely green Icelandic culture). There is the added question of whether global warming is a net positive or negative for Iceland, as while glaciers are melting away the island's namesake ice, warmer weather is creating more voluminous rivers and thus more efficient hydroelectric power, increasing demand worldwide for Iceland's unique energy strategy, and creating overall more pleasant conditions in an area frigidly close to the arctic circle.⁷³ With such a mixed-bag of impacts, what is the backyard effect in Iceland? Are the melting glaciers causing alarm or glee or, as was indeed usually the case in this investigation... a shoulder shrug?

The late-May sun doesn't quite set in Iceland. It hovers at the horizon, bathing the white and rust city of Reykjavik in undying twilight. The city is sprinkled with parks and green spaces, but on this particular day in the capital, dozens of residents had settled in the centrally located "Family Park" in preparation for a Eurovision concert from Iceland's returning second-place finisher⁷⁴. This gathering, which represented all ages but primarily 20 and 30-somethings, served as the home base for interviews on residents' views on climate change with regard to nearby melting glaciers and palpably changing weather patterns. The responses were collected from both one on one and group discussions, and in some cases the quotes are anonymous due to the fast-paced nature of the interviews and the fleeting availability of the interviewees.

by-country/

⁷³ Bragadottir, A & Cox, A. (2008, April 6). Iceland: life on global warming's front line. *Environmental News Network*. Retrieved June 13, 2010 at

<http://www.enn.com/wildlife/article/34208>

⁷⁴ The last time there was such excitement and parading here, I was told, was when Iceland won a silver medal in men's handball at the 2008 Beijing Olympics. I do wonder

One woman expressed concern over others' inability to comprehend their impact on the natural environment: "they are so stuck in their left-brain, they have no connection to the consequences of their actions." But, when asked whether she blames other nations' carbon emissions for the melting of Iceland's glaciers, responded that she sees a difference between governments and their people: "the people are really different from the government – the people are thinking differently than the people who are in control." Repeatedly, she called for the earth to have a "higher level of consciousness" in regards to man's impact on the environment. Of all the on-the-street interviewees in Iceland, she was the only one to express such sentiments, although others indicated a similar love of nature.

So, do the people of Iceland care that the glaciers are melting?

A 20-year-old Icelandic man had a positive spin, which he expressed while sunbathing on the grass: "even though the glaciers are melting, a lot of people in Iceland don't care because we are getting warmer weather." This sentiment was echoed in affirmative nods from his buddies, who sat nearby awaiting the Eurovision concert.

This idea was also echoed in other interviews, many of which included the phrase "it is such a nice day," and the information that such nice days have gotten more common in recent years. Others mentioned that I should visit a glacier, "before it's gone!" somewhat jokingly. Mostly, it felt like climate change talk was just an annoying negative topic on an otherwise beautiful, wonderful day – thanks, not improbably, to climate change.

Asta, a worker at the tourist information center in Reykjavik, helped to me plan

what will happen when someone finally places first.

my route to a melting glacier, the Solheimajokull tongue of the Myrdalsjokull glacier.

She explained:

Last year if I remember correctly it retreated 180 meters in one year (2008). Last time I went there it took me 15 minutes to walk to the glacier, I'm sure it'll take 25 minutes now. Most glaciers are retreating, there are just a few that are not. In 50 or 60 years the smallest glacier will be completely melted. And in 200 years, this one (Myrdalsjokull) will as well. Let's hope it won't be that bad!

Leibwitz Flaversson is one of the original owners of Icelandic Mountain Guides, which began glacier walking tours in Iceland in 1993. He was primarily concerned with how melting glaciers are affecting the several glacier-dependent tourism industries in Iceland. He explained that his tour company educates their guides about global warming and its impact on the glaciers, who in turn educate the guests:

We see a rapid change in the glacier from year to year, and month to month, and since we started this 14 summers ago there have been enormous changes in the glaciers. It is causing us some difficulties, well one positive -- for instance the front of the glacier as it melts gets flat, making access much easier. But the retreating is creating glacial lakes, meaning places we used to walk across to get to the glaciers are now lakes. Snowmobiling is a big thing in Iceland, and they suffer more because they depend on snow on the higher glaciers. And now that we've had a decade where every year has seen more retreating and less snow, they've seen hard times. I think for the next few decades we will not have

problems with glacier tours – but going into another century, then we might run into some real problems. But during the next one or two decades, we will be able to change the routes, where we go on the glacier, but I think the glacier will still exist.

At the Solheimajokull glacier I accidentally parked at the old car park, and was directed to the new car park built several hundred meters closer to the glacier – which has been in rapid retreat since 1995. Even this new car park was expected to lose its usefulness within a few years, according to tour guides Johann and Maxime, who were on location to train us to use our crampon spikes and give a glacier tour.

I was interested in how the tour guides would explain the melting glacier to the group, given the explanation from the tour company that the guides are trained to explain the connections to global warming. I was also interested in the tone the guides would take – would they explain the science matter-of-factly, or perhaps take a reproachful, mournful, or angry tone? Or perhaps they would be excited by all the action. A glacier walk is, after all, a tourist activity and one expects such things to be fun. But this glacier, like many around the world, was literally creaking and moaning as it retreated, alerting all glacial walkers to its transient existence. Would the guides take advantage of such an atmosphere to educate – or would they merely point out the ice screeching as a neat little novelty?

Early in the tour, the guides seemed more interested in the various sources of impending doom for the glacier trekkers than for the moaning glacier itself. Maxime pointed out the “moulins,” deep holes in the ice caused by summer melting water streams

that slowly narrow in their long descent into the glacier core, and mentioned that it was in our best interest to avoid falling into one.⁷⁵ One was also supposed to avoid certain areas which the guides would point out later – these were susceptible to collapse. Many of the dangers were the result of the rapid melting now taking place in the spring and summer months, and many were due to the fact that we were walking on ice with giant metal spikes on our feet.

Eventually, they pointed out the pace of the glacial retreat. First, Maxime pointed to a bus far in the distance, where the edge of the glacier was in 1995. Then Johann pointed to the hill cliffs on either side of the glacier, which was the level at which the glacier was in the 18th century (during the “little ice age”). Johann went on to quote scientists who say that in 100 or 150 years, all the ice in Iceland will be gone: “No ice anymore. We’ll be out of a job!”

During this portion of the tour, the connection to climate change was implied. But the tone was not mournful or nostalgic – merely matter-of-fact, so-it-goes shoulder-shrugging. There was no further discussion of climate change, and the topic of conversation quickly shifted to the fact that the volcano buried under the glacier could quite possibly erupt during our tour. Politely, it waited until about a year later.

Oddur Sigurosson, a glaciologist at the Icelandic Meteorological Office,

⁷⁵ The next day, Oddur Sigurosson, perhaps Iceland’s leading glaciologist, explained to me the gruesome process of falling into a moulin: one slides for several seconds, as if on a water park slide, until the ice tunnel narrows to where the body cannot pass. At that point, the water running down the moulin piles on top of you until the pressure is such that the body is squeezed through the opening, “like toothpaste, sssssp!” I was glad to have heard the story *after* my tour.

explained to me in detail the comings and goings of Iceland's glaciers and the connections to climate change. He explained the noted warm period between 1930 and 1970 when retreat was hasty, the semi-recovery in the cooler period in until 1993, and the even more rapid retreat that has taken place since the early 1990s. According to his analysis, the summer temperatures affect glacial melting that very year – glacier response to warming temperatures, therefore, is nearly instantaneous. Were the global warming to continue, the glaciers would almost certainly disappear.

What interested me, however, was the investment of the Icelandic people in their national namesake glaciers – their national backyard. Sigurosson mentioned that he leads the Icelandic glaciological society, which has volunteers who every fall visit 50 glacier tongues to measure their retreat with tape. The group includes farmers, blacksmiths, teachers, “plastic surgeons, whatever” – basically a diverse sampling of Icelandic society. This is how he has tracked the pace of the glacial retreat: with the help of concerned citizens.

Sigurosson views the world with a scientist's expanded sense of time, and he responded to questions of how Icelanders feel about losing their glaciers by mentioning that in the 1800s (when glaciers were much larger and taking up valuable farmland) Icelanders would beg for global warming to take them away. And yet, he notes that many of his countrymen love them for the same reason he does: they are beautiful, interesting, and contain a buried history of mysteries, “which, if you know their alphabet, you can retrieve.” In short, they are sublime, but their loss just may be worth the rewards:

We will be sorry to see them go. Ask an Icelandic...would you like a warmer summer, no question. But if that will cause all the glaciers to melt

away, there might be some concern. Because they are beautiful. Truly beautiful.

In fact, he predicted the tone and nature of the responses I had already received.

In Iceland, the local awe and mysticism surrounding nature brings an interesting element into the climate change phenomenon. Residents there have a connection to their natural environment rare on modern earth, and their evident trust in nature's mysterious ability to regain balance may, in fact, hold some deeper truths. Following the eruption of Iceland's Eyjafjallajokull volcano in April 2010, which served to halt carbon-spewing air traffic in Europe for a matter of weeks and thus halted an estimated 2.8 million tonnes of CO₂⁷⁶, a British study found a possible connection of volcanoes to climate change. According to the study, as global warming causes glaciers to melt, the loss of mass releases pressure from magma chambers underground – making volcanic eruptions more likely and more intense.⁷⁷ Whether Eyjafjallajokull was a recent result of “glaciovolcanism” is certainly not clear – although the volcano was buried beneath a rapidly melting glacier – but a sudden upsurge in volcanic ash in the atmosphere could, indeed, serve to cool the earth somewhat. Of course, this is controversial and somewhat speculative – but nonetheless thought provoking. And thus, Icelanders' trust in the mysterious mechanisms of nature is difficult to dismiss.

⁷⁶ Adam, D. (2010, April 19). Iceland volcano causes fall in carbon emissions as eruption grounds aircraft. *The Guardian*. Retrieved June 13, 2010 from <http://www.guardian.co.uk/environment/2010/apr/19/eyjafjallajokull-volcano-climate-carbon-emissions>

⁷⁷ Pagli, C & Sigmundsson, F. (2008, May 7). Will present day glacier retreat increase volcanic activity? *Geophysical Research Letters*. Retrieved June 13, 2010 from <http://homepages.see.leeds.ac.uk/~earcpa/2008GL033510.pdf>

But the primary impression one gets from the island is that the glaciers are both beautiful and an important source of tourist income. Nevertheless, the warmer weather is not unwelcome, and climate change – while perhaps disastrous for other parts of the world – would be kind to near-arctic Iceland. In our discussion, the glaciologist Oddur Sigurosson reflected on man's relationship to change: "man wants to have things as they used to be. All changes are a nuisance to people who are adjusted to the circumstances." And yet, Icelanders sunbathing in their capital city seemed to be adjusting to global warming's pleasant circumstances quite easily. Climate change could hardly be defined as a problem for the country. The backyard was becoming sunnier, and the loss of income (from the end of the glaciers) was a possibility a century in the future. In Iceland, it seems the backyard effect on climate change was simply...the ability to spend more time in the backyard.

The Backyard Effect in America

Montana

One place where local environmental change has been connected to contemporary climate changes is in the American West, where the pine forests are rapidly dying. The cause of the dye-out is an unprecedented infestation of the mountain pine beetle, which is now able to breed more frequently as winter temperatures become milder.

In October of 2009, reporters Sam Eaton and Sarah Gardner of American Public Media interviewed the citizens of Helena, Montana – perhaps the epicenter of the infestation and resulting forest depletion – in order to gauge how people were reacting to climate change taking place in their own backyards⁷⁸. According to the report, the dead pine trees have turned the previously green hillsides gold and have led to fears of a deadly firestorm that could destroy Montana’s capital city. Responding to the fire threat has been costly, because it costs far more to cut down the tree than it’s worth in lumber. One property owner described spending \$30,000 removing the dead trees surrounding his property.

Jim Robbins, a writer who lives in Helena, described the effect of these drastic environmental changes on the local opinion on climate change. “I mean, there are still some people who refuse to believe it. But I think there’s been an erosion of that disbelief and it’s changed pretty drastically.”

The mayor of Helena, Jim Smith, noted that the politics of the debate (whether it is natural or man-made,) cease to matter when environmental changes are directly

⁷⁸ Eaton, S & Gardner, S. (Reporting).(2009, October 27). Climate change in our own backyards. [Radio Transcript]. American Public Media. Retrieved from

impacting one's community.

While there are other manifestations of climate change in the United States – melting permafrost in Alaska being a prominent example – none have so directly and evidently impacted a community like the forest die-out around Helena. Perhaps most importantly, nowhere does climate change seem to be costing individuals so much money. And, as the testimony community members and observers such as the property owner, the mayor, and the writer indicate, opinions have changed on the matter. That is, seeing is believing – but especially if the object of belief is affecting the bottom line. In Helena, there is a clear economic incentive to deal with climate change – and yet, while the citizens of Helena may now have the incentive and issue-knowledge to take action, it's apparently too late to change the havoc that has already occurred.

In the radio interviews, the writer Jim Robbins employed the religious saying “there are no atheists in foxholes” to describe the changing opinions of his fellow citizens regarding climate change. It was an apt analogy – climate change, like God, is frequently framed as an issue one either “believes in” or has “doubts.” Of course, belief in God is founded on “faith,” whereas climate change involves the employment of reason in the accumulation of scientific evidence – faith in science. And given “belief” in climate change frequently pressures the believer toward significant changes in one's lifestyle, and belief in God can do the same, there would seem to be major incentives toward disbelief. When those incentives change – as for the atheist in imminent danger of death who now hopes for an after-life, and the citizen who had previously dismissed climate change as a fraud-designed-to-raise-his-damn-taxes but is now forced to spend his own money

dealing with immediate climate impacts – attitudes can change with them.

The citizens of Helena were confronted with a highly visible, potentially deadly, and economically costly manifestation of climate change – literally, for many, in their own backyards. And, if the observations of the interviewees are to be believed, many changed their mind on the matter (of course, not all – Jim Robbins noted that “there are still some” that still refuse to believe it). The tree loss was a problem directly traceable to long-term rising temperatures, and it was an impact that was felt over a relatively period of a few years.

As such, this example seems to support the hypothesis that a visible, local, potentially dangerous or costly climate change impact will effectively change public opinion on climate change, as well as the way people view the issue. And yet, this American story conflicts with examples across the Atlantic, where residents seemed far more indifferent to local threats and impacts, also connected to climate change. Why is this so? What was the difference between Helena and Grindelwald?

There is the potential that the direct, out of pocket economic costs associated with the climate damage in Montana has something to do with the change of opinion. That is, while in Switzerland the potential of damage to tourism (which was dismissed across the board by the interviewees) was not a concern, and the threat to life itself still abstract (despite the menacing media reports), in Montana the threat to life combined with a direct economic cost for many residents in order to force a changing mindset.

Alaska: Searching for a Backyard Effect in Public Opinion Data

Perhaps the US region most directly impacted by climate change thus far has been Alaska, where melting permafrost and warming weather has been increasingly apparent in recent decades, and overall temperatures have risen over 3.5 degrees Fahrenheit since 1950.⁷⁹ Interestingly – perhaps ironically – Alaska is currently in the national mindset as Sarah Palin’s home state, a politician with a sizable following and significant media coverage who is also a climate skeptic.⁸⁰ Former Alaska Senator Ted Stevens was infamous for his assertion that global warming had ended and the world was now beginning to cool, even as global warming threatened the existence of various villages in his home state.⁸¹ More recently, current Senator Lisa Murkowski has attempted to limit the EPA’s authority to regulate carbon emissions.⁸² This gives an impression of Alaska as a state perhaps more suspicious of climate change, given the views of their democratically elected former governor and Senators, as well as the state’s economic interest in the oil and natural gas industries. But Alaska’s residents have been able to observe visible impacts to their environment due to climate change, more so than other parts of the country. In fact, the state itself is unique in the United States in that it has been affected by climate change nearly in its entirety, giving most residents a firsthand

⁷⁹ Wise, E. (2006, May 31). Alaska poster state for climate concerns. *USA Today*. Retrieved June 4, 2010 from http://www.usatoday.com/weather/climate/2006-05-29-alaska-globalwarming_x.htm

⁸⁰ Reid, T. (2009, December 10). Sarah Palin decries ‘hoax’ of climate change data. *The Sunday Times*. Retrieved from http://www.timesonline.co.uk/tol/news/world/us_and_americas/article6950967.ece

⁸¹ Tracy, J. (2007, September 3). Shishmaref feels heat of global warming. *KTUU local news*. Retrieved from <http://www.ktuu.com/Global/story.asp?S=7020437>

⁸² Sander, W. (2010, May 27). Climate push sputters. *Capital Press*. Retrieved from <http://www.capitalpress.com/california/ws-climate-bill-052110>

perception of climate changes. Is there a backyard effect in Alaska?

According to climate expert Gunter Weller, the former director of the Center for Global Change & Arctic System Research at the University of Alaska Fairbanks, “observable changes in everyday life...are turning global warming skeptics into believers.”⁸³ This is due, in part, to temperature increases that one witnesses over a life time, with Alaska’s winters warming at an alarming rate since 1977.⁸⁴ In one oft’ repeated example, the Iditarod Trail Dog Sled Race had to be moved further north, because warmer temperatures has made the old trail too mushy and dangerous. In addition, shrinking glaciers across the state give the public a direct view of climate changes over time.

A 2006 report from the National Science Foundation on Alaskan opinions on global warming⁸⁵ found that “most Alaskans consider global warming a serious threat.” There was an interesting correlation between the percentage who believed global warming is happening (81%) and the percentage who believe global warming has already manifest in loss of sea ice (83%) or melting permafrost (82%). In addition, 93% of Alaskans who noticed temperate changes in their local area attributed the phenomenon at least partly to global warming. Whether Alaskans witnessed these events and connected it to global warming, or believed in global warming and subsequently connected it to

⁸³ Queary, P. (2001, March 18). Greenhouse-effect skeptics become believers. *Associated Press*. Retrieved from

http://www.juneauempire.com/stories/031801/Ins_greenhouse.html

⁸⁴ Evidence of climate change in Alaska. (2009, January 30). U.S. Fish & Wildlife Service. Retrieved from <http://alaska.fws.gov/climate/inak.htm>

⁸⁵ Leiserowitz, A., & Craciun, J. (2006). Alaskan Opinions on Global Warming (No. 06-10). Eugene: Decision Research.

http://www.decisionresearch.org/Projects/Climate_Change/

these events, is unclear. What is clear, however, is that while many in Iceland semi-joked that global warming would be a “good” thing in their near-arctic environment, 67% of Alaskans surveyed believed global warming would be bad for Alaska, and 93% believe it is a problem. Breaking down the survey, it is Alaskan Republicans who have a more Grindelwald-esque view of the situation, with somewhat fewer (65%) believing global warming is happening, and majorities of Republicans believing it is a natural cycle and not a serious threat. This partisan divide is typical of the nation as a whole.

The year 2006, like 1988, was a boom year for climate change credibility – with 2005’s hurricane Katrina exemplifying the possibility of global warming intensified severe weather⁸⁶ and Al Gore’s “*An Inconvenient Truth*” becoming a surprise hit at the box office. And yet, when one compares the 2006 opinion levels in Alaska with the rest of the nation (most of which was not privy to such pronounced backyard climate impacts), there are a few noticeable differences. A 2006 ABC News poll (which, notably, phrased the questions somewhat differently) found that 85% of Americans believed global warming was “probably occurring” (although those very sure of it were far fewer). About half witnessed “disruptions in weather patterns” that one could possibly connect to global warming, a situation that poll givers posited could be “counteracting continued misapprehensions about scientific disagreement.”⁸⁷ Interestingly, the 85% of Americans is very close to the 81% of Alaskans who believe global warming is happening, but while

⁸⁶ Americans link hurricane Katrina and heat wave to global warming. (2006, August 21. Zogby. Retrieved on June 1, 2010 from <http://www.zogby.com/news/readnews.cfm?ID=1161>

⁸⁷ Langer, G. (2006, March 26). Public concern on warming gains intensity. *ABC News*. Retrieved on June 1, 2010 from <http://abcnews.go.com/Technology/GlobalWarming/story?id=1750492&page=1>

93% of Alaskans had witnessed temperature changes, only about 50% of Americans on the whole did so. That is, in 2006 at least, many Americans were credulous without first-hand evidence of warming in their “backyards”.

Another 2006 poll of Americans found that 74% were increasingly convinced that global warming was real, with 65% believing a connection between heat waves and global warming, and 68% seeing a connection to hurricane Katrina.⁸⁸ Another 2006 University of Maryland multi-country poll found that 76% of Americans believed that “climate change or global warming, due to the greenhouse effect, is a serious problem” (which was still one of the lowest percentages in the industrialized world), and 59% believed recent extreme weather patterns (like Katrina) were unnatural and unusual (a sharp increase from 2004).⁸⁹ Again, this implies a connection between the national witnessing of Hurricane Katrina and a change in the American public’s understanding of global warming – an understanding that, in 2006, more closely aligned with a population (Alaskans) who had witnessed firsthand climate change for many years.

Of course, there has been a massive turn around in public opinion (in America and Europe) in recent years, particularly in the wake of scandals over climate science. A March 2010 Gallup poll of American opinions found that two-thirds of Americans do not believe global warming will ever pose a threat in their lifetimes, and only half of those surveyed agree that temperature increases are due to human activities (while 46% do not

⁸⁸ Americans link hurricane Katrina and heat wave to global warming. (2006, August 21). *Zogby*. Retrieved on June 1, 2010 from <http://www.zogby.com/news/readnews.cfm?ID=1161>

⁸⁹ 30-Country poll finds worldwide consensus that climate change is a serious problem. (2006, April 25). *World Public Opinion.org*. Retrieved on June 1, 2010 from <http://www.worldpublicopinion.org/pipa/articles/btenvironmentra/187.php?lb=bte&pnt=1>

blame humans at all). Of greater note, more Americans (48%) believe that the threat of global warming is “generally exaggerated” than any time since 1997, when the question was first posed.⁹⁰ In addition, despite continued reports of melting ice caps and glaciers (as Gallup notes), the percentage of Americans who believe the effects of global warming have already begun has fallen from 65% in 2008 to 53% in 2010. A May 2010 Rasmussen Report showed that only 40% believe global warming is due to human activity – and 44% blame long term trends, and only 58% believe global warming is a serious problem.⁹¹ With such a significant about-face in public opinion in America, does there parallel a similar situation in Alaska – or has that state’s direct confrontation with global warming impacts secured its residents confidence that global warming is taking place?

Unfortunately, a trustworthy in depth climate change poll has not been conducted in Alaska since 2006. However, several developments have indicated that Alaska is not going the way of the nation in terms turn-around on climate change opinion. In one recent example, the University of Alaska in Fairbanks recently launched “SNAP,” a web tool that connects 350 Alaskan communities with detailed charts of local greenhouse gas emissions, temperatures, and precipitation. As SNAP Director Scott Rupp put it: “It can be hard to digest the big picture on a global or even a statewide scale, but this method makes it easier to relate to, in a way that is specific to how changes can impact specific

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⁹⁰ Newport, F. (2010) Americans’ global warming concerns continue to drop. *Gallup*. Retrieved June 2, 2010 from <http://www.gallup.com/poll/126560/americans-global-warming-concerns-continue-drop.aspx>.

⁹¹ Energy update. (2010, May 30). *Rasmussen Reports*. Retrieved on June 1, 2010 from http://www.rasmussenreports.com/public_content/politics/current_events/environment_e

locations.”⁹² The site has links to the Governors Subcommittee on climate change, and scientific reports on climate impacts already underway in the state. In addition, while most Americans let Katrina fade in memory, Alaska has been dealing with record high temperatures.⁹³

The Inupiat Community, traditionally located near the Chukchi sea, have been particularly outspoken on climate change issues, especially since the melting of sea ice has forced their re-location. As Colleen Swan, a tribal administrator, told the *Christian Science Monitor*: “What’s happening with climate change – it’s not speculation, it’s our reality.”⁹⁴ The response from the Inupiat and other directly impacted Alaskan towns highlights an interesting finding from the in depth 2006 poll, which found that urban Alaskans are less concerned with the threat warming poses than rural Alaskans – who clearly have more experience with the impacts in their backyard.⁹⁵ While a more in depth poll would need to be conducted of Alaskans’ current views on climate change in order to distinguish a backyard effect in relation to the general American data, an ironic corollary to the backyard effect seems identifiable from this information. Climate change opinion

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⁹² SNAP tracks climate change for Alaska towns. (2010, Jan 6). *Homer Tribune*. Retrieved on June 1, 2010 from <http://homertribune.com/2010/01/snap-tracks-climate-change-for-alaska-towns/>

⁹³ Masters, J. (2010, July 30). Ice and fire: extremes grip North America. *Dr. Jeff Masters’ WunderBlog*. Retrieved on June 1, 2010 from <http://www.wunderground.com/blog/JeffMasters/comment.html?entrynum=1179&tstamp>

⁹⁴ Velasquez-Manoff, Moises. (2008, August 28). Alaska: climate change frontier. *The Christian Science Monitor*. Retrieved on June 1, 2010 from [://www.csmonitor.com/Environment/Global-Warming/2008/0828/alaska-climate-change-frontier](http://www.csmonitor.com/Environment/Global-Warming/2008/0828/alaska-climate-change-frontier)

⁹⁵ Leiserowitz, A., & Craciun, J. (2006). *Alaskan Opinions on Global Warming* (No. 06-10). Eugene: Decision Research.

has demonstrated itself to be a highly partisan issue, with associations of Democratic concern and Republican skepticism.⁹⁶ In addition, there is an ever-widening gap between the rural and urban vote in American politics (with rural areas more decidedly Republican.)⁹⁷ And so, the fact that the direct experience with climate impacts more prevalent in rural areas perhaps influences their more pronounced belief in climate change and its contemporary effects is, indeed, a type of Backyard Effect – one that seems to trump, or at least rival, partisan influences in opinion.

http://www.decisionresearch.org/Projects/Climate_Change/

⁹⁶ Newport, F. (2010) Americans' global warming concerns continue to drop. *Gallup*. Retrieved June 2, 2010 from <http://www.gallup.com/poll/126560/americans-global-warming-concerns-continue-drop.aspx>.

⁹⁷ McKee, S. C. (2008) Rural Voters and the Polarization of American Presidential Elections. *University of South Florida St. Petersburg*.

Conclusion

Climate change is a problem of unprecedented complexity and scope, and yes, it challenges the way we, as a species, think about the world we inhabit. But, at the time, World War II was a problem of unprecedented complexity and scope, which changed the way we thought about the world. As was the Great Depression, as was World War I. So too were events from the problems caused by early industrialization to the global plague of the Black Death. We have encountered the unprecedented before – the question is how quickly we can overcome old ways of thinking and establish more successful precedents of action. Failure could be disastrous; success would better prepare humanity to confront issues of similar scope and urgency.

This study sought to explore *how* people think about climate change, through the lens of individuals confronted with it in their own backyards. It stemmed from a long-running question that has plagued pollsters, scientists, and public officials: why the lack of alarm on climate change? This study supposed something about human nature, that when someone is confronted with firsthand evidence (in one's backyard) of danger or a threat, it will provoke a response. Efforts to find this climate change “backyard effect” involved interviews with residents near melting glaciers, analysis of poll numbers, and journalistic anecdotal reports of other locations confronted with climate change impacts. The case studies have been examined. So, is there a backyard effect?

The people of Grindelwald, Switzerland, confronted with the threat of dangerous flooding caused by melting glaciers, caused by global warming (according to the local museum), did, in fact, have a backyard effect. But instead of the predicted higher

awareness of the threat of climate change, the effect was different: a longer-term view of natural cycles and a reserved optimism that things will work itself out. There was little indication that the melting glacier contributed to any alarm or even increased understanding of climate change, and few unprovoked connections to human-induced climate change were made by the interviewees. There was a community feeling, shared phrases, and seemingly a shared perspective: this too shall pass. After watching the glaciers in their backyard for years, the interviewees of Grindelwald appeared to be *more* complacent about the threat and the financially threatening potential of the glacier's ultimate retreat. Whether this is a view of the majority of residents is not clear, but that it was the general perspective of nearly all of interviewees is definitely the case.

The people of Iceland, in contrast to the solemn Swiss, seem to experience the hard knocks of life with a wink and a nudge, so much so that it was at times difficult to know whether responses were sincere or jocular. That stated, if the general vibe from Grindelwald was “this too shall pass,” the vibe from Iceland was, “here comes the sun!” The people seemed uncommonly connected to the land they inhabit, and as such sad to see the glaciers retreat so quickly. They also seemed more understanding of the connection to overall climate change – because not only is the warmer weather evident in the glacial melt, but also in the increasingly comfortable springs and summers. The Icelanders were literally basking in the sun global warming helped enhance (so to speak), and as such were dealing with conflicted emotions. There was certainly a backyard effect – with such pronounced impacts of climate change it would be difficult not to have one – but, again, instead of increased knowledge and action, it was acceptance and in-action. As described by Oddur Sigurdsson, the throngs of people from all walks of life who trek

out every year to measure the retreat of their national treasures seem less like active climate change combatants and more resemble hospice caretakers. In the end, in a country with people known for having a close relationship to nature, that relationship is simply not close enough to overcome what promises to be a more temperate climate for Iceland.

The one location in which there appeared to be a backyard effect – and perhaps warrants further study – was Helena, Montana. Here, climate change was directly associated (by the town’s mayor himself, not just “scientists” or “the media”) with the beetle infestation that was threatening to cause a firestorm, and in the short term, was costing the townspeople money. This direct out of pocket expense, according to the journalistic reports, was enough to change citizens’ minds about climate change.

Both Helena and Grindelwald were under direct threat from climate change impacts, threatened – respectively – by fire and melting ice. And yet, the interviewees of Grindelwald seemed stoic, unalarmed, and uninterested in the broader connections to human-induced climate change. In Helena, the danger was met with alarm and questioning – and the primary difference seems to be that in Helena, people had to pay to have trees removed themselves, while in Grindelwald it was a broader tax-based effort to dig an emergency run-off tunnel. In Helena, the costs were direct, while in Grindelwald they were indirect. Of course, there are other factors to consider: the Helena story was, in fact, a story conducted by a radio show interested in telling stories – and as such there is a risk that interviews were cherry-picked in order to convey a tale. In Grindelwald, perhaps the interviewees – most of whom had incomes dependent on tourism – simply did not want to scare away tourists by sounding alarmed. Here, again, would point to an

economic incentive, only to act in an opposite fashion.

But what can be taken from this study is it takes more than direct threats to spur action: it takes direct economic costs to individuals in order to perhaps spur a changing of minds and foster better understanding. How do people think about climate change? They think with their wallets. This is not a surprising discovery. In the section “The Brain on Climate Change,” there was a discussion on the evolutionary origins of the way humans think about complex problems. Indeed, it seems that we still think in terms of survival – but instead of fear of natural disaster, we fear financial disaster – and it is the threat of financial hardship that causes action. Climate change is both complex and abstract – that is the problem. And yet, no study is needed to say that few things are more concrete than money. Connecting climate change to direct economic costs may be the simplest way to simplify the problem.

My hometown of Binghamton, New York recently installed a “Cost of War” sign on its City Hall in order to convey to its citizens how much the wars in Iraq and Afghanistan are costing them, both in total and per capita. There has been a debate over the appropriateness of the sign, but more interestingly, a debate about its effectiveness. Clearly, Binghamton Mayor Matt Ryan sees some value in forcing passerby to consider how much they pay for the war, in addition to the cost in human lives that can usually be found in a back page of the morning paper. Would similar signs for climate change be effective – or even possible to calculate? There has been plenty of talk about the natural disasters that could result from climate change, from floods and rising sea levels to firestorms and droughts, but fairly little mentioning of direct economic costs. This study seems to indicate that it may be better to focus on the economic impact of climate change

impacts rather than the ecological or biological impact. There are many ways in which people see the world, and for those who wish for a greener world, perhaps its best to understand that others think in terms of a different green. They think in money. This is not breaking news, but it is important to remember, and in terms of the climate change debate – vitally so.

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Capstone Summary

The “Backyard Effect” is the idea that on an issue as abstract, complex, and vast-in-scope as climate change, it will take experiential evidence of impacts in order for people to change and view the problem as urgent – and take action. This project sought to investigate “Backyard Effects” around the world in order to determine what impact they had on residents’ views, opinion, discourse, and action on climate change. The overriding question throughout the investigations was *why* the public has remained relatively unengaged on the issue, and what it might take to finally engage average citizens in the climate change issue.

To begin, an academic study of climate change public opinion over time begged the question of why the poll numbers on climate change understanding have continually reverted to very low levels. This led to a psychological and sociological investigation of mankind’s ability to comprehend complex, abstract issues such as climate change. This research led to the hypothesis of the backyard effect – that people will be likely to finally both comprehend and take action on climate change when it’s impacts are felt locally – in their backyards. At the very least, the idea posited that experiencing impacts would affect people differently than merely hearing about the possibility of them.

The methodology used in this project was varied and relied on both academic and journalistic styles of data gathering, reporting, and analysis. In order to investigate specific instances of climate change impacts first-hand, I visited the site of rapidly melting glaciers in both Iceland and Grindelwald, Switzerland. There I interviewed both experts and residents on their climate change opinions and reactions to the environmental phenomena taking place in their backyards. These interviews were more qualitative than

quantitative in nature, as the focus was an analysis of the individual responses in order to formulate a general impression rather than calculate public opinion statistics. The results from these interviews were similar stories: a general lack of serious concern, and in Grindelwald's case even understanding, of the threat of climate change or the connection to the impacts taking place in their communities.

An analysis of media reports of a tree-killing beetle infestation in Montana served as a way to gauge another localized climate change impact without necessarily traveling to the location. From this NPR report, in which various citizens of Helena were interviewed regarding their reactions to the local threats posed by the climate change caused tree die off, one could identify an actual change in a community's attitude due to a localized impact. As such, the experience of Helena's citizens was compared to those in Switzerland and Iceland in order to compare, contrast, and identify reasons. It seemed that the difference rested in the financial connection to the climate disaster. While Iceland did not yet suffer financial costs (merely aesthetic ones) and Grindelwald did not see the potential for financial costs (merely the threat of natural disaster), Helena's citizens were actively paying for dead tree removal on their properties (as a fire precaution) and were thus actively paying out of pocket in response to a climate change impact. This was the backyard effect – in the form of a back-pocket effect.

A final method was the comparison of poll numbers in America nationally with those in Alaska locally – a state which has already experience significant temperature increases and climate change impacts. This method was less productive, given the lack of adequate polling confined to Alaska's citizens, but the comparison itself seems worthy of further research.

The significance of this project rests chiefly with the new questions it asks and the relatively exhaustive methods used to answer them. While much research has been done regarding poll numbers on climate change issues in a general sense, little research has been done regarding the influence of climate change impacts on a community's view of climate change. In part, this is because readily traceable global warming impacts are a fairly recent phenomenon, and also because it is still difficult to trace specific phenomena to man-made climate change. As such, the time has come for an analysis of this relationship, and this project sought to help begin this type of research.

Secondly, it is an assumption of this project that the science on climate change is sound and that it is a real and urgent issue that must be confronted by the entire world in concert. It is an understanding of this project that, so far, such action has not taken place, and attempts to begin such action have been mostly failures. As such, this project asks an incredibly timely and, in fact, rather desperate question: will we even act when the abstract threats become real? Will we believe what is before our eyes?

The results of this project seem a mixed bag, and in some cases alarmingly so. In Switzerland, residents confronted with the possibility of deadly, destructive flooding *directly* caused by climate change impacts with skepticism and a shrug. This despite clear signage pointing out the threat and connection, as well as a local museum devoted to the same. In Iceland, residents confronted with the loss of their glaciers were torn between the loss of their nation's namesake wonders and the excitement for balmy, sunnier weather. In Montana, residents changed their views only after the direct impacts of climate change cost them significant out of pocket expenses. This insight was both somewhat obvious, and yet incredibly significant: it offers a way to move forward in

communicating the threat of climate change to the distractible public. This insight demonstrates that it is the financial angle that may require emphasis as the world continues to attempt to prevent the worst impacts of global climate change.