Can Education Overcome Climate Change Inactivism?

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Responses

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Introduction

> ***Inactive*** adj. Not active, working or energetic. (Concise Oxford English Dictionary, 2002, p.714).
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> Education is not a 'magic bullet' in approaching climate change and sustainability, but without coordinated educational interventions, even the best thought through technical policies will fail (International Alliance of Leading Educational Institutes, 2009, p. 4).

Anthropogenic climate change could be described as the mother of all 'collective action' problems. Individually we are powerless to slow it down while collectively we appear paralyzed by a combination of neoliberal economics, unrepresentative politics, and ecologically dysfunctional worldviews.

This paper will examine from a critical perspective elements of the contentious public debate in North America and pose questions that critical educators might explore with their students in order to help them become catalysts for genuine change.

Anthropogenic climate change has become a reality that on one on the planet can avoid. As a topic in school it has elements that touch on many subjects from science and politics and from social through to technological studies. It fits in no one place easily because climate change is a problem that transcends social, economic, political and scientific-technological boundaries.

Education to overcome climate change inactivism is not about telling young people what to think, but rather about helping them understand how manipulative politics, economic power and myth making PR are subverting public democratic will and encouraging inactivism. In attempting to marginalize and discredit CC science these actors are trying to discourage critical awareness and blunt effective citizen action to reduce greenhouse gases and decarbonize the economy. Science education for CC activism reaches beyond the basic science to encourage young people to apprentice as critical scientific policy analysts and media investigators, exploring the political and media ecology of how climate science has been used and manipulated in the public arena. Activist pedagogy encourages young people to employ disruptive technologies to create innovative counter-narratives to the old dysfunctional stories of intensifying carbon dependence.

This paper will explore a small background segment of the 'inactivist' movement, that is the array of people and organizations working to maintain the status quo with respect to carbon emissions. In exploring this terrain we will ask some questions that educators might consider as generative. In order to become more active in terms of heeding the multiple warnings the world's climate science community has repeatedly and loudly articulated, young people need to become more aware of the realpolitik of the forces working to ensure that the scientist's warnings remains marginalized.

The inactivist movement is advantaged by the status quo. Enormous amounts of economic and political capital around the planet have a vested interest in ensuring that carbon emissions continue their unabated

rise. Questions about climate change entails asking critical questions about the ethical and moral legitimacy of existing technological practices, laws, economic policies, political powers and decision-making principles as they impact some of the most disadvantaged people on the planet.

The examples of inactivism[1] will be drawn primarily from the North American context, but similar movements exist in Australia and the U.K. Although Canadians may not be aware as a country we have emerged as a global environmental pariah in terms of our non-response to the climate change crisis. In Canada the story of climate change is inextricably linked to the rapid development growth of the Alberta tar sands, the oil and gas industry pressure for development in the rapidly melting arctic, and the absence of significant federal government leadership measures to combat greenhouse gas emissions. Although stories in the corporate business press frame the retreat of arctic sea ice due to climate change predominantly as a good news story, a opportunity to make even more profit by the oil, gas and minerals multinationals (Reuters, 2011; Berkow, 2011; Ljunggren, 2011), the story for indigenous peoples and the biodiversity which has supported them is far less rosy.

Basic Climate Literacy

Proverbial 'blind spots' in all facets of human education have already impacted and continue to impact the climate in an increasingly negative way. Because carbon emissions are a product of virtually every phase of our economy, their ubiquitous nature makes the problem seem all the more intractable. The U.S. Global Change Research Program defines 'climate literacy' as *"an understanding of your influence on climate and climate's influence on you and society"*:

> People who are climate science literate know that climate science can inform our decisions that improve quality of life. They have a basic understanding of the climate system, including the natural and human-caused factors that affect it. Climate science literate individuals understand how climate observations and records as well as computer modeling contribute to scientific knowledge about climate. They are aware of the fundamental relationship between climate and human life and the many ways in which climate has always played a role in human health. They have the ability to assess the validity of scientific arguments about climate and to use that information to support their decisions (U.S. Global Change Research Program, 2009, p4).

One of the most extensive studies concerning climate change knowledge of the American general public found that misconceptions were widespread:

> 63 percent of Americans believe that global warming is happening, but many do not understand why. In this assessment, only 8 percent of Americans have knowledge equivalent to an A or B, 40 percent would receive a C or D, and 52 percent would get an F. The study also found important gaps in knowledge and common misconceptions about climate change and the earth system. These misconceptions lead some people to doubt that global warming is happening or that human activities are a major contributor, to misunderstand the causes and therefore the solutions, and to be unaware of the risks (Leiserowitz, Smith & Marlon, 2010, p.3).

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[1] *A note about terminology*

In this paper I will use the term broad term 'inactivists' to include those who deny climate change is even occurring, as well as those who acknowledge that although the climate is rapidly changing human activities have not played any significant role in it, hence no need for 'action' to reduce emissions. The terms 'skeptic', 'climate denier' and 'denial' will be used in their original contexts as quoted from sources.

These authors concluded, *"Many Americans lack some of the knowledge needed for informed decision-making in a democratic society"*. For example, only:

- 57% know that the greenhouse effect refers to gases in the atmosphere that trap heat.
- 50% of Americans understand that global warming is caused mostly by human activities.
- 45% understand that carbon dioxide traps heat from the Earth's surface.
- 25% have ever heard of coral bleaching or ocean acidification (Leiserowitz, Smith & Marlon, 2010, p.4).

Under the barrage of disinformation spewing from cable news networks these results are not surprising. Basic climate literacy is very important and necessary, but by itself is insufficient preparation for young people to take on citizenship responsibilities. Students should be challenged to expose and critique efforts in public relations and self-interested commentary that masquerade as balanced reporting of science or even scientific commentary. Today young people are facing a tide of poor climate science reporting combined with climate denial disinformation that is being manufactured; both flow through social and broadcast media. Because many Canadians work in energy-related industries, critical conversations concerning climate change and the oil & gas, and tar sands industries can threaten strongly held beliefs and values.

Several studies (Sterman, 2008; 2007) have examined how well people understand the system dynamics of the carbon system and how human emissions are unbalancing that system. For example, 84% of MIT *graduate* students could not resolve a simple problem involving a bathtub analogy for accumulating carbon emissions in the atmosphere:

> Nearly two-thirds of the participants asserted that atmospheric GHGs can stabilize even though emissions continuously exceed removal--analogous to arguing a bathtub continuously filled faster than it drains will never overflow. Most believe that stopping the growth of emissions stops the growth of GHG concentrations. The erroneous belief that stabilizing emissions would quickly stabilize the climate supports wait-and-see policies but violates basic laws of physics (Sterman, 2008, p.532).

As Sterman explains people often mistakenly "assess system dynamics using a pattern-matching heuristic, assuming that the output of a system should "look like"--be positively correlated with--its inputs". This points to a crucial blind spot that pervades most of our formal education systems, namely the fact that we provide little if any formal learning experiences that involve young people in understanding and controlling dynamic systems, those that don't respond to simple linear cause-effect reasoning. A cursory examination of science curricula in elementary, secondary and even university programs reveals little if any mention of 'system dynamics' or social, environmental, economic model building. Research by Hartley, Brook, Schramm, D'Avanzo, & Anderson (2011) found that most U.S. College students do not understand the basic concepts of the carbon cycle or the processes that transform carbon. They found that everyday informal reasoning resulted in misconceptions related to the conservation of matter and from the source of photosynthetic mass.

The Technofix

After teaching the basic scientific concepts that form the physiochemical basis of the greenhouse effect, science educators might be tempted to approach any remaining curriculum time emphasizing that science-technological 'progress' and 'fixes' will ameliorate the problem without having students examine the roots of the problem. In focusing on 'fixes' to the crisis teachers cannot be faulted, after all, technofixes have been the employed to varying degrees of success to ameliorate the worst environmental excesses of consumer

culture and its enabler laissez-faire or neoliberal capitalism. While an emphasis on science and technology in reducing greenhouse gases is important, other important questions also need to be asked.

These include the difficult questions surround the question of responsibility and climate change, including: who is primarily responsible for the emissions already in the atmosphere? What is just and fair in terms of who should assume the most responsibility for reducing emissions? And, what systems of values, economics and worldviews have got us into this problem and importantly are these same factors at work preventing us from moving forward to tackle the problem? To be clear, clean technology will need to play a central role in reducing GHG emission growth, but some of the important questions going forward for young people are not for example, whether solar panels and wind turbines are good and necessary, they are of course. The tougher more significant questions they will face as citizens include;

- Is carbon capture and sequestration a viable option for reducing emissions from coal-fired electricity? Who should pay and who should take on the risks? Is there even such a thing as 'clean coal'?
- Should nuclear energy systems be expanded?
- How much more carbon in the atmosphere will lead to irreversible impacts on human and the natural systems which support them?
- Are large scale geoengineering plans to alter the climate too risky?
- Are the promises of a future technofix to the climate crisis is being used by a relatively number of political and industry actors to forestall any carbon taxes or a cap-and-trade system that might threaten special interests and their firm grip on the status quo of emissions as usual?
- What changes to our economic system are required to ensure that the biggest carbon polluters pay their fair share?

Choosing to avoiding these contentious questions in the classroom is understandable, after all politicians of nearly all stripes continue to downplay the risks that the climate science community insists are here now and will become even more dire into the future. At this writing at the halfway point of a federal election in Canada, the issue of climate change has barely even been raised.

Through their government Canadian taxpayers are now significantly invested in the so-called 'silver bullet' of carbon sequestration or 'carbon capture and storage', a massive technological fix that even the most optimistic forecasts indicate will only put a small dent in the problem. Carbon-capture and storage (CCS) or sequestration involves storing carbon dioxide by injecting it into coal seams, depleted oil and gas wells, saline aquifers and caverns. The Royal Society of Canada report concluded:

> Unfortunately for the specific case of GHG emissions from oil sands, the geology of northeastern Alberta, where most of the oil sands activity is concentrated, is generally not suitable for CCS (Royal Society of Canada Expert Panel, 2010, p.90).

Simpson examined the cost per tonne of capturing carbon dioxide emissions for the $1.6 billion Canadian taxpayers have invested and concluded:

> On a cost-benefit basis, these carbon-capture and storage projects are madness, leaving aside the fact that taxpayers are picking up the bill. They are wildly expensive for the small amount of carbon they will (might?) prevent from entering the atmosphere. They are most definitely not a substitute for a serious climate-change policy that, however structured, must put a price on carbon emissions by those who produce them - either upstream emitters such as industrial concerns and/or downstream consumers…CCS will be part of the long-term effort to reduce greenhouse-gas emissions, but the possibilities of its contribution have been hyped by promoters and political actors beyond what is reasonable to expect. And the initial costs, as these projects show, lead to staggeringly expensive per-tonne reductions (Simpson, 2009).

Before we go further, its appropriate to briefly recap the state of the science.

The Warning from Science

> Warming of the climate system is unequivocal, as is now evidenced from observations in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level (IPCC Working Group 1, 2007, p.996).

A broad and deep scientific literature supports the scientific consensus position on climate change, namely that human behaviours are driving the global climate system into a new operating state, one that is without precedent in human history. Anthropogenic climate change is a measurable byproduct of the way we manufacture products, construct our built environment, design our economy, consume energy, grow our food and procure transportation (Hertwich & Peters, 2009). We engage in all of these things with *educated intention*, that is we employ to varying degrees a rational calculus in most phases of our personal and communal decision-making involving these basic human needs. Until very recently the carbon footprint of all these activities was considered inconsequential, not worthy of reflective attention or economic consideration. The scientific and the social sciences communities are now telling us in the strongest language possible that this can no longer be the case (National Research Council, 2010a, 2010b; Lenton, 2008; Intergovernmental Panel on Climate Change (IPCC), 2007; United Nations Environmental Programme (UNEP), 2007; The Royal Society, 2007; American Association for the Advancement of Science, 2006; Stern, 2006; Schellnhuber, 2006; Lovelock, 2006; May, 2005; Intergovernmental Panel on Climate Change, 2001; National Academies of Science Joint Statement, 2001; Earth Systems Research Laboratory, 2011; National Research Council, 2001; Hansen, 2010) .

Even if the weak international commitments made in Copenhagen Accord are enacted, they put the planet firmly on a path of over 2C of warming by 2050 (Joeri et. al., 2010). The 2000's were the hottest decade in human history, while last year 2010 was ranked as one of the warmest years on record, tied with 2005 and 1998(National Oceanic and Atmospheric Administration, 2010; World Meteorological Organization, 2011). Anthropogenic Climate change is happening and all credible scientific studies have indicated that it presents one of the most significant if not *the* most significant threat to planetary biodiversity (Vie et.al. 2009). A technical expert group report of the Secretariat of the Convention on Biological Diversity concluded:

> Information in Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC AR4) suggests that approximately 10% of species assessed so far will be at an increasingly high risk of extinction for every 1°C rise in global mean temperature, within the range of future scenarios modeled in impacts assessments (typically <5°C global temperature rise) (Secretariat of the Convention on Biological Diversity, 2009, p.9).

As climate scientist Andrew Weaver reminds us as Canadians *"we are the stewards of carbon"*(Weaver, 2009). Weaver is referring to the vast quantities of carbon that are sequestered in the great northern Boreal forest of Canada, a unique bioregion under threat from industrial mining and forestry practices, and from insect pests like the mountain pine beetle which is thriving as a result of climate change. Climate change is threatening the health and stability of the Canadian boreal forest and the communities who depend on it and it may already be on the verge transformation from being a net 'sink' of atmospheric carbon to a net source.

Good Science Alone is not Good Enough Now

A significant dimension of the problem in terms of public awareness and support for effective political action has been the manner in which climate science has been presented to the public. As Nisbet and Mooney point out, many scientists:

> Retain the well-intentioned belief that, if laypeople better understood technical complexities from news coverage, their viewpoints would be more like scientists', and controversy would subside. In reality, citizens do not use the news media as scientists assume. Research shows that people are rarely well enough informed or motivated to weigh competing ideas and arguments. Faced with a daily torrent of news, citizens use their value predispositions (such as political or religious beliefs) as perceptual screens, selecting news outlets and Web sites whose outlooks match their own. Such screening reduces the choices of what to pay attention to and accept as valid (Nisbet & Mooney, 2007, p.56).

One of the problems with communicating climate science to the public involves a dominant assumption among scientists and policy makers that ignorance is at the root of public inaction (Groffman et al., 2010, p.284). As Groffman notes that this 'knowledge deficit model' neglects how ideology, social identity and trust often have a stronger impact on an individuals commitment to action.

Technology has greatly expanded the capacity of individuals to filter out information that challenges their worldviews, their biases and prejudices. This poses challenges to democratic participatory democracy insofar as citizens now have the ability create ever smaller insular information niches, thus further fragmenting attempts of a broad shared public conversation. In terms of climate change, a measure of this fragmentation can be found in the thousands of climate inactivist blogs and websites that purport to inform the reader about the 'real' issues surrounding climate change science.

Group polarization is the result of 'limited argument pools, social comparisons and the effects of corroboration'. In the 'blogosphere' Sunstein describes 'cyber-cascades' in which:

> Repeated exposure to an extreme position, with the suggestion that many people hold that position, will predictably move those exposed, and likely predisposed, to believe in it (Sunstein, 2007, p.69).

Giles explains how the "illusion of truth" appears in media echo chambers:

> Hearing something 10 times does not mean there are 10 different pieces of information…But the more you hear something the more likely you are to believe it is true. And so it is with denial: if everybody appears to be saying that climate science is corrupt, or that the MMR vaccine causes autism, it takes on the appearance of fact (Giles, 2010, p. 42).

With thousands of pseudoscience blogs on the Internet, and denouncing everything from the benefits of childhood vaccines, or the theory of evolution and the science of climate change, the capacity to spread disinformation via cyber cascades has never been greater. These 'narrowcast' channels provide a rich context for rapidly exploiting 'echo-chambers' reinforcing poor uncritical thinking, scapegoating, and ideological indoctrination.

Intellectuals and the rare political leaders who offer up visionary plans to reduce greenhouse gases and to decrease oil consumption are often lampooned and attacked on major North American television networks like the right-wing Fox News Network, by CNN's Glenn Beck, as well as by talk radio personalities like Rush Limbaugh who reach millions of people. Given that conservatives and their climate change skeptical commentaries dominate 91 percent of weekday talk radio in the U.S. (Halpin et. al., 2007), and their popularity, it should come as no surprise that deep skepticism in terms of taking substantive measures to combat climate change remains entrenched in a large segment of the North American population. Manjoo explains in his book *"True Enough: Learning to Live in a Post-Fact Society"* (Manjoo, 2008) that while:

> New technology eases connections between people, it also paradoxically, facilitates a closeted view of the world, keeping us coiled tightly with those who share our ideas. In a world that lacks real gatekeepers

> and authority figures, and in which digital manipulation is so effortless, spin, conspiracy theories, myths, and outright lies may get the better of many of us (Majoo, 2008, p.35).

The combined effects of inactivist anti-science echo chambers is that journalists fell under increasing pressure to treat climate change as a 'scientific controversy':

> Journalists were constantly pressured to grant the professional deniers equal status-and equal time and newsprint space-and they did…members of the media found themselves hounded by experts who conflated scientific diffidence with scientific uncertainty, and who wrote outraged letters to the editor when a report didn't include their dissent…editors evidently succumbed to this pressure, and reporting on climate in the United States became biased toward the skeptics and deniers because of it (Orekes & Conway, 2010, p. 214).

Keeping citizens focused on narrow short-term self-interest instead of collective long-term interest is a well-worn political tactic. As well often too much emphasis is placed on individual efforts to reduce greenhouse gases and too little on what larger social movements and elected governments can and must do to catalyze societal change. Individual efforts are of course important but the magnitude of the climate problem demands collective action. As former U.N. Ambassador Stephen Lewis explains:

> The bulk of environmental education today tends to address the greening of society… it is tremendously admirable for its consciousness-raising and for creating a more livable community, both locally and internationally. But it's not sufficient. And it seems to me to pretend that having kids go out into the countryside, and dwell beside the water, and fish in the ponds, and plant trees, and see the beauty of nature—it's not enough. It's not nearly enough because, in truth all of that will not prevent the growing crisis of global warming (Lewis, 2010, p27).

Nor is it adequate to simply let students 'debate the climate science' in the classroom as some inactivists argue. This strategy is reminiscent of the creationist calls to 'debate the theory of evolution'. In other words, 'teaching the debate' implies that the science itself and the broader scientific community equally support both 'sides' in these issues. This is nonsense, but sowing and amplifying the seeds of doubt in terms of overemphasizing uncertainty concerning the scientific understanding of the basic processes of climate change has become an industry.

The product of this disinformation industry is public doubt (Michaels, 2008) and it continues to exert pressure on citizens and their politicians to remain passive and inactive. The wide scope of this climate doubt manufacturing industry is described in detail in Oreskes & Conway (2010), Pooley (2010) and Hoggan (2007).

The organized inactivist movement is part of a larger neolibertarian undertaking that celebrates the dismantling of public policies related to limiting pollution and limits to so-called free markets. It also holds contempt for the 'precautionary principle' and governmental regulation in general. As Jensen explains:

> A perverted form of the precautionary principle is already employed by our culture, but instead of serving the public or the environment, it serves corporate entities: actions that protect the real world, including human communities, must be shown to not harm profits before they can be seriously considered (Jensen, 2011, p.23).

As Michaels explains, when it comes to science that impacts profitability, industry has learned that *"debating the science is much easier and more effective than debating the policy*" in many contexts where science research departs from industry self-interest:

> We see this growing trend that disingenuously demands proof over precaution in the realm of public health. In field after field, year after year, conclusions that might support regulation are always disputed. Animal data are deemed not relevant, human data not representative, and exposure data not reliable. Whatever the story—global warming, sugar and obesity, secondhand smoke—scientists in what I call

> the "product defense industry" prepare for the release of unfavorable studies even before the studies are published. Public relations experts feed these for-hire scientists contrarian sound bites that play well with reporters, who are mired in the trap of believing there must be two sides to every story. Maybe there are two sides—and maybe one has been bought and paid for (Michaels, 2008, p.x).

Canada's Dismal Record on Climate Change

> We often invest enormous mental energy to maintain a perspective on the world that's at variance with reality—that's far from intellectual equilibrium, so to speak (Homer Dixon, 2009, p.12).

It is a matter of public record that the current Prime Minister was a staunch opponent of the Kyoto Accord, the only binding international climate change treaty to date. Before becoming PM he called the Kyoto Accord a "job-killing, economy-destroying" initiative, "essentially a socialist scheme to suck money out of wealth-producing nations" (Sanger & Saul, 2010, p. 282). Harper pointed out that some of the problems with the accord were that:

> It's based on tentative and contradictory scientific evidence" and that "It focuses on carbon dioxide, which is essential to life, rather than upon pollutants (Sanger & Saul, 2010, p. 282).

There is a lot to deconstruct in this "economy destroying" hubris, but the talking point about carbon dioxide being "essential to life" was the same tagline used in an ongoing anti climate regulation media campaign by the Koch Brothers funded Competitive Enterprise Institute. This is the group whose infamous television campaigns reinforced *"They call it pollution, we call it life"*. Carbon dioxide is of course essential to life on this planet, but so is water and if you ingest too much of it you drown.

As Suzuki explains, one of Canada's national newspapers repeatedly spread fear about the Kyoto climate accord claiming the cost of the treaty in Canada was:

> "Pegged" at 450,000 lost jobs. How do they figure? They figure by playing with numbers to fit a predetermined agenda. The "study" that got so much coverage (front pages and big articles in newspapers across the country) was a document from the Canadian Manufacturers and Exporters, an industry association. The report listed no formal author and was not peer reviewed. But you certainly wouldn't know that from the coverage it received… The *Post* article left readers with the impression that the Kyoto agreement was some evil, foreign scheme plotted by unwashed anarchists under the dim glow of candlelight determined to push Canada back into the Stone Age (Suzuki, 2009, p.238).

Climate Change remains a low priority for Prime Minister Harper in the lead up to the 2010 G8/G20 summit, an event that cost Canadian taxpayers well over a billion dollars, he referred to the subject of climate change as a "sideshow" that wouldn't find its way onto the agenda of the conferences if he had his way (Simpson, 2010, Jun. 23). Unfortunately policy inaction on climate change in Canada has occurred under both Liberal and Conservative leadership, as Simpson et.al., explain:

> The easiest course for politicians has been to speak earnestly about long-term targets while avoiding short-term steps that might cost political support. That way, politicians can be rewarded for their apparent virtue without imperiling their reelection prospects. That way has been the Canadian political way since climate change was first discussed at home and abroad (Simpson, Jaccard & Rivers, 2007, p.32).

The Canadian federal government has effectively removed itself from any attempts to engage individual Canadians and their communities in thinking about the issue and how they might collaboratively respond. From the 1990 federal 'Green Plan', to the 1995 'National Action Plan', 'Action Plan 2000', 2002's 'Climate Change Plan for Canada', and 2005's 'Project Green' Canadian greenhouse gas emissions have continued to

rise. Although the government of the day pledged in the Kyoto Accord to cut emissions by 6% between 1990 and 2012, emissions have increased by 35% since then. On the international stage Canada has the dubious distinction of being voted the *"Colossal Fossil of the Year"* at international climate change conferences for four straight years by more than 500 NGO international environment groups. This 'distinction' is earned by being the country that has done the most to disrupt or undermine the UN climate talks.

In the fall of 2010 *unelected* senators killed Bill C-311 the 'Climate Change Accountability Act' that was previously passed by the *elected* Canadian House of Commons. Bill C-311 required the federal government to science-based plan to establish targets to bring greenhouse gas emissions 25 per cent below 1990 levels by 2020, and to set a long-term target to bring emissions 80 per cent below 1990 levels by 2050 and to regularly report to parliament on progress (Galloway, 2010). To add insult to democratic injury, the snap vote was taken without any committee hearing or debate. The defeat of Bill C-311 was a victory for Canada's largest and most influential business organization, the Canadian Chamber of Commerce which had launched a summer lobbying campaign urging senators to defeat the bill, arguing in part that 2050 and not 2020 targets were more achievable (De Souza, 2010).

This example is important in terms of teaching young people how powerful publically unaccountable special interests can operate opaquely and manipulate public policy at even the highest levels in a democratic system. Fundamentally students might be asked what right does a commercial trade group have to kill environmental legislation that a democratically elected national legislative body decides is warranted? Corporate management guru Henry Mintzberg states it clearly:

> If someone in a corporation says to me we want to become really socially responsible I say good start by getting out of my government, you have no right lobbying my government, you have no right investing in my government, as individual shareholders, as individual executives you have every right to act as a citizen the way I act as a citizen as long as you don't throw your money around, but as a corporation get out of my government (Mintzberg, 2011).

The role of special interest lobbyists in any democratic system is problematic, and given the stakes at play in the climate crisis all the more so. In a study for the *Center of Public Integrity* investigative journalist Marsden concluded:

> The battle over climate change in Canada largely pits environmental groups against a powerful coalition of energy companies, along with academic climate-change skeptics and deniers who support the Harper Conservatives. The lobbyists hired by these groups are among the largest special interest groups on Parliament Hill, an ICIJ analysis of the Canadian lobby registry shows. They lobby not only to shape legislation in an industry's favor, but also to ensure that those industries benefit from the billions of dollars in government grants being issued for clean energy and emissions-reduction projects. The analysis found that 1,570 climate change lobbyists have pounded the halls of Parliament since 1996. Their client list has steadily increased since that year from just 13 to 109 (Marsden, 2009, p.1).

The Conference Board of Canada gives our climate change performance a 'D' in terms of other OECD countries. Canada ranks second-to-last out of 17 countries for greenhouse gas (GHG) emissions per capita, and Canada's GHG emissions have increased by 32 per cent in 15 years (Conference Board of Canada, 2010). Overall the Conference Board gives Canada a "C" grade on environmental performance and ranks 15th out of 17 peer countries. The 2010 Living Planet Report ranked Canada's ecological footprint as seventh largest per capita among the 130 nations measured. Approximately half of this footprint is the result of carbon emissions from transportation, heating and electricity production from fossil fuels (WWF, 2010). This consumption is more than twice the average global citizen's consumption rate and would require approximately four Earths to sustain if every human were to live as Canadians do. An international comparative study of the climate policies and performance of G8 economies conducted by Allianz, a global financial services company and the WWF, states:

> Canada scores lowest of all G8 countries: total emissions are steadily increasing and are far above the Kyoto target, per capita emissions are among the highest in the world. Mid to long-term greenhouse gas targets are inadequate. A plan to curb emissions was developed last year but has not been implemented. The Kyoto target will stay completely out of reach (Allianz, WWF, 2009, p.9).

On one level the Canadian problem with respect to climate change is clear. As a nation we are one of the highest per capita emitters of greenhouse gases in the world. On international measures we are not innovating at a pace required to decrease emissions to be more in line with other OECD countries or with the levels of emissions that science is telling is required to avoid over 2°C change (Weaver, 2008). The lack of political willpower is not of course limited to Canada; most countries in the G20 are struggling to make even minor inroads to reducing emissions. Compounding the lack of political will is an industry-funded disinformation campaign that has been very successful to date. On April 6, 2011 the US House of Representatives today voted *down* 240-184 an amendment from Henry Waxman (D-CA) that simply stated:

> Congress accepts the scientific findings of the Environmental Protection Agency that climate change is occurring, is caused largely by human activities, and poses significant risks for public health and welfare.

As some North American politicians go out of their way to ignore and marginalize the scientific conclusions concerning climate change, the magnitude of the threat and the estimated future cost of responding to it continue to escalate (Stern, 2009; 2006). Before going further it is worth asking whether citizens really do want governments to take effective action on climate change.

Public Demands for Action Remain Stifled by Inaction

The Climate Confidence Monitor 2008 surveyed 12,000 people across 12 markets worldwide, revealing that citizen expectations concerning climate are proving resilient to the current economic crisis. Forty three per cent of those surveyed chose climate change ahead of global economic stability when asked about their top three concerns, despite the survey-taking place in the midst of the financial market turmoil in September-October 2008.

A Harris Decima (2009) poll taken just before the Copenhagen Climate Conference revealed a number of interesting Canadian beliefs:

1. Canadians accepted the notion that developed countries had a responsibility to set higher targets for emissions reductions than developing countries.
2. A strong majority of Canadians believed that environmental initiatives should remain as high a priority as economic initiatives
3. Canadians wanted a binding climate treaty.
4. Canada should take a leadership role in the negotiations and;
5. Canada should if necessary develop a climate policy independent of the U.S.

It is significant to note that Canadians received nearly the exact opposite of what polling indicated they wanted their government to do in Copenhagen, namely; a very low nearly invisible public presence of their elected leaders, an exclusive focus on the downside economic costs of implementing a real climate policy, no mention of the differentiated responsibilities between those who caused the problem-developed countries and those who are suffering from the consequences, no international leadership at the conference and a commitment to simply copy whatever the Americans did.

40% of Canadians polled in 2009 believe that "global warming will significantly impact my life and the life of future generations" (Angus Reid Global Monitor, 2009d). A 2009 Harris Decima poll found that

nearly two thirds of Canadians agreed with the statement: *"Climate change is mankind's defining crisis, and demands a commensurate response"* (Canadian Press, 2009). 40% of Canadians believe global warming will significantly impact their lives and the lives of future generations. Almost three-in-four Canadians (73%) say they would believe what scientists say when they are talking about global warming, and almost half (47%) would believe environmental organizations. On this issue, less than one-in-four respondents believe in television news (23%), their provincial government (20%), the federal government (16%), opinion columnists in the media (15%), individual corporations (8%) and industry associations (6%) (Angus Reid Public Opinion, 2009c).

Another Angus Reid poll in July 2010 indicated that 66 per cent of Canadian respondents think the federal government is paying too little attention to environmental issues (Angus Reid Global Monitor, 2010). Fifty eight percent of respondents in Canada believe global warming is a fact and is mostly caused by emissions from vehicles and industrial facilities (Angus Reid Public Opinion, 2010).

A spring 2010 Climate Action Network Canada poll found that:

- 70% of respondents support the government taking action to reduce fossil fuel subsidies (47% strongly support; 23% support). Tax advantages to oil and gas producers in Canada are worth an estimated $2 billion a year.
- 78% of respondents believe that the Canadian government should use the G8 and G20 meetings as an opportunity to signal that Canada wants to be a leader in the global fight against climate change (48% strongly support; 30% support).
- 65% oppose the Canadian government's strategy of waiting for the U.S. and other nations to develop their plans before implementing further climate change measures (Climate Action Network Canada, 2010).

The question all this polling data begs is, why has so little been done to tackle greenhouse gas emissions despite multiple sources of evidence that Canadians want an effective climate policy? For young people the exploration of this question might serve as a starting point for consideration of:

- How engaged are youth peers with the issue?
- What responsibilities do politicians have for supporting policies related to the 'common good'?
- What industries appear to have special access to political power through lobbying and undue influence over climate policy?
- How might creative forms of social activism enabled through social media be brought to bear on better democratic representation in climate policy circles?

A Few Words concerning 'Climate Denial'

The Science and Public Policy Institute (SPPI, 2011) publishes hundreds of pamphlets with titles like "*The Many Benefits of Atmospheric CO2 Enrichment"* and *"Why NOAA and NASA proclamations should be ignored"*. Although the SPPI describes itself as "a nonprofit institute of research and education dedicated to sound public policy based on sound science", its publications are full of unreferenced opinions, assertions and graphs, laden with 'cherry-picked' data. People who are not scientists, or even experts on the subjects they write about often write the SPPI reports, and many convey conspiratorial themes. For example, an SPPI publication by Joanne Nova, who describes herself as a "freelance science presenter, writer, & former TV host", exemplifies not only the 'Dunning-Kruger' effect (Dunning et.al. 2003), but also the inactivist movement's frustration with mainstream climate science and its inflated sense of victimhood:

> Just as Tutsis were called cockroaches, and the Jews were called vermin, when a scientist is a denier, they're automatically a fake, and without the human ability to *reason*, they're sub-human…There is virtually no sector which doesn't sink to name-calling: Major media houses, prime ministers, *Nature*, the National Academy of Science, The Royal Society, and dozens of elected representatives have all contributed to the hate campaign. The people who go into paroxysms if anyone utters the N word are often the same people who use *denier* as if it were a recognized taxonomic order. (*Homo-denialist*: Subspecies of freak-nematode: two arms, two legs, and a primitive brain). Exterminating deniers is just a form of pest control (Nova, 2010,p.7).

A 'denier' according to the Concise Oxford English Dictionary (2002,p.382) 'Denier: (n) *a person who denies something'*, while Hoofnagle & Hoofnagle define denialism as:

> The employment of rhetorical tactics to give the appearance of argument or legitimate debate, when in actuality there is none. These false arguments are used when one has few or no facts to support one's viewpoint against a scientific consensus or against overwhelming evidence to the contrary. They are effective in distracting from actual useful debate using emotionally appealing, but ultimately empty and illogical assertions (Hoofnagle & Hoofnagle, 2010).

As Shermer (2010, p.1) explains a climate skeptic: "examines specific claims one by one, carefully considers the evidence for each, and is willing to follow the facts wherever they lead", however:

> A climate denier has a position staked out in advance, and sorts through the data employing "confirmation bias" - the tendency to look for and find confirmatory evidence for pre-existing beliefs and ignore or dismiss the rest (Shermer, 2010, p.1).

Good science is of course based on skepticism and all competent scientists are skeptical in nature. We want science students to be skeptical of all kinds of bogus claims that they may encounter and use the critical conceptual tools of science to evaluate claims. The peer review process, although far from perfect is a quality control mechanism to weed out the ideas that earn the title 'scientific knowledge'. But as Shermer explains denial is different:

> It is the automatic gainsaying of a claim regardless of the evidence for it - sometimes even in the teeth of evidence. Denialism is typically driven by ideology or religious belief, where the commitment to the belief takes precedence over the evidence. Belief comes first, reasons for belief follow, and those reasons are winnowed to ensure that the belief survives intact (Shermer, 2011, p.2).

All people who challenge the reports of the IPCC and the climate consensus are not inactivists per se. Some are reputable scientists who articulate theories, which challenge mainstream science. This is of course a good thing because all scientific ideas must withstand the rigorous scrutiny of not only their scientific peers, but also challenges from the wider public. Shermer suggests that the denier moniker is merited when: "no matter how much evidence is laid out before them they continue to deny the claim"(Shermer, 2011, p.3).

Mackenzie describes denialism as, "the systematic rejection of a body of science in favour of make-believe" and is largely a product of the way normal people think" (Mackenzie, 2010, p.38). She suggests that:

> All set themselves up as courageous underdogs fighting a corrupt elite engaged in a conspiracy to suppress the truth or foist a malicious lie on ordinary people. This conspiracy is usually claimed to be promoting a sinister agenda: the nanny state, takeover of the world economy, government power over individuals, financial gain, atheism (Mackenzie, 2010, p.39).

This is certainly the case for the majority of global warming inactivists, the most common conspiratorial idea being that carbon taxes or cap-and-trade initiatives are proxies for 'one world' government. As Specter points out:

> Unless data fits neatly into an already formed theory, a denialist doesn't really see it as data at all. That enables him to dismiss even the most compelling evidence as just another point of view. Instead,

> denialists invoke logical fallacies to buttress unshakable beliefs…These words might as well have been torn from a denialist instruction manual: change is dangerous; authorities are not to be trusted; the present "posture" of the scientific community has to be one of collusion and conspiracy (Specter, 2009, p.1).

Research published in the Proceedings of the National Academy of Sciences of the United States (PNAS) exploring the publication and citation data of 1,372 climate researchers found that:

> (i) 97–98% of the climate researchers most actively publishing in the field support the tenets of ACC [Anthropogenic Climate Change] outlined by the Intergovernmental Panel on Climate Change, and;
>
> (ii) the relative climate expertise and scientific prominence of the researchers unconvinced of ACC are substantially below that of the convinced researchers (Anderegg, Prall, Harold & Schneider, 2010).

How do the inactivist bloggers and pamphleteers respond? Nova who operates a skeptic blog wrote:

> PNAS: Witchdoctors of science…A shameful day in the history of science. The once esteemed National Academy of Science is reduced to pagan witchcraft: point the bone at the blacklist, count the tea-leaf-citations, put on your funny hat and make a prophesy about the weather…The list of approved "climate scientists" might as well be a list of anointed preachers of the Cult of Climate Science. The esteemed? (Nova, 2010).

Not satisfied with slandering the what she calls the *"Proceedings of the National Academy of Sorcery"* she then aims her blog vitriol at the late Professor Stephen Schneider a Stanford University climate science pioneer:

> Shame on you Schneider, traitor to science. Shame on the NAS editors who allowed this pathetic excuse for research into their publications. And shame on any member of the NAS who doesn't shout in protest at this denigration of the good name that took decades to build. R.I.P. The Scientific Method. Hello totalitarian government, where money buys you authority, and authority passes for reason (Nova , 2010).

In another example, an ex-newspaper photographer runs *"No Frakking Consensus"* a blog dedicated to promote her upcoming book, on it she writes:

> *Decoding the Climate Bible:* Almost nothing you've heard about the UN's climate change report is true. Climate skepticism is free speech. Alternative points-of-view deserve to be heard…I'm now writing an exposé of the climate bible – the massive report prepared every five years or so by a United Nations body most people have never heard of…the climate bible has attracted criticism for years. Ignored by the media, those critics have been voices in the wilderness. But there are now too many of them. When their concerns are collected in one place, the climate bible that emerges falls well short of its extravagant billing (Laframboise, 2009).

Importantly Mackenzie observes that to be a denialist:

> Only requires people to think the way most people do: in terms of anecdote, emotion and cognitive short cuts. Denialist explanations may be couched in sciency language, but they rest on anecdotal evidence and the emotional appeal of regaining control (Mackenzie, 2010, p.40).

McKee (2009) and Mackenzie (2010, p.3) summarize the basic tactics of denialism:

1. Allege that there's a conspiracy. Claim that scientific consensus has arisen through collusion rather than the accumulation of evidence.
2. Use fake experts to support your story. Denial always starts with a cadre of pseudo-experts with some credentials that create a facade of credibility.
3. Cherry-pick the evidence: trumpet whatever appears to support your case and ignore or rubbish the rest. Carry on trotting out supportive evidence even after it has been discredited.

4. Create impossible standards for your opponents. Claim that the existing evidence is not good enough and demand more. If your opponent comes up with evidence you have demanded, move the goalposts.
5. Use logical fallacies. Hitler opposed smoking, so anti-smoking measures are Nazi. Deliberately misrepresent the scientific consensus and then knock down your straw man.
6. Manufacture doubt. Falsely portray scientists as so divided that basing policy on their advice would be premature. Insist "both sides" must be heard and cry censorship when "dissenting" arguments or experts are rejected.

It is important for students to have structured learning opportunities to find and analyze how these tactics are employed by climate denial organizations and blogs like the *'International Climate Science Coalition'*, the *'Friends of Science'*, the '*Science and Public Policy Institute'*, or *'Watts up with That'* and others. In helping young people recognize the common characteristics inactivist media campaigns teachers can better prepare them to apply and hone critical thinking skills when they encounter different applications of denial argument in the context of other science policy debates.

Similar strategies employed of both the climate inactivists today and the tobacco lobby during the 1950 through to the 1980's (Oreskes & Conway, 2010). It is also interesting and worthwhile to point out to young people how other proponents of junk science from AIDS denial, anti-vaccine movements to homeopathy and astrology employ similar forms of poor logic, irrational thinking and self-delusion.

Lobbying Spin for Inaction

The U.S. National Association of Manufacturers (NAM) and their counterparts, the Canadian Manufacturers and Exporters (CME) vigorously lobbied for years against ratification and implementation of the Kyoto climate accord. They attempted to characterize discussions concerning carbon reductions being driven by zealots and alarmists, whose only agenda is to further hamper 'progress' and economic growth:

> The cause of global warming has come at a fortuitous moment for clean-air warriors looking for alarms to ring. It is global in scope, will take decades to come to fruition -- or to be revealed as another false alarm – and provides endless opportunities for government intrusion into the economy… having lost the debate over Kyoto, certain greens would now rather not debate the evidence at all and merely invoke some "consensus" that everyone *allegedly* knows to be true (National Association of Manufacturers, 2006, p.1).

The American Chamber of Commerce launched one of its biggest lobbying efforts ever between 2008-10, spending millions in order to ensure the defeat of a carbon 'cap-and-trade' bill in the U.S. (Mckibben, 2011). In Canada the government of Alberta launched a $25 million public relations 'greenwashing' campaign to improve the image of the tar sands as "environmentally friendly" in Canada and in the U.S. where political momentum has been building to move away from carbon intensive dirty energy sources like tar sands oil (Markusoff, 2008). David Collyer, former president of Shell Canada and president of the Calgary-based lobby group *'Canadian Association of Petroleum Producers'*, an industry lobby group wrote: *"Big Oil is listening to Canadians"* trumpeting the fact the industry organization has set up a website on which Canadians can *"voice their concerns about everything from water use, to toxic waste, to land reclamation"*(Collyer, 2009).

Of course the act of "listening to Canadians" does not imply that when it comes to the backroom lobbying of governments *for* subsidies and *against* carbon taxes that the wishes of ordinary citizens will be on the table. As indicated earlier polls in Canada and the U.S. have consistently indicated that citizens want the climate change crisis dealt with by their political leaders. Herein lies the region of realpolitik, where corporate power and money is applied to shift the consciousness of people and legislators and so redefine

the notion of "environmental limits" to fall within the narrow boundaries of "corporate limits" in terms of willingness to cooperate and pay their fair share.

Large scale corporate climate lobbying to deny the science and stall climate legislation began in the 1990's with organizations like the Global Climate Coalition (GCC), whose members were some of the world's biggest multinationals. During the 1990's Canada's corporate sector would agree to no more than 'voluntary' reductions, efforts that yielded nothing but increasing emissions. Canada was the only country to ratify and then ignore the Kyoto climate accord, the only legally binding treaty to reduce emissions. Even Canadian *political* scientists played a prominent role in fighting against policies for carbon reduction, Barry Cooper and David Bercuson stated that Alberta:

> Will have to fight Kyoto on the grounds that it is based on panic, not science. There is plenty of solid science around to counter the unsubstantiated and apocalyptic claims of the pro-Kyoto fanatics…For those who, like [then Environment Minister] Anderson, claim the "science of global warming" is settled, it is important to insist that, while there may be a science of climate change, there is no science of global warming. On that topic, nothing is settled (Cooper & Bercuson, 2002).

Politicians are often more ideologically polarized on the issue of climate change than the general public. Although each IPCC report has asserted with increasing confidence that global warming is occurring, and that business as usual scenario was dire, when asked when the effects of global warming will begin to happen, only 61 percent of American respondents said "they have already begun", slightly more than the 48 percent that indicated the same in 1997 (Dunlap & McCright, 2008). Dunlap & McCright (2008) found that 76 percent of Democrats agreed that global warming is already happening, while only 42 percent of Republicans agreed.

Hamilton (2010) in U.S. research found that with respect to climate change there is a significant interaction effect between education and party support, and another between how well people believe they understand climate change and party support. The *better* that republicans stated they understood global warming, the *less* serious they perceived it as a threat. This was the exact opposite of the self-identified understanding of democrats who perceived global warming as more of a threat the better they understood the issue.

> The effective dissemination of contrarian arguments means that many people who have no contact with climate scientists or the primary research literature can nevertheless learn that a scientist says temperatures have risen on Mars (politically spun as evidence that global warming has solar or cosmic origins), or another scientist says it is cooling in East Antarctica (spun as evidence that our planet is not warming after all). They might consider themselves well informed about climate science even while not understanding its basic ideas. (Hamilton, 2010, p.5)

The *more* formal education that republicans acquired, the *less* they perceived climate change as a threat. This was again the opposite result from democrats who became more concerned about climate change with increasing levels of formal education. Hamilton observes:

> The inconsistency marks a social shift away from patterns seen in older research. It reflects the efficacy of media campaigns that provide scientific-sounding arguments against taking climate change seriously, which disproportionately reach educated but ideologically receptive audiences [...]. Among many educated, conservative citizens, it appears that that such arguments have overshadowed the scientific consensus presented by the IPCC reports and other core science sources (Hamilton, 2010, p.6).

It is well understood that diplomats and their entourage practice a form of public relations for their own country wherever they are stationed internationally. What is less well known is that governments also hire lobbyists to work on public officials in foreign countries in order to produce legislative results that are favourable to the sponsor's wishes. The government of Alberta regularly hires consultants to lobby Washington on behalf of the Tar Sands industry (CBC, 2010). Lobbyists paid for by Canadian taxpayers are

working against U.S. clean energy laws, laws that elected U.S. State and federal administrations are trying to implement to reduce the use of high carbon fuels like those from the tar sands (Dembicki, 2011a). In effect the Canadian government is working with some of the largest multinational oil and gas companies in the world to subvert the democratic will of the American people who through their elected representatives are demanding concrete action to reduce carbon emissions (see Dembicki, 2011b; 2011(c)). The Canadian government is staging a similar lobbying campaign against clean energy legislation in the European Union which wants to add a tariff to the high carbon content oil from the tar sands entering the EU (Harrison & von Reppert-Bismarck, 2011, Feb 21).

Canadian lobbyists also are at work exerting pressure on U.S. Lawmakers to approve the Keystone Gulf pipeline which would carry 900,000 barrels a day of tar sands crude oil from Alberta to refineries on the Gulf of Mexico. At this writing the pipeline has not been approved by the Obama administration. Henry Waxman, the chair of the U.S. House Committee on Energy and Commerce, has concerns about the Keystone pipeline citing studies that indicate the carbon intensity of U.S. transportation fuel could increase by as much as 37 per cent if the country shifts to dirty tar sands crude, adding roughly the equivalent of adding 18 million passenger vehicles to the road (Nikiforuk, 2010). Public relations machinery is hard at work attempting to 're-branding' Alberta's tar sands as "ethical oil"

'Ethical oil' a term coined by conservative pundit, Sun Media 'personality' and former tobacco industry lobbyist Ezra Levant, essentially argues that when comparing oil production in Alberta with that in undemocratic states around the world, Canadian production is at least more ethical in comparison (Levant, 2010). However as Grant correctly points out this is:

> A classic case of the rhetorical device called bait-and-switch. The "ethical oil" argument would have Canadians forget all about the serious and so far unresolved negative impacts of unrestrained development of the oil sands, and ask ourselves instead whether Canada's system of government is better than Saudi Arabia's or Iran's. Of course it is — but that only means Canada is better equipped and has even more responsibility to address the unresolved social, economic and environmental implications of oil sands development (Grant, 2011).

The Canadian Prime Minister and his Environment Minister have picked up on the 'ethical oil' meme as well. According to Environment Minister Kent his government:

> Will not impose any greenhouse-gas reductions on the oil patch that discourage investment…it is not our intention to discourage development of one of our great natural resources. We know it can be developed responsibly (Chase, 2011).

Students should examine and debate the role of lobbyists in democratic science-public policy discussions. How much special interest influence over public science policy is too much? What role if any should science play in arbitrating future energy policy? How should self-interested reports generated by industry and business groups be weighed against objective evidence and scientific testimony?

Questions can also be raised concerning the kinds of priorities an *environment* minister should have with respect to the balance between his portfolio and the economy, and the meaning of the over-used phrase 'responsible development'. For whom is development responsible? In what time frame is responsibility measured? Who and what might *not* be served by more 'responsible development'? Are the already powerful the biggest beneficiaries of responsible development?

Well-crafted rhetoric is used to sell citizens on all kinds of policies that governments and special interests create. Encouraging students to explore the multiple meanings and contexts of catchphrases and campaign slogans of any sort constitute an important intellectual defense skill for citizenship. The goal is not to create cynics but rather to help young people develop skills in deconstructing messages whose purpose is manipulation. Even the term "junk science" has been cynically appropriated by the disinformation industry as Michaels explains:

> The vilification of any research that might threaten corporate interests as " junk science" and the sanctification of its own bought-and paid- for research as "sound science" are indeed Orwellian—and nothing less than standard operating procedure today. But to give credit where credit is due, the sound science/junk science dichotomy has worked wonders as a public relations gimmick and has gained widespread acceptance in the current debate over the use of scientific evidence in public policy (Michaels, 2008, xii).

In fact one of the major online disseminators of genuine 'junk science' Steve Milloy actually runs junkscience.com! According to Sourcewatch:

> Milloy defines "junk science" as "bad science used by lawsuit-happy trial lawyers, the 'food police,' environmental Chicken Littles, power-drunk regulators, and unethical-to-dishonest scientists to fuel specious lawsuits, wacky social and political agendas, and the quest for personal fame and fortune." He regularly attacks environmentalists and scientists who support environmentalism, claiming that dioxin, pesticides in foods, environmental lead, asbestos, secondhand tobacco smoke and global warming are all "scares" and "scams"(Sourcewatch, 2011).

Corporate PR spin takes all forms, in 2010 BP is accused of purposely tried to deceive scientists who were trying to estimate the flow rate from BP's leaking oil well in the Gulf of Mexico (Sheppard, 2011), the company's early estimate of 1000 barrels a day turned out to be in fact to be nearer to 53,000 barrels a day! Crafting public relations spin is big business and large multinational corporations spend tens of millions of dollars to shape public opinion and in turn influence elected officials. In the 1990's big greenhouse gas emitters and compliant Canadian governments to great fanfare announced 'voluntary' greenhouse gas emission restrictions. In the end these amounted to little more that hot air PR, a stalling trick and emission growth continued unabated.

The Distraction of 'ClimateGate'

> *"Nobody Can Control The Climate But God, So Give A Little Extra At Mass Or Services"* Bill O'Reilly From the most watched cable news show in the U.S., The O'Reilly Factor (O'Reilly, 2011, April 6).

> The core science supporting anthropogenic global warming has not changed. This needs to be stated again and again, in as many contexts as possible. Scientists must not be so naive as to assume that the data speak for themselves. Nor should governments (Nature Editorial(c), 2010, p.141).

In late 2009 emails were illegally hacked from the server of the Climate Research Unit (CRU) of the University of East Anglia, a globally important repository of historical climate change records and research. The 'climategate' affair as it came to be known should be more accurately labeled 'swifthack', after the *'swiftboat veterans for truth'* group that dogged John Kerry's presidential campaign of 2004. In this case a small group of veterans group financed by a republican billionaire falsely accused U.S. presidential candidate John Kerry of being undeserving of his Vietnam war commendations. The false message was broadcast repeatedly during the 2004 campaign and did his campaign irreparable harm.

Among other things the private emails revealed scientists calling other scientists and 'outsiders' unflattering names, contemplating censorship with regard to what they perceived as poor quality scientific work and so on. The right-wing media already biased against accurately reporting the climate change story had a heyday, prematurely charging that a global scientific conspiracy was underway to misinform people about climate change (See Pearce, 2010).

Shortly after the story broke Rex Murphy a long time climate skeptic on the CBC national television news weighed in with premature and uninformed invective against the entire profession of climate science. Speaking of "manipulation":

> So let's hear no more talk of the "science is settled"…they've lost the raw data on which all the models, all the computer generated forecasts, the graphs and projections are based, you wouldn't accept that at a grade 9 science fair…these emails demonstrate one thing beyond all else, that climate science and global warming advocacy have become so entwined, so meshed into a mutant creature, that separating alarmism from investigation, ideology from science, agenda from empirical study is well nigh impossible. Climategate is evidence that science has gone to bed with advocacy and both have had a very good time…climate science has been shown to be in part a sub-branch of climate politics (Murphy, 2009).

Both conspiratorial and inaccurate, Murphy's comments reflect one example among hundreds of poorly researched and biased media reports that consumed the denial minded following the email hack. Even after the scientists were cleared by three different investigative inquiries as discussed below, Murphy has not offered any public retraction or clarification of his comments.

Wente proclaimed it the *"Great global warming collapse"* and echoing other critics: *"The global warming movement as we have known it is dead" …It was done in by a combination of bad science and bad politics"* (Wente, 2010, p.10).

The UK House of Commons Science and Technology Committee, the Scientific Assessment Panel of the Royal Society, and the Independent Climate Change E-mails Review conducted three independent inquiries into the alleged scientific misconduct of the Climate Research Unit at the University of East Anglia. Russel et.al. concluded:

> On the specific allegations made against the behaviour of CRU scientists, we find that their rigour and honesty as scientists are not in doubt…we did not find any evidence of behaviour that might undermine the conclusions of the IPCC assessments (Russell, Boulton, Clarke, Eyton, & Norton, 2010, p.4)

The House of Commons inquiry stated:

> We are content that the phrases such as "trick" or "hiding the decline" were colloquial terms used in private e-mails and the balance of evidence is that they were not part of a systematic attempt to mislead. Likewise the evidence that we have seen does not suggest that Professor Jones was trying to subvert the peer review process. Academics should not be criticized for making informal comments on academic papers (House of Commons Science and Technology Committee, 2010, p.3).

Lord Oxburgh's committee reports that:

> We saw no evidence of any deliberate scientific malpractice in any of the work of the Climatic Research Unit…Rather we found a small group of dedicated if slightly disorganized researchers who were ill prepared for being the focus of public attention. As with many small research groups their internal procedures were rather informal (Oxburgh, Davies, Emanuel, Graumlich, Hand, Huppert, 2010. P.5).

Perhaps the most important dimension in terms of learning for the climate science community was that:

> As educators, scientists should redouble their efforts to promote rationalism, scholarship and critical thought among the young, and engage with both the media and politicians to help illuminate the pressing science-based issues of our time (Nature Editorial, 2010a).

The credibility of the climate science community took a major hit in the court of public opinion over the 'climategate' affair as a lead editorial in the journal Nature explains:

> Climate scientists are on the defensive, knocked off balance by a re-energized community of global-warming deniers who, by dominating the media agenda, are sowing doubts about the fundamental science. Most researchers find themselves completely out of their league in this kind of battle because it's only superficially about the science. The real goal is to stoke the angry fires of talk radio, cable news, the blogosphere and the like, all of which feed off of contrarian story lines and seldom make the time to

> assess facts and weigh evidence. Civility, honesty, fact and perspective are irrelevant (Nature Editorial(c), 2010, p.141).

The inactivist community rejected the findings of these inquiries outright. On his blog *'Ecomyths'* Smith (2011) refers to climate science as *"AGW dogma"* and climategate as the *"collapse of contrivance"*. He thinks that the Mann 'hockey stick' graph is being used *"to proselytize the IPCC meme"*, and all of this covered up by so-called *"whitewash inquiries"* (Smith, 2011). Smith in true conspiratorial fashion asserts that the climate *"issue was never about the environment or the science…both were used as moral suasion for political desire to control and regulate economy"* (Smith, 2011).

A central focus of the inactivist effort has focused on discrediting the work of the Intergovernmental Panel on Climate Change (IPCC) or as Patterson and Harris have called it the *"U.N. Doomsayers meeting"*. Disparaging the science reports of the IPCC began long before the 'climategate' incident as Patterson and Harris demonstrate:

> The U.N.'s IPCC propaganda machine excels in the production of news media sound bites and sensationalist reports that exclude common sense and the views of dissenting scientists. It is unfortunate that its knowledge of climate science, economics and intellectual honesty are not equally well developed (Patterson & Harris, 2001, Feb 13).

The media tactic is straightforward, discredit the IPCC messenger and you discredit the climate science message in the eyes of the general public.

In 2010, 255 members of the U.S. National Academy of Sciences, including 11 Nobel laureates, published a stunning "Lead Letter" in the prestigious journal Science. Its message is unsettling and significant to quote at length:

> We are deeply disturbed by the recent escalation of political assaults on scientists in general and on climate scientists in particular. All citizens should understand some basic scientific facts. There is always some uncertainty associated with scientific conclusions; science never absolutely proves anything. When someone says that society should wait until scientists are absolutely certain before taking any action, it is the same as saying society should never take action. For a problem as potentially catastrophic as climate change, taking no action poses a dangerous risk for our planet.
>
> Many recent assaults on climate science and, more disturbingly, on climate scientists by climate change deniers, are typically driven by special interests or dogma, not by an honest effort to provide an alternative theory that credibly satisfies the evidence. The Intergovernmental Panel on Climate Change (IPCC) and other scientific assessments of climate change, which involve thousands of scientists producing massive and comprehensive reports, have, quite expectedly and normally, made some mistakes. When errors are pointed out, they are corrected. But there is nothing remotely identified in the recent events that changes the fundamental conclusions about climate change
>
> We also call for an end to McCarthy- like threats of criminal prosecution against our colleagues based on innuendo and guilt by association, the harassment of scientists by politicians seeking distractions to avoid taking action, and the outright lies being spread about them. Society has two choices: we can ignore the science and hide our heads in the sand and hope we are lucky, or we can act in the public interest to reduce the threat of global climate change quickly and substantively. The good news is that smart and effective actions are possible. But delay must not be an option (Gleick et. al., 2010, p.689).

McCarthy like attacks on scientists were not restricted to the U.K. and the U.S., In 2006 ninety climate science leaders in academic, public and private sectors from across Canada wrote an open letter to the Canadian Prime Minister urging him in part:

> To provide national leadership in addressing the issue. The scientific views we express are shared by the vast majority of the national and international climate science community (Austin et.al., 2006. p.1).

This letter was met by derision from the skeptic press, Reuven Brenner a professor at McGill University's Desautels Faculty of Management took issue with the credentials of 90 scientists who signed the letter. In a scathing rebuke printed in the National Post Brenner charges that the signatories were "not scientists" and "their approach is not scientific at all". Perhaps most unsettling were his recommendations in which Brenner states:

> It is about time that taxpayers stop funding activists and lobbyists who masquerade as scientists. The government would give a strong signal by applying a scientific "Accountability Act" by putting the 90 who signed this "manifesto" on the watch list (Brenner, 2006).

Setting aside the hubris of a management professor telling 90 leading climate scientists that they are 'not scientists', Brenner is essentially arguing that when scientists give their politically unfiltered expert scientific opinion regarding the magnitude of the climate threat we face, they are to be marginalized summarily and put under some form of political accountability surveillance by their government.

Unfortunately Brenner is not an exception, diatribes against climate science have become commonplace in the corporate press. The belief that somehow the tools of economics constitute a superior perspective on reality as we find it is consistent with the intellectual hubris of market fundamentalism that dominates the planet. For example, in a paper in 'Economic Affairs' titled *'The Economic Science Fiction of Climate Change: A Free-Market Perspective on the Stern Review and the IPCC'* the economist Dawson states:

> The IPCC is not the competitive arena of scientific debate but a monopoly producer of a highly politicized science and its conclusions do not merit Stern's unquestioning adherence…The IPCC's would be standard is not a science, not a collection of conjectures that have survived rigorous testing, but a politically driven selection from the full range of scientific opinion (Dawson, 2008, p.43).

Dawson gives us a glimpse into the egocentric worldview underlying market fundamentalism and much of the climate denial lobby *"Why should I do anything for posterity? What has posterity ever done for me?"* (Dawson, 2008, p.43), and *"there is no basis on which to write blank cheques in favour of future generations"* (Dawson, 2008, p.44).

The failure of some economists to recognize in a fundamental way how incomplete and tenuous their prescriptions are, stem from the hubris of economics in general which sees itself as a transcendent discipline anchored in some fundamental way to human nature. While this in itself would be a simple reflection of bloated self-importance, the all too eager willingness of the economics profession to dismiss the wisdom gained from other areas of human endeavor are nothing short of a form of arrogant recklessness.

In the end, the core lessons for the science community from the climategate issue are summarized by Reay:

> The Climategate affair has already changed how science is conducted and communicated. All scientists should welcome the push for improved data archiving and greater transparency. There are also lessons aplenty on how and how not to handle the media (Reay, 2010, p.157).

The Real Disinformation Networks

> The integrity of climate research has taken a very public battering in recent months. Scientists must now emphasize the science, while acknowledging that they are in a street fight (Nature editorial, 2010).

Corporations of all stripes have been largely involved in telling stories that deny or obfuscate environmental reality. One of the largest private companies in the U.S. Koch Industries, has been bankrolling greenwash astroturf websites and anti-climate science libertarian organizations like Canada's Fraser Institute and the

U.S. Heartland Institute for years (Greenpeace, 2010, 2011; Carrk, 2011). According to Greenpeace from 2005 to 2008, ExxonMobil spent $8.9 million funding climate denial organizations while the Koch Industries controlled foundations contributed $24.9 million in funding to organizations of the 'climate denial machine' (Greenpeace, 2010).

The Fraser Institute campaigned against climate change legislation for a number of years, publishing reports contesting the IPCC conclusions. After the release of the 2007 IPCC report, the Fraser Institute generated its own "Independent Summary for Policymakers" the report led by a Fraser Institute affiliated scholar concluded not surprisingly in part:

> There is no evidence provided by the IPCC in its Fourth Assessment Report that the uncertainty can be formally resolved from first principles, statistical hypothesis testing or modeling exercises. Consequently, there will remain an unavoidable element of uncertainty as to the extent that humans are contributing to future climate change, and indeed whether or not such change is a good or bad thing (McKitrick, et.al., 2007).

The Fraser Institute also sponsored the creation of *'Understanding Climate Change. Lesson Plans for the Classroom'* written by economists Fretwell, & Scarborough (2009). Fretwell author of *'The Sky's Not Falling: Why It's OK to Chill About Global Warming'* (World Ahead Media, 2007), steers students toward the Fraser Institute's view that is antithical with the world's climate science community, namely that there is no causation between carbon dioxide and increased surface temperatures, that climate change concerns today are similar to purported concerns about a looming ice age in the previous century and that efforts to decrease carbon emissions are too costly to undertake.

Energy industry lobbyist Tom Harris and Carleton University Professor Tim Patterson have been collaborating to discredit mainstream climate science and public policies related to reduce greenhouse gas emissions for at least 11 years. Attacking the science and the motivations of those supporting greenhouse gas reduction policies like environmentalist Dr. David Suzuki has been an ongoing project. In 1999 Harris wrote of Suzuki's public pronouncements calling for greenhouse gas reductions:

> Since few reputable scientists agree with this proposition, one has to wonder what Dr. Suzuki's real motivation is in this activism (Harris,1999, March 26).

If climate skeptics want to question the ethics and motivations of the mainstream scientists urging action on climate change for the public good, fair play constitutes questioning the proponents of inaction as well. In 2000 Patterson and Harris wrote that the UN Climate talks in the Hague were based on an *'environmental myth'*, the article featured a lampoon of Dr. Suzuki dressed as a winged fairy with a magic wand flying over a castle (Patterson, & Harris, 2000, Nov 29). Another article 'cheered' global warming, arguing that it would offer some relief from the next cycle of glaciation that would arrive in a few thousand years (Patterson & Harris, 1999).

Patterson and Harris were collaborators in one of the first organized conferences to attack the Kyoto climate treaty, entitled *'Kyoto's Fatal Flaws Revealed'* (APCO Worldwide, 2002) The conference held in Ottawa and organized by APCO the PR firm which employed Harris featured "climate specialists" including Tim Ball, Pat Michaels, Fred Singer, and Fred Seitz, and was sponsored in part by Imperial Oil (Exxon-Mobil's Canadian subsidiary). 'APCO' has a track history of spinning science (Oreskes & Conway, 2010) and as Hoggan explains:

> APCO was hired by Philip Morris in 1993 to create a front group titled The Advancement of Sound Science Coalition (TASSC). TASSC manufactured a public relations campaign with the purpose of discrediting any science that suggested tobacco increased cancer and heart problems. It also advocated industry-friendly positions on global warming and pesticides. TASSC labeled environmentalists as promoting "junk science" while the Coalition advocated what they describe as "sound science"(Hoggan, 2011).

As Oreskes & Conway (2010, p.143) explain in 1990 Singer worked with APCO to found the 'Science and Environmental Policy Project' to promote tobacco industry friendly 'sound science' and "to discredit as junk any science they didn't". Fred Seitz worked for the tobacco industry in the defense of second hand smoke encouraging the tobacco industry to "challenge the weight of evidence approach"(Oreskes & Conway, 2010, p.142).

One thing remains clear, despite all the peer review published climate science and major climate science reports conducted by the world's premier scientific academies including the two comprehensive 3000+ page IPCC studies over the intervening 9 years, the people listed as part of this 2002 conference, these 'pioneer skeptics', have not shifted from their original positions. Many of the leaders of this 2002 conference, including Patterson, Ball and Harris would go on to found and play prominent roles in a number of astroturf organizations fighting against mainstream climate science including the *'Friends of Science'*, the *'Natural Resources Stewardship Council'* and the latest iteration the *'International Climate Science Coalition'* (Deep Climate, 2009). Many of the same people were featured prominently in documentaries to promote inactivism such as *"Climate Catastrophe Cancelled: What You're Not Being Told About the Science of Climate Change", "Climate Catastrophe Cancelled"* and *"The Great Global Warming Swindle"*. Apart from the common theme of refuting the scientific consensus on climate change, the one thing many of them have in common is that they focused considerable effort on using the media to take their case to the public, their success in convincing scientific peers that their position is more scientifically credible is not evident in the literature.

The appeal on the website of the *'International Climate Science Coalition'* reads

> For sensible climate policy to triumph, it will require that the vast majority of the public come to regard human caused climate catastrophe concerns as unfounded. This can only happen if we quickly 'expand the tent' of supporters of sound, science-based climate policies to include citizens of many different political persuasions, social philosophies and commercial interests (International Climate Science Coalition, 2011).

Cleverly phrased to appear inclusive to the public, words like *'sensible'* and phrases like *'science-based'* and *'expand the tent'* take on new meanings when it is understood that this group's sole raison d'etre is to refute the *scientific* evidence on climate change that has accumulated over the past 25 years.

This begs the obvious question: If skeptic scientists are so convinced that anthropogenic climate change is not happening, why have they been unable to convince the overwhelming majority of their peer scientists actively working in the field that they are wrong? A Nobel Prize would probably be the reward for the scientists who could furnish conclusive proof that humans are not significantly contributing to recent climate change, and that all the quantified climatic changes to date have been solely the result of some natural process that has not been examined in enough depth by the climate science community.

Dr. Tim Ball has been one of the most outspoken public critics of climate science in Canada. For the last fifteen years Ball a retired associate Professor of geography, worked as an energy industry supported climate change campaigner to sow public distrust of climate science (Littlemore, 2007). He has appeared on many television interviews, his work has been featured in many op-ed and feature pieces in newspapers and websites all focused on essentially the same message, that being that the mainstream science conclusions concerning climate change are fatally flawed. Ball worked as part of the Calgary-based 'Friends of Science' a skeptic group that was set up in part by University of Calgary Political Science Professor Barry Cooper, with funding from the oil and gas industry. Ball became chairman of the *'Natural Resources Stewardship Project',* which the Toronto Star reported in January 2007, was a creation of the Toronto-based energy-industry lobby firm the High Park Group run by Tom Harris (Littlemore, 2007). Ball is also listed on the 'International Climate Science Coalition' science advisory board as a former 'climatology professor'.

Ex-wrestler and politician Jesse Ventura stars in a television series appropriately called *'Conspiracy Theory'* in which he says:

> You think you know the whole story, think again…I know things that will blow your mind and now I think its time you get the whole story…Global warming the most serious threat to our planet or a plot to cheat, extort and control you and everyone else…the Global Warming Scam (Ventura, 2009).

One of the investigators in the Ventura program suggests that the planet is cooling. Tim Ball appears in silhouette, over an ominous soundtrack the commentator intones he is "fearful for his life because he defied the global warming forces" Ball asks "why are they trying to destroy me?" the announcer describes Ball as a: *"climate scientist who's been at the top of his field since the 1970's when the concern was global cooling"*. The program lapses into stages of acute paranoia warning viewers of *'one world government'* and the mastermind behind it Maurice Strong (Ventura, 2010). In the inactivist movement the demonization of Maurice Strong is a recurrent theme, he is the Machiavellian inventor of *"climatism"* according to the National Post (Foster, 2009a, 2009b). Among Maurice Strong's many accomplishments include serving as Secretary General of the United Nations Conference on the Human Environment as well as becoming the first director of the United Nations Environment Programme.

Climate scientists are finally beginning to fight back against the disinformation and invective that has targeted them and their profession (Lewis, 2010). For example, in an unprecedented move University of Victoria Professor Andrew Weaver, the Canada Research Chair in Climate Modeling and Analysis, launched a lawsuit against three writers at The National Post and the newspaper as a whole over a "series of unjustified libels based on grossly irresponsible falsehoods that have gone viral on the Internet"(McConchie Law Corporation, 2010). As Weaver explains:

> If I sit back and do nothing to clear my name, these libels will stay on the Internet forever. They'll poison the factual record, misleading people who are looking for reliable scientific information about global warming (McConchie Law Corporation, 2010).

The National Post which includes the 'Financial Post' has carried on a decade long ideological fight against climate science and scientists. Editorials and feature pieces have consistently attacked the credibility of climate science, the Kyoto Protocol, the IPCC and environmentalists, framing climate science as 'junk science'. In the words of the Financial Post (FP):

> annual Junk Science Week celebrates the scientists, NGOs, activists, politicians, journalists, media outlets, cranks and quacks who toil to advance the principles of junk science. Junk Science occurs when science is politicized and facts and risks are exaggerated, distorted and misrepresented (Financial Post, 2011).

Climate scientist Professor Andrew Weaver sued Dr. Ball for libel for comments he wrote in an article concerning Weaver's competency as a scientist (Rudolf, 2011, Feb 8; Greer, 2011). According to Greer;

> Weaver says Ball wrote the article, "Corruption of Climate Science Has Created 30 Lost Years," published on the Internet by the Canada Free Press, a conservative website that touts itself as a news source "espousing conservative viewpoints, cornerstone of which contain love of God, love of family, love of country."
> Weaver claims the article falsely accused him of cheating taxpayers by using research grant money to publish junk science about climate change. Ball also falsely claimed that in a face-to-face meeting Weaver was paranoid and fearful of being exposed as incompetent and unfit to hold his position as the Canada research chair in climate modeling and analysis at the University of Victoria's school of Earth and Ocean Sciences, according to the complaint (Greer, 2011).

Weaver's track record as a scientist is outstanding, he has over 210 climate related publications:

> He is a Professor and Canada Research Chair in climate modeling and analysis in the School of Earth and Ocean Sciences, University of Victoria. He was a Lead Author in the United Nations Intergovernmental Panel on Climate Change 2nd, 3rd and 4th scientific assessments and is also a Lead Author in the ongoing 5th scientific assessment. He was the Chief Editor of the Journal of Climate from

> 2005-2009. Dr. Weaver is a Fellow of the Royal Society of Canada, Canadian Meteorological and Oceanographic Society and the American Meteorological Society. Over the years he has received several awards including the E.W.R. NSERC Steacie Fellowship in 1997, the Killam Research Fellowship and a CIAR Young Explorers award in 2003, the CMOS President's Prize in 2007 and a Guggenheim fellowship in 2008. In 2008 he was also appointed to the Order of British Columbia (Weaver, 2011).
>
> Hoggan reports that:
>
> A search of 22,000 academic journals shows that over the course of his career Ball published *four* pieces of original research in peer-reviewed journals on the subject of climate change (Hoggan, 2011).

On March 31 2011 the U.S. House of Representatives Committee on Science Space and Technology held a hearing on *'Climate Change: Examining the Processes Used to Create Science and Policy'*. Republicans in charge summoned a number of skeptics to bolster their case that it is unnecessary to regulate greenhouse gas emissions from industries. There was a breathtaking (but not altogether surprising) amount of climate misinformation provided both by the Republican politicians and the skeptic scientists they invited as expert witnesses. These types of hearing tend to be partisan but people who were clearly non-experts in science nonetheless made some astounding claims. Scott Armstrong Professor of *Marketing & Advertising* Wharton School of Business made the following statements:

> I work with Willie Soon, who does a lot of research on this particular topic, and that's what he tells me [that natural factors are causing global warming]
>
> The [IPCC] temperature forecasting procedures are improper...these alarming forecasts...
>
> Forecasting global warming lacks any scientific basis.
>
> The most appropriate evidence-based forecast is that there will be no long-term warming claim (Cook, 2011).

Further in a submitted report to the hearings this *marketing* professor states:

> Our findings on the scientific evidence related to global warming *forecasts* lead to the following recommendations:
>
> 1. End government funding for climate change research.
>
> 2. End government funding for research predicated on global warming (e.g., alternative energy; CO2 reduction; habitat loss).
>
> 3. End government programs and repeal regulations predicated on global warming.
>
> 4. End government support for organizations that lobby or campaign predicated on global warming (Armstrong, Green & Soon, 2011).

In other words Armstrong wants the U.S. government to shut down all funding for any research into climate change, end of story. Not surprisingly Armstrong and Green are also listed as members of the 'science' advisory board of the 'International Climate Science Coalition' chaired by Tom Harris. Keston Green is a lecturer in Managerial economics. This testimony is just another blatant example of the immense academic arrogance and disdain for climate science that circulates in inactivist organizations. Cook (2011) does a wonderful job in exposing and correcting the climate myths and disinformation spread by non-experts. Wonderful web resources like 'Debunking Climate Myths from Politicians' and Skeptical Science (Cook 2011) provides an easily accessible index of all the scientifically inaccurate arguments and statements made by skeptics and U.S. politicians. Students can reflect on the words of MIT climate scientist Kerry Emanuel:

> Politicians who make mascots out of mavericks are engaging in advocacy…and shooting the messengers [of genuine science] are not rational options (Emanuel, - House of Representatives Hearing March 2011).

There is probably no better context than climate change to illustrate the interconnectedness of science, politics, economy, ecosystems, human health and ethics. There is no better 'messy' human problem to illustrate how cynical politics, neoliberal economics, and the human propensity for greed and short-term thinking have proven to be more effective in sustaining *inaction*, than the best insights the global scientific community can provide arguing for prompt and decisive action.

Given that the classroom time to cover any topic like climate change is extremely limited, the bulk of learning about climate change for young people will largely occur informally through social media and television. Public discussions about the science of climate change and public policy responses to it provide a rich context for engaging youth in questions concerning the nature of science itself as well as the contribution politics, economics, values and worldviews have in shaping public policy. Instead of avoiding the contrarian messages, materials, people and industries behind this disinformation campaign, science teachers should bring some of this material into the classroom so that students can analyze it in a structured learning environment using the basic skills of critical thinking applied to both the science and the media used to communicate the message. This includes questions related to credibility, scientific veracity and the visual media tactics employed to manipulate the viewer toward an opinion.

The selection of sources used here is by no means definitive, rather it is a small sample that follows the climate skeptic narrative as it weaves its way through our media consciousness.

While educators may dismiss the You Tube ignoramuses who rail on about Al Gore and 'climategate' while invoking every kind of nutty conspiracy theory going, the fact is that young people are exposed to them. The fear mongering concerning any legislation to curb greenhouse gases in North America has been relentless. In the U.S. demagoguery attacking climate science has been unfolding on the most popular cable channel Fox News for years. Probably no one person has borne more of the brunt of this rage-filled movement than Nobel Laureate Al Gore. In 2006 as Milbank recounts Fox News host Glenn Beck saw Nazism in Al Gore's book An Inconvenient Truth:

> It's like Hitler. Hitler said a little bit of truth, and then he mixed in 'and it's the Jews' fault.' That's where things get a little troublesome, and that's exactly what's happening (Beck quoted in Milbank, 2010, p.47)

Milbank then recounts how Beck likened Gore's global warming campaign to the eugenics campaign and the Holocaust:

> Now, I'm not saying that anybody's going to—you know Al Gore's not going to be rounding up Jews and exterminating them. It is the same tactic, however. The goal is different. The goal is globalization. The goal is global carbon tax. The goal is the United Nations running the world. That is the goal. Back in the 1930s, the goal was get rid of all of the Jews and have one global government …You got to have an enemy to fight…And when you have an enemy to fight, then you can unite the entire world behind you, and you seize power. That was Hitler's plan. His enemy: the Jew. Al Gore's enemy, the U.N.'s enemy: global warming … And you must silence all dissenting voices. That's what Hitler did (Beck quoted in Milbank, 2010, p.48).

Of course ill-informed paranoid media rants are no substitute for actually trying to understand the science involved, one merely requires momentary attention, the other sustained and critical engagement. The impact on young people of countless irrational anti-scientific rants on any number of science and science-technology policy issues available through social media cannot be readily dismissed.

Young people will need to be both critically science literate and media literate in order to examine the claims of those who argue that reducing greenhouse gas emissions is; too costly, impractical, only possible through massive geo-engineering schemes or worse yet, pointless. As a complex civilization we exist on a knife-edge, our increasingly hyper complex production-consumption systems depend upon cheap oil, cheap labour and a stable climate system. Reducing carbon emissions will not be easy or without temporary 'losers' and 'winners'.

Climate inactivism encompasses a wide spectrum of actors and endeavours. What they share in common is a steadfast refusal to accept the science of climate change as articulated in peer-reviewed studies and international reports. In effect they express a desire to keep societies locked into a dependency upon fossil fuels despite what they may claim through their public relations and advertising. In other words they agitate for the status quo, a high consumption, high carbon world.

Climate Justice, the Missing Corporate Meme

> Modern industrial civilization has developed within a certain system of convenient myths. The driving force of modern industrial civilization has been individual material gain... Now it's long been understood - very well - that a society that is based on this principle will destroy itself in time. It can only persist - with whatever suffering and injustice it entails - as long as it's possible to pretend that the destructive forces that humans create are limited, that the world is an infinite resource, and that the world is an infinite garbage can. At this stage of history either... the general population will take control of its own destiny and will concern itself with community issues guided by values of solidarity, and sympathy, and concern for others, or - alternatively - there will be no destiny for anyone to control (Chomsky quoted in Achbar, 1994, p.221).

Fairness in terms of describing differential international responsibilities for reducing carbon were built into the 1992 United Nations Framework Convention on Climate Change (UNFCCC), it called all nations to:

> protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities (UNFCC, 1992).

At a fundamental level, climate change reflects a failure of markets in general and the libertarian notion of market fundamentalism :

> those who damage others by emitting greenhouse gases generally do not pay. Climate change is a result of the greatest market failure the world has ever seen. The evidence on the seriousness of the risks from inaction or delayed action is now overwhelming. We risk damages on a scale larger than the two world wars of the last century. The problem and the response must be a collaboration on a global scale (Stern, 2009, p.12).

The inactivist's reluctance to *acknowledge* the basic scientific truth that excessive emission of greenhouse gases constitute pollution and thus a *failure of the market* as Stern suggests is central to understanding the ideology. A market failure implies that the state must step in to correct the situation. For those whose self-interest is served in the ideological belief that markets are 'perfect' mechanisms and that state intervention into them is always a bad thing, acknowledging market failure is a tough pill to swallow. As scientist Ken Caldiera acknowledges:

> Is it too late to do anything? It is within our technical and economic means to modify our energy and transportation systems and land-use practices to largely eliminate carbon dioxide emissions from our economies by mid-century. It is thought that the cost of doing this — perhaps 2% of the worldwide economic production — would be small, yet at present it has proven difficult for societies to decide to undertake this conversion (Caldiera, 2010).

Climate change also challenges the neoliberal notion that the Earth has bottomless resources, providing unlimited opportunities for human exploitation. In essence to acknowledge the reality of anthropogenic climate change is to acknowledge the existence of real biospheric limits of exploitation. The libertarian worldview posits perfect markets and the inexhaustibility of the planet's biosphere or "neutral stuff" as Smith calls it:

> The environment exists and is neutral stuff until it is transformed by human use into a resource…Most appeals for conservation are unwarranted. Because there are no permanent resource scarcities, no resource limits and no intergenerational equity, all most conservation efforts do is deprive existing populations from the advantages that exist of contemporary use of the resource base … Limits do not exist. Long before we run out of any resource, technology will have supplanted that resource with something better, cheaper, more effective, more efficient. Resources become obsolete, they do not become extinct (Smith, 2011).

Likewise the concepts of intra and intergenerational equity are also fallacies according to Smith:

> Intergenerational equity is a fallacy. Because the rate of change of technology advances so rapidly (and the contemporary rate of change ever more rapidly than that of the past), we simply do not know what future generations will want or need as their resource base (Smith, 2011).

According to this worldview whatever problems a high carbon polluting society accrues, technology and the market will fix it, no worries. For Smith, simple 'stuff' like fresh water, a functioning boreal forest, a non-acidic ocean with wild populations of fish and all the rest of the free 'natural services' provided by healthy functioning ecosystems will presumably be replaceable by advanced technologies at some time in the future. Good luck with that.

North Americans have an annual carbon footprint of approximately 28 tons per capita, while the Chinese weigh in at 3 tons and the global average is about 7 tons per person (Berners-Lee, 2011, p.11). When discussions concerning fairness and carbon justice enter the picture, the strident skeptics retreat, saying little or nothing. The idea of a 'fair share' of atmospheric carbon emissions distributed equally among citizens of the planet is anathema to their mental economic model of the atmosphere as a bottomless carbon waste sink. 'Climate debt' according to Klein is "the idea that poor countries are owed various forms of reparations from rich countries for the climate crisis" (Klein, 2010, p.55). Most of the damage due to climate change is and will be felt by marginalized citizens living in developing countries, which means the majority of people on the planet.

Skeptics however frame any notion of 'climate debt' or the demand from developing countries for adaptation compensation due to climate change that they had little part in contributing to as a form of 'extortion':

> The deterioration of coral reefs in the Maldives and Barbados also will be blamed on the West as well; again due to increases in ocean temperature caused by, you guessed it, climate change. This might be a good tactic for countries seeking to extort billions of dollars in compensation, but it is certainly not good science (Patterson & Harris, 2001, Feb 13).

The concepts of full 'carbon 'disclosure', carbon equity and climate justice (Demerse, 2009) as embodied in the *Bali Principles of Climate Justice* (International Climate Justice Network, 2002) remain threatening ideas to people who believe that markets are pure, perfect mechanisms for allocating resources. The Global Humanitarian Foundation (2009, p.3) identifies eight key dimensions of 'Climate Justice':

1. Take responsibility for the pollution you cause
2. Act according to capability and capacity
3. Share benefits and burdens equitably
4. Respect and strengthen human rights
5. Reduce risks to vulnerable populations to a minimum
6. Integrate solutions
7. Act in an accountable and transparent manner

8. Act now

In her book the 'Shock Doctrine' Klein points to the underlying mechanism that makes addressing climate change so difficult:

> An economic system that requires constant growth, while bucking almost all serious attempts at environmental regulation, generates a steady stream of disasters all on its own, whether military, ecological or financial. The appetite for easy, short term profits offered by purely speculative investment has turned the stock, currency and real estate markets into crisis-creation machines (Klein, 2008, p.426).

The next crisis point may be closer than we think as unknown tipping point thresholds in terms of the Earth's biogeophysical systems may already have been surpassed because of human behaviour (Lenton et.al., 2008). Although we don't know for certain exactly where these critical thresholds are or what quantitative measure of disturbance will be the deciding measure to push these systems into new regions of behaviour, scientists believe they exist (Lenton et.al., 2008) . As Lenton et. al., warn:

> Society may be lulled into a false sense of security by smooth projections of global change. Our synthesis of present knowledge suggests that a variety of tipping elements could reach their critical point within this century under anthropogenic climate change. The greatest threats are tipping the Arctic sea-ice and the Greenland ice sheet, and at least five other elements could surprise us by exhibiting a nearby tipping point (Lenton et.al., 2008, p.1792).

Tools for Clarification

NGO groups have tracked the funding sources of various inactivism groups and some provide easy web access to the data. For example, Exxon Secrets (Greenpeace USA, 2011) tracks Exxon-Mobil's funding of think tanks, while 'Sourcewatch' provides detailed referenced biographies of the main organizations involved in climate inactivism. Climate scientists themselves have created an innovative new social media tool to overcome the disinformation providers, the 'Climate Science Rapid Response Team' is described as a:

> Matchmaking service to connect climate scientists with lawmakers and the media. The group is committed to providing rapid, high-quality information to media and government officials. Thus far we have enlisted over 100 climate scientists. They are chosen on the basis of their professional competence as reflected in original research in peer-reviewed professional scientific journals. Nearly all of them are members of University faculties or Government laboratories (e.g. NASA, NOAA) involving some aspect of climate science, both in the US and abroad (Climate Science Rapid Response Team (CSRRT), 2011).

DeSmogBlog (2011) a web resource run by Hoggan & Associates, a Public Relations firm has an extensive database on key players in the climate inactivist movement. DeSmog's stated aim is to provide a *"fact based information regarding global warming misinformation campaigns."* Other resources like Sourcewatch (Center for Media and Democracy, 2011), allow students to examine the backgrounds, funding sources and influence of the people making the case that anthropogenic climate change is a non-issue.

Students should be encouraged to contrast and compare the science in the short accessible scientifically factual and fully referenced *'Scientific Guide to Global Warming Skepticism'* (Cook, 2010) with the ranting polemic against the IPCC, science, and scientists that is *'The Skeptics Handbook 2 'Global Bullies Want Your Money'* (Nova, 2009). It appears that Nova's anti-climate science pamphlets are aimed at young people, they are promoted on many inactivist blogs and websites including those of 'International Climate Science Coalition' and the 'Heartland Institute'. One of Nova's cartoon books replete with cartoons and irrational conspiracy theories asks:

> What if governments poured billions of monopolistic funding into one theory but hardly anything into the alternatives: a theory that suited personal ambitions, profits of major players, careers of scientists, and the aims of naive greens?(Nova, 2009).

At the other end of the educational spectrum, Greg Craven, a secondary science teacher has written a wonderful book *"What's the Worst that Could Happen? A Rational Response to the Climate Change Debate"* to help teachers make sense of the competing claims in the climate science debate. Using tools like a 'credibility spectrum' and decision grids readers can step through a rational process of deciding what constitutes good science as well as basic sensible policy directions.

Having students compare and contrast the way climate science is discussed with in a popular skeptic blog run by an ex-TV weatherman (http://wattsupwiththat.com/) versus a blog operated by professional climate scientists like 'Real Climate' (www.realclimate.org). Students can examine the scientific quality of the postings, whether assertions are backed up by genuine science or whether it is merely recirculating echo chamber disinformation memes. Are the references sourced from opinion-driven outlets or scientific sources? Students can research the blog posters qualifications in terms of making expert or definitive statements concerning science as well as whether the institutions they might represent are independent or corporate think tanks. What quality control measures if any exist? Do the opinions expressed reflect a minority or a majority of expert opinion? How is uncertainty conveyed? Do the posted materials focus on climate science or do they veer off into a hodge-podge of unrelated hot button' issues? Do the links in the blog reflect a variety of scientific sources or are the links merely encouraging the reader toward more subjective non-expert opinion?

Other questions include:

- Who funds the website?
- How many links to reputable scientific organizations/resources exist?
- How many links to inactivist websites exist?
- How many links to business/industry 'think tanks' exist?
- How do the positions argued deal with known inequities with respect to per capita carbon emissions? Are they ignored?

The question of what to do about climate change raises all kinds of generative questions for young people concerning the kind of future they would like to see unfold. It is important to involve students in assessing the science and technology policy options articulated by a variety of groups and to map out the future ramifications envisioned implicitly or explicitly.

Learners can inquire as to how choosing particular climate policy options precludes the selection of others as time progresses. Have any so-called 'solutions' or strategies been widely consulted on? Who do they impact on significantly? Have democratic participatory practices been at the heart of strategy development, or has policy development occurred behind closed doors by nameless bureaucrats and lobbyists? What voices have had an influence related to their economic power and what voices have been marginalized because they are disadvantaged and not perceived as being influential? How can these policies and the processes that led to them be made more inclusive? How do young people think science can better contribute to the construction of just and equitable policies to deal with climate change?

Importantly we must ask young people, the most adept and creative users of social media how they would like to better understand the ongoing developments in climate science. What suggestions for new tools and strategies can they imagine?

In the age of blogs, twitter and all other forms of social media, the scientific community needs to find new strategies to continue to make the case to the public that this work is vital. Conventional peer-review

processes are under scrutiny and researchers in many scientific fields are trying to cope with the impact of social media review of their work as:

> [Scientific] Papers are increasingly being taken apart in blogs, on Twitter and on other social media within hours rather than years, and in public, rather than at small conferences or in private conversation (Mandavilli, 2011, p.286).

Student's can certainly be encouraged participate in reviewing social media they frequent as well as mainstream media's reporting of climate-related science stories.

The civil society groups involved in education and street protests in Copenhagen during the 2009 climate talks did not spring up overnight, they were involved in all forms of 'activism' using a variety of social media tools for months if not for years preceding the conference. In other words, the people and organizations protesting were merely the tip of the proverbial iceberg in terms of numbers of engaged and *active* people in communities around the world. Some of the mainstream media reports that focused on isolated incidents of vandalism emphasizing the 'blood on the streets' sensationalism belies the depth and breadth of global public support for climate legislation. The real story that needs to be emphasized is the crucial involvement, the *'activism'* of young people in producing and disseminating guerilla social media in all its forms that bypasses the old media frames, the old corporate disinformation and ways thinking to reach new and emerging international constituencies.

Conclusion

The selection of skeptic voices examined in this paper reflect only a sample of a much wider climate inactivist continuum, the common thread through most of the perspectives presented here is that in various ways they are closely united and interconnected them through blogs and websites, that is as a whole they reflect a portion of the international skeptic echo chamber. Students should spend time analyzing how the anti-science 'narrowcast' blogosphere creates self-referential echo chambers of myopic opinion. As Manjoo asserts:

> People have generalized their preference for politically consonant news to nonpolitical domains…in other words, they've become addicted to their own preferred spin…they've gotten into the habit of saying 'Whatever the news is talking about, I'm just going to go to Fox [News]"(Manjoo, 2008, p.42).

In circulating selective scientific facts interspersed with ideologically driven opinion, conspiratorial thinking and unsubstantiated conjecture, these pseudoscientific narratives have captured large numbers of lay people and in effect help stall progress toward an international climate treaty.

Climate change will not be 'solved' in any real sense by a technological fix alone because the 'fixing' it involves questioning the sociopolitical, economic and ecological legitimacy of our energy intensive civilization.

There is of course inadequate time in any curriculum to refute all of the claims of the climate inactivist movement. But it is important to enable students to refute some of them as they work to develop a critical scientific literacy and a sense of capability in applying critical thinking to understand logical fallacies, propagandistic media and the nature of the ideology behind much of the climate inactivist movement.

The label 'activist' is often used as a pejorative by those who occupy positions of economic and political power and who seek the status quo in order to maintain that position. We seldom see the established mainstream media employ the news frame of 'corporate activism' or 'carbon polluting status quo activist' despite the indisputable fact that many large and powerful carbon intensive industries employ armies of lobbyists and tens of millions of dollars to persuade politicians and the public that a self-interested 'carbon

business as usual' policy is the only tenable path forward.

University of British Colombia professor Michael Byers, the Canadian Research Chair in International Law and Politics states emphatically:

> It is time for a change. It is time to harness the emotional connection that many Canadians have with nature, our sense of responsibility for human beings elsewhere and our deep concern for future generations. It is time to take strong and decisive action on climate change, with or without the co-operation of other countries (Byers, 2008, p.149).

Young people are leading this change and assisting them in learning how to recognize climate science disinformation in whatever media form it takes will make their task easier.

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