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C H A P T E R 10

ORGANIZED CLIMATE CHANGE DENIAL

RILEY E. DUNLAP AND AARON M. MCCRIGHT

Even as the consensus over the reality and significance of anthropogenic climate change (ACC) becomes stronger within the scientific community, this global environmental problem is increasingly contested in the political arena and wider society. The spread of debate and contention over ACC from the scientific to socio-political realms has been detrimental to climate science, as reflected in significant declines in public belief in global warming in 2009 and 2010 (Leiserowitz et al. 2010). Contrarian scientists, fossil fuels corporations, conservative think tanks, and various front groups have assaulted mainstream climate science and scientists for over two decades. Their recently intensified denial campaign building on the manufactured 'Climategate' scandal (Fang 2009) and revelations of various relatively minor errors in the 2007 IPCC Fourth Assessment Report appears to have seriously damaged the credibility of climate science (Tollefson 2010). The blows have been struck by a well-funded, highly complex, and relatively coordinated 'denial machine' (Begley 2007).¹ It consists of the above actors as well as a bevy of amateur climate bloggers and self-designated experts, public relations firms, astroturf groups, conservative media and pundits, and conservative politicians.

The motivations of the various cogs of the denial machine vary considerably, from economic (obvious in the case of the fossil fuels industry) to personal (reflected in the celebrity status enjoyed by a few individuals), but the glue that holds most of them together is shared opposition to governmental regulatory efforts to ameliorate climate change, such as restrictions on carbon emissions. While the claims of these actors sometimes differ and evolve over time (there's no warming, it's not caused by humans, it won't be harmful, etc.), the theme of 'no need for regulations' remains constant (McCright and Dunlap 2000; Oreskes and Conway 2010). A staunch commitment to free markets and disdain of governmental regulations reflect the conservative political ideology that is almost universally shared by the climate change denial community.² This suggests how the diverse elements of the denial machine are able to work in a compatible and mutually reinforcing manner even when their efforts are not necessarily coordinated. By attacking climate science and individual scientists in various venues and fashions, the denial machine seeks to undermine the case for climate policy making by removing (in the eyes of the public and policy makers) the scientific basis for such policies—i.e. by challenging the reality and seriousness of climate change.

Viewed through a broader theoretical lens, climate change denial can be seen as part of a more sweeping effort to defend the modern Western social order (Jacques 2006), which has

been built by an industrial capitalism powered by fossil fuels (Clark and York 2005). Since anthropogenic climate change is a major unintended consequence of fossil fuel use, simply acknowledging its reality poses a fundamental critique of the industrial capitalist economic system. European scholars such as Ulrich Beck and Anthony Giddens describe the current era as one of 'reflexive modernization,' in which advanced nations are undergoing critical self-confrontation with the unintended and unanticipated consequences of industrial capitalism—especially low-probability, high-consequence risks that are no longer circumscribed spatially or temporally such as genetic engineering, nuclear energy, and particularly climate change (Beck 1992; Beck et al. 1994; Giddens 1990). Reflexive modernization theorists like Beck and Giddens argue that a heightened level of reflexivity is a necessary precondition for dealing effectively with this new set of human-induced ecological and technological threats.

Crucial drivers of this reflexivity, or societal self-confrontation and examination, are citizen action/social movements (Beck's 'sub-politics') and science, most notably environmental activism and those scientific fields that examine ecological and human health impacts of technologies and economic activities. By directing societal attention to environmental disasters like massive oil spills and creosote problems like climate change that result from economic production, the forces of reflexivity draw the ire of defenders of the capitalist system who often mobilize against them (Beck 1997; Mol 2000). This has been particularly true in the United States, where a combination of corporate and conservative interests have long battled environmentalism (Helvarg 2004) and environmental science (Jacques et al. 2008). We have argued elsewhere that these interests are now mobilizing more broadly in opposition to reflexive modernization writ large and are becoming a source of 'anti-reflexivity' (McCright and Dunlap 2010). Nowhere is this anti-reflexive orientation—particularly the dismissal of scientific evidence and methodology—more apparent than in climate change denial.

This chapter provides an overview of organized climate change denial.³ We begin by describing the growth of conservative-based opposition to environmentalism and environmental science in general, and then explain why climate change became the central focus of this opposition, which quickly evolved into a coordinated and well-funded machine or 'industry' (Monbiot 2007). We also examine denialists' rationale for attacking the scientific underpinnings of climate change policy and the crucial strategy of 'manufacturing uncertainty' they employ (Michaels 2008; Oreskes and Conway 2010). The remainder of the chapter describes the complex and evolving set of actors espousing climate change denial, touching on their tactics when appropriate and tracing their interconnections when possible. Describing the climate change denial machine is difficult, because it is both a complex and ever-evolving labyrinth and because many of its components intentionally mask their efforts and sources of support. We focus primarily on the US, where denial first took root and remains most active, but also include a brief look at its international diffusion. We conclude with observations about the dangers of growing anti-reflexivity in an era of profound ecological threats such as climate change.

1 HISTORY AND STRATEGY OF CLIMATE CHANGE DENIAL

Riding the wave of a conservative resurgence launched in reaction to the progressive gains of the 1960s and early 1970s (Lapham 2004), including an impressive set of environmental agencies and regulations, the Reagan Administration came into office promising to get

government off the back of the private sector. However, the administration's efforts to curtail environmental protection created a backlash that forced it to moderate its anti-environmental rhetoric and actions, albeit not its objectives (Dunlap 1987). This experience taught conservatives (and industry) that it was more efficacious to question the need for environmental regulations by challenging evidence of environmental degradation, rather than the goal of environmental protection. Promoting 'environmental skepticism' which disputes the seriousness of environmental problems (Jaques 2006) has subsequently been heavily employed by conservative think tanks and their corporate allies, especially since the 1990s when the downfall of the Soviet Union and the rise of global environmentalism represented by the 1992 Rio 'Earth Summit' led conservatives to substitute a 'green threat' for the disappearing 'red threat' (Jaques et al. 2008). Perception of the Clinton-Gore Administration as receptive to environmental protection heightened conservatives' fears of increasing national and international environmental regulations.

These fears crystallized around climate change, as creation of the Intergovernmental Panel on Climate Change (IPCC) by the United Nations Environmental Program and the World Meteorological Organization represented an unprecedented international effort to develop a scientific basis for policy making.⁴ This, combined with the encompassing nature and wide-ranging implications of climate change, turned ACC into a *cause célèbre* for conservatives. The mainstream conservative movement, embodied in leading foundations and think tanks, quickly joined forces with the fossil fuels industry (which recognized very early the threat posed by recognition of global warming and the role of carbon emissions) and wider sectors of corporate America to combat the threat posed by climate change—not as an ecological problem but as a problem for the pursuit of unbridled economic growth (Gelspan 1997). In the process this coalition took the promotion of environmental skepticism to a new level, attacking the entire field of climate science as 'junk science' and launching attacks on such pillars of science as the importance of peer-reviewed publications (Jaques et al. 2008). The result has been an evolution of environmental skepticism into a full-blown anti-reflexivity in which the ability and utility of science for documenting the unintended consequences of economic growth are being undermined (McCright and Dunlap 2010).

The conservative movement/fossil fuels complex quickly adopted the strategy of 'manufacturing' uncertainty and doubt (perfected by the tobacco industry) as its preferred strategy for promoting skepticism regarding ACC (Union of Concerned Scientists 2007). Early on contrarian scientists—with considerable support from industry and conservative think tanks—stressed the 'uncertainty' concerning global warming and human contributions to it (Oreskes and Conway 2010). As the threat of international policy making increased, from the 1997 Kyoto Protocol to the 2009 COP in Copenhagen, the growing army of opponents to carbon emissions reduction policies has stepped up their attacks (Greenpeace 2010a; McCright and Dunlap 2003; Pooley 2010). They have also broadened their tactics well beyond manufacturing uncertainty, increasingly criticizing peer-review, refereed journals, governmental grant making, scientific institutions (American Association for the Advancement of Science, US National Academy of Sciences, etc.) and the expertise and ethics of scientists (Nature 2010a, 2010b; Sills 2010). Again, this assault on scientific practices, evidence, and institutions weakens a major mechanism of reflexive modernization. We now turn to an examination of the major actors in the denial machine, which are portrayed in Figure 10.1 to help readers readily identify them and visualize their interconnections.

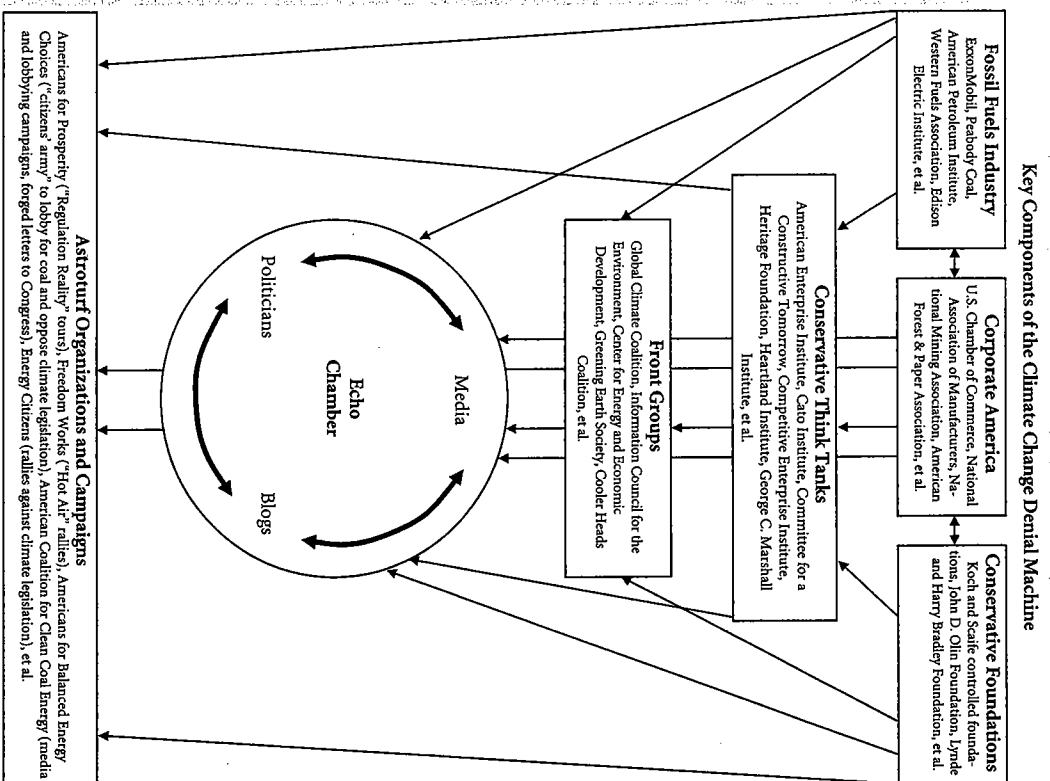


FIGURE 10.1 Key components of the climate change denial machine.

2 MAJOR ACTORS

2.1 Fossil Fuels Industry and Corporate America

Coal and oil corporations recognized the implications of global warming and efforts to combat it for their industries early on, as burning fossil fuels was quickly identified as a major source of greenhouse gas emissions. Not surprisingly, therefore, the fossil fuels industry pioneered the charge against climate science and policy making (Begley 2007; Gelbspan 1997; Goodell 2007). Both individual corporations such as ExxonMobil and Peabody Coal as well as industry associations such as the American Petroleum Institute, Western Fuels Association, and Edison Electric Institute provided funding for individual contrarian scientists, conservative think tanks active in climate change denial, and a host of front groups we discuss below. ExxonMobil² has long been the leading contributor to think tanks and front groups involved in climate change denial, although it cut back somewhat in recent years in response to negative publicity and severe criticism (Mooney 2005; Union of Concerned Scientists 2007).

The efforts of fossil fuels corporations and industry associations to combat climate science and policy making were quickly supplemented by those of numerous energy companies (e.g. Southern Company), other resource-based corporations in the steel, forestry, and mining industries as well as their associations (e.g. National Mining Association), numerous manufacturing companies such as automobile corporations (e.g. Chrysler, Ford, and General Motors), and large national associations such as the National Association of Manufacturers and the US Chamber of Commerce (Gelbspan 1997, 2004; Hoggan with Littlemore 2009; Layzer 2007). Thus, in the early 1990s it appeared that much of corporate America was lining up against climate science and policy making, with the IPCC being the crucial target.

The growing evidence of anthropogenic climate change reported in the IPCC's Second Assessment Report in 1995 and the adoption of the Kyoto Protocol at the 1997 Kyoto Conference led to some fracturing within the business community, and several corporations including BP announced that they no longer questioned the reality of ACC and were halting efforts to undermine climate science. Several oil companies and other major corporations joined with leading environmental organizations to form the US Climate Action Partnership, and it appeared that a major segment of corporate America was ready to accept the reality of climate change and the inevitability of carbon reduction policies (Kolk and Levy 2001; Layzer 2007). However, with the inauguration of the George W. Bush Administration, which institutionalized climate change denial in the federal government (McCright and Dunlap 2010), the fossil fuels industry in particular had little to fear.

The election of Barack Obama and a Democratic majority in both houses of Congress has made the reality of legislation to limit carbon emissions salient, and the result has been enormous corporate lobbying to oppose or weaken the various measures introduced in the House and Senate as well as international efforts such as COP-15 in Copenhagen (Goodell 2010; Pooley 2010). This lobbying has been accompanied by escalating attacks on climate science and scientists as well as the IPCC, with considerable support from corporations such as ExxonMobil and associations such as the US Chamber of Commerce (Greenepeace 2010a; Mashey 2010). Thus, while there are divisions within corporate America over policy proposals such as 'cap-and-trade,' it appears that significant portions of it remain active in climate change denial.

2.2 Conservative Philanthropists, Foundations, and Think Tanks

The earlier-mentioned conservative resurgence began when wealthy conservative philanthropists such as Joseph Coors began to fund, typically through their family foundations, the establishment of conservative think tanks (CTTs) such as the Heritage Foundation to wage a 'war of ideas' against the progressive gains of the 1960s (Himmelfstein 1990; Lapham 2004). By the 1990s conservative foundations were funding a 'conservative labyrinth' designed to implant conservative values and goals in academic, media, governmental, legal, and religious institutions (Covington 1997: 3). Particularly important is the network of well-heeled and influential think tanks that churn out an endless flow of policy proposals credited with moving the US policy agenda significantly to the right (Krehely et al. 2004) and—since the 1990s—influencing climate policy (McCright and Dunlap 2003, 2010).

Major funders include foundations controlled by Richard Mellon Scaife and David and Charles Koch (both drawing upon family fortunes stemming in part from oil interests). Besides giving generously to a vast range of CTTs and conservative causes, they are responsible for establishing the Cato Institute (C. Koch), Citizens for a Sound Economy, now Americans for Prosperity (D. Koch) and Committee for a Constructive Tomorrow or CFACT (R. M. Scaife)—three particularly crucial elements of the denial machine. In fact, in recent years the Scaife and Koch families of funds may have exceeded ExxonMobil in terms of funding climate change denial actors and activities (Grandia 2009; Greenepeace 2010b; Mashey 2010).

CTTs represent 'social movement organizations' that typically serve as spokespersons and facilitators for conservative causes, and share a universal commitment to free enterprise, limited government, and the promotion of unfettered economic growth (Jaques et al. 2008; McCright and Dunlap 2000). While corporations like ExxonMobil have joined conservative foundations in providing generous funding for CTTs, many of the latter appear to oppose climate science and policy making for purely ideological reasons (McCright and Dunlap 2010: 109–11), and some of their leaders have criticized corporations for disengaging from climate change denial (Layzer 2007: 112). CTTs involved in climate change denial range from large, multi-issue ones (e.g. the Heritage Foundation and American Enterprise Institute), to medium ones with a strong interest in environmental/climate issues (e.g. George Marshall Institute and the Heartland Institute), to small shops currently dedicated to climate change denial (e.g. Fred Singer's Science and Environmental Policy Project and Republican operative Robert Ferguson's Science and Public Policy Institute) (Mashey 2010; McCright and Dunlap 2003).

CTTs are a fundamental and highly effective component of the denial machine, providing institutional bases for leading contrarians such as Patrick Michaels (a Cato Fellow), hosting anti-IPCC conferences (Heartland Institute), sponsoring 'educational events' for politicians (National Center for Policy Analysis), assisting the George W. Bush Administration's efforts to impede climate policy (Competitive Enterprise Institute), and producing and circulating a vast range of anti-climate change material via various forms of media (reports, press releases, press conferences, videos, radio and television interviews), among other activities (see e.g. Hoggan with Littlemore 2009; Lausen 2008; McCright and Dunlap 2000, 2003; Oreskes and Conway 2010).

More generally, CTTs help shield the efforts of corporations and philanthropists to combat climate change policy, as for example ExxonMobil, the Koch brothers, and R. M. Scaife support contrarian scientists and denial campaigns effectively but 'discreetly' by funneling millions into think tanks that sponsor the contrarians and organize the campaigns (Greenpeace 2010b; Mashey 2010; Union of Concerned Scientists 2007).⁶ Furthermore, CTTs have been successful in marketing themselves as objective sources of information, basically an alternate academia, and thus they have more credibility with much of the public, many media outlets, and some policy makers than do corporations (Jacques et al. 2008). They enhance their credibility by sponsoring contrarian scientists who are treated as 'experts' (regardless of the relevance or quality of their research records) by the media and public, and whose ideas are amplified considerably by CTTs' media access (Hoggan with Littlemore 2009; McCright and Dunlap 2000, 2003; Mooney 2005; Oreskes and Conway 2010). Finally, CTTs work carefully with corporate America to set up a maze of front groups and astroturf campaigns to combat climate science and policy making.

2.3 Front Groups

Most corporations prefer to shield their anti-environmental activities from public scrutiny, and creating front groups that act on their behalf is one way to do this. The Global Climate Coalition (GCC), formed in 1989 in reaction to establishment of the IPCC, was an early front group designed to combat evidence of climate change and climate policy making. Sponsored by oil companies (ExxonMobil, Texaco, and BP), automobile manufacturers (Chrysler, Ford, and GM) and industrial associations such as the American Petroleum Institute (API), US Chamber of Commerce, and the National Association of Manufacturers, it was originally led by William O'Keefe of API. The GCC was very active in opposing US ratification of the Kyoto Protocol, running television ads against it, and played a critical role in launching a vicious (and unfounded) attack on climate scientist Benjamin Santer for allegedly altering a chapter in the 1995 IPCC report in an effort to discredit the entire report and the IPCC (Gelbspan 2004: 78–80; Oreskes and Conway 2010: 207–13). The accumulating scientific evidence in support of climate change led BP, Shell, and other companies to leave the GCC in the late 1990s, presumably because they no longer wanted to be associated with its aggressive and highly visible opposition to climate science and policy. The GCC disbanded in 2002, confident that its goals were shared by the George W. Bush Administration (Gelbspan 2004; Greenpeace 2010a; Pooley 2010).

The Information Council on the Environment (ICE) was created in 1991 by coal and utility interests, including the National Coal Association, Western Fuels Association, and Edison Electric Institute, and launched a campaign to 'reposition global warming as a theory (not fact)' (Pooley 2010: 41). Assisted by contrarian scientists such as Patrick Michaels, Robert Balling, and Sherwood Idso, ICE ran a media campaign designed to denigrate the notion of global warming and campaigned against US agreement to mandatory greenhouse gas emissions at the 1992 Earth Summit in Rio. ICE folded up when its strategic plans were leaked to the press, but the Western Fuels Association subsequently established the Greening Earth Society in 1998 to promote the idea that CO₂ was good for the environment and thus global warming was to be welcomed. Besides an advertising campaign, it sponsored a quarterly *World Climate Review* edited by contrarian Patrick Michaels, which has been

replaced by the *World Climate Report* blog also edited by Michaels but with unknown sources of support (Gelbspan 2004; Hoggan with Littlemore 2009; Pooley 2010).⁷

The Cooler Heads Coalition (CHC) is the final major US front group for climate change denial, and unlike its predecessors its membership consists primarily of CTTs including CFACT, the Marshall Institute, the Heartland Institute, and the Competitive Enterprise Institute (CEI)—who, of course, receive significant corporate and conservative foundation funding. It emerged in 1997 as a subgroup of the National Consumer Coalition, a project of Consumer Alert—an industry-funded entity founded in 1977 to oppose consumer protection regulations such as mandatory seatbelts. It is tied closely to CEI, which hosts its website <www.globalwarming.org>, where CHC is described as 'an informal and ad-hoc group focused on dispelling the myths of global warming.' CHC/CEI leaders Myron Ebell and Christopher Horner are central figures in the denial machine, and use both CHC and CEI to distribute a flood of denial material, host press conferences and Congressional briefings, and amplify the voices of contrarian scientists (Hoggan with Littlemore 2009; Mooney 2005; Pooley 2010). They have played a crucial role in promoting 'Climategate' and waging war on the IPCC, and often launch malicious attacks on individual climate scientists.

2.4 Contrarian Scientists

From the earliest stages of climate change denial the fossil fuels industry and conservative think tanks, and their front groups like GCC, recognized the importance of employing credentialed scientists to manufacture uncertainty concerning climate change (building on the tobacco industry's success with this strategy—Oreskes and Conway 2010), and they readily found scientists who were eager to assist (Gelbspan 1997; McCright 2007). Some had expertise relevant to climate science (e.g. Patrick Michaels and Fred Singer), but many did not. For instance, the George C. Marshall Institute was established by a trio of prominent physicists who, despite having no expertise in climate science per se, quickly made climate change denial a central mission of the Institute and created a magnet that eventually attracted several contrarians, such as Roy Spencer, who do have climate science expertise (Lahsen 2008; Oreskes and Conway 2010).

It is impossible to discern whether contrarian scientists sought affiliations with CTTs (and front groups) or were solicited by them, but at this point most of the highly visible contrarians have some form of affiliation with CTTs, such as: having formal appointments like Patrick Michaels at the Cato Institute; serving on boards, as scientific advisors, or as affiliated experts; giving talks at the CTTs and participating in CTT press conferences, political briefings, and public lectures; and especially publishing material for CTTs (McCright and Dunlap 2000, 2003).⁸ Being affiliated with CTTs enables contrarians to avoid the 'stigma' of being directly linked to fossil fuels corporations (see e.g. Gelbspan 1997: 41), while still benefiting from the industry's largesse to many CTTs (Mashey 2010; Union of Concerned Scientists 2007).

The strong bond between contrarian scientists and CTTs reflects the staunch conservative aversion to governmental regulations and commitment to free markets shared by nearly all leading contrarian scientists (Oreskes and Conway 2010). It may also reflect contrarians' realization that their marginal standing within mainstream climate science (Anderegg et al. 2010) can be offset by moving into the public and policy spheres where

their messages are greatly amplified by their very influential CTT sponsors and often welcomed by journalists eager to provide 'balanced' reporting (Boykoff and Boykoff 2004; McCright 2007; McCright and Dunlap 2003).

As climate change denial has matured, the number of 'scientists' who promote it has grown both in size and diversity (as well as spread internationally). CTTs and fossil-fuels front groups, in particular, now sponsor a multitude of 'experts' who often have no discernible credibility as climate scientists. An increasing number of their spokespersons appear to lack any scientific training or expertise, such as the ubiquitous Christopher Walter Monckton (aka Lord Monckton) who is affiliated with the Science and Public Policy Institute in the US. However, manufacturing uncertainty is most successful when it is done by individuals that the media and public will accept as experts, and CTTs continue to find and support a number of credentialled scientists critical of climate science, giving them unprecedented visibility regardless of how poorly they typically non-peer-reviewed work fares among the scientific community (see e.g. Enting 2010 on one example). Indeed, Monbiot's (2007) characterization of the 'denial industry' reflects the fact that climate change denial now offers the possibility of a rewarding 'career' for contrarian scientists and others eager to work with CTTs, front groups, and conservative media.

2.5 Conservative Media

The influence of the conservative media or 'echo chamber' has been well documented and has been credited with helping move the US rightward in recent decades (e.g. Jamieson and Cappella 2008). For right-wing talk radio commentators, most notably Rush Limbaugh, attacks on 'environmental wackos' is standard fare, and climate change (and Al Gore) a favorite target (Nature 2010b; Wolcott 2007). Perhaps exceeding the impact of the right-wing dominance of talk radio is Rupert Murdoch's Fox News, as both its reporters and most popular commentators (Glenn Beck, Bill O'Reilly, and Sean Hannity) consistently denigrate climate change by, for example, highlighting 'Climategate' and critiques of the IPCC and providing frequent opportunities for contrarian scientists and CTT representatives to disparage climate change, the IPCC, and climate scientists.

The conservative media assault on climate science also occurs in print media, especially conservative newspapers such as the Murdoch-owned *Wall Street Journal* (whose editorial pages have become a regular forum for climate change denial, including columns by contrarian scientists) and the *New York Post* and the Reverend Moon's *Washington Times*. Climate change denial is also a regular feature in leading conservative magazines such as *The Weekly Standard*, *National Review*, and *The American Spectator* as well as online publications such as *The American Thinker*. Add in prominent conservative columnists like George Will and Charles Krauthammer (infamous for their erroneous statements about climate change—Dickinson 2010) who reach vast newspaper audiences via national syndication, and the result is a barrage of assaults on climate science (and, increasingly, climate scientists) that not only inundates committed conservative audiences but also reaches a large segment of the general public. Conservative media consistently present contrarian scientists and CTT representatives as 'objective' experts, in stark contrast to their portrayal of scientists working with the IPCC as self-interested and biased, further magnifying the influence of the former relative to the latter.

In recent years these conservative media outlets have been supplemented (and to some degree supplanted) by the conservative blogosphere, and numerous blogs now constitute a vital element of the denial machine. While a few are hosted by contrarian scientists (most notably Roy Spencer), the most popular North American blogs are run by a retired TV meteorologist (wattsupwiththat.com), a retired mining executive and dedicated critic of the 'hockey stick' model of historical climate trends (climateaudit.org), and a self-styled 'warrior' in the climate wars (climatedepot.com). The latter individual, Marc Morano, exemplifies the deep roots of climate change denial in conservative circles. Before setting up Climate Depot, which is modeled on the popular right-wing 'Drudge Report' and supported by R. M. Scaife's CFACT, Morano—who has a BA degree in political science—worked for Rush Limbaugh, right-wing Cybercast News Service (where he played a key role in the 'swift-boat' campaign against 2004 Democratic Presidential candidate John Kerry), and then for Republican Senator James Inhofe (Dickinson 2010; Harkinson 2009b).

Having this powerful, pervasive, and multifaceted media apparatus at its service provides the denial machine with a highly effective means of spreading its message, as reflected quite recently by its success in turning a tiny and highly unrepresentative sample of thirteen years worth of personal e-mails hacked from the Climate Research Unit at the University of East Anglia into a major scandal that has generated a decline in public belief in climate change and trust in climate scientists (see Leiserowitz et al. 2010 on public opinion and Greenpeace 2010 on the role of Koch-funded actors in publicizing Climategate)—despite the fact that several investigations have concluded that the e-mails neither demonstrate unethical behavior nor undermine climate science (Young 2010).

2.6 Conservative Politicians

Most conservative politicians have been highly skeptical of climate change from the outset, as accepting its reality challenges their faith in inevitable progress created by the free market and raises the specter of increased governmental regulations. Republicans in Congress have been eager hosts of contrarian scientists, CTT spokespersons, and a raft of other non-credentialled deniers from novelist Michael Crichton (whose *State of Fear* portrayed climate change as a contrived plot) to, most recently, Lord Monckton. They have also called hearings to rebut and in some instances harass mainstream climate scientists. The most notable include the 1994–5 House of Representatives hearings called by California Republican Dana Rohrabacher devised to portray evidence for dioxin, ozone depletion, and global warming as 'junk science' (McCright and Dunlap 2003: 361), and a 2005 House hearing held by Texas Republican Joe Barton designed to disprove the hockey stick model of Mann, Bradley, and Hughes and thereby discredit the IPCC (Mashey 2010).⁹

The single most prominent Republican when it comes to climate change denial is Oklahoma Senator James Inhofe, famous for claiming in a Senate speech that global warming is 'the greatest hoax ever perpetrated on the American people.' When Inhofe was Chair of the Committee on Environment and Public Works he turned it into a bastion of climate change denial via its website run by Marc Morano and his frequent invitations to contrarian scientists to testify at Committee hearings (McCright and Dunlap 2010). More recently he has called for a criminal investigation of leading climate scientists (Nature 2010a). The ease with which Inhofe and his Republican colleagues gain access to

conservative media like Fox News provides yet another means for amplifying the messages of contrarian scientists in the conservative echo chamber.

The inauguration of George W. Bush institutionalized climate change denial throughout the most powerful branch of the US government, allowing representatives of the fossil fuels industry and CTTs to undermine climate science and policy from within the administration. For eight years the Bush administration used a variety of techniques, ranging from emphasizing the ‘uncertainty’ of climate science and calling for ‘sound science’ to suppressing the work of governmental scientists, to justify inaction on climate policy (McCright and Dunlap 2010). By the time it was replaced by the Obama Administration, most Republican politicians had followed its lead in questioning the seriousness of climate change. The predictable upsurge in denial activism and lobbying against climate policy that has occurred following the change in administrations, especially the embrace of denialism among the more extreme elements of the Right (e.g. Tea Party supporters), has turned climate change denial into a litmus test for Republicans (Johnson 2010). As a consequence, even one-time sponsors of bipartisan climate legislation like Republican Senators John McCain and Lindsey Graham have had to back-pedal to appease Republican interest groups and supporters.

2.7 Astroturf Groups and Campaigns

The defining feature of astroturf groups is that they are generated by an industry, think tank, or front group, but disguised to appear as a spontaneous, popular ‘grassroots’ effort. They are created to lobby or campaign on behalf of their sponsors, who hope to remain hidden from view (Beder 1998). Front groups and PR firms typically play key roles, and are often inseparable from the astroturf group/campaign itself, the key distinction being that the former tend to last longer while astroturf efforts come and go in response to specific events and policies. The use of astroturf groups has flourished in the Obama era, being used to oppose healthcare reform and other progressive goals of the President and Democratic Congress. Especially important are the roles played by the Koch-funded Americans for Prosperity and FreedomWorks front groups in generating a significant portion of the ‘Tea Party’ and encouraging it to focus on climate change (Dickinson 2010; Goodell 2010; Poolley 2010).

For example, Americans for Prosperity sponsored a multi-state ‘Hot Air Tour’ in 2008 with the slogan, ‘Global Warming Alarmism: Lost Jobs, Higher Taxes, Less Freedom,’ while FreedomWorks played a major role in promoting the 2009 rallies against climate legislation in about twenty states that were ‘officially’ sponsored by ‘Energy Citizens’—an astroturf group created by the American Petroleum Institute (API). While its website proclaims that Energy Citizens ‘is a movement made up of tens of thousands of Americans,’ API President Jack Gerard’s memo to API member corporations urged them to provide ‘strong support for employee participation at the rallies’ and asked that his (inevitably leaked) memo be treated as ‘sensitive information’ because ‘we don’t want critics to know our game plan’ (Dickinson 2010; Goodell 2010).¹⁰

More generally, the success of Americans for Prosperity and Freedom Works along with CFACT and other conservative organizations and spokespersons (e.g. Glenn Beck) in melding climate change denial into the faux populist rage of the Tea Partiers has put climate science squarely in the sights of right-wing extremists, which has no doubt contributed to the escalating attacks against climate scientists (Hickman 2010). As Levy (2010: 4) states, ‘Tea Party activism has elevated climate change to the status of a litmus test

of cultural politics in the U.S., up there with abortion, guns, god, gays, immigration and taxes.’ This raises the politicization of climate change/science (Dunlap and McCright 2008) to a new level and into a treacherous domain.¹¹ While the entire denial machine (but particularly the Kochs and their operatives) has contributed to this ‘accomplishment,’ it epitomizes successful astroturfing.

2.8 International Diffusion of Climate Change Denial

We have concentrated on the US because it is where climate change denial was born and continues to be most active, but denialism has spread to other nations—often with some degree of assistance from American actors. It tends to be strongest in nations that currently have or have recently had conservative governments and in which CTTs are firmly planted, notably the UK, Canada, and Australia, reinforcing our claim that free-market conservatism (with the strong support of the fossil fuels industry in the latter two countries) is the unifying force behind climate change denial. The UK’s International Policy Network and its affiliate the Institute of Economic Affairs, Canada’s Fraser Institute, and Australia’s Institute of Public Affairs, for example, have provided early and continuing support for contrarian scientists and others active in climate change denial in their respective nations (Hamilton 2010; Hoggan with Littlemore 2009; Monbiot 2007).

In addition, one finds a similar emphasis on the creation of a web of front groups to act on behalf of industry and think tanks, perhaps best exemplified by Australia. There the Institute of Public Affairs (a free-market think tank) created in 2005 the Australian Environment Foundation (to mimic the pro-environmental Australian Conservation Foundation), which in turn set up the Australian Climate Science Coalition to promote climate change denial. These organizations are complemented by the Lavosier Group, funded heavily by mining interests, which focuses specifically on climate change. Most leading Australian contrarian scientists such as Robert Carter, William Kininmonth, Garth Paltridge, and Ian Plimer are connected in some fashion to these organizations, which are also active in bringing American contrarians to Australia. In fact, the US denial machine was very active in helping establish its counterpart in Australia. Contrarians such as Fred Singer and Patrick Michaels visited there early on, and in the mid-1990s the Competitive Enterprise Institute recognized that Australia’s Howard Government could become a valuable ally in opposing the Kyoto Protocol and began to coordinate efforts with the Institute for Public Affairs and mining interests (Hamilton 2007; Climate Action Network Australia 2010).

Climate change denial is now spreading far beyond the US, UK, Canada, and Australia, and once again this is directly due to the efforts of crucial CTTs to diffuse their goals and influence internationally. In particular, the Atlas Economic Research Foundation (established by Sir Anthony Fisher of the UK, but based in the US) serves as an ‘incubator’ for free-market think tanks around the world, and is credited with helping plant them in several dozen nations where they are frequently active in climate change denial. Canada’s Fraser Institute (which receives funding from Koch and Scaife foundations) has a similar international reach with its Economic Freedom Network having affiliates in scores of nations, many helping spread climate change denial. And finally, in 2007 Fisher’s UK-based International Policy Network created the ‘Civil Society Coalition on Climate Change’ which consists of ‘independent civil society organizations’ in forty nations committed to denying the reality of climate change (Harkinson 2009a).

As Harkinson (2009a: 1) puts it, 'With US-backed overseas think tanks parroting denier talking points in dozens of languages, the echo chamber is already up and running.' In sum, we are witnessing the globalization of organized climate change denial and this does not bode well for the future of climate science and especially for effective international action and policy making to deal with the reality of climate change.

3 CONCLUSION

Many factors influence both national and international policy-making on environmental (and other) issues (Dryzek et al. 2002). We are definitely not suggesting that organized climate change denial has been the sole factor in undermining efforts to develop domestic climate policies in nations such as the US, Australia, and Canada where it has been especially prominent, nor at the international level where diverging national interests are obviously a major obstacle (Parks and Roberts 2010). Nonetheless, it is reasonable to conclude that climate change denial campaigns in the US have played a crucial role in blocking domestic legislation and contributing to the US becoming an impediment to international policy making (McCright and Dunlap 2003; Pooley 2010). The financial and organizational resources and political and public relations expertise available to and embodied in the major components of this machine, and the various actors' ability to coordinate efforts and reinforce one another's impacts, have certainly had a profound effect on the way in which climate change is perceived, discussed, and increasingly debated—particularly within the US.

We have argued that because of the perceived threat posed by climate change to their interests, actors in the denial machine have strived to undermine scientific evidence documenting its reality and seriousness. Over the past two decades they have engaged in an escalating assault on climate science and scientists, and in recent years on core scientific practices, institutions, and knowledge. Their success in these efforts not only threatens our capacity to understand and monitor human-induced ecological disruptions from the local to global levels (Hanson 2010), but it also weakens an essential component of societal reflexivity when the need for the latter is greater than ever.

NOTES

1. The actions of those who consistently seek to deny the seriousness of climate change make the terms 'denial' and 'denier' more accurate than 'skepticism' and 'skeptical' (Diehlein and McKee 2009), particularly since all scientists tend to be skeptics (Schneider 2010: 205). We will, however, refer to scientists involved in the denial machine as 'contrarians.' For an alternative but complementary use of 'denial' see Kari Norgaard's chapter in this volume.
2. This may be somewhat less true of contrarian scientists, but the few examples of self-professed liberals active in climate change denial such as Freeman Dyson are clearly exceptions to the rule (Larson and Keating 2010).

3. For overviews that provide clear time-lines for the historical evolution of climate change denial see Greenpeace (2010a) and Mashey (2010).
4. The explicit merger of science and policy making within the IPCC has contributed to climate science *and* climate scientists, along with the IPCC, becoming targets for those fearful that strong evidence of climate change will lead to national and international regulations on carbon emissions that create restrictions on corporate behavior, free markets, and economic growth (Corfee-Morlot et al. 2007).
5. Exxon merged with Mobil to become ExxonMobil in 1999, and other oil companies have merged and/or changed their names (e.g. British Petroleum became BP) in the past two decades. To avoid confusion, we will employ the current names even when describing activities undertaken by earlier versions of the contemporary corporations.
6. Only recently have the links between the Koch brothers and right-wing activities, including the Tea Party and climate change denial, been publicized (Greenpeace 2010b; Mayer 2010).
7. Another important coal-based front group, the Center for Energy and Economic Development, and its offshoots Americans for Balanced Energy Choices and American Coalition for Clean Coal Energy, have also supported climate change denial; however, their primary focus has been on lobbying against climate legislation by generating phony citizens' or astroturf (see below) campaigns (see Hoggan with Littlemore 2009 and especially Pooley 2010).
8. While the activities of a number of contrarian scientists are discussed in Begley (2007), Geltsman (1997, 2004), Mooney (2005), and Oreskes and Conway (2010), individuals seeking detailed information on the CTT affiliations of leading contrarians should consult Greenpeace's website detailing connections between ExxonMobil and CTTs and contrarians (<<http://www.exxonsecrets.org>>), the data base created by James Hoggan and colleagues at their Desmogblog website (<<http://www.desmogblog.com/global-warming-denier-database>>), or John Mashey's highly detailed report (Mashey 2010).
9. Mashey (2010) provides evidence suggesting that the Competitive Enterprise Institute and the Marshall Institute played a role in stimulating Barton's hearing by promoting the efforts of Canadians Stephen McIntyre and Ross McKittrick to critique the work of Michael Mann and his colleagues.
10. The leaked memo is trivial compared to an earlier API embarrassment a 1998 'Global Climate Science Communication Action Plan' developed at a meeting of leading figures in the denial machine hosted by API which was made public by Greenpeace. The document laid out a detailed astroturfing strategy (involving contrarian scientists) and suggested that 'Victory will be achieved when average citizens understand (recognize) uncertainties in climate science . . . , media [does the same], and those promoting the Kyoto treaty on the basis of extant science appear to be out of touch with reality' (Greenpeace 2010a: 9; Hoggan with Littlemore 2009: 42–5).
11. Readers are encouraged to read the 'comments' on various denial websites particularly in response to posts about climate scientists to get a sense of the vitriol aimed at the latter.

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