

## Mitigating Climate Change

*Karen Ehrhardt-Martinez, Thomas K. Rudel,  
Kari Marie Norgaard, and Jeffrey Broadbent*

### INTRODUCTION

The anticipated changes in the Earth's global climate and their impact on people and ecosystems can potentially be minimized through two courses of action: mitigation and adaptation. Mitigation efforts are concerned with reducing the emissions of greenhouse gases (GHGs) while adaptation efforts are focused on enhancing our ability to live with the changes that will occur. This chapter focuses on mitigation efforts and how sociological insights can help us to better understand mitigation strategies and processes.

While a variety of mitigation efforts are already under way in many countries and cities around the globe, the Intergovernmental Panel on Climate Change (IPCC)'s Fourth Assessment Reports concluded that current efforts are far from sufficient to forestall the continued growth in atmospheric concentrations of GHGs and the continued warming of the planet (IPCC Summary Report 2007c). The IPCC's Fifth Assessment Report reiterates this observation (IPCC 2014). Achieving meaningful levels of mitigation is difficult because most developed countries (and the modern global economy) rely heavily on fossil fuel energy sources. As such, GHG emissions are firmly rooted in the current organization of economic and social systems, and meaningful mitigation efforts are likely to require fundamental changes in these systems. Given the limited scope of current climate change mitigation policies and sustainable development practices, the IPCC estimates that global GHG emissions will increase by 25 to 90 percent between 2000 and 2030, leading to an increase in average global temperatures of 1.8 to 4 degrees Celsius by 2090 (compared to averages during 1980–1999).<sup>1</sup>

The IPCC mitigation report (2007a) forecasts an increase in global GHG emissions of 8 to 36 Gt of CO<sub>2</sub> equivalent by 2030. The same report estimates the global mitigation opportunity at roughly 5 to 31 Gt of CO<sub>2</sub> equivalent by 2030. In other words, the IPCC studies suggest mitigation efforts could offset most of the projected growth in emissions or even reduce emissions below current levels, but only if "adequate policies are in place and barriers removed" (IPCC 2007b:58).

These IPCC estimates of mitigation opportunities focus on the potential impact of new technologies, failing to adequately account for the potential influence of nontechnological factors such as lifestyle changes or the effects of social forces and shifts in social structures. Given the well-documented ability of human societies to organize and reorganize themselves in response to both environmental conditions and economic and political forces, current IPCC estimates are incomplete and likely to be conservative in their conclusions. IPCC estimates of mitigation potential indicate that the largest global mitigation opportunities are associated with enhanced energy efficiencies in buildings (both residential and commercial), industry, energy supply, and agricultural end uses. Additional, albeit less substantial, mitigation potential is attributed to technological improvements in forestry, transportation, and waste.

While the IPCC reports have a global focus, a series of reports by the National Academy of Sciences (NAS) known as *America's Climate Choices* (ACC) considers climate change and mitigation opportunities for the United States in particular (NAS 2010). Like the IPCC reports, the ACC studies are predominantly concerned with technological approaches to climate change mitigation. However, unlike the IPCC reports, the ACC discussions of mitigation opportunities focus most heavily on the role of energy systems and technologies. For example, the ACC report on "Limiting the Magnitude of Climate Change" notes that in the United States "CO<sub>2</sub> emissions from fossil fuel combustion in the energy system accounts for approximately 82% of total U.S. GHG emissions" (NAS 2010:38). The determinants of fossil fuel consumption are identified as (1) the overall demand for goods and services that require energy to produce or deliver, (2) the efficiency with which the energy is used to provide goods and services, and (3) the extent to which energy comes from fossil fuels. As such, the predominant focus of the mitigation opportunities discussed in the ACC reports is on energy efficiency and renewable energy technologies. Similar to the IPCC global assessment, the ACC studies find that the building sector offers large opportunities for mitigating GHG emissions through enhancements in energy efficiency. Additional mitigation opportunities are associated with industry, transport, the carbon intensity of energy, and renewable and nuclear power.

Compared to the IPCC report, the ACC report on mitigation gives somewhat more weight to social and cultural factors. However, its discussion is limited to two areas: (1) efforts to understand the variation in consumer demand for energy-intensive and energy-efficient goods and services (and to potentially influence consumer preferences and choices) and (2) possible equity implications of mitigation strategies (especially for disadvantaged populations). In understanding consumer demand, the ACC report recognizes that "Consumer choices among market offerings in different societies shape demand for everything from living space and electrical appliances to dietary choices" (NAS 2010:39) and that "long-term sustained changes will be driven by the interactions of technology markets, the policy environment and consumer choices" (NAS 2010:41). Despite the range of insights that a sociological perspective might offer, this analysis reduces the social aspect mainly to market decisions. Among the report's conclusions, though, the authors note that "the adoption of many energy efficient technologies and practices requires significant changes in human behavior, lifestyle, and consumer spending practices" (NAS 2010:66). The report also stresses that more social science research is needed to understand how social and behavioral dynamics interact with technology.

An overarching commonality between the IPCC and ACC assessments is their common characterization of climate change and mitigation strategies as *technological* hurdles, generally ignoring the possibilities of *social and cultural change and neglecting to acknowledge* the limited effectiveness of ongoing, technology-focused strategies to date. For example, within the IPCC reports' discussion of mitigation limits, the human dimensions of climate change are mostly relegated to the chapter on *Framing Issues* in which the authors explore the linkages between climate change and sustainable development.

Notably, however, neither the IPCC nor the ACC reports consider the importance of the myriad other aspects of social organization and culture: governance, power structures, political activism, labor policies, the countless drivers of consumption, the force of social routines and expectations, systems of global production, cultural values, and a range of other sociological factors that shape and constrain mitigation opportunities apart from technologically focused solutions.

In contrast, in the present chapter we suggest that there are important synergies and tradeoffs among climate change, the capacity to mitigate climate change, and particular configurations of social organization and cultural practices. Social organization and culture produce variation in values among stakeholders and decision makers, variation in the perception of risks and uncertainties, differences in costs and benefits, and variation

in the capacity of decision makers to implement mitigation policies (Beck 1992; Fisher 2006; Roberts and Parks 2007).

#### UNDERSTANDING CLIMATE CHANGE MITIGATION FROM A SOCIOLOGICAL PERSPECTIVE

From a sociological standpoint our present output of GHG emissions stems from the current organization of social, political, and economic systems and the social and cultural practices that reinforce those systems. Therefore, efforts to mitigate GHG emissions will require a better understanding of the working of these systems and the various components that make them up (organizations, cultural practices, economic policies and regulations, technologies, individuals, and networks) as well as an understanding of the relationships among these components.

A particular strength of the sociological perspective is its foundation in approaches that recognize the nested nature of social systems from individuals and households to organizations, cities, states, and nations to global systems. The nested nature of social systems requires the acknowledgment that nations comprise numerous subunits, including states (or provinces), organizations, communities, households, and individuals. Similar to the work of ecologists, the work of social scientists conceptualizes "the systems they study as hierarchical but with complex embeddings" (Dietz, Rosa, and York 2010:84). As such, a sociological perspective can help shed light on the interplay between actions at different levels, from individuals and households at the micro level, to organizations and cities at the meso level, to national and international governmental organizations at the macro level. By considering the nested nature of social systems, such assessments can uncover the effects of agency, culture, social structure, institutions, power, inequality, and spatial characteristics and the roles that they play in shaping and constraining our efforts to reduce climate emissions. These insights reveal that while the actions of individuals and households can have a significant impact on reducing GHG emissions and may even induce policy change, in isolation such actions are unlikely to be sufficient for meeting the challenges of reducing emissions to the levels needed to avert major shifts in the Earth's climate. The enormity of the mitigation challenge requires a "both/and" solution that engages actors at all levels to change both individual and household practices as well as implement organizational, municipal, state, national, and international policies. How can we instigate, support, encourage, and catalyze the changes that are needed? Sociological insights can help to answer this question, but first we need to break free

from traditional policy approaches that focus exclusively on economic factors and technological fixes.

While this chapter is far from comprehensive in its discussion of the range of sociological approaches to climate change mitigation, it does highlight some of the sociocultural factors that influence the effectiveness of mitigation efforts while also calling into question many of the assumptions and biases that underlie technology-centric approaches (like those used by the IPCC and ACC assessments). As a discipline, sociology offers a wealth of resources, including a range of theories and methods that acknowledge and address the influence of agency, culture, power, diversity, social inequality, global systems, social movements, and other social factors that shape and constrain mitigation efforts. As demonstrated in this chapter, the use of a sociological lens offers the means to expand and enhance our understanding of mitigation challenges by—for example—acknowledging the social construction of consumer demand (Wilhite et al. 2000), understanding the ways in which individuals and organizations make sense of climate challenges in the contexts of their everyday lives (Norgaard 2011), and revealing cross-national differences in discourse about climate change mitigation and networks of advocacy coalitions, and their implications for the success of national mitigation policies (Broadbent et al. 2013). Through the lens of sociology, policymakers can gain the ability to recognize the oddities, discrepancies, omissions, and inconsistencies of standard techno-economic definitions of mitigation challenges and prescriptions for change. They can also become more cognizant of the range of sociocultural factors that are equally—if not more—important in facilitating or impeding mitigation efforts.

The remainder of this chapter provides a selection of sociological insights on factors affecting climate change mitigation. The chapter is organized in parallel with the nested nature of social structures, beginning with a discussion of sociological insights at the micro level (individuals and households) followed by meso-level insights (organizations, companies, industries, networks, and states) and concluding with macro-level insights (nations, international organizations, and global systems). While each of these three sections has a *primary* focus on one of the three levels, the divisions that separate these realms of sociological thinking represent more of a disciplinary convention rather than firm boundaries not to be crossed. In fact, because the essence of a sociological perspective is the study of complex social systems, the failure to recognize the interconnectedness of levels would be antithetical to the task at hand.<sup>2</sup> For these reasons, the discussions in each section try to identify some of the ways in which the social processes operating at one level influence and interact with processes operating at other scales. The chapter ends with a brief discussion of the interplay between

levels and a summary of many of the sociological insights highlighted in this chapter.

### MICRO: INDIVIDUALS AND HOUSEHOLDS

How can the agency<sup>3</sup> of individuals be leveraged toward emissions reductions? Climate emissions are produced by individuals directly through the consumption of energy in the household and personal travel, and indirectly through the use of commercial goods and services. In the United States, the activities of individual consumers directly account for around 38 percent of total carbon emissions (Dietz et al. 2009). However, while the ability of any one individual to effect change is limited, sociological work on the agency of individuals to carry out cultural practices and internalize cultural beliefs emphasizes how social structure is both enacted and contested by individuals in social interactions. Thus, as sociologists we recognize that the micro-level agency of individuals can be mobilized in a variety of ways to leverage lower emissions. Here we describe sociological insights regarding the role of individuals and households in the mitigation of direct emissions, and the mitigation potential of individuals as agents of democratic renewal and social change. We begin with a discussion of the role of micro-level actors in determining GHG emissions and the associated opportunities for mitigation. The second subsection discusses the opportunities for individuals to shape mitigation efforts through indirect processes and social movements.

#### Direct Emissions

Scholars in economics, psychology, and science communication have placed the human response to climate change more centrally in their research agendas than have sociologists, with the overall result that within the larger interdisciplinary conversation about mitigation (1) micro-level approaches have dominated the general policy and scientific discourse; (2) within this micro focus the potential role for individuals in mitigation has largely been construed in terms of their ability to reduce individual and household consumption; and (3) explanations for consumer behavior have undertheorized the role of social context in shaping consumption behavior. (See Chapter 4 on the sociology of consumption for a more in-depth discussion of this topic.) Taken together, the resulting emphasis on individual consumption choices in the absence of social context overrepresents the importance of individual decision making and the potential power of individuals as the actors most responsible for climate emissions (Maniates 2002; Szasz 2011; Webb 2012).

Direct emissions by individuals in the “household sector” do of course matter. A key sociological insight is that individual behaviors and choices regarding direct contributions to household and transportation emissions take place in a context of social opportunities and constraints that include everything from the availability of low-carbon transportation options and the price of energy to the social construction of beliefs, values, and knowledge. So while information about the seriousness of climate change and the relation of fossil fuel use to individual behaviors may be a necessary condition for people to respond, normative constructions of time and space beyond the individual shape whether climate change is perceived to be “near” or “far” (Norgaard 2011) or the responsibility of people as citizens or a consumption choice (Maniates 2002; Szasz 2007). Furthermore, cultural constructions of space affect the visibility of problems and shape an individual’s sense of personal responsibility for emissions (Frantz and Mayer 2009; Norgaard 2011; Ungar 2003). No doubt a central challenge in our attempt to grapple with climate change is its connection to qualities outlined in Ulrich Beck’s work on the “risk society” (1992). In particular, rather than a problem we can touch and see for ourselves, climate change is a threat that must be interpreted for us through scientific expertise, using complex instrumentation. The reliance on experts opens the door to the politicization of what is known and what needs to be done.

— In addition to relying on expert knowledge, however, people also have the ability to look to those around them for social cues in order to assess normative behavior and determine their own course of action. And in fact, social norms are often an important source of influence in shaping individual patterns of behavior. Notably, however, their influence appears to be higher under conditions of uncertainty and matter most when activities are visible (Cialdini and Goldstein 2004; Schultz et al. 2007). The public nature of curbside recycling, for example, is well suited to the development of such programs (Schultz 2002). On the other hand, most household energy practices are performed behind closed doors, making the use of social norms more difficult. Given the proven effectiveness of social norms in changing behavior, however, many program designers are looking for innovative ways to induce normative changes in emissions-intensive activities like heating homes. (A more in-depth discussion of household consumption and social norms is provided in Chapter 4.)

Many efforts to enhance environmental sustainability rely on value-driven campaigns aimed at changing attitudes and mobilizing individuals with strong environmental values to engage in new practices or to support particular policies. However, research has found that the removal of structural constraints is often a more effective means of changing individual behaviors. For example, in a study of recycling behaviors, researchers found that

the existence of curbside recycling programs was a more reliable indicator of whether households recycled than environmental orientation (Derksen and Gartrell 1993). And while strong environmental values were associated with the push for environmental legislation in the past, Szasz (2007) suggests that today, people are more likely to express their environmental concerns in individualized acts of self-protection that he characterizes as an *inverted quarantine*. Instead of engaging in political mobilization, people buy bottled water, sunscreen, and organic foods to protect themselves from the environmental risks of modern life. Szasz outlines several social conditions that would be necessary for consumers to aggressively switch to low-carbon lifestyles, including a widespread sense that climate change is real and urgent, affordable and attractive low-carbon alternatives, motivation (i.e., from an organized consumer movement), and trust. He concludes that because most of these conditions do not currently exist, targeting the consumption of individual consumers should not be a priority.

It is important to note, however, that social science researchers disagree about the potential importance of individual behavior for mitigation efforts. As noted earlier, some research suggests that the decisions and practices of individuals and households represent a "behavioral wedge" that could, through policy inducements, reduce national carbon emissions in the short term by as much as 74 percent (Dietz et al. 2009; Vandenberg et al. 2010). Moreover, this philosophy is being embraced by a growing number of cities and organizations that are working to mitigate GHG emissions through local programs that work collaboratively with individuals, households, and organizations. Such efforts include the development of energy feedback programs focused on providing electricity and natural gas consumers (both residential and commercial) with information about their energy consumption in ways that incorporate social norms research and other social psychological research to effectively motivate action, shift energy use practices, and encourage conservation (Alcott and Mullainathan 2010; Nolan et al. 2008). As documented by Ehrhardt-Martinez, Donnelly, and Laitner (2010), energy feedback programs have been effective in reducing average household energy consumption by 4 to 12 percent, depending on the type of feedback provided and the degree to which feedback programs successfully integrate social science insights. Indirect forms of feedback, such as Opower's use of monthly statements that incorporate both descriptive and injunctive norms to compare household electricity use to neighborhood averages, were shown to reduce household electricity use by 2 to 4 percent on average. If this program were scaled to the national level, it could reduce U.S. emissions by an estimated 12.7 million metric tons of CO<sub>2</sub> annually, or roughly 1 percent of U.S. carbon emissions from electric power (Alcott and Mullainathan 2010). Energy savings among high energy users were shown



to be even more dramatic, and when social norms were used in conjunction with goal setting, average savings reached 8 percent. It is important to note that most of the savings from feedback-related interventions are generated through low-cost or no-cost types of activities such as simple shifts in everyday practices rather than high-cost investment activities (Ehrhardt-Martinez et al. 2010). These findings suggest that shifts in the everyday behaviors of individuals and households can make a measurable difference in reducing carbon emissions.

Research findings such as these have sparked the interest of a growing number of electric utilities and other types of organizations who have begun studying and applying social science insights in innovative new programs aimed at reducing household energy consumption. For example, public utility commissions in a growing number of states are requiring utilities to invest in enhancing energy efficiency before they invest in new power-generation facilities (although not always with the goal of addressing climate concerns). These types of utility policies and the growing interest in household energy consumption recently prompted the California Public Utilities Commission to sponsor a set of nine white papers on energy efficiency and behavior (California Institute for Energy and Environment 2009). Similarly, the New York State Energy Research Administration has recently funded social science research to test the effectiveness of various behavioral mechanisms for reducing energy use in commercial buildings and transportation.

In New Zealand, an interdisciplinary group of researchers is working in collaboration with the national government to gain a better understanding of the social factors that shape the existing energy culture and the opportunities to reshape it. Their approach is rooted in a sociological perspective, drawing both from Bourdieu's (1990) concept of "habitus" (the persistent patterns of thought, perceptions, and actions within which the individual exists) and Lutzenhiser's research on the cultural models of household energy consumption (Stephenson et al. 2010). In combination, these ideas have helped inform an interdisciplinary approach to understanding modern energy and climate mitigation challenges that focuses on the culture of consumption. At its core, the energy cultures model "suggests that consumer energy behavior can be understood at its most fundamental level as the interactions between cognitive norms (e.g. beliefs, understandings), material culture (e.g. technologies, building form) and energy practices (e.g. activities, processes)" (Stephenson et al. 2010:6123–6124). Similar to other studies, their research concludes that people often behave in ways that are inconsistent with their attitudes or values, but there is value in exploring and understanding the rationalizations that people provide and mechanisms for overcoming them (Lawson, Miroso, and Gnoth 2011; Miroso et al. 2011).

### Indirect Processes

While the ability of individuals to effect change through their role as *consumers* may be limited, sociological research also acknowledges the role that individuals play in maintaining or changing established social orders that in turn shape GHG emissions. Changes in fertility patterns demonstrate how shifts in practices can have powerful indirect effects on the mitigation of GHGs.

Micro-level changes in fertility decisions are important because they add up, producing large aggregate impacts on national and global climate emissions. In the developed world, declines in fertility rates over the past century are expected to persist into the future, resulting in significant GHG emissions reductions during the twenty-first century (all else equal). While these estimates are encouraging, it is important to note that even when fertility rates decline to below replacement levels, they do not immediately result in negative population growth (or emissions reductions) because populations have momentum. In fact, it takes roughly twenty years after fertility rates fall below replacement levels to generate actual declines in population size—only after absolute declines occur in the size of cohorts entering their reproductive years. Acknowledging this dynamic, one recent calculation suggests that population declines in high-GHG-emitting societies during the twenty-first century could generate anywhere from a 15 percent to a 29 percent decline in global GHG emissions (O'Neill et al. 2010).

Globally, however, births continue to exceed deaths, and estimates suggest we will reach roughly 9 to 10 billion people by the late twenty-first century. Most of this population growth will occur in less-developed countries and is often described as a driver of increased GHG emissions. This type of global-scale analysis can be misleading because it fails to differentiate between the effects of population growth in high-emitting versus low-emitting societies. The distinction is important because per capita emissions levels in affluent societies are many times the levels found in less-affluent societies, where fertility rates are the highest. Moreover, economic development often results in lower fertility rates. As countries become more developed and skills become more specialized, the status of children shifts from being an economic asset to being an economic liability. Shifts in gender roles and opportunities are also common. Lower fertility rates and enhanced economic opportunities are associated with growth in women's access to education and work as well as income equality, legal protections, and social safety nets (Oppenheim Mason 1987). And as opportunities for women continue to expand, fertility rates fall. Such findings suggest that the relationship between household fertility and GHG emissions is complex but that changes in women's social status may play an important mediating

role between economic development and population-driven trends in GHG emissions.

### Individual Involvement in Social Movements

Sociologists emphasize the need for individuals to work collectively to challenge the social structures that shape unsustainable behaviors by engaging in social movements and participating in a renewal of democracy more broadly (Brulle 2010; Kent 2009). Viewed from this perspective, there are numerous micro-level mitigation opportunities to contest and reshape social norms and social structures as people participate in a variety of activities that affect both indirect consumption and large-scale climate policy. Individuals may choose to join with others to live more simply, adopt a vegan or vegetarian diet, or eat locally grown food. Individuals also volunteer with community groups working on climate change through churches, schools, watershed councils, and local nonprofits. Individuals engage in changing normative ideas about the world through their involvement in more formal political work through voting, letter writing, volunteering, involvement in local political parties and campaigns, testifying before city council, running for office, and marching in the streets. Collective activities pertaining to climate change provide an opportunity to reshape taken-for-granted practices and may also reshape individual personalities. According to McAdam (2012), individuals who participate in social movements sometimes experience a process of “cognitive liberation.” This term describes the realization gained by social actors that society can be changed and that engaging in such change is worthwhile (McAdam 2012). Liberation occurs when individuals recognize the importance of their actions and feel empowered to change social orders.

According to Gamson (1992), movement mobilization also requires an integration of information from three different sources in order to gain traction—media, direct experience, and personal networks. As people gather information about the large-scale changes in the world around them, this information shapes their personal motivations to accept the status quo or take action (Roy 1994). Although the American public is currently divided into different camps on climate change (Leiserowitz et al. 2011), the growing number of climate-related disasters and the growth in scientific knowledge is likely to shift public opinion in the future. As the objective damages of climate change intensify (e.g., fires, droughts, heat waves, floods), support for mitigation policies is likely to increase. When combined with measures of self-efficacy, sociological insights on movement mobilization and cognitive liberation could inform future mitigation efforts.

### MESO: STATES, CITIES, ORGANIZATIONS, AND NETWORKS

At a more aggregate level of analysis, sociologists study the functioning of states, cities, organizations, and networks to better understand the effect of organizational dynamics and structures on GHG emissions. These studies focus on the ways in which meso-level entities shape human responses to climate change. Meso-level actors intent on reducing emissions include nongovernmental organizations (NGOs), social movements, the larger private enterprises, cities, and state governments. Their impacts on emissions are discussed in the following order: the impact of focusing events as catalysts for new regulatory efforts, the influence of political-economic contexts in shaping mitigation efforts, the influence of spatial proximity in the spread of mitigating practices, the roles of city and state governments in promoting mitigation, and, finally, the influence of intraorganizational coalitions and business cycles on the establishment of new norms and standards.

#### Focusing Events and Punctuated Equilibria

The effectiveness of organizations is always at least partially determined by the social context in which they operate. For social movement organizations, effectiveness has been linked to measures of political opportunity that suggest that the most far-reaching reforms occur in the aftermath of events that transform social structures. The *Exxon Valdez* spill is a good example of such an event. In the two years after the spill, the federal government and more than thirty state governments adopted more restrictive laws regarding oil spills (Faass 2009). A pattern of punctuated equilibria in policymaking (Repetto 2006) emerges with alternating periods of political stasis and event-triggered surges in legislative activity. In times of environmental crisis, more progressive agencies within government can find themselves in charge of clean-ups and of making new regulations (as with the National Oceanic and Atmospheric Administration in the BP Gulf oil spill case). Perhaps surprisingly, the new regulations often come from proposals put together in preceding, quieter political periods by movement activists. In the case of proposals for state laws, government officials frequently use legislation passed in adjacent jurisdictions as models for their own legislation (DiMaggio and Powell 1983). For this reason, prior mobilization by movement activists around an issue is important because it increases the likelihood that activists will be able to take advantage of the political moment in the aftermath of galvanizing events when political change typically occurs (Boudet 2011).

### Economic Opportunities, Power Structures, and Ecological Modernization

Economic conditions play an important role in determining whether or not and when enterprises invest in sustainable practices that reduce their environmental impact. Certainly time-sensitive government incentives such as tax breaks have been shown to spur businesses to substitute newer, cleaner-burning technologies for older, more emissions-intensive technologies. Proximate factors frequently play an important role in decisions to modernize. For example, it's not uncommon for companies to make a decision to overhaul their manufacturing processes based on an assessment of aging machinery that has little to do with the environmental impact of old versus new machinery. But once the company executives have embarked on the overhaul, research findings suggest that they may be more likely to decide to purchase "greener" machinery (Florida 1996). Such decisions may also be shaped by voluntary standards programs, such as ISO 14001, which provide the firm with positive publicity in a concerned consumer market. If the adopting firm is an industry leader, other firms are more likely to adopt similar technologies in order to stay competitive. Such opportunities help shape a process such that a decision by one company to build a new, greener technology initiates a cascade of similar decisions throughout an industry.

A somewhat similar set of proximate circumstances influenced organizational participation in the Kyoto Protocol's clean development opportunities in Brazil and India. In this case, companies that had worked with a particular set of consulting firms were faced with a unique opportunity to benefit from the consultants' expertise and familiarity with a new clean development program. These consulting firms, which had previously given advice to cement mill and sugarcane mill owners about their production processes, became the conduit for further overhauls in production processes in order to receive carbon credits, which the mill owners could then sell in carbon markets (Pulver, Hultman, and Guimaraes 2010). In effect, the consultants became agents of diffusion for emission-reducing changes, but the effects of their activities were largely limited to the particular subset of organizations with whom they had previously worked.

Mitigation opportunities are also influenced by political ideology and the power of economic elites—although not always in ways that we would expect. In a comparative study of state-level emissions in the United States, Dietz et al. (2012) found that measures of conventional liberal/conservative politics mattered little in explaining state-by-state variations in emissions. The power of economic elites was, however, significant. When economic elites were politically strong, states exhibited higher levels of emissions. In states where economic elites were less powerful, reforms were more likely,

resulting in lower emissions levels. This assessment builds on Shwom's (2011) research on appliance efficiency standards in the United States that concluded that societal power relations (including the power of economic elites and the strength of the state) play an important role in determining when treadmill of production theories are more applicable or, alternatively, when ecological modernization theories are likely to hold true. Based on her findings, Shwom emphasizes the importance of regulatory actions in shaping appliance standards that, in turn, shape the range of options available to consumers. Shwom concludes that, unless the strength of the state can counterbalance the interests of industry, progress will be slow at best and that "a purely voluntary approach without regulation or the threat of regulation is unlikely to lead to action on climate change" (2011:724). Similarly, Dietz et al. (2012:20) suggest that when business interests are especially powerful, "liberals will have little ability to promote environmental reforms and may not consider the environment a matter of central concern. When capital is less strong, a bipartisan consensus may form around such reform."

#### The Effect of Spatial Spillovers on Sustainable Practices

Spatial proximity has also been shown to influence changes in organizational behaviors and norms. Sometimes these patterns result from proximity to a focusing event, and in other cases they result from simple observation facilitated by spatial proximity or from geographically defined access to enthusiastic service providers. After the *Exxon Valdez* accident, for example, contiguous states adopted similar legislation regulating the transport of oil (Faass 2009). Spatial proximity also facilitates learning through observation. This type of spillover is exemplified by neophyte organic farmers who benefited from their proximity to more experienced organic farmers because they were able to track the progress of various agricultural experiments in their neighbors' fields. As a result, the farmers were able to learn best practices more quickly (Risgaard, Frederiksen, and Kaltoft 2007). In some cases, as with geographic patterns of no-till agriculture, adoption follows the spatial lines of jurisdictions. Counties with extension agents who were enthusiastic about conservation agriculture (no-till or minimum-till) had more farmers who adopted the new techniques than nearby counties with less enthusiastic extension agents (Kane et al. 2011). In addition, spatial proximity also facilitated the development of local farmers' networks focused on the sharing of relevant information. In this case, farmers from the same locations who attended the first "farm day demonstrations" of no-till techniques in the 1960s were able to reach out to each other and later formed networks of no-till farmers in their counties or states (Coughenour and Chamala 2000).

Proximity also has played a role in the creation of agricultural markets that link urban consumers and peri-urban farmers. For example, movements to establish farmers' markets and community-supported agriculture in the United States has resulted in a surge in the number of farmers' markets to more than four thousand across the United States and an increase in the numbers of consumers who consider themselves to be (emissions-reducing) locavores. If successful, these types of social movements reduce emissions and offer the opportunity to begin to bridge the metabolic rift between city and countryside that developed with urbanization during the nineteenth century (Foster 1999; Marx 1976).

#### Challenging the Status Quo Through Interorganizational Coalitions

Reducing the impact of organizations and businesses on the environment generally requires changing organizational norms and industry practices. The development of interorganizational coalitions can facilitate this process through the development of common goals and common "frames" for defining environmental problems and solutions. By working collectively, networks of NGOs institutions can aggregate their power and influence. For example, coalitions have developed among churches that espouse eco-theology and promote ideas like ecological stewardship (Ellingson, Woodley, and Paik 2012). These coalitions frequently bring different kinds of organizations together. For example, the U.S. Green Building Council brings together builders, urban planners, engineers, energy professionals, and environmental researchers and advocates to promote more energy-efficient building construction practices and the energy-efficient operation of existing buildings. By bringing together diverse interests, these coalitions have the opportunity to weave together the varied interests of disparate groups through the use of smartly crafted "issue frames." These types of coalitions can be effective because they are able to leverage common values across organizations. In the case of real estate interests and energy efficiency, for example, effective coalition organizers will recognize that while most real estate professionals are not likely to be motivated by concerns over climate change, they are often motivated by the status associated with LEED certification, the use of state-of-the-art technologies, the cost savings of efficient building operations, and the need to conform to industry norms concerning building performance. By tapping into these common values, coalitions offer the opportunity to shift industry norms and standards, particularly as building performance standards, publicized through city, state, and national programs, become more widely known. Similar coalitions have been formed by activists, sympathetic government officials, and national environmental NGOs to block the further expansion of energy-intensive sprawl in suburbs (Rudel 2009).

### Cities, States, and Regions as Mitigators

Over the past two decades, cities and states have slowly developed programs that help residents shift their behaviors in ways that reduce both direct and indirect sources of emissions. Such programs work with households to lower thermostat settings, hang laundry to dry, car pool, reduce bottled water consumption, and compost biodegradable waste. Since 2005 more than a thousand cities have signed on to the U.S. Conference of Mayors Climate Protection Agreement, which calls on cities to (1) meet or beat the Kyoto Protocol targets in their own communities; (2) urge state and federal governments to enact policies to do the same; and (3) urge Congress to pass GHG reduction legislation that would establish a national emissions trading system. So far, more than six hundred cities have crafted their own climate action plans.

State and provincial governments have also made efforts to reduce GHG emissions. The most notable effort in the United States has come in California, which has established a cap-and-trade system for reducing GHG emissions. It also has mandated reductions in the carbon content of fuels and promoted the use of zero-emission vehicles for travel. In 2013 the scope of this political initiative to mitigate GHGs expanded to the region when the governors of British Columbia, California, Oregon, and Washington agreed to coordinate their efforts. Similarly, fuel efficiency standards adopted in California were later adopted at the national level by the U.S. Environmental Protection Agency (Wines 2013). These adoption–diffusion dynamics that accompany regulatory and technological innovations have long been studied by sociologists, but studies about the spread of GHG-reducing innovations across enterprises and jurisdictions are only just beginning.

### Business Cycles, Exogenous Events, and New Industrial Norms

Finally, business cycles also matter in decisions to “go green.” During periods of economic expansion, enterprises are enriched, enhancing the likelihood that they will invest in more environmentally efficient technologies. Research on the association between economic expansion and business investments in energy efficiency explains the paradoxical relationship between the growth in energy efficiency investments and the simultaneous growth in total energy consumption. As Jevons first noted, instead of decreasing overall energy use, new efficiencies in energy use often occur alongside increases in the absolute amounts of energy used (York 2006).

Apart from cycles of expansion and contraction, several additional factors have been shown to contribute to shifts away from engrained industrial norms and toward more sustainable practices. In particular, sociological



research suggests that the perturbations caused by system-transforming events, when coupled with an abundance of capital, can sometimes bring a sudden end to preexisting communities of practice that organizations adhere to in order to produce a commodity with as little uncertainty as possible (Biggart and Beamish 2003). Exogenous events disturb these routines and increase the opportunities for change as organizations cast around for a new set of cultural tools or conventions around which to organize their daily operations. People open up to new schemata, and in these confused situations ideologies often become stronger because they provide ready-made explanations for events that do not fit well into the preexisting culture (Swidler 1986).

#### MACRO APPROACHES: NATIONS AND GLOBAL REGIMES

At the most aggregated level, researchers study the ways in which emergent characteristics and processes of entire societies influence global mitigation strategies and outcomes. In particular, the application of cross-societal comparison can provide unique insights concerning the range of national mitigation responses and the social conditions that either facilitate or impede mitigation policies, practices, and outcomes. Studies at the macro level are particularly appropriate given that climate change is a global phenomenon that can only be countered through strong national policies and an unprecedented level of international cooperation.

Macro-level studies generally focus on global (and international) social movements, global (and international) policy regimes, or cross-national patterns of mitigation. Research on global social movements studies the actions of NGOs, their strategies and tactics, and the roles that they play in reducing climate emissions. Studies of global policy regimes and international cooperation are concerned with the ways in which global (and international) policies are shaped, their implications for various participants, and their effectiveness in changing outcomes. Finally, national and cross-national studies look at the ways in which differences in social structures, history, and culture result in different mitigation outcomes. The research discussed in this section will focus on the latter two of these approaches. A discussion of the influence of social movements can be found in Chapter 8.

This section begins with an overview of the Kyoto Protocol and a short discussion of global mitigation policy efforts. The remainder of the section highlights some of the key sociological contributions to understanding the development and ratification of a global climate policy, the ineffectiveness of international climate agreements, and the lack of meaningful climate legislation in the United States.

### The Kyoto Protocol and International Efforts to Mitigate Climate Change

The Kyoto Protocol, adopted in Kyoto, Japan, in 1997, attempts to mitigate climate change. It is an international agreement that commits developed countries to internationally binding emissions reduction targets of 5 percent below 1990 emissions levels during the first commitment period (2008–2012) and 18 percent below 1990 emissions levels during the second commitment period (2013–2020). The detailed rules for the implementation of the protocol were adopted in 2001, and the protocol entered into force in February 2005.

Countries first expressed their concern over climate change through the adoption of the United Nations Framework Convention on Climate Change in 1992. The treaty committed the signatories to “cooperatively consider what they could do to limit average global temperature increases and the resulting climate change, and to cope with whatever impacts were, by then, inevitable” (United Nations Framework Convention on Climate Change n.d.). By 1995, it had become clear that the emissions reductions provisions in the convention would not be sufficient to address climate change, sparking the development of more stringent approach through the Kyoto Protocol. Currently there are 195 parties to the convention and 192 parties to the Kyoto Protocol. Notably, the United States has failed to ratify the protocol, and Canada denounced the convention effective December 2012 and ceased to be a member from that time.

The lack of U.S. participation in the protocol has generated high levels of international concern given the critical role of the United States in both producing emissions and establishing international standards. The United States was the single largest producer of GHG emissions in the world until 2007, when it was overtaken by China. Moreover, the United States plays an important leadership role in the world both economically and politically. Social scientists have sought to better understand why some countries agreed to sign the protocol while others did not and why many of the signatories have failed to cut their emissions. The failure of the United States to sign the protocol and the lack of any significant national-level legislation on climate change in the United States have also drawn the scrutiny of social scientists. These topics are discussed in more detail in the following three sections.

### Understanding Participation in International Climate Policies and Mitigation Efforts

How can we best understand why some countries agree to ratify a climate policy treaty while others do not? What conditions increase the likelihood

of treaty ratification? This section explores three sociological approaches to these questions. The first considers the impacts of ecological modernization on the preparedness of nation-states to battle climate change and their willingness to ratify the Kyoto Protocol. The second considers the role of a global set of environmental values and norms in shaping the policies of nation-states and their willingness to ratify the protocol. Finally, a hybrid approach considers how national and global forces work together to shape national policies.

By definition, global climate change is among those environmental problems that are truly international in scope. Because a solution requires international cooperation and no supranational authority has the authority to compel compliance, social scientists often seek to explain cooperation by looking at the compatibility of national interests with international policy or structural differences in country-specific characteristics (e.g., education levels or the strength of civil society organizations). International regime theory and ecological modernization theory are two common approaches to understanding how and when cooperation among nation-states is achieved through international treaties or regimes.

#### Regime Theories

Regimes can be thought of as “implicit or explicit principles, norms, rules and decision-making procedures around which actors’ expectations converge in a specific issue area” (Hasenclever, Mayer, and Rittberger 1997:9). Formal regimes generally include explicit agreements while less formal regimes may be identified through observations of state actions or through the reactions of nation-states to noncompliance. Classical (international regime) theory posits that the actions of nation-states are driven by national interests and rational decisions. Generally speaking, international regime theory predicts that countries will support international agreements only when they serve domestically determined national interests. Since dominant national interests are often focused on immediate problems, a traditional international regime analysis would be pessimistic about the possibility of developing effective international mitigation agreements.

#### Ecological Modernization and Global Environmental Systems

In contrast to international regime theory, approaches based on ecological modernization theory consider the structural differences between countries that serve to “circumscribe or enable their ability to reduce GHG emissions” (Zahran et al. 2007:39). Such studies are concerned with measures of countries’ structural and strategic readiness to commit to and comply

with the Kyoto Protocol (Fisher 2003; Zahran et al. 2007). The expectation is that through the process of ecological modernization, societies design economic, political, and cultural institutions that regulate human interactions with nature in a way that offers greater environmental protections. To do so, the process of modernization must become more reflexive and adaptable, allowing for the reconsideration, reorganization, and reform of past ways of doing things (Mol 2003). Economic changes center around the restructuring of production practices to increase energy efficiency and decrease environmental externalities. Politically, ecologically modernized countries are more likely to combine market-based approaches with command-and-control approaches to overcome production-side environmental problems (Spaargaren 2000), and they are more likely to cooperate internationally and recognize the value of multilateral relationships. Culturally, popular value systems tend to value aesthetics, identity, and self-actualization over economic growth. Such "postmaterialist" values are linked to higher levels of membership in environmental groups, donations for environmental protection efforts, and environmentally friendly behaviors (Kidd and Lee 1997). Studies of the prevalence of ecologically modernized institutions across countries found notable differences (Sonnenfeld and Mol 2002; Spaargaren and Mol 1992), and these differences were found to provide a partial explanation of the likelihood of Kyoto Protocol ratification (Zahran et al. 2007). In particular, Zahran's research found that "societies characterized by extensive civil liberties and political rights, high energy efficiency, low carbon dioxide emissions per capita, high education levels, and records of international cooperation on other transboundary environmental issues are significantly more likely to commit to the Protocol" (50). Governments have a range of domestic policy instruments at their disposal to enhance energy efficiency, including utility incentives, tax credits, energy-sensitive building codes, equipment efficiency standards, and regulation of alternative energy markets. By engaging in these actions, governments set the stage for participation in binding international agreements.

#### World Society Theory and an International Culture of Environmentalism

In contrast to ecological modernization theory and classic international regime theory, world society theory provides an alternative perspective that is rooted in the evolution of global institutions and global culture. More specifically, world society theory conceives of international policies and common patterns of national development as an outgrowth of emerging supranational (often global) institutions and the common set of norms, values, and cultural rules that they share. Rather than viewing nation-states as rational actors pursuing their own unique interests, neoinstitutional theory

suggests that nation-states are guided by the emergence of a commonly held set of ideas about particular issues such as approaches to governance or environmental practices. The formation of a dominant set of global norms results in the institutionalization of cultural models that come to define what a "normal" or appropriate nation-state looks like (Meyer et al. 1997). Through the process of institutionalization, there is an enhanced likelihood that similar policies and practices will be transmitted and adopted across and within a broad spectrum of nation-states. In fact, sociological research has found that state environmentalism is measurable and is a viable concept for describing the propensity of a nation-state to take political action in support of the environment (Dietz and Kalof 1992; Frank 1999). Such research suggests that an international culture of environmentalism is likely to be an important factor in shaping the likelihood that nations will ratify a common international policy despite competing interests at the national level. As noted by Frank (1999:538), "Environmentalization often appears to conflict with other national interests, especially economic development, generating intense resistance from nation states." Nevertheless, the same study found that those countries that are most embedded in the world social system are also most likely to ratify international environmental treaties despite competing domestic interests.

Hypotheses rooted in a world society perspective would generally be more optimistic than international regime theory about the possibility of developing a collaborative path toward international climate mitigation policies through an international learning process about climate change. To understand the development of international regimes, world society theory often looks to the role of international NGOs in both establishing and reinforcing cultural norms (e.g., Schofer and Hironaka 2005). According to Meyer and his colleagues (1997), international environmental NGOs and other types of civil society organizations are the carriers of world culture that is subsequently adopted by local actors. International environmental NGOs help shape the language of international treaties, assist in setting standards, develop codes of conduct, and create technical guidelines; they may even monitor compliance by nations in the absence of formal enforcement mechanisms (Jorgenson, Dunlap, and Clark 2013).

With regard to climate change mitigation policy, recent sociological research has explored the creation of this type of learning process through the facilitation of the United Nations. By actively bringing countries together, the UN is acting as an agent of change with the goal of persuading self-interested actors to see the longer-term view and to act in accordance with the collective good. As described above, these processes are consistent with the principles of neoinstitutional theory and the tenet that new norms can diffuse on a global scale, changing the very definition of

national interests toward new goals while also institutionalizing new forms of international cooperation (Busch and Jörgens 2005; Frank, Hironaka, and Schofer 2000).

The UN-sponsored regime seeks to engage societies and governments to work toward the development of (1) increasingly consensual and certain scientific information disseminated in the reports of the IPCC; (2) cogent moral injunctions to reduce emissions as part of the United Nations Framework Convention on Climate Change; and (3) specification of specific policy mechanisms for reducing GHG emissions.

A recent study considered the role of major national newspapers in diffusing scientific knowledge and mitigation norms. Consistent with neo-institutional theory, Broadbent et al. (2013) found that the prevalence of climate information in newspapers was more pronounced in UN member countries than in non-UN member countries. The findings suggest that such processes may prove to be a mechanism for enhancing the emergence of a global mitigation culture and agreement on basic scientific knowledge, norms of action, and a fair distribution of responsibilities for action.

Global mitigation norms are also being communicated directly by the UN through its new Climate Performance Index in an effort to increase pressure for action among nation-states (Lee et al. 2010). The new UN index scores two measures of climate action, *climate accountability* (effectiveness of programs and policies) and *climate performance* (actual emissions reductions). The index clearly communicates the values and expectations that countries should aspire to. In the period following the 2009 Copenhagen meetings, the best combination of overall accountability and performance was achieved by Sweden, Denmark, Germany, Japan, and France, while Germany, China, and the Republic of Korea had achieved the largest improvements on both scores. During the same period, measureable improvements in climate accountability were achieved by India, Indonesia, Kenya, Mexico, the Philippines, and Rwanda. Notably, the climate performance of Switzerland and Austria was rated as good, while the United Kingdom and the United States were found to have strong accountability but not strong performance.

### Theory of Global Environmental Systems

Research by Fisher (2003, 2004) suggests a third approach for understanding protocol ratification that incorporates both measures of nation-state characteristics and the influence of global environmental norms and expectations and the interactions between these sources of influence. Given the findings of prior research (Fisher and Freudenburg 2004), Fisher's work is focused exclusively on the environmental regimes of advanced capitalist countries

with the goal of identifying factors that can help explain the variation in the environmental policies between those countries.

Like the ecological modernization approach described above, Fisher's research includes an assessment of nation-state characteristics as potential sources of variation. However, Fisher's domestic measures are focused on the roles of four sets of domestic actors and their participation in the formation of a domestic climate change regime: the state, science, the market, and civil society. More specifically, the study considers why responses to the Kyoto Protocol have been so different among advanced capitalist nation-states by assessing the interrelationships between state strength, the centrality of science to policymaking, the material composition of the economic market and the role it plays with the state, and the level of civil society participation in domestic decision-making processes.

Through a comparative assessment of three countries—Japan, the Netherlands, and the United States—Fisher's findings suggest that when strong states work with collaborative market actors in an environment where scientists are highly and collaboratively engaged in the policymaking processes, treaty ratification and favorable environmental outcomes are more likely. Politically, a culture of collaboration was also found to benefit treaty ratification.

#### Explaining the Failure of International Climate Agreements

A notable group of researchers have suggested that while treaty ratification might be the first step toward finding a global solution to climate change, the success or failure of mitigation efforts is closely tied to issues of international inequality (Parks and Roberts 2008, others). Global inequalities exist on a variety of climate-related issues, including who will suffer the effect of climate change the most, which countries hold the most responsibility for the problem, and who is willing and able to address climate problems.

As noted by Parks and Roberts (2008:623–624):

With only four percent of the world's population, the US is responsible for over 20 percent of all global emissions. That can be compared to 136 developing countries that together are only responsible for 24 percent of global emissions (Roberts and Parks 2007). Poor countries therefore remain far behind wealthy countries in terms of emissions per person. Overall, the richest 20 percent of the world's population is responsible for over 60 percent of its current emissions of greenhouse gasses. That figure surpasses 80 percent if past contributions to the problem are considered, and they probably should be, since carbon dioxide (the main contributor to the greenhouse effect) remains in the atmosphere for over one hundred years.

A casual observer might think that the best way to resolve the issue of responsibility for climate change would be to give all humans equal

atmospheric rights and assign responsibility to individuals based on how much "environmental space" they use. This is a basic rule of civil justice and kindergarten ethics: those who created a mess should be responsible for cleaning up their fair share. But in international politics things are not so simple.

Despite the Kyoto Protocol's recognition of historically rooted inequalities and its attempt to address them, tensions over issues of inequality, justice, and fairness have continued to plague international climate discussions and impede the success of international mitigation efforts (Roberts and Parks 2007).

In reference to the vast disparities described above, four distinct proposals about the roles that different types of countries should be obligated to play in the cleaning up the atmosphere have emerged as part of climate negotiations: grandfathering, carbon intensity, contraction and convergence to a global per capita norm, and historical responsibility. The grandfathering approach would require the world's wealthier nations to reduce their emissions relative to a particular baseline year rather than requiring the establishment of a global emissions average or a much earlier historical baseline. The carbon intensity approach would require voluntary changes in the *efficiency* of emissions to allow for economic growth alongside higher emissions standards. Both of these approaches favor the short-term economic interests of industrial nations while producing only incremental mitigation benefits. The third option, the historical responsibility approach, would require an accounting of the amount of damage done as a result of nations' past emissions. And finally, the per capita contraction and convergence approach would require that countries work toward a global average per capita emissions target that would allow nations with low levels of emissions per capita to increase and require high emitters to decrease emissions. In addition, low emitters could trade their carbon emissions credits in exchange for the capital they need for economic development. These last two approaches involved more benefits for less-developed countries.

Ultimately, the Kyoto Protocol was developed based on grandfathering, allowing high-emitting nations to make voluntary reductions using 1990 base year targets but only requiring commitments from the more-developed countries and allowing voluntary emissions reductions from less-developed ones. This "resolution" of the inequality problem has been blamed for ongoing political tensions and inaction on the part of many less-developed countries and the United States alike (Parks and Roberts 2008; Roberts and Parks 2007; Roberts, Parks, and Vasquez 2004).

Many sociological studies of the impact of inequality have emphasized the importance of climate justice in shaping both treaty ratification and the likelihood of successful climate mitigation efforts. Among such studies,



Roberts and Parks (2007) specifically consider how the globalization of production systems has further complicated issues of climate justice. Their study suggests that while the globalization of production has created the *illusion* that the economies of more-developed countries are dematerializing, a closer examination reveals evidence indicating that declines in resource consumption in these countries is achieved through their ability to export material-intensive production and its environmental consequences to less-developed nations. Such relationships create situations of ecological indebtedness and ecologically unequal exchange in which "poor nations export large quantities of under-priced products whose value does not include the environmental (and social) costs of their extraction, processing or shipping" (Roberts and Parks 2007:196). Sociologists note that these types of relationships are historically rooted in colonial and neocolonial power relations. The ongoing impacts of such relationships can be measured using a materials flow accounting methodology. Such assessments suggest that more-developed nations are in fact exhausting the ecological capacity of extractive economies by importing resource-intensive products and have shifted environmental burdens to less-developed ones through the export of waste (Andersson and Lindroth 2001). Similarly, statistical research suggests that when less-developed nations trade more products, it results in higher emissions for poor nations and lower emissions for more-developed ones (Heil and Selden 2001; Roberts and Parks 2007).

To address climate justice dilemmas, Roberts and Parks suggest the adoption of one of several potential hybrid approaches that take into account factors such as historical emission levels, per capita emissions levels, geography, climate, energy supply, and domestic economic structures.

In an extension of such research, a more recent sociological study (Roberts 2011) considers how changes in global economic and political systems and the international balance of power have reshaped climate coalitions, strategies, and negotiations. The article suggests that over time, discussions have moved further away from the principles and practices of climate justice due to the fragmentation of less-developed nations' perspectives and continued resistance on the part of the United States. Importantly, the article attributes growing U.S. stubbornness to its increasing insecurity about its ability to provide jobs for its workers in the context of job outsourcing (to China and India). At the same time, China, India, and other rapidly developing nations must deal with their own concerns that negotiations might dampen growth in their countries and defer their aspirations for higher levels of prosperity.

A sociological evaluation of climate mitigation policies underscores the importance of taking a systems approach that also recognizes the historical influences on current international relations and that questions widespread assumptions about the development trajectories of today's less-developed

nations. By recognizing the importance of inequality in the global system, its historical roots in colonialism and neocolonialism, and its perpetuation in today's system of global production, sociologists have revealed the mechanisms that have resulted in the ecological indebtedness of developed countries like the United States. Such studies suggest that the success of global mitigation efforts is likely to depend on hybrid policy strategies that adequately take such factors into account.

#### Assessments of National Mitigation Legislation in the United States

The lack of any large-scale climate strategy in United States and the country's failure to ratify the Kyoto Protocol have led many sociologists to focus their attention on explanations of what some refer to as the U.S. climate "non-policy" (Lutzenhiser 2001). Such studies have pointed to a variety of potential causes, including climate change denial and the lack of popular policy support (McCright and Dunlap 2011a; Norgaard 2011), the politicization of climate change (McCright and Dunlap 2011b), the influence of powerful special interests (Brulle 2013), the role of natural resource interests (Fisher 2006), and the interrelations among state, market, civil society, and the scientific community (Fisher 2003).

According to Norgaard, the public's inability or unwillingness to recognize the climate imperative and support policies that address it may be rooted in emotional responses to climate dilemmas as well as measures of political economy. Norgaard's research suggests that while people experience deep fears regarding climate change, they often "normalize their inaction through a variety of cultural tools and narratives" (2011:177). However, in the United States, there is a literal denial of climate change among many Americans that is linked to political efforts to divert action by suggesting that the problem needs further study or by questioning the quality of the science. U.S. climate skepticism is further fueled by corporate-funded campaigns that have actively worked to instill doubt and question the legitimacy of science in the public sphere. As noted by Norgaard, the effectiveness of such efforts is at least partially rooted in the anti-intellectualism that pervades American culture and is complicated by America's cultural reliance on fossil fuels and comparatively high levels of GHG emissions. Finally, Norgaard's research also suggests that in the United States, political alienation and a culture of individualism contribute greatly to disengagement on climate change issues. In general, Americans don't trust that government institutions can respond to modern problems, while a culture of individualism leaves Americans at a loss in terms of what to do about climate change. Under these conditions, it isn't surprising that the American public feels both disempowered and

ineffective in the face of global climate change (Macnaghten 2003:77). The prevalence of climate denialism was found to be particularly prominent among conservative white males in the United States (McCright and Dunlap 2011a).

In addition to the broad disempowerment felt by many Americans, sociologists have also attributed the lack of U.S. climate policy to the politicization of the issue. Beginning in the early 1990s

a coordinated anti-environmental countermovement, spearheaded by conservative foundations, think tanks, and politicians, emerged in response to the rise of global environmentalism—symbolized by the 1992 Rio “Earth Summit”—and its perceived threat to the spread of neoliberal economic policies worldwide (McCright and Dunlap 2011b:158).

As a result of these efforts and the rightward shift in U.S. political culture, conservative interests were able to shift the climate perspectives of politically conservative Americans, resulting in a “sizable political divide” between liberals/Democrats and conservatives/Republicans (McCright and Dunlap 2011b:178). In general, the views of liberals were more likely to be consistent with scientific consensus. Importantly, this political divide became increasingly prominent between 2001 and 2010. Such findings are important because they call into question the assumption that advanced, modern societies will necessarily adopt more environmentally friendly policies when such policies are supported by sound science. Instead, this work suggests that forces of antireflexivity must also be accounted for.

As noted earlier, part of the cause of U.S. inaction on climate change mitigation can also be attributed to the active funding of a climate change countermovement that Brulle (2013) describes as a cultural contestation between efforts to restrict carbon emissions and those opposed to the restrictions. The countermovement comprises a number of conservative think tanks, trade associations, and advocacy organizations focused on confounding public understanding of climate science and delaying government mitigation policies. According to Brulle, these efforts justify the unlimited use of fossil fuels by delegitimizing climate science and efforts to impose mandatory limits on carbon emissions. Such research is important because it documents the role of political and philanthropic interests in actively manipulating and misleading the public over the threat posed by climate change and delaying the ability of U.S. policymakers to take action on the issue. Similarly, an assessment of Senate voting records on climate-related policies reveals the influence of partisan politics (Fisher 2006). Fisher’s work is unique in that it also highlights the influence of states’ dependency on fossil fuel resources (oil and coal) as a key determinant of climate policy voting patterns. In fact, her research suggests that it is the resource dependence

of the state that matters most in determining both national policy and the implementation of state-level GHG emission targets.

Finally, in a comparative assessment of nation-state action on climate change mitigation policies, Fisher (2003) attributes U.S. nonaction to some of the unique characteristics of the U.S. climate change regime. According to Fisher's assessment, the relative power of four key influencers (the state, science, the market, and civil society) determines the opportunities for policy action. In the United States, the federal government has relatively little autonomy relative to other social actors, limiting its ability to act in the absence of strong support from other sectors. In addition, the heavy dependence of the U.S. economy on fossil fuels and the peripheral role of science and environmental organizations in climate policy processes have stacked the deck against the likelihood of climate legislation.

#### THE INTERPLAY OF LEVELS AND FUTURE RESEARCH

Efforts to mitigate climate change are happening throughout the social system, from the micro-level efforts of individuals and households to the macro-level efforts of nations and intergovernmental bodies. A sociological perspective helps shed light on the interplay among actions at the micro, meso, and macro levels, revealing the effects of agency, culture, social structure, institutions, power, inequality, and spatial characteristics in shaping and constraining our success in reducing climate emissions. These insights reveal that while the actions of individuals and households can have a significant impact in reducing GHG emissions, these actions alone will be insufficient for meeting the challenges of reducing emissions to the levels needed to avert major shifts in the Earth's climate. The enormity of the mitigation challenge requires a "both/and" solution that engages actors at all levels to change both individual and household practices and organizational, municipal, state, national, and international policies. How can we instigate, support, encourage, and catalyze the changes that are needed? A sociological perspective can contribute greatly in answering this question as well.

In a social system, change can begin anywhere, and isn't necessarily a linear process. Social psychology and social movement theory tend to highlight the importance of individual agency in a social context and how individual choices and actions can reshape policies through shifts in everyday practices, involvement in political processes, and the establishment of broad social movements that encourage or demand shifts in national and international policies. Organizational sociologists can shed light on the dynamics and actions of businesses, nonprofits, and other groups that operate in the shadow of national policy but offer the ability to scale up change quickly

through organizational networks. Economic sociology and political sociology are often concerned with the roles that national governments and institutions play in determining national and international policy directly.

As described in this chapter, efforts are being made at all levels, but their success at reducing GHG emissions has been limited. At the micro level, the challenges of climate change have largely been met with denial and consumerist-type responses. As Norgaard (2011) points out, the scale of the problem and its perceived distance in time have allowed people to find ways to continue to live their lives as if the problem didn't exist. And for those who have been mobilized to action, the actions have often been limited to consumerist and individualized forms of action (Szasz 2007). At the macro level, much progress has been made in documenting the threat of climate change, in the formation of some international agreements, and even some actual carbon reductions in a subset of countries.

Nevertheless, decades of efforts to establish a global agreement or strong U.S. policy have largely failed in the face of a variety of political and economic challenges. More encouraging progress may be found at the meso level, where cities and organizations have begun to step forward *en masse*. Similarly, organizations such as the U.S. Green Building Council and the Urban Land Institute have begun engaging their networks of builders, building owners, and building managers in actions to reduce energy consumption and carbon emissions.

Whether or not we, as a global community, will be successful in mitigating the worst impacts of climate change remains to be seen. History provides ready examples of the factors that have led to social collapses in the past (Diamond 2004). Given the global scale of the climate problem, it is unlikely that efforts to address the problem at the micro or meso levels alone will avoid some type of collapse of global proportions in the future. In other words, shifts in national and international policy are required to avoid the catastrophic consequences of climate change that are expected to occur unless emissions are dramatically reduced. Perhaps micro- and meso-level initiatives will help lay the groundwork necessary for achieving the national and international policies that are needed.

### Research Recommendations

The predominant programmatic emphasis on *individual* consumption choices (in the absence of social context, organizational behavior, and national and international policies) has resulted in an unbalanced level of attention on the power of individuals and households to change consumption patterns and achieve much-needed changes in emissions. Instead, a more balanced research agenda should look more broadly at the social

dynamics influencing climate mitigation efforts in each of the three levels of the social system (micro, meso, and macro) as well as the interplay among the levels with the goal of revealing constraints, opportunities, and policies that are likely to facilitate action across all three levels. Such efforts need to explore more fully the effects of agency, culture, social structure, institutions, power, inequality, and spatial characteristics as they shape and constrain our success in reducing climate emissions. More research is needed in three broad categories:

1. Which factors most constrain and/or facilitate the implementation of national and state policies? When, to what degree, and in what ways do the actions and interests of different political actors shape policy outcomes? What are the contexts in which power elites are successful in shaping political agendas? What is the role of social movements, advocacy organizations, and voters in influencing outcomes, and when do their efforts matter most? And how can cities, states, utilities, and other meso-level actors influence both climate-related practices and national policy?
2. What can we learn from cross-societal comparisons that offer unique insights concerning the range of national mitigation responses and the social conditions that either facilitate or impede mitigation policies, practices, and outcomes?
3. Under what conditions does social, political, economic, and cultural change occur? How might policy efforts such as a carbon tax leverage momentum across spatial and temporal scales? How do state-level or city-level initiatives influence broader levels of change? How can shifts in industry norms reshape social debate, cultural beliefs, and the range of viable policy options? How can shifts in the social organization of energy technologies reshape public perceptions and policy options? Under what circumstances does social movement mobilization occur? How can sociological insights on movement mobilization and cognitive liberation leverage efforts at larger scales (e.g., state policy)?

#### NOTES

1. These estimates are based on scenarios in which fossil fuels maintain their dominant position in the global energy mix to 2030 and beyond, such that global emissions from energy use are expected to grow 40 to 110 percent between 2000 and 2030. The IPCC scenario estimates also assume a world of rapid economic growth, a global population that peaks in midcentury, and the rapid introduction of new and more efficient technologies. The most conservative GHG emissions estimates

assume important shifts in global economic structures toward a service and information economy (IPCC 2007b).

2. Environmental sociology also expands beyond the social systems to include their relationship to the encompassing ecology: the biosphere, geosphere, and other natural phenomena.

3. *Agency* refers to the ability of individuals to act independently and make their own free choices.

### REFERENCES

- Alcott, Hunt and Sendhil Mullainathan. 2010. "Behavior and Energy Policy." *Science Magazine* 327.
- Andersson, Jan Otto, and Mattias Lindroth. 2001. "Ecologically Unsustainable Trade." *Ecological Economics* 37:13–122.
- Beck, Ulrich. 1992. *Risk Society: Towards a New Modernity*. Translated by Mark Ritter. London: Sage.
- Biggart, Nicole W. and Thomas D. Beamish. 2003. "The Economic Sociology of Conventions: Habit, Custom, Practice, and Routine in Market Order." *Annual Review of Sociology* 29:443–464.
- Boudet, Hilary S. 2011. "From NIMBY to NIABY: Regional Mobilization against Liquefied Natural Gas Facility Siting in the U.S." *Environmental Politics* 20:786–806.
- Bourdieu, Pierre. 1990. *The Logic of Practice*. Translated by Richard Nice. Palo Alto, CA: Stanford University Press.
- Broadbent, Jeffrey, Sun-Jin Yun, Dowan Ku, Kazuhiro Ikeda, Keiichi Satoh, Sony Pellissery, Pradip Swarnarkar, Tze-Luen Lin, Ho-Ching Lee, and Jun Jin. 2013. "Asian Societies and Climate Change: Global Events and Domestic Discourse." *Globality Studies Journal* 32, July 26, 2013 ([http://globality.cc.stonybrook.edu/wp-content/uploads/2013/07/032\]Broadbent.pdf](http://globality.cc.stonybrook.edu/wp-content/uploads/2013/07/032]Broadbent.pdf)).
- Brulle, Robert J. 2010. "From Environmental Campaigns to Advancing the Public Dialogue: Environmental Communication for Civic Engagement." *Environmental Communication: A Journal of Nature and Culture* 4(1 March):82–98.
- Brulle, Robert J. 2013. "Institutionalizing Delay: Foundation Funding and the Creation of U.S. Climate Change Counter-Movement Organizations." *Climate Change* 122(4):681–694.
- Busch, Per-olof and Helge Jörgens. 2005. "The International Sources of Policy Convergence: Explaining the Spread of Environmental Policy Innovations." *Journal of European Public Policy* 12:860–884.
- California Institute for Energy and Environment. 2009. "Behavior and Decision Making." White papers available at <http://uc-ciee.org/behavior-decision-making/overview>.
- Gialdini, Robert B. and Noah J. Goldstein. 2004. "Social Influence: Compliance and Conformity." *Annual Review of Psychology* 55:591–621.
- Coughenour, C. Milton and Shankariah Chamala. 2000. *Conservation Tillage and Cropping Innovation. Constructing the New Culture of Agriculture*. Ames, IA: Iowa State University Press.
- Derksen, Linda and John Gartrell. 1993. "The Social Context of Recycling." *American Sociological Review* 58:434–442.

- Diamond, Jared. 2004. *Collapse: How Societies Choose to Fail or Succeed*. New York: Penguin.
- Dietz, Thomas, Gerald T. Gardner, Jonathan Gilligan, Paul C. Stern, and Michael P. Vandenbergh. 2009. "Household Actions Can Provide a Behavioral Wedge to Rapidly Reduce U.S. Carbon Emissions." *Proceedings of the National Academy of Sciences USA* 106(44):18452-18456.
- Dietz, Thomas and Linda Kalof. 1992. "Environmentalism among Nation-States." *Social Indicators Research* 26:353-366.
- Dietz, Thomas, Eugene A. Rosa, and Richard York. 2010. "Human Driving Forces of Global Change: Dominant Perspectives." Pp. 83-134 in *Human Footprints on the Global Environment: Threats to Sustainability*, edited by Eugene A. Rosa, Andreas Diekmann, Thomas Dietz, and Carlo C. Jaeger. Cambridge, MA: MIT Press.
- Dietz, Thomas, Cameron T. Whitley, Jennifer Kelly, and Rachel Kelly. 2012. "Treadmill of Production or Ecological Modernization: The Political Economy of Greenhouse Gas Emissions in the United States." Proceedings of the American Sociological Associations Annual Meeting, Denver, Colorado.
- DiMaggio, Paul J. and Walter W. Powell. 1983. "The Iron Cage Revisited: Institutional Isomorphism and Collective Rationality in Organizational Fields." *American Sociological Review* 48:147-160.
- Ehrhardt-Martinez, Karen, Kat Donnelly, and John A. "Skip" Laitner. 2010. "Advanced Metering Initiatives and Residential Feedback Programs: A Meta-Review for Household Electricity-Saving Opportunities." Washington, DC: ACEEE.
- Ellingson, Stephen, Vernon A. Woodley, and Anthony Paik. 2012. "The Structure of Religious Environmentalism: Movement Organizations, Interorganizational Networks, and Collective Action." *Journal for the Scientific Study of Religion* 51(2):266-285.
- Faass, Josephine. 2009. "Mission Accomplished or Mission Impossible: Current Practices, Common Challenges, and Innovative Solutions in State-level Oil Pollution Regulation." PhD dissertation, Rutgers University.
- Fisher, Dana. 2003. "Global and Domestic Actors Within the Global Climate Change Regime: Toward a Theory of the Global Environmental System." *International Journal of Sociology and Social Policy* 23:5-30.
- Fisher, Dana. 2004. *National Governance and the Global Climate Change Regime*. Lanham, MD: Rowman & Littlefield Publishers.
- Fisher, Dana. 2006. "Bringing the Material Back In: Understanding the United States Position on Climate Change." *Sociological Forum* 21:467-494.
- Fisher, Dana and William R. Freudenburg. 2004. "Postindustrialization and Environmental Quality: An Empirical Analysis of the Environmental State." *Social Forces* 83:157-188.
- Florida, Richard. 1996. "Lean and Green: the Move to Environmentally Conscious Manufacturing." *California Management Review* 39:80-105.
- Foster, John Bellamy. 1999. "Marx's Theory of Metabolic Rift." *American Journal of Sociology* 105(2):366-405.
- Frank, David J. 1999. "The Social Bases of Environmental Treaty Ratification, 1900-1990." *Sociological Inquiry* 69(4):523-550.
- Frank, David John, Ann Hironaka, and Evan Schofer. 2000. "The Nation-State and the Natural Environment over the Twentieth Century." *American Sociological Review* 65:96-116.



- Frantz, Cynthia M. and F. Stephan Mayer. 2009. "The Emergency of Climate Change: Why Are We Failing to Take Action?" *Analyses of Social Issues and Public Policy* 9:205–222.
- Gamson, William A. 1992. *Talking Politics*. New York: Cambridge University Press.
- Hasenclever, Andreas, Peter Mayer, and Volker Rittberger. 1997. *Theories of International Regimes*. New York: Cambridge University Press.
- Heil, Mark T. and Thomas M. Selden. 2001. "International Trade Intensity and Carbon Emissions: A Cross-Country Econometric Analysis." *Journal of Environment and Development* 10:35–49.
- IPCC. 2007a. "Climate Change 2007: Mitigation." Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, edited by B. Metz, O. R. Davidson, P. R. Bosch, R. Dave, and L. A. Meyer. Cambridge and New York: Cambridge University Press.
- IPCC. 2007b. "Climate Change 2007: Synthesis Report." Contribution of Working Groups I, II, and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, edited by R. K. Pachauri and A. Reisinger. Geneva, Switzerland: IPCC.
- IPCC. 2007c. "Summary for Policymakers." Pp. 7–22 in *Climate Change 2007: Impacts, Adaptation and Vulnerability*. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, edited by M. L. Parry, O. F. Canziani, J. P. Palutikof, P. J. van der Linden, and C. E. Hanson. Cambridge: Cambridge University Press.
- IPCC. 2014. "Climate Change 2014: Mitigation." Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, edited by O. Edenhofer, R. Madruga, and Y. Sokona. Retrieved December 2, 2014 (<https://www.ipcc.ch/report/ar5/>).
- Jorgenson, Andrew K., Riley E. Dunlap, and Brett Clark. 2014. "Ecology and Environment." In *Concise Encyclopedia of Comparative Sociology*, edited by M. Sasaki, J. Goldstone, E. Zimmermann, and S. K. Sanderson. Leiden and Boston: Brill Academic Publishers.
- Kane, Stephanie, Penelope Dieble, J. D. Wulforst, Barbara Foltz, and Douglas Young. 2011. "Socio-economic Factors Affecting Tillage Practices in Northwest Dryland Agriculture." Proceedings of the Rural Sociological Society Meetings, July 30—August 2, Boise, Idaho.
- Kent, Jennifer. 2009. "Individualized Responsibility and Climate Change: If Climate Protection Becomes Everyone's Responsibility, Does It End Up Being No-one's?" *Cosmopolitan Civil Societies Journal* 3(1):132–149.
- Kidd, Quentin and Aie-Rie Lee. 1997. "Postmaterialist Values and the Environment: A Critique and Reappraisal." *Social Science Quarterly* 78(1):1–15.
- Lawson, Rob, Miranda Miroso, and Daniel Gnoth. 2011. "Linking Personal Values to Energy-Efficient Behaviours." *Environment and Behavior* (December) (<http://eab.sagepub.com/content/early/2011/12/26/0013916511432332>).
- Leiserowitz, Anthony, Edward Maibach, Connie Roser-Renouf, and Nicholas Smith. 2011. "Americans' Actions to Conserve Energy, Reduce Waste and Limit Global Warming in November 2011." Yale Project on Climate Communications.
- Lee, Hee Ryung, Alex MacGillivray, Paul Begley, and Elena Zayakova. 2010. *The Climate Competitiveness Index 2010*. AccountAbility.
- Lutzenhiser, Loren. 2001. "The Contours of U.S. Climate Non-Policy." *Society and Natural Resources* 14:511–523.

- Macnaghten, Phil. 2003. "Embodying the Environment in Everyday Life Practices." *Sociological Review* 51(1):63–84.
- Maniates, Michael. 2002. "Individualization: Buy a Bike, Plant a Tree, Save the World?" Pp. 43–66 in *Confronting Consumption*, edited by T. Princeton, M. Maniates, and K. Conca. Cambridge, MA: MIT Press.
- Marx, Karl. [1867] 1976. *Capital*, Vol. 1. New York: Vintage.
- McAdam, Doug. 2012. "Cognitive Liberation." In *The Blackwell Encyclopedia of Social and Political Movements*, edited by D. Snow, D. della Porta, B. Klandermans, and D. McAdam. Malden, MA, and Oxford: Blackwell Publishing.
- McCright, Aaron M. and Riley E. Dunlap. 2011a. "Cool Dudes: The Denial of Climate Change among Conservative White Males in the United States." *Global Environmental Change* 21(4):1163–1172.
- McCright, Aaron M. and Riley E. Dunlap. 2011b. "The Politicization of Climate Change and Polarization in the American Public's Views of Global Warming, 2001–2010." *The Sociological Quarterly* 52:155–194.
- Meyer, John W., David John Frank, Ann Hironaka, Evan Schofer, and Nancy Brandon Tuma. 1997. "The Structuring of a World Environmental Regime, 1870–1990." *International Organization* 51:623–651.
- Miroso, Miranda, Daniel Gnoth, Rob Lawson, and Janet Stephenson. 2011. "Rationalising Energy-Related Behaviour in the Home: Insights From a Value-Laddering Approach." European Council for an Energy-Efficiency Economy Summary Study, France.
- Mol, Arthur P. J. 2003. *Globalization and Environmental Reform: The Ecological Modernization of the Global Economy*. Cambridge, MA: MIT Press.
- National Academy of Sciences. 2010. "Limiting the Magnitude of Future Climate Change." *America's Climate Choices: Panel on Limiting the Magnitude of Future Climate Change*. Washington, DC: National Academies Press.
- Nolan, Jessica M., P. Wesley Schultz, Robert B. Cialdini, Noah J. Goldstein, and Vladas Griskevicius. 2008. "Normative Social Influence is Underdetected." *Personality and Social Psychology Bulletin* 34(7):913–923.
- Norgaard, Kari. 2011. *Living in Denial: Climate Change, Emotions and Everyday Life*. Cambridge, MA: MIT Press.
- O'Neill, Brian, Michael Dalton, Regina Fuchs, Leiwen Jiang, Shonali Pachauri, and Katarina Zigova. 2010. "Global Demographic Trends and Future Carbon Emissions." *Proceedings of the National Academies of Science USA* 107(41):17521–17526. doi: 10.1073/pnas.1004581107.
- Oppenheim Mason, K. 1987. "The Impact of Women's Social Position on Fertility in Developing Countries." *Sociological Forum* 2(4):718–745.
- Parks, Bradley C. and J. Timmons Roberts. 2008. "Inequality and the Global Climate Regime: Breaking the North-South Impasse." *Cambridge Review of International Affairs* 21(4):621–648.
- Pulver, Simone, Nathan Hultman, and Leticia Guimaraes. 2010. "Carbon Market Participation by Sugar Mills in Brazil." *Climate and Development* 2:248–262.
- Repetto, Robert (Ed.). 2006. *Punctuated Equilibrium and the Dynamics of U.S. Environmental Policy*. New Haven, CT: Yale University Press.
- Risgaard, Marie-Louise, Pia Frederiksen, and Pernille Kaltoft. 2007. "Socio-cultural Processes behind the Differential Distribution of Organic Farming in Denmark: A Case Study." *Agriculture and Human Values* 24:445–459.

- Roberts, J. Timmons. 2011. "Multipolarity and the New World dis(Ord)er: US Hegemonic Decline and the Fragmentation of the Global Climate Regime." *Global Environmental Change* 21(3):776–784.
- Roberts, J. Timmons and Bradley C. Parks. 2007. *A Climate of Injustice: Global Inequality, North-South Politics, and Climate Policy*. Cambridge, MA: MIT Press.
- Roberts, J. Timmons, Bradley C. Parks, and Alexis A. Vasquez. 2004. "Who Ratifies Environmental Treaties and Why? Institutionalism, Structuralism and Participation by 192 Nations in 22 Treaties." *Global Environmental Politics* 4(3):22–64.
- Roy, Beth. 1994. *Some Trouble with Cows*. Berkeley: University of California Press.
- Rudel, Thomas K. 2009. "How Do People Transform Landscapes?: A Sociological Perspective on Suburban Sprawl and Tropical Deforestation." *American Journal of Sociology* 115(1):129–154.
- Schofer, Evan and Ann Hironaka. 2005. "The Effects of World Society on Environmental Outcomes." *Social Forces* 84(1):25–47.
- Schultz, P. Wesley. 2002. "Knowledge, Information, and Household Recycling: Examining the Knowledge-Deficit Model of Behavior Change." Pp. 67–82 in *New Tools for Environmental Protection: Education, Information, and Voluntary Measures*, edited by T. Dietz and P. C. Stern. Washington, DC: National Academy Press.
- Schultz, P. Wesley, Jessica M. Nolan, Robert B. Cialdini, Noah J. Goldstein, and Vidas Griskevicius. 2007. "The Constructive, Destructive, and Reconstructive Power of Social Norms." *Psychological Science* 18(5):429–434.
- Shwom, Rachael. 2011. "A Middle Range Theory of Energy Politics: The U.S. Struggle for Energy Efficient Appliances." *Environmental Politics* 20(5):705–726.
- Sonnenfeld, David A. and Arthur P. J. Mol. 2002. "Globalization and the Transformation of Environmental Governance: An Introduction." *American Behavioral Scientist* 45(9):1311–1339.
- Spaargaren, Gert. 2000. "Ecological Modernization Theory and Domestic Consumption." *Journal of Environmental Policy and Planning* 2(4):323–335.
- Spaargaren, Gert and Arthur P. J. Mol. 1992. "Sociology, Environment, and Modernity: Ecological Modernization as a Theory of Social Change." *Society Natural Resources* 5(4):323–344.
- Stephenson, Janet, Barry Barton, Gerry Carrington, Daniel Gnoth, Rob Lawson, and Paul Thorsnes. 2010. "Energy Cultures: A Framework for Understanding Energy Behaviours." *Energy Policy* 38:10.
- Swidler, Ann. 1986. "Culture in Action: Symbols and Strategies." *American Sociological Review* 51(2):273–286.
- Szasz, Andrew. 2007. *Shopping Our Way to Safety: How We Changed From Protecting the Environment to Protecting Ourselves*. Minneapolis: University of Minnesota Press.
- Szasz, Andrew. 2011. "Is Green Consumption Part of the Solution?" Pp. 594–608 in *The Oxford Handbook of Climate Change and Society*, edited by J. S. Dryzek, R. B. Norgaard, and D. Schlosberg. New York: Oxford University Press.
- United Nations Framework Convention on Climate Change. n.d. "Background on the UNFCCC: The International Response to Climate Change" ([https://unfccc.int/essential\\_background/items/6031.php](https://unfccc.int/essential_background/items/6031.php)).
- Ungar, Sheldon. 2003. "Misplaced Metaphor: A Critical Analysis of the "Knowledge Society." *Canadian Review of Sociology* 40(3):331–347.

- Vandenbergh, Michael, Paul Stern, Gerald Gardner, Thomas Dietz, and Jonathan Gilligan. 2010. "Implementing the Behavioral Wedge: Designing and Adopting Effective Carbon Emissions Reduction Programs." *Environmental Law Review* 40:10547-10554.
- Webb, Janette. 2012. "Climate Change and Society: The Chimera of Behaviour Change Techniques." *Sociology* 46(1):109-125.
- Willhite, Harold, Elizabeth Shove, Loren Lutzenhiser, and Willett Kempton. 2000. "The Legacy of Twenty Years of Energy Demand Management: We Know More About Individual Behaviour but Next to Nothing about Demand." Pp. 109-126 in *Society, Behaviour, and Climate Change Mitigation*, edited by E. Jochem, J. Sathaye, and D. Bouille. Dordrecht, The Netherlands: Kluwer Academic Publishers.
- Wines, Michael. 2013. "Climate Change Pact is Signed by Three States and a Partner." *The New York Times*, October 29.
- York, Richard. 2006. "Ecological Paradoxes: William Stanley Jevons and the Paperless Office." *Human Ecology Review* 13(2):143-148.
- Zahran, Sammy, Eunyi Kim, Xi Chen, and Mark Lubell. 2007. "Ecological Development and Global Climate Change: A Cross-National Study of Kyoto Protocol Ratification." *Society and Natural Resources* 20:37-55.