



# Global climate change and non-violent civil disobedience

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**ABSTRACT:** Despite knowledge of the risks of global climate change during the past 30 yr, the USA, among other nations, has failed to mitigate greenhouse gas emissions to reduce the risks to present and future generations. This is despite the fact that scientific and ethical literature makes the case that meaningful action is urgent. Consequently, we suggest that climate and environmental scientists, among others, consider whether non-violence civil disobedience should be used as a means to promote action on global climate change.

**KEY WORDS:** Global climate change · Non-violent civil disobedience

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## INTRODUCTION

UN Secretary-General Ban Ki-moon commented that global climate change (GCC) is the 'only one truly existential threat...the great moral imperative of our time' (Ki-moon 2009). Although he might be one of the most visible international public figures to make such a proclamation, others have argued the case that GCC is an important ethical issue (e.g. Jamieson 1992, Lemons et al. 1995, Brown 2002, Brown et al. 2005, Gardner 2006, Brown & Tuana 2007–2010, Brome 2008).

Given the urgency to reduce greenhouse gas (GHG) emissions and the failure, to date, to implement GHG reduction targets in the USA and some other countries in accord with the best available science in order to avoid serious and irreversible harm and do so in an equitable manner between nations, we suggest that a new approach to bring about action on GCC should be discussed and, indeed, might be required: non-violent civil disobedience (NVCD). Parenthetically, we have never been involved with NVCD. Accordingly, we write with over 30 yr of frustration from trying to help achieve progress toward solving GCC. Our comments focus on the USA because it is the country we are most familiar with and because we consider this nation to be extremely remiss in not taking action to address global climate change.

Cohen (1971, p. 111) defined non-violent civil disobedience broadly as:

'...an act of protest, deliberately unlawful, conscientiously and publicly performed. It may have as its object the laws or policies of some governmental body, or those of some private corporate body whose decisions have serious public consequences; but in either case the disobedient protest is almost invariably nonviolent in character.'

There are several types of NVCD. For example, NVCD can occur when a citizen disobeys a law that he or she believes to be immoral, or when a citizen disobeys a law because he or she believes a moral right to someone has been denied, or when a person believes that morally wrong public policies or laws need to be changed (Kress & Anderson 1989).

Our intent is that the present paper should be a 'conversation starter' because to our knowledge NVCD has not been dealt with in the scientific or environmental peer-reviewed literature and because, as we demonstrate, it warrants discussion in view of the possibility that it might spur urgently needed action. We recognize that the practice of NVCD has been, and likely will remain, controversial, especially insofar as involvement of scientists and other environmental professionals is concerned. We discuss (1) the science of GCC, (2) the politics surrounding GCC in the USA, (3) the ethical dimensions of GCC, and (4) justifications for NVCD.

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Finally, we acknowledge, like most commentators on NVCD, that under most circumstances citizens have a duty to comply with duly elected laws. Consequently, to justify NVCD, 2 conditions need be demonstrated: a great injustice is occurring, and there is strong reason to believe that policies and laws and lawful recourse to changing them will not work (Morreall 1976, Sustain 2003).

## THE SCIENCE OF GLOBAL CLIMATE CHANGE

Scientific information is not prescriptive because it does not mandate or require specific public policy. However, it is important because it provides knowledge of the harm caused by human activities and its mitigation. Scientific evidence of existing and potential harm from anthropogenic GCC gives rise to public policy and ethical concerns to reduce the likelihood of damage resulting from sea level rise, changes in agricultural productivity, water quantity and quality, and incidence of diseases, as well as increasing species extinction as high as 20 to 30% above current levels (Thomas et al. 2004, IPCC 2007). As we discuss later, the harm done by GCC falls disproportionately on the most vulnerable people, presently and in the future.

Ethical imperatives for all governments to take strong action to mitigate GCC stem, in part, from the fact that the risks from GCC have been known for decades. For example, in 1979 the US National Academy of Sciences (NAS) concluded that a wait and see policy on global climate change may mean waiting until it is too late to take meaningful action (NAS 1979), and in 1980 the US Council on Environmental Quality (CEQ) concluded that the responsibility for the carbon dioxide problem is ours, and we should accept it and act in a way that recognizes our role as trustee for future generations (CEQ 1981). This knowledge is supported by 4 Intergovernmental Panel on Climate Change (IPCC) assessments (IPCC 1990, 1995, 2001, 2007), NAS reports (e.g. NAS 2005, 2009, 2010), and more recent scientific studies concluding that there is an urgency to reduce GHG emissions by up to 40% by 2020, compared to 1990 or 2000 levels, and that emissions need to peak and then decline beginning around 2015 to 2020 (e.g. Hansen et al. 2008, Baer et al. 2009, Bates 2009, Kaufman et al. 2009, Rockström 2009). Disturbingly, the scientific literature published after the IPCC 2007 AR4 Report indicates that not only are GHG emissions rising faster than IPCC's worst-case scenario, but that observed impacts exceed those projected (Allison et al. 2009, Levin & Tirpak 2009, New et al. 2011). It is also worth noting that on 21 October 2009 the American Association for the Advancement of Science

(AAAS) along with 17 other national scientific societies delivered a letter to all members of the United States' Senate expressing the need for urgent action to dramatically reduce GHG emissions (AAAS 2009).

Years of studying GCC have led to fundamental conclusions about GCC and its anthropogenic contributions that are not in dispute by 97 to 98% of scientists who publish in the scientific peer-reviewed literature on GCC (Anderegg et al. 2010, Gleick et al. 2010). The conclusions include the following: (1) the earth-atmosphere system is warming due to increased concentrations of GHGs; (2) most of the increase in GHGs over the past century or more is due to human activities, especially the burning of fossil fuels and secondarily deforestation; (3) natural causes always have a role in changing the earth's climate, but now play a less significant role due to human-induced changes; (4) warming of the earth-atmosphere system is and will cause climatic processes and spatial and temporal patterns to change at rates that are without precedent during the past 800 000 yr including sea-level rise, changes in the hydrological cycle, and species extinction rates; and (5) unless GHG emissions are urgently reduced, future levels will exceed 'dangerous anthropogenic interference with the climate system', which nations that have ratified the United Nations Framework Convention on Climate Change (UNFCCC) are prohibited from doing (UNFCCC 1994). The word 'dangerous', while having an imprecise meaning, generally refers to impacts that would result from mean atmospheric temperature increases above 1750 levels of around 2°C (see, e.g. Hansen et al. 2008, Baer et al. 2009, Allison et al. 2009, New et al. 2011).

Finally, recent scientific studies confirm an urgency to deal with GCC if we are to avoid serious and irreversible impacts. Ramanathan & Feng (2008) show that even if GHG emissions were stopped immediately, the world would be committed to a warming of at least 2.4°C by 2030, with a probability of 0.5 or more bounded by a 90% confidence level, and that this warming would have significant impacts on (1) arctic summer ice and/or complete loss of ice, (2) melting of world-wide glaciers, including those in Himalaya and Tibet, (3) instability of the Greenland and West Antarctic Ice Sheets, (4) rapid loss of the Amazon rain forest, (5) alteration of the El Niño Southern Oscillation, and (6) a slowing or redistribution of the Atlantic thermohaline circulation. Rogelj et al. (2010) also demonstrate that pledges made under the Copenhagen Accord will not be sufficient to limit earth-atmospheric temperatures to 2°C and, in fact, likely will lock the world into exceeding a 3°C degree temperature increase by 2100. Because of uncertainties in future world-wide emissions of GHGs, mean atmospheric global temperatures are projected to increase 2 to 7°C above pre-industrial levels by 2100 (Allison et al. 2009).

According to Anderson & Bows (2008), achieving the goal of 2°C atmospheric stabilization for temperature increase requires several highly optimistic but plausible conditions; plausible only if we take immediate action. First, that deforestation peaks in 2015 and rapidly falls afterward to about half the current level by 2040 and close to zero by 2060. Second, that levels of methane and nitrous oxide released mostly from agricultural practices peak in 2020 (12.2 billion tonnes) and then fall to a stabilization value of 7.5 billion tonnes by 2050. Assuming a world population in excess of 9 billion people by 2050 (UN 2007), achieving a level of 7.5 billion tonnes is possible only if the GHG intensity of food production is halved over the next 4 decades (We believe this conclusion concerning the level of reduced GHG agricultural intensity is debatable but beyond the scope of our article to discuss.). Third, global emissions of GHGs would need to peak by 2020 or before and then decline by about 3% yr<sup>-1</sup> afterward. However, to account for equity between developed and developing nations, the energy and industrial emissions of developed nations would have to fall by about 6 to 7% yr<sup>-1</sup>. These actions are unlikely to occur; if they do not, the projections are that GHGs would likely stabilize at a level of about 650 ppm and temperature would increase by 4°C or more, far beyond the 'acceptable' level required to protect the earth and its peoples from catastrophic harm (New et al. 2011).

Echoing these studies is a recent report by the German Advisory Council on Global Change (WGBU 2009), which assessed what it would take to keep within the goal of '2 degree C-450 ppm atmospheric stabilization for carbon dioxide eq.'. According to WGBU, GHG emissions would have to peak in 2015 and the annual reduction rate for all emissions would have to be 4 and 6.5% for energy and industrial emissions, respectively. If the peaking year for GHG emissions were 2020, an annual reduction rate for all emissions of 6 and 9% for energy and industrial emissions, respectively, would yield a carbon dioxide eq. atmospheric concentration of 550 ppm and a likely 3°C or more temperature increase; the same peaking year with annual reduction rates for all emissions of 3 and 3.5%, respectively, would yield a carbon dioxide eq. atmospheric concentration of 650 ppm and a likely 4°C or more temperature increase.

Furthermore, den Elzen et al. (2010) calculate that the slow pace in climate policy development and the steady increase in global GHG emissions make it almost infeasible to reach the relatively low global emission levels in 2020 needed to meet an atmospheric stabilization value of 450 ppm carbon dioxide eq. Finally, delays in peaking of global GHG emissions compound the problem by such a large extent as to

make it almost intractable. For instance, even a warming of 2°C is projected to result in the following: (1) 100 to 400 million more people placed at risk of hunger; (2) 1 to 2 billion more people not having access to water for consumption, hygiene, and food needs; (3) significant increases in incidence of tropical and other diseases; and (4) many millions of people displaced because of sea-level increase—to name a few examples of expected impacts. These statistics should be viewed in the context that people are losing their lives to impacts from GCC already. According to the World Health Organization (WHO 2005), an estimated 150 000 to 300 000 deaths per annum have likely been caused since 2000 due to GCC, and a further 5.5 million healthy years of life lost due to debilitating diseases; these figures are consistent with Patz et al. (2005). Of course, the poor in developing nations suffer most of the deaths and hardships from GCC.

Perhaps most disturbing is the report by Baer et al. (2009). They reviewed current scientific literature providing evidence that to avoid serious and irreversible harm the world needs to stabilize carbon dioxide atmospheric concentrations at 350 ppm to keep global mean atmospheric temperatures from increasing no more than 2°C relative to 1750 levels. The challenge to do this is daunting because, based on this review, these conditions are only achievable if world-wide emissions peak and then decline about 40% prior to 2020. Baer et al. (2008) point to plausible pathways to accomplish this, but only if the United States nation, and other developed nations, adopt what they call a 'wartime footing' to reduce emissions.

## THE POLITICS OF GLOBAL CLIMATE CHANGE

The United States' Senate ratified the UNFCCC in 1994 which, among other things, required that it (1) makes a good-faith effort to reduce GHG emissions to 1990 levels by 2000, (2) along with other developed nations, takes the lead to protect the climate system for the benefit of present and future generations and on the basis of equity with developing nations, and (3) adopts the precautionary principle wherein lack of full scientific certainty should not be used as a reason for postponing measures to combat GCC. Although with ratification of the UNFCCC the country is bound by the treaty's principles, it has not fulfilled any of them (Brown 2010a).

One might think that in the USA, with about 4.6% of the world's population emitting ~30% of the cumulative total world-wide GHGs from 1900 to 2005, there would be particular sensitivity to reducing the nation's emissions in order to avoid harming the most vulnerable people of the world, both present and future (IEA 2007).

It can be argued that a nation's responsibility for cumulative emissions should cover a time since it was informed of GCC and its impacts. Taking this approach, and using 1990 which was the year of the first IPCC report, the cumulative GHG emission of the USA for the period 1990 to 2010 is 33 % (Baer et al. 2009).

Not only has the United States' government failed to take meaningful action to mitigate GCC despite the best available science, it also has been proactive in avoiding mitigation measures. For example, after the first 2 IPCC assessments, as well as numerous reports from the NAS, in 1997 S. Res. 98, which was a 'sense of the United States Senate,' was approved by a vote of 95 vs. 0 (US Senate 1997). Among other things, S. Res. 98 resolved that the United States' Senate should not ratify any protocol or other agreement under UNFCCC that would mandate commitments to reduce GHG emissions or which would result in harm to its economy, despite the fact that, as we will discuss, ethically speaking economic interests alone do not permit the activities of people of one nation to harm those in other nations (Brown 2010b). More recently, although most of the international community had hoped for an outcome from the 2009 UNFCCC Conference of the Parties (COP) 15 in Copenhagen to include binding targets for GHG reductions in an equitable manner between the developed and developing nations, this was probably wishful thinking due to the USA lagging behind the rest of the world in including GCC policies in an international framework, or, in fact, because of its opposition to such a framework. The position of the USA at Copenhagen should not have surprised anyone. During the UNFCCC meetings in Bangkok, 28 September to 9 October 2009, and in Barcelona, 2 to 6 November 2009, which set the goal of gaining agreement to limit GHG emissions that could be finalized during the COP 15 in Copenhagen, led by the USA and followed by the EU, Japan, Canada, and Australia, the meetings failed to develop a draft negotiating text to be used in Copenhagen because of opposition by the USA (Shamsuddoha 2009).

More troublesome is that there are few if any positive signs that the government of the USA will take sufficient and timely actions to address GCC. For example, since climate negotiations began in 1990, the country has failed to adopt legislation limiting GHG emissions (Brown 2002, Brown 2010c) and is not likely to do so in the near future. The recent elections in the USA on 2 November 2010 gave Republicans control of the House of Representatives, and reduced the majority of Democrats in the Senate, who as a group are more inclined to support GCC legislation, to 51 %. Republican opposition to enacting GCC legislation is high and virtually unanimous, and supporters of GCC legislation in the Senate would need at least 60 votes to

move a bill through the Senate, which would be virtually impossible under present or likely future circumstances. Every Republican candidate for a seat in the House of Representatives, the Senate, or a state governorship stated that he/she thought anthropogenic GCC was a hoax and/or expressed opposition to implementing legislation or regulations to mitigate it (Romm 2010). With respect to the possibility of the international community building on the Kyoto Protocol with a meaningful international GCC treaty, the prospect for ratification by the United States' Senate of any treaty is dim for the simple reason that ratification requires the approval of 67 senators. Without the agreement from the USA to some sort of international treaty with binding emissions, there is little hope that such a treaty will be promulgated. It can be argued that an international treaty involving most nations of the world is not necessary for meaningful action to mitigate GCC; in fact, the 2009 Copenhagen Accord is predicated on this premise. However, it is worth noting that an analysis of the Copenhagen Accord indicates that nations' pledges fall short of the IPCC's or other more stringent targets and timelines for GHG emission reductions needed to avoid a 2°C temperature increase or 'dangerous anthropogenic climate changes' (Duscha et al. 2010). Finally, the fact that the USA continues to build new coal fired power plants indicates a firm lack of resolve to tackle GCC (Hansen 2009).

## THE ETHICS OF GLOBAL CLIMATE CHANGE

Given that in the USA there has been little meaningful action to mitigate GCC based on the best available science, is there anything to be done? We must first accept there is an ethical responsibility to adopt urgent actions to reduce GHG emissions.

Hopefully, a consideration of ethics would resonate with public policy makers in the USA and drive them to enact meaningful GCC policy and legislation. After all, ethical considerations were a factor in ending slavery, racial segregation, discrimination against women, and atmospheric nuclear weapons testing, to name a few high profile issues (Zinn 1997).

Applied ethical analyses of GCC issues have been extensive and provided 'roadmaps' for specific actions. However, as discussed by Jamieson (1992), Lemons et al. (1995), Brown (2002), Brown et al. (2005), Gardner (2006), and Brown & Tuana (2007–2010), to name a few, calls for developing and implementing ethically informed policies and actions to address GCC have largely gone unheeded by public policy makers in the USA and are not reflected in any draft or pending policies or legislation of the country. We are aware of only one national legislator in the USA who has framed

GCC as an ethical issue (Broder 2011), and the media does so rarely if at all (Pooley 2009).

GCC creates duties because those most responsible for causing this problem are the richer developed nations, yet those who are most vulnerable to GCC's harshest impacts are some of the world's poorest people who can do little to adapt to them (Lemons 2010). Examples of harm caused by GCC include deaths from disease, droughts, floods, temperature changes, and intense storms, damage to homes and villages from rising oceans, adverse impacts on agriculture, diminishing natural resources and extinction of species, the inability to rely upon traditional sources of food, the destruction of water supplies, and political and social unrest. In fact, GCC threatens the very existence of some small island nations.

Ethical dimensions of GCC also stem from its global scope. At the local, regional or national scale, citizens can petition their governments to protect them from serious harm. However, at the global level, no government exists whose jurisdiction matches the scale of GCC. Although national, regional and local governments have the ability and responsibility to protect citizens within their borders, they have no legal responsibility to foreigners in the absence of international law. For this reason, ethical appeals are necessary to motivate governments to take steps to prevent their citizens from seriously harming foreigners.

Baer et al. (2009) point out that developed nations have adopted GHG emission reduction targets that are under-recognized because they are hidden by the technical language and methods of science and policy. For example, many developed nations (except the USA) have considered the goal of reducing GHG emissions in the range of 20 to 40% by 2020 compared to 2000 levels but, in fact, chose the 20% reduction level as a matter of policy without, apparently, addressing the fact that developing nations face a far greater challenge adapting to the results of a 20 compared to a 40% GHG reduction. Even more problematic is IPCC's AR4 conclusion that to keep emissions from causing a 2 to 2.4°C temperature increase world emissions of GHGs will need to be reduced to 50–85% below 2000 levels by 2050. The ethical problems stem from the timing of when GHG emissions peak and then begin to decline and how fast. For example, if the world's GHG emissions peak by 2013 and then begin to decline, there would be relatively little emissions space left for developing countries to meet needs for development and the alleviation of poverty. The more the peak year for GHG emissions is delayed the less emissions space remains for developing countries; in fact, in order for the world to avoid a 2 to 2.4°C temperature increase, developing nations would have to begin almost immediately to reduce their GHG emissions, long before

their development and alleviation of poverty needs are met. Plausibly, there is time to avoid such dire consequences, but only if urgent action is implemented.

A significant ethical problem with the stance of policy makers in the USA is that they almost exclusively look only at national costs and benefits in discussions about national GCC policy (Brown 2010b). Such a position implicitly denies that there are duties and responsibilities to others for the impacts of GHGs emitted within the USA. Typically, the economic arguments about GCC are based on aggregate cost–benefit analyses and do not consider the distribution of costs and benefits spatially or temporally, especially as far as the most vulnerable people who have contributed least to GCC are concerned. By emphasizing costs and benefits to itself, the United States nation sidesteps the issue that no nation is justified in formulating policies about GHG emissions on national interests alone without considering what a 'safe' level of atmospheric GHG emissions is and what its fair share of emissions should be relative to other nations. (For a discussion about criteria and processes to determine 'fair' see Ott et al. 2004.) In fact, contrary to the UNFCCC (1994), a common sentiment in the USA is that the nation need not reduce its GHG emissions unless and until all other nations have agreed to do so, despite (interestingly) the fact that most developed nations have agreed to GHG emission targets and some have already reduced their emissions. Significantly, by emphasizing economic costs to itself only, the United States nation has ignored a duty not to infringe peoples' basic human rights, such as those of island inhabitants or residents of coastal areas of Alaska who are experiencing loss of livelihood from GCC. The United Nations Human Rights Council recognizes violations of human rights from GHG emissions (OHCHR 2008).

Finally, many public policy makers in the USA continue to stress scientific uncertainty as a reason for not enacting strong mitigation measures to control GHG emissions. Philosophically, how to deal with scientific uncertainty is an ethical problem and is not a value–neutral scientific problem. This is because science is never completely certain of anything, and because uncertainty raises such questions as whether it is ethical to delay action until more information is available or to act with precaution to protect human and environmental health given that some uncertainties exist (Lemons et al. 1997). Scientifically speaking, uncertainties about GCC do not undermine the fundamental conclusions (Anderegg et al. 2009, Gleick et al. 2010). Given the scientific consensus from the IPCC, NAS, AAAS, other nations' national academies of sciences, and other scientists about the factual reality of anthropogenic GCC, waiting for more information is tantamount to doing nothing, and this places those at

risk from GCC now and in the future at even greater risk (AAAS 2009) (see, e.g., Anderegg et al. 2009 for statistics on GCC 'consensus').

### JUSTIFICATION FOR NON-VIOLENT CIVIL DISOBEDIENCE

If over the past 30 yr public policy makers in the USA have not taken meaningful action to mitigate GCC in light of scientific findings and ethical analyses pointing to the urgent need to do so, is there anything that might induce them to act now?

One suggestion is to continue working as usual to develop more scientific information about GCC and better communication of the findings to the public and policy makers. Of course, this has been done continuously over decades while the atmospheric GHG levels have continued to climb substantially. A second suggestion is to continue to focus on, and make better known, the profound ethical dimensions of GCC. Yet, as we have discussed, there is little evidence that public policy makers in the USA have any inclination to meld GCC policy around its ethical dimensions (Gardner 2006, Brown 2010a–c). Given the urgency of mitigating GCC and the apparent absence of resolve in the USA to base policy on the best available scientific information or ethical considerations, we suggest a third alternative: Non-violent civil disobedience.

NVCD has a long history and tradition extending back to Socrates, St. Thomas Aquinas, John Locke, Henry David Thoreau, Mohandas Karamchand Gandhi, Martin Luther King Jr., and John Rawls, to name a few. Socrates posited that should the laws of the state and higher moral laws that transcend the state conflict an individual has an obligation to disobey the laws of the state. St. Thomas Aquinas argued that unjust laws of the state do not bind citizens in their conscience, and one of Locke's theses was that because government derived its authority from the people that one of the purposes of government was protection of the rights of the people and that the people had the right to alter government should it fail to discharge its fundamental duties. In his lecture 'On the Relation of the Individual to the State,' Thoreau proposed 2 principles that were essential to his conception of NVCD (Lenat 2009). First, is that the authority of the government depends on the consent of the governed, and second, that the individual pursuit of justice is superior to unjust laws or policies enacted by government. In the latter case, Thoreau argued that individuals have a duty to disobey an unjust governmental law and accept the consequences of acting in an NVCD manner. Finally, Rawls's (1971) philosophy has contributed greatly to theories of NVCD insofar as advanc-

ing accounts that the breach of law is demanded by self-respect and moral consistency, and that those practicing NVCD address themselves to the majority of the populace or policy and decision makers to show that principles of justice have not been respected. In addition, part of Rawls's justification for NVCD is rooted in the public explanation of reasons for disobedience during NVCD acts to achieve justice.

Many people associate NVCD with Mohandas Karamchand Gandhi in his struggles for Indian independence (Jack 1956, Brown 2008). Central to Gandhi's movement was the concept of 'satyagraha,' which commonly translated means to 'hold firmly to the truth' and also provided that to be binding all state laws and policies had to be truthful and, as well, all untruthful laws and policies had to be resisted even if by NVCD means. Importantly, adhering to satyagraha means that anyone engaged in NVCD actions should be aware that the actions are directed against wrongs and not at wrong-doers, which is to say the NVCD should be rooted in love and not hate for fellow humans. Gandhi contributed greatly to achieving India's independence, as well as providing moral justification for independence.

In the USA, NVCD was widely practiced as part of the anti-slavery movement arising in the mid 1850s, and beginning in 1872 was used by the women's movement to obtain the constitutional and lawful right to register and vote in elections. Some commentators have held that NVCD practiced against slavery and for women's suffrage directly lead to the Thirteenth, Fourteenth, and Fifteenth Amendments to the constitution of the United States, which abolished slavery, guaranteed that former slaves had citizenship, and protected the right to vote for all citizens (Fortas 1968, Weber 1978). Martin Luther King Jr., who used NVCD as a cornerstone of his movement to gain civil rights for African Americans held the view that the practice of NVCD was a duty on every American wishing to rid the nation of laws allowing or promoting segregation between races; he also held the view, based on St. Thomas Aquinas, that an unjust law was a human law was no law at all, and that to serve such a law only degraded the people who served it, and, therefore, such a law had to be disobeyed (King 1997). In the USA, NVCD campaigns were also partially successful in introducing labor laws and unions to eradicate child labor and improve conditions for workers (Mantsios 1998), and helping to end the Vietnam war (Bedau 1969).

Of course, NVCD has also been used in other countries, and we offer only a few examples for illustration. NVCD was used in South Africa to help bring down apartheid, in eastern European countries to gain independence from the former Soviet Union, and in New

Zealand to protest against atomic weapons testing. With respect to environmental issues, NVCD has also been used by other nations to bring about change related, e.g. to forestry practice, as in the case of the rubber tapper, environmentalist, and union leader Chico Mendez in Brazil, who began an NVCD movement to lessen destruction of the Amazon rain forest caused by cattle ranchers and miners. Mendez was assassinated in 1988, but after his death Brazil considered his work and established the Chico Mendes Extractive Reserve, which protected over 97 million hectares of the Amazon forest (Chopra 2005). Women have been particularly active in NVCD in India to protest against the building of large dams that displace local indigenous peoples and have large environmental impacts, and indeed that threaten the core of democratic development (Narula 2008). Having said this, there is no guarantee that NVCD will work either ultimately or expeditiously.

We briefly mentioned the issue of slavery in the USA. We come back to this point. To what extent is the analogy of slavery with inaction in the USA to deal with GCC appropriate? One could argue that by not mitigating GHGs, high-emitting nations are relegating the poorest and vulnerable present and future people who are at greatest risk from GCC to involuntary burdens of contending with GCC they did not cause and cannot avoid. For the poorest of the world, we believe this is arguably akin, although imperfectly so, to a form of slavery, although not one in which a slave is literally owned.

With respect to NVCD and GCC, one case in particular deserves mention. On 8 October 2007, environmental activists climbed the smokestack of the Kingsnorth coal-fired power plant in Kent, England, in order to paint a demand to close such facilities, which release nearly 20 000 tonnes of carbon dioxide into the atmosphere daily. The activists were caught by the police and arraigned on charges of trespass and damage to property (Engler 2009).

However, the activists were acquitted of charges by a 12-person jury after considering the defendants' 'necessity defense', which applies to situations in which a person violates a law to prevent a greater imminent harm from occurring. In criminal law in the USA, 'necessity' may be either a possible justification or exculpation for breaking the law (Christie 1999). When used in NVCD cases, the 'necessity defense' allows guilt to be denied without renouncing socially driven acts. It also offers a means for defendants to discuss political issues in the courtroom while receiving respect from judges and juries. Importantly, the 'necessity defense' allows explanation of the political motivations for actions and the imminence of the harm or urgency of the social problem defendants seek to

address. Further, the 'necessity defense' unveils the severity of the harm and the lack of reasonable alternatives because of unresponsiveness of those in power, which can, thus, spur policy- and decision-makers into action. The successful use of the 'necessity defense' requires 4 conditions to be met: (1) a defendant was faced with a choice of evils and chose the lesser evil; (2) a defendant reasonably anticipated a cause-and-effect relationship between his conduct and the harm avoided; (3) a defendant acted to prevent imminent harm; and (4) there were no legal alternatives to violating the law.

In the Kingsnorth case, world-renowned climate scientist Dr. James Hansen, director of the National Aeronautics and Space Administration's Goddard Institute for Space Studies in the USA, presented evidence that the Kingsnorth plant could cause enough global warming to prompt 'the extinction of 400 species over its lifetime' (Hansen 2009). Entered into the court record was a British government study showing that each ton of released carbon dioxide incurs US\$85 in future GCC costs (Stern 2007), and the activists contended that shutting the plant down for the day had prevented US\$1.6 million in damages—a far greater harm to society than any rendered by their paint on the plant's smokestack—and that their transgressions should therefore be excused.

## CONCLUSIONS

At the beginning of our paper, we acknowledged that in order to justify NVCD 2 conditions need be demonstrated: (1) a great injustice is occurring, and (2) there is strong reason to believe that policies and laws and lawful recourse to changing them will not work. We believe our discussion demonstrates that these conditions have been met with respect to the issue of GCC.

The unwillingness of policy makers in the USA to reduce GHG emissions in some proportion to its historical emissions, given that they have known for over 30 yr about their impacts mocks principles of democracy that all citizens have equal rights and, further, mocks the most basic of secular and religious norms: that no-one has the right to knowingly impose preventable harm on those who have not given their consent to being harmed. Further, delaying action on GCC poses a serious threat to the progress of human development with respect to alleviating poverty and suffering because it is the poor who have least contributed to GCC, but who are the most at risk from its impacts. Obviously, delaying action subjects future generations to serious and irreversible harm. Are the injustices of GCC brought by inaction of the United States nation no less important than those of slavery, civil rights, or

international issues such as gaining independence for India or eliminating apartheid in South Africa?

The practice of NVCD always has been and likely will be controversial, and even more so if scientists are involved. For those who might be uncomfortable acting outside of traditional professional roles, we remind them of actions taken by Einstein and other scientists in developing the 'Russell–Einstein Manifesto' to call the world's attention to the threats and tragic consequences of nuclear war and encouraging NVCD as a potential remedy against the spread and use of nuclear weapons (Rosenkranz 2002), or of physicians such as Helen Caldicott and others who engaged in NVCD to try to help rid the world of nuclear weapons testing and proliferation (Elkins 1992). Further, Shrader-Frechette (2005) argues that those affected by environmental problems must be included in the process of remedying those problems; that all citizens have a duty to engage in activism on behalf of environmental justice; and that in a democracy it is the people, not the government, that are ultimately responsible for fair use of the environment.

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