The background of the entire page is a composite image. The top half shows a city skyline with various skyscrapers under a dramatic, orange and red sunset sky. The bottom half shows a vast, cracked, and parched landscape, likely a dry lake bed or desert, in shades of brown and tan. The text is centered within a semi-transparent orange rounded rectangle in the middle of the image.

**Workshop on
Sociological Perspectives on
Global Climate Change**

May 30-31, 2008

**Joane Nagel
Thomas Dietz
Jeffrey Broadbent**



National Science Foundation 2009

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This report is a summary of the proceedings of the “Sociological Perspectives on Global Climate Change” workshop held at the National Science Foundation in Arlington, Virginia, May 30-31, 2008. Any opinions, conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the United States Government.

Workshop on Sociological Perspectives on Global Climate Change

May 30 - 31, 2008

Report prepared by:

Joane Nagel
University of Kansas

Thomas Dietz
Michigan State University

Jeffrey Broadbent
University of Minnesota

Sociology Program
Directorate for Social, Behavioral and Economic Sciences

National Science Foundation

2009



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Workshop Participants

Tom Baerwald, National Science Foundation

Nancy Beller-Simms, National Oceanic and Atmospheric Administration

Michele Betsill, Colorado State University

Steven Brechin, Syracuse University

Jeffrey Broadbent, University of Minnesota

Robert Bullard, Clark Atlanta University

Penelope Canan, University of Central Florida

JoAnn Carmin, Massachusetts Institute of Technology

Thomas Dietz, Michigan State University

Riley Dunlap, Oklahoma State University

Barbara Entwisle, University of North Carolina

Marina Fischer-Kowalski, Alps-Adria University

Dana R. Fisher, Columbia University

Ken Frank, Michigan State University

Eric Hanley, University of Kansas

Sharon Harlan, Arizona State University

Patricia Romero Lankao, National Center for Atmospheric Research

Marta Maldonado, Iowa State University

Sabrina McCormick, Michigan State University

Aaron McCright, Michigan State University

Linda Mearns, National Center for Atmospheric Research

Joane Nagel, University of Kansas

Kari Norgaard, Whitman College

Simone Pulver, Brown University

Timmons Roberts, College of William and Mary

Eugene Rosa, Washington State University

Joel Scheraga, Environmental Protection Agency

Rachel Slocum, St. Cloud State University

Paul Stern, National Research Council

Kathleen Tierney, University of Colorado

Beverly Wright, Dillard University

Richard York, University of Oregon

Sammy Zahran, Colorado State University

Student Associates

Anna-Lisa Aunio, McGill University

Xiaodong Chen, Michigan State University

Lindsey Feitz, University of Kansas

Monique Laney, University of Kansas

Philip Mancus, University of Oregon

Umar Moulta-Ali, Ohio State University

Vikrum Sequeira, University of Texas at Austin

Rachel Shwom, Michigan State University

John Tribbia, University of Colorado at Boulder

Executive Summary

On May 30-31, 2008, a workshop on Sociological Perspectives on Global Climate Change was held at NSF in Arlington, Virginia. The workshop was funded by an NSF grant from the Sociology Program to Drs. Joane Nagel, University of Kansas; Jeffrey Broadbent, University of Minnesota; and Thomas Dietz, Michigan State University. The purpose of the workshop was threefold: identify ways to 1) increase sociology's capacity to conduct climate change research, 2) motivate research that contributes solutions to a global problem of historical importance, and 3) expand sociological participation in interdisciplinary research and education about global climate change. Workshop participants were asked to answer two questions in their short papers and workshop deliberations: What is the state of sociological research on global climate change? What are the major research questions that sociologists should be asking and seeking to answer about climate change? The workshop was intended to contribute to advancing sociological research on global climate change, and thus to advancing the research capacity, tools, and infrastructure in the social sciences.

This report is organized into four sections; the first three parallel the organization of the Intergovernmental Panel on Climate Change 2007 Fourth Assessment Report's *Summary for Policymakers*¹ which identifies causes, impacts, and mitigation and adaptation strategies for climate change.

Part I outlines the current state of sociological knowledge and opportunities for future research about the *social causes* of global climate change; several theoretical and empirical research areas in sociology are referenced both for the knowledge they have already generated and for their potential to contribute to further research on the causes of climate change: global political economy, human ecology and environmental impact models, cultural and meaning systems, macro-comparative policy research, social organization of science and science policy.

Part II identifies the current state of sociological knowledge and opportunities for future research about *social impacts* of global climate change; relevant theoretical and empirical research areas in sociology are referenced both for the knowledge they have already generated and for their potential to contribute to further research on the causes of climate change: environmental justice, disaster research, human health, security and conflict, and social demography and population research.

Part III summarizes the current state of sociological knowledge and opportunities for future research about the *social dimensions of mitigation and adaptation* to global climate change; several theoretical and empirical research areas in sociology are referenced both for the knowledge they have already generated and for their potential to contribute to further research on mitigation and adaptation efforts: global governance, risk assessment and decision making, cultures of consumption, contributions to advocacy and action research, and organizations and networks.

Part IV contains recommendations to sociologists and to funding agencies, including NSF, for advancing sociological research on global climate change including recommendations for catalyzing the discipline of sociology, forging interdisciplinary collaborations, and developing the capacity and infrastructure to increase sociology's contribution to understanding and responding to global climate change.

¹ Intergovernmental Panel on Climate Change (IPCC), [*Climate Change 2007: Synthesis Report, Summary for Policymakers*](#) (Cambridge University Press, 2007).

Recommendations for catalyzing the discipline:

- Build capacity by increasing the number of researchers in the sociological study of the environment.
- Increase the presence of sociologists in climate change research and policy organizations.
- Provide funding opportunities to develop and conduct research projects that investigate the human dimensions of climate change.
- Develop an American Sociological Association committee and position statement on climate change.
- Facilitate sociologists' access to climate change research and policy networks.

Recommendations for forging interdisciplinary collaborations:

- Facilitate interdisciplinary collaboration and training.
- Encourage sociologists to embrace multi-method frameworks.
- Increase support of research networks and collaborations with natural scientists and engineers.
- Increase training of sociologists in natural science approaches to global climate change.
- Fund summer institutes that facilitate interdisciplinary working groups.

Recommendations for capacity building and infrastructure development:

- Include social scientists and social science data collection in large-scale ecological observation projects such as the Long Term Ecological Research (LTER) Network.
- Include data collection on climate change in currently supported data infrastructure projects such as the General Social Survey (GSS), Panel Study of Income Dynamics (PSID), and the American National Election Studies (ANES).
- Organize follow-up workshops to bring together environmental sociologists with sociologists specializing in models and tools to inform the study of climate change such as GIS specialists, demographers, network analysts, and consumer culture researchers.
- Develop an interdisciplinary Social Environmental Observatory Network (SEON).
- Create a training institute focused on the social dimensions of climate change.

The report concludes with appendices that list workshop participants, present the workshop agenda, and include the papers submitted by workshop participants. A complete copy of this report along with recommended readings and other useful information for climate change students and researchers is available on the University of Kansas Center for Research on Global Change website: <http://ireswb.cc.ku.edu/~crgc/NSFWorkshop>.



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Michele Betsill, Colorado State University
 Steven Brechin, Syracuse University
 Jeffrey Broadbent, University of Minnesota
 Robert Bullard, Clark Atlanta University
 Penelope Canan, University of Central Florida
 JoAnn Carmin, Massachusetts Institute of Technology
 Thomas Dietz, Michigan State University
 Riley Dunlap, Oklahoma State University
 Barbara Entwisle, University of North Carolina
 Marina Fischer-Kowalski, Alps-Adria University
 Dana R. Fisher, Columbia University
 Ken Frank, Michigan State University
 Eric Hanley, University of Kansas
 Sharon Harlan, Arizona State University

Marta Maldonado, Iowa State University
 Sabrina McCormick, Michigan State University
 Aaron McCright, Michigan State University
 Joane Nagel, University of Kansas
 Kari Norgaard, Whitman College
 Simone Pulver, Brown University
 Timmons Roberts, College of William and Mary
 Eugene Rosa, Washington State University
 Rachel Slocum, St. Cloud State University
 Paul Stern, National Research Council
 Kathleen Tierney, University of Colorado
 Beverly Wright, Dillard University
 Richard York, University of Oregon
 Sammy Zahran, Colorado State University

Background

Since the establishment of the Intergovernmental Panel on Climate Change (IPCC) in 1988,² the potential impacts of global climate change have captured the attention of the scientific research community and made it to the top of many international policy making agendas. As the human causes and consequences of climate change have become increasingly apparent, social scientists have found themselves called on to contribute to the scientific understanding of the role of humans in global climate change. The opportunities for social science at the international climate change table have tended not to be filled by sociologists. Sociologists have been slow to engage the topic of global climate change in their research. This is despite the fact that the reports of several governmental agencies in the United States and around the world cite human activity as one of, if not *the* primary driver of global climate change. For example, the IPCC's *Climate Change 2007: Synthesis Report*³ explicitly links climate change and increased greenhouse gases to human activity since pre-industrial times, and notes that the impacts of global climate change are expected to be unequally distributed across socio-economic groups and geographic space.



The National Academy of Science (NAS) Committee on the Human Dimensions of Global Change has produced a number of reports that address various social facets of global climate change.⁴ The 2008 NAS summary report, *Understanding and Responding to Climate Change*, identifies several areas as crucial for scientific investigation: 1) human activities that alter the earth's environment; 2) forces that drive these activities; 3) consequences of environmental changes for societies and economies; and 4) how humans respond to these changes.⁵ The work of the IPCC and NAS recognizes that global climate change is a social problem as much as it is a physical one; purely technical responses to climate change will not address the complex social, cultural, and behavioral changes that must occur if humans are to successfully confront the potential complex environmental challenges ahead.

Growing scientific and governmental acknowledgment that human activity and social behaviors are key drivers of global climate change underscores the critical role of social science in advancing, understanding, and designing strategies for responding to global climate change. Sociologists have a valuable array of perspectives, theories, methods, and tools to bring to the study of global climate change. It is important for sociologists to engage with the broader community of scholars, policy experts, and officials conducting climate change research and agenda-setting activities.

² Background on the Intergovernmental Panel on Climate Change and copies of all IPCC reports can be found at: <http://www.ipcc.ch/>

³ IPCC, *Climate Change 2007: Synthesis Report, Summary for Policymakers* (Cambridge University Press, 2007).

⁴ Links to National Academies Committee on the Human Dimensions of Global Change reports can be found at: <http://www7.nationalacademies.org/hdgc/>

⁵ The report can be found at: http://dels.nas.edu/dels/rpt_briefs/climate_change_2008_final.pdf

In order to assess the current state of sociological knowledge about global climate change and to expand the discipline's engagement in basic research on the human dimensions of global climate change, Joane Nagel, Director of the Center for Research on Global Change at the University of Kansas; Thomas Dietz, Director of the Environmental Science and Policy Program at Michigan State University, and Jeffrey Broadbent, Director of the Comparing Climate Change Policy Networks project at the University of Minnesota organized a workshop on "Sociological Perspectives on Global Climate Change" at NSF in Arlington, Virginia, on May 30-31, 2008.

This workshop brought together environmental sociologists already addressing climate change in their research, as well as sociologists working on related topics, but not yet pursuing research on climate-related global change.

Policy and government officials also contributed overviews of research programs in their organizations. One of the workshop's primary goals was to open a dialogue among participants so that they could collectively identify important climate-related research questions. Specifically the workshop was designed to:

- identify core areas of established sociological knowledge about global climate change.
- outline significant gaps in sociological knowledge about major topics related to climate change.
- facilitate interaction and collaboration among sociologists working on climate-related research.
- motivate sociologists to focus on climate change research topics.
- catalyze new sociological research on the human causes and consequences of global climate change.
- encourage sociological participation in interdisciplinary climate change research.
- formulate ways to increase the number of sociologists represented in national and international climate change research initiatives.
- introduce sociologists to leading experts involved in designing and funding human dimensions of global change research in national agencies and laboratories.

Before the workshop, participants were asked to read background materials, including selections from several key reports, including the IPCC Fourth Assessment Reports from Working Groups I, II, and III, the National Research Council Committee on the Human Dimensions of Global Change reports, U.S. Climate Change Science Program Synthesis and Assessment Product reports, and the International Human Dimensions Programme on Global Environmental Change (IHDP) Global Environmental Change and Human Health Science Plan and Implementation Strategy.⁶

⁶National Research Council Committee on the Human Dimensions of Global Change, *Decision Making for the Environment: Social and Behavioral Science Research Priorities*, Garry Brewer and Paul Stern, editors (2005); IPCC, *Fourth Assessment Report: Climate Change 2007 – The Physical Science Basis* (Working Group I Report); IPCC, *Fourth Assessment Report: Climate Change 2007 – Impacts, Adaptation and Vulnerability* (Working Group II Report); IPCC, *Fourth Assessment Report: Climate Change 2007 – Mitigation of Climate Change* (Working Group III Report); International Human Dimensions Programme on Global Environmental Change, *Strategic Plan 2007-2015: Framing Worldwide Research on the Human Dimensions of Global Environmental Change*, D. Williamson, editor (2007); U.S. Climate Change Program, *Synthesis and Assessment Product Reports* (2006-2008); International Human Dimensions Programme on Global Environmental Change (IHDP) *Global Environmental Change and Human Health Science Plan and Implementation Strategy* (2007).

Each participant was asked to write a short paper which was circulated in advance of the workshop and answered two central questions: 1) What is the state of sociological research on global climate change? 2) What are the major research questions that sociologists should be asking and answering about climate change?

What follows in this report is a summary of the discussions and recommendations that emerged from the workshop. The first three parts of the workshop report correspond to topics included in the IPCC Fourth Assessment's *Summary for Policymakers*: causes, impacts, and mitigation and adaptation.⁷ Specifically, participants were asked to identify the current state of sociological knowledge on global climate change and the most pressing understudied sociological questions. What knowledge and tools do sociologists bring to the table to better understand the causes, identify the impacts, and help to mitigate and adapt to global climate change? What are the core unanswered sociological research questions about climate change causes, impacts, mitigation, and adaptation? Workshop participants' answers were used to outline an agenda to guide future sociological research and inform policy on global climate change.

Part I summarizes ongoing and promising new areas of sociological research about the **social causes** of global climate change. Part II identifies presents ongoing and promising new areas of sociological research about the **social impacts** of global climate change. Part III describes ongoing and promising new areas of sociological research about the **social dimensions of mitigation and adaptation** to global climate change. Part IV contains **recommendations** for advancing sociological research on global climate change, including recommendations for catalyzing the discipline of sociology, forging interdisciplinary collaborations, and developing capacity and infrastructure to increase sociology's contribution to understanding and responding to global climate change.



⁷ IPCC, *Climate Change 2007: Synthesis Report, Summary for Policymakers* (Cambridge University Press, 2007).

Part I: Sociological Analyses of the Causes of Global Climate Change



Sociological research on global climate change has its roots in environmental sociology—a specialty field that developed in reaction to increased social awareness of environmental problems in the 1970s. Environmental sociologists examine and theorize the complex and multi-faceted relationship between human beings and their natural environments, including the question: why do social systems tend to exceed their ecological carrying capacities? Beginning in its early days, environmental sociology focused on the social and political dynamics of the environmental movement, studying how people organized around, reacted to, and adapted to air and water pollution, the impacts of technology, controversies over land use, and questions of environmental justice. By the 1980s, environmental sociology expanded its field

of inquiry beyond environmentalism as a social and political movement and began examining the underlying organizational, economic, cultural, and emotional factors that have shaped modern industrial society's relationship to the bio-physical world, in particular the implications for the environment of various models of economic development, political contestation, pre-existing structures of inequality, and questions of sustainability

Environmental sociology has drawn theoretical insights from the broader discipline of sociology in a number of areas, including research on social movements, political sociology, organizational sociology, small group and large-scale decision making, micro and macro foundations of social inequality, community studies, network theory, population and migration research, and models of globalization. Environmental sociologists have reached outside sociology's disciplinary boundaries to borrow and adapt theoretical models from population ecology, geography, and demography, among others. These different conceptual lenses have provided depth and breadth to a number of critical debates among environmental sociologists about the most important and promising theoretical and research questions and about the place of environmental sociology within the discipline of sociology and the social sciences.

In the four decades since its founding, environmental sociology has produced a substantive body of scholarship that highlights the motivations, behaviors, and organizing mechanisms underlying society's relationship with nature and the physical world. The field has provided important insights into comparative public opinion about the environment, diffusion of environmental institutions around the world, effect of values on individual environmental behavior, role of culture in shaping environmental exploitation and regulation, social interests driving consumerism and high resource usage production systems, capacity of societies to learn and practice sustainability, environmental effects of local and global systems of resource extraction, social dimensions of

environmental impact assessment, interaction of population, technology, and affluence on the environment, tradeoffs between economic growth and environmental protection, mobilization and networking of environmental movements, unequal social and economic consequences of environmental policies in local communities, and environmental implications of economic and political arrangements that characterize international relations and define the relative places of peoples around the world. Despite its foundational focus on the human-natural nexus, environmental sociologists have only recently turned their research attention to global climate change. There is, however, a great deal that sociologists in general, and environmental sociologists specifically, have learned that contributes to understanding the causes of global climate change, for example, which populations are most vulnerable and resilient to the impacts of climate change, and what is the role of competition among states in the global system to accelerating the drivers of global climate change.

The 2007 IPCC report documents increases in global atmospheric and ocean temperatures, predicts associated rises in sea level, and concludes that the warming of the global climate is both unequivocal and anthropogenic.⁸ Sociologists who study global climate change have devoted considerable efforts to investigating and applying a range of conceptual approaches to this emerging scientific consensus about global warming. Central to these sociological analyses is the knowledge that purely technological “fixes,” absent consideration of social factors, will not be sufficient to mitigate or successfully adapt to global climate change. The research areas listed below represent some of the major theoretical and methodological strategies used by sociologists to better understand the relationship between humans and their natural world and to identify the ecologically-relevant features of modern industrial nations and their impact on global climate change. Each section contains both a summary of sociological analyses of the social causes of global climate change and promising areas for investigation and questions for future research.



Political Economy: One of sociology’s most significant contributions to climate change research arises out of attention to the intersecting political and economic orders, at both global and national levels, as contributors and potential mitigators of global climate change. Like all social scientific approaches, political economy research acknowledges that climate change is not merely rooted in planetary physical systems, often the main focus of natural scientists, politicians, and the general public. Building on social theories like Allan Schnaiberg’s “Treadmill of Production,”⁹ John Bellamy Foster’s “Metabolic Rift,”¹⁰ and Marina Fischer-Kowalski’s “Social Metabolism,”¹¹ political economy analyses link carbon emissions and their effect on the global climate to

⁸ Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report, Summary for Policymakers* (Cambridge University Press, 2007), p. 2.

⁹ Allan Schnaiberg, *The Environment: From Surplus to Scarcity* (Oxford University Press, 1980); see also Kenneth Gould, David Pellow, Allan Schnaiberg, *The Treadmill of Production: Injustice and Unsustainability in the Global Economy* (Paradigm Publishers, 2008).

¹⁰ John Bellamy Foster, “Marx’s Theory of Metabolic Rift: Classical Foundations for Environmental Sociology.” *American Journal of Sociology* 105, 2 (1999):366-405.

¹¹ Marina Fischer-Kowalski and H. Haberl, *Socioecological Transitions and Global Change. Trajectories of Social Metabolism and Land Use* (Edward Elgar, 2007).

economic and social organization in modern industrial societies. Global political economy research underscores the relationship among national economies, political organizations, resource extraction regimes, and population demographics and their CO₂ (carbon dioxide) emissions. Political economy quantitative approaches examine cross-national data on national CO₂ emissions. They highlight differences among agrarian, lesser developed, and highly developed countries' metabolic profiles based on per capita consumption of materials and energy output. They also examine the implications of urbanization, industrialization, and the spread of consumer culture around the world. Environmental sociologists have examined the patterns and drivers of economic growth as they affect the environment, including cross-national research on the resource use, social metabolic levels, and environmental impacts of industrial and industrializing economies. They have evaluated hypotheses arising out of ecological modernization and world system models. The role of multi-national corporations in producing and responding to climate change (sometimes simply by “greenwashing” their products) has been well documented by environmental sociologists. Recent trends and areas for new global political economic research reflect a qualitative shift toward understanding the assumptions about progress, notions of individual rights, the ethos of consumption, and definitions of quality of life in modern industrialized societies.¹²

Human Ecology and Environmental Impact Models: Sociologists have applied theories from ecology to study the complex relationship between humans and their natural environment. The human ecology perspective underscores the socio-spatial dynamics of climate change and varied interactions humans have with their physical environments across spatial and temporal scales. Drawing on work in geography and urban studies, sociologists have applied this “place-based approach” to research on migration, resource competition, and disaster relief. This perspective provides evidence that while climate change is a global threat, its effects are experienced locally, and can better be understood when sociologists include data from humans' biophysical environments.¹³ A major contribution by environmental sociology is modeling the social causes and consequences of environmental change. These modeling techniques are directly applicable to the study of global climate change. For example, data collected by researchers in the STIRPAT¹⁴ research program link CO₂ emissions to “...the scale of population, levels of consumption, the pace of material flows, [and] the position of nations in the world system...”¹⁵ Environmental impact researchers have documented many of the pathways and obstacles to transitioning to a low carbon economy on both micro and macro levels. Areas for future research include assessments of carbon trading schemes and the impact of economic development on environmental change in the twenty-first century global system.¹⁶

Stratification and Status-Attainment Effects on Production and Consumption: Sociologists have examined the social factors that drive excessive production and consumption leading to high-throughput, high-waste economies. These studies investigate the social dynamics of conspicuous consumption and status display coupled with the power of advertising to drive consumers to expand their consumption habits often without regard to either environmental consequences or personal financial cost. Less well-studied is the role of advertising and public relations firms in shaping and framing public perceptions of global climate change as a scientifically credible or pressing social, economic, and political concern.¹⁷

¹² See Broadbent, Dietz, Fischer-Kowalski, Hanley, Pulver, Rosa, and York papers in Appendix 3.

¹³ See Harlan and Zahran papers in Appendix 3.

¹⁴ *Stochastic Impacts by Regression on Population, Affluence, and Technology*; <http://www.stirpat.org/>

¹⁵ See Rosa paper in Appendix 3.

¹⁶ See Betsill, Brechin, Entwisle, Fischer-Kowalski, Hanley, Maldonado, Rosa, York, and Zahran papers in Appendix 3.

¹⁷ See Brechin, Dunlap, Fisher, McCright, Norgaard, and Roberts papers in Appendix 3.

Cultural and Meaning Systems: Environmental sociologists use quantitative and qualitative methods to explore the social and cultural processes that shape attitudes, discourses, and ideological dimensions of climate change in public debates and policy processes. This scholarship is relevant to sociological understandings of the causes of climate change in that it explores how publics define climate change as a problem or not and view solutions to climate change as necessary and acceptable or not. Of particular importance here is the degree of public acceptance of natural science evidence as a guide to policy formation. Research on cultural and meaning systems assesses the attitudes, people, and organizations like the media, public relations firms, and political think tanks that shape public knowledge and opinions about global climate change, examines the social organization and rationales used by activists to promote and challenge scientific claims, and documents how these groups exert their influence to shape national agendas. Emerging work in this area asks, what are the social and psychological factors that cause individuals to internalize, react to, or deny the realities of global climate change? Strengthening research capacity to study these issues will be essential in programs designed to mitigate and adapt to climate change.¹⁸

Policy Process Research: Sociologists have employed multi-level analyses to study the range of factors that shape climate policy formation, implementation, and effectiveness within and across states and countries. This research examines the links between causes of and solutions to climate change; local, national, and international policies governing greenhouse gas production; the role of local, national, and international policies in allowing greenhouse gas production to escalate, stabilize, or decrease; cross-national comparisons of the social factors that affect political processes associated with climate change attitudes and policies; the effect of different institutions (i.e., pluralist versus corporatist), interest groups, advocacy coalitions, and participatory venues on the policy process. Important areas of research also include studying the interactions between states and non-governmental/ intergovernmental organizations, evaluating the effectiveness of specific government policies on decreasing CO₂ emissions, and analyzing social and cultural factors that influence the general public's attitudes about climate change.¹⁹

Social Organization of Science and Science Policy: Sociological research on the role of partisan politics, shifts in public discourse, and the influence of discourse and debates about scientific findings in the United States and abroad illustrates the need for projects designed to analyze the social organization of science and science policy. This research gets at the heart of the relationship between the science of climate change and its translation into public understanding and policy formation. Research on the social organization of climate change science and climate policy includes projects that identify features that make climate science and policy distinct from or similar to other science policy debates and implementation issues, explore the role of experts in governments and non-governmental organizations, and investigate the place of climate policy in changing individual and collective behaviors, attitudes, and beliefs about science and climate change. An important set of research questions are: What are the social processes by which the issue of global climate change emerged and evolved in public discourse? How have these public discussions affected climate policy? How do policy responses to global climate change work when analyzed in conjunction with the sociology of denial? How do the processes associated with climate public opinion and science policy compare across communities, geographic locales, or countries in the global system? How have different sectors within different countries reacted to the IPCC reports on climate change science?²⁰

¹⁸ See Broadbent, Dunlap, McCright, Roberts, and Norgaard papers in Appendix 3.

¹⁹ See Broadbent, Carmin, Dietz, Fischer-Kowalski, Fisher, Pulver, York, and Zahran papers in Appendix 3.

²⁰ See Brechin, Broadbent, Dunlap, McCright, Nagel, Norgaard, and Zahran papers in Appendix 3.

Part II: Sociological Perspectives on the Impacts of Global Climate Change

A central finding of sociology is that unequal power dynamics shape patterns of social mobility and access to social, political, and economic resources. An understanding of inequality is one of the most powerful tools that sociologists can bring to the study of global climate change. It is widely documented that the effects of global climate change will not be equally distributed around the world, and many of the countries least responsible for the rise in greenhouse gases will be most likely to feel its impacts in changes in weather, sea levels, human health costs, and economic hardships. These inequalities will be further exacerbated by the unequal burdens inflicted by climate-related disasters and limited disaster response capacities. One important predicted outcome of climate change is human migration



out of poorer regions and countries into more developed, less impacted areas; this environmental migration has the potential to strain the resources and social fabrics of receiving societies and deplete the human capital in sending communities. Variations in individual, community, and national vulnerability to the impacts of climate change are only part of the structure of inequality in global climate change. As the 2007 IPCC report notes, there is an unequal distribution of impacts and vulnerabilities to climate change associated with social class and age in both developed and developing countries.²¹ Furthermore, there is inequality between women and men, adults and children, and present and future generations. The quest for prosperity drives the rapid economic growth of large countries like China and India without whose cooperation, global mitigation efforts will fail. The unequal impacts of climate change are coupled with inequalities of representation in global and national policy-making arenas leaving global climate change policy efforts open to charges of bias. Below is a summary of sociological research areas elucidating the link between social inequalities and the impacts of global climate change and promising areas for future research.

²¹ "...vulnerability to climate change can be exacerbated by other stresses. These arise from, for example, current climate hazards, poverty and unequal access to resources, food insecurity, trends in economic globalisation, conflict and incidence of diseases such as HIV/AIDS." IPCC, *Climate Change 2007: Synthesis Report, Summary for Policymakers*, p. 14.

Environmental Justice: Sociology's attention to people, communities, and the socio-economic ordering of resource distribution, especially in contrast to research in the natural sciences or economics, makes sociological research on climate change critical to protecting vulnerable populations, e.g., the poor, elderly, children, women, and communities of color. Environmental justice researchers have shown that efforts to rebuild communities and distribute resources in the wake of environmental disasters require that researchers pay attention to the power differentials shaping people's access to fair and just protection from these disasters. Environmental justice scholarship builds on existing research by documenting how social inequalities are structured and exacerbated by environmental disasters and economic development in both industrial and industrializing countries. Sociological research on the intersections of race, gender, and class offers a lens for analyzing environmental justice dimensions of global climate change. Weather-related disasters like Hurricane Katrina can serve as a laboratory for future sociological research on equitable and inequitable rebuilding and aid practices, and can ensure that research on vulnerable populations is included in decision-making processes and policy-setting agendas. Research questions specifically include: How do social inequalities shape policy responses to global climate change? How are inequalities reproduced by responses to climate change and extreme weather events? How can medical, transportation, agricultural, and other sectors prepare and remedy specific challenges posed by social inequalities magnified by global climate change both within and among states? Specific topics for future research include right to return policies, post-disaster reconstruction (e.g., housing, business, infrastructure, and environmental refugees), and decreasing the environmental impact of rebuilding efforts.²²

Disaster Research: Scholars engaged in disaster research emphasize the social, political, and economic factors that magnify weather events like Hurricane Katrina and turn them into large-scale disasters. Disaster researchers examine the social organization of response and relief efforts and the underlying organizational and political cultures of disaster planning and response policies. Drawing on theories of social construction, disaster researchers trace the definition of disasters as they emerge from politically-organized responses, policy agendas, mass media coverage, and narratives of individual or collective responsibility for disaster prevention and response. Environmental disaster research follows the human ecology tradition by examining how human interaction with the environment exacerbates the negative effects of natural disasters, for instance, by destroying protective wetlands or developing residential housing in known flood zones. Disaster and hazard scholars have documented a lack of disaster readiness, response, and coordination efforts at both the local and federal levels in the United States. Post-9/11 policies have tended to shift power and authority to security and law enforcement agencies whose primary efforts and resources are focused on terrorism, rather than on the threats posed by environmental disasters. Sociological research is necessary to understand how these and other political decisions occur, and how they may magnify the impacts of climate-related disasters.²³



²² See Bullard, Maldonado, McCormick, Nagel, Slocum, and Wright papers in Appendix 3.

²³ See Carmin, Entwisle, McCormick, Nagel, Tierney, and Wright papers in Appendix 3.

Human Health: The IPCC and the World Health Organization (WHO) have catalogued a wide-range of vulnerabilities and threats to human health from changing weather and climate patterns. Poorer populations in the U.S. and abroad who lack access to adequate health care systems are especially at risk for the spread of air and water-borne infectious diseases whose emergence, frequency, and location are projected to shift under different climate change scenarios. Natural science and public health researchers have begun to note variations in seasonal diseases, like the flu, and the geographic spread of malaria and diarrheal diseases resulting from ill-equipped sanitation services and a lack of access to clean, fresh water. Medical sociologists, WHO researchers, and the IPCC note an increasing likelihood of deaths related to malnutrition, heat waves, and the spread of infectious diseases to populations that lack natural immunity and adequate health care. The extent to which changes in mortality are linked to the impacts of climate change is an important area for sociological research, as is the extent to which these impacts may be compounded by mass migrations resulting from climate-related natural disasters, the disruption of agricultural production, or loss of access to fresh water. Opportunities exist for sociologists to study the health impacts of global climate change: How are pre-existing social and health inequalities affected by medical systems' ability to accommodate at-risk, aging, or ill populations impacted by the physical, economic, and social consequences of climate change? What is the relationship among human migration, disease, and the capacity of poor communities to cope with the influx of seasonal, water-borne, or infectious diseases that are projected to increase and spread in tropical and subtropical environments? Research on health behaviors offers sociologists an opportunity to draw from methodological and conceptual approaches currently used by researchers in public health, disaster, and hazard research studies.²⁴

Security and Conflict: The effects of global climate change on water resources, agricultural production, weather, land use, and human health and social life have geopolitical implications. Sociological research on the shape and operation of the global economic and political system provides a strong foundation for launching studies of the implications of climate change on national and transnational mobilizations and conflicts associated with resource scarcity, resource allocation, and environmental decision making. Research on internal and international migration can be focused on the demography of climate change and the phenomenon of "environmental refugees." The IPCC noted the potential for conflict arising from the unequal economic, social, and health consequences of climate change, and the U.S. military has taken notice of the implications of climate change for "security," especially in light of the likely international race to secure limited and alternative sources of energy.²⁵ These impacts underline the importance of research on the ways that climate changes may change political relationships, and reshape alliances and national-security apparatuses as states seek to safeguard and obtain additional sources of energy. Sociological research on climate change drawing on globalization, world system, and political economy models have the potential to offer insights into questions of conflict and security, and the impacts on civil society of militarized responses to climate change.²⁶

Social Demography and Population Research: Understanding the scale of the demographic dimensions and likely outcomes of global climate change is one of the most important and promising opportunities for sociologists to contribute to climate change research and policy. Demographic studies of migration, fertility patterns, and health outcomes are directly applicable to studying the impacts of climate change. Demographic research on the relationships among population trends, economic growth, and patterns of human consumption have important implications for understanding various climate change impacts and policy responses. A crucial

²⁴ See Bullard, Entwisle, Tierney, and Wright papers in Appendix 3.

²⁵ Carol Pumphrey (ed.). *Global Climate Change: National Security Implications* (Strategic Studies Institute, United States Army War College, 2008).

²⁶ See Bullard, Nagel, Slocum, Tierney, and Wright papers in Appendix 3.

area for sociological research is to map the demographic impact of global climate change on different populations, especially differences in race, class, gender, age, health status, region, and nation. Sociologically-based research findings can inform human development scenarios for population sectors that are particularly vulnerable to climate change impacts. Sociological research should pursue the IPCC's human dimensions of climate change research agenda which calls for studies of the demographic aspects of poverty, unequal access to resources, food insecurity, conflict, and incidence of diseases. Demographic research on the impact of climate change could examine the causes, features, and consequences of global urbanization as well as the impacts of growing slums and urban megalopoli for greenhouse gas emissions, food production and consumption, water access and use, health outcomes, political participation, and a wide variety of other social, economic, and political variables.²⁷



²⁷ See Canan, Entwisle, Fischer-Kowalski, Harlan, Maldonado, McCormick, and Nagel papers in Appendix 3.

Part III: Sociological Approaches to Climate Change Mitigation and Adaptation

Scientific research hypothesizes a wide array of consequences of rising global air and water temperatures for different regions of the world: shifts in the availability of fresh water resources, changes in growing seasons and food supplies, increased coastal flooding, rising numbers of heat waves, unpredictable variations in the types and locations of diseases, and increased likelihood of severe weather events. Natural and social science research has begun exploring the implications of these predicted outcomes for human populations. They have, however, only begun to develop strategies using this emerging knowledge about the scope and outcomes of climate change. There are many opportunities for sociological research on mitigation (i.e., the reduction) of the drivers of climate change and adaptation to (i.e., coping with) the significant changes already underway. Many of the areas of sociological theory and research outlined in Sections I and II above are potential contributors to climate change mitigation and adaptation research. The 2007 IPCC reports identify a number of mitigation and adaptation options for managing changes in water resources, agriculture, infrastructure and settlement issues, human health, tourism, transport, and energy usage and production that can be informed by sociological research. There are also research opportunities to study variations in individual, community, and national resiliency and capacity to respond to climate change causes and consequences. These are not well-developed research topics in the scientific community, and do not reflect the broad involvement of social scientists. This gap in social science knowledge and representation is both an opportunity and a challenge for sociology as the world struggles to identify feasible mitigation and adaptation strategies for responding to global climate change, especially in light of the inequalities likely to be associated with both mitigation and adaptation.²⁸ Each section below contains both a summary of sociological approaches to climate change mitigation and adaptation and a discussion of promising areas for future research.



Multi-Level and Global Governance: Sociologists have begun to study the possibilities of different governance arrangements to maximize the effectiveness of climate change countermeasures. The climate change problem is global, but can only be solved through integrated governance systems at multiple levels: local, regional, national, and global. Given the potential for any individual signatory to defect from world-wide emissions control agreements, the success of such global governance efforts will require relatively high voluntarism

²⁸ “Adaptive capacity is intimately connected to social and economic development but is unevenly distributed across and within societies.” IPCC, *Climate Change 2007: Synthesis Report, Summary for Policymakers*, p. 14.

and willing assent. Effective climate change governance implies a historically unprecedented level of global cooperation. Creating workable rules, timetables, exchanges, credits, and subsidies will require extensive research and experimentation in which sociologists can make crucial contributions. Drawing on theoretical insights from research on social movements, organizational theory, and political sociology, sociologists have begun to study how interest groups share climate-related knowledge, the role of social networks in policy formation and implementation, the social and political dynamics of policy agendas, and the salience of political decisions made in national and international arenas. This research has expanded our understanding of land use and land changes, patterns of property and resource control, and the organization of international climate change policy formation and implementation, such as the Kyoto Protocol or the Intergovernmental Panel on Climate Change. Sociological research opportunities include studying the ways in which micro, meso, and macro global governance structures emerge and operate to design widely adhered to mitigation strategies such as carbon trading schemes, carbon taxes, alternative energy development, and green technology transfers, the conditions under which various forms of global governance produce consensus, adherence, and successful outcomes, and the feasibility of global governance alternatives to global conflict and militarization of climate change mitigation and adaptation.²⁹

Decision Making and Risk Assessment: The 2005 National Research Council report, “Decision Making for the Environment,” notes that the behavioral and social sciences are “...essential but often unappreciated knowledge bases for wise choices affecting environmental quality.”³⁰ The NRC recommended five areas for future climate change mitigation and adaptation research that fit well with the theoretical and empirical strengths of sociology: improving environmental decision making processes; institutions for environmental governance; including the environment in business decision-making; environmentally significant individual behavior; and decision-relevant science for evidence-based environmental policy. These research areas offer opportunities for sociologists working in the areas of decision making and risk assessment to shift their research to focus on questions associated with global climate change. Research questions associated with decision making and risk assessment include: what factors shape the responses of individuals, organizations, communities, and governments to environmental information, calls to arms, or challenges to policy formation; what strategies work and fail when communities and countries design programs to reduce greenhouse gas emissions, promote technical innovation, develop emergency response programs, or decrease consumer demand; what are the decision-making factors that influence governments and businesses to participate in environmental programs?³¹

Cultures of Consumption: It is not only economics and politics that shape responses to mitigate or adapt to global climate change. It is also cultural and meaning systems. Sociological research on consumerism documents its intimate relationship to economic production and advertising, definitions of personal “taste” and “distinction,” and styles of consumption integrated into the global circulation of popular culture. Policies designed to change consumption as a mitigation or adaptation strategy for responding to global climate change must take into account not only politics and economics, but also the cultural and social realms of human life. Sociological research on these and other aspects of the



²⁹ See Betsill, Broadbent, Fisher, and Pulver papers Appendix 3.

³⁰ Garry Brewer and Paul Stern (eds.), *Decision Making for the Environment: Social and Behavioral Science Research Priorities* (National Research Council of the National Academies, 2005), p.1.

³¹ See Broadbent, Fisher, Frank, Pulver, and Stern papers in Appendix 3.

consumption processes can identify institutional pathways and barriers to restructuring an eco-friendly economy. In addition to analyzing social, cultural, and political efforts that encourage consumers to “go green,” research in this area can explore the benefits, obstacles, and feasibility of creating more sustainable consumption habits and lifestyle choices in a consumer society; alternative modes of consumption, sustainability, and lifestyle behaviors of individuals and eco-friendly communities; the rise of green-marketing and advertising; and the relationship among environmental, consumer-advocacy, and human rights organizations.³²

Contributions to Advocacy and Action Research: An important issue facing sociologists conducting climate change research is whether their research will be useful to communities and policymakers seeking to mitigate or adapt to climate change, and whether such utility should be a high priority in identifying research questions and designing research programs. Questions of mitigation and adaptation are especially important areas of inquiry for researchers seeking to increase the broader impacts of their work for various constituencies—the public, governments, non-governmental organizations (NGOs), advocacy groups, and activists. Researchers seeking to make a difference through advocacy or action research should ask: Where are successful programs of mitigation or adaptation underway—what are their features, how were they implemented, what are their outcomes? Where are local and national programs underway to forge sustainable communities and change consumption habits—of individuals, local communities, or national economies? What is the role of “green” marketing in the development of green technology? Do green products reduce consumption or simply promote a new kind of consumption? Especially critical areas for sociological research are studies that analyze the ecological restructuring of economies and efforts to promote environmentally-friendly consumption habits, investigate the community dynamics for making sustainable places by drawing on ecological models of community studies and refining models that include geographic and social data gathered from environmentally impacted communities such as New Orleans, Louisiana, California firestorm communities, Greensburg, Kansas, and other places that have tried to mitigate and adapt to environmental disasters.³³

Organizations and Networks: Organizational sociology’s strategies for studying the internal structure and operation of organizations, interactions among organizations, organizational networks and sectors, and organizational evolution are all applicable to understanding the role of informal and formal organizations, economic and governmental organizations, and NGOs in climate policy formation, implementation, and enforcement. Important questions about organizations and networks in climate change mitigation and adaptation include: What is the organizational landscape of climate change mitigation and adaptation efforts? How are governments and NGOs moving to “climate proof” their aid projects? What are the links between climate change campaigns and environmental NGOs, especially humanitarian efforts to include environmental relief and the competition for financial resources available for environmental projects? What is the role of social and policy networks within and among states in the global system in shaping and enforcing climate change mitigation policies? Many of these research questions also are being asked by non-academic researchers. Academic sociologists need to make their work available to networks of people outside the academy, for example community organizers, NGOs, government agencies, at-risk communities, and indigenous populations who also are invested in mitigating and adapting to challenges presented by global climate change. Forging these relationships provides sociologists with ideas, potential funding, research opportunities, and outlets for their research.³⁴

³² See Brechin, Dunlap, Fisher, McCright, Norgaard, and Roberts papers in Appendix 3.

³³ See Broadbent, Canan, Carmin, Entswisle, and Stern papers in Appendix 3.

³⁴ See Broadbent, Canan, Carmin, Fisher, Frank, Maldonado, Rosa, Roberts, and Slocum papers in Appendix 3.

Part IV: Recommendations for Advancing Sociological Research on Global Climate Change

Workshop participants made specific suggestions and recommendations about what sociologists need in terms of enhanced training, tools, outreach, and networking to catalyze climate change research in sociology and to forge interdisciplinary collaborations to establish a sociological agenda for global climate change research. The first set of recommendations focuses specifically on what NSF and sociologists can do to encourage future research on global climate change within sociology. The second set of recommendations outlines steps to increase sociologists' networking, participation, and collaboration with other disciplines and subfields studying global climate change. The third set of recommendations addresses infrastructural development to advance sociological research on global climate change and serve the broader research community. The workshop papers in Appendix 3 provide workshop participants' analyses of the topics discussed in the sections above and contain many additional specific recommendations.



Recommendations for Catalyzing the Discipline

Sociologists are not well-represented in the field of climate change research, including research on the human dimensions of climate change. Organizations such as the IPCC and the major international actors that set the social science agenda for climate change research are relatively unfamiliar to sociologists [e.g., the International Human Dimensions Programme on Global Environmental Change (IHDP) or the Committee on the Human Dimensions of Global Change (CHDGC)]. Since many sociologists studying climate change identify themselves as environmental sociologists, the historical relationship between environmental sociology and the field at large has limited the “mainstreaming” of environmental and climate change research in sociology. Environmental sociology research typically has not been at the center of the discipline of sociology, and the leading journals in

sociology have been slow to publish environmental sociology research,³⁵ although several recent publications in the *American Sociological Review* may mark a change in this trend.³⁶

Workshop participants observed that early career sociologists may face disciplinary resistance and institutional challenges to specializing in environmental and climate change research. Research on these topics may be viewed by colleagues as marginal to the core concerns of the discipline, especially since opportunities for publication and funding have been limited. Despite the historical and contemporary obstacles facing sociologists who wish to study environmental change, and because of the pressing challenges posed by global warming, workshop participants made a number of recommendations intended to catalyze climate change research within the discipline of sociology.

- **Build capacity by increasing the number of researchers engaged in the sociological study of the environment** by recruiting sociology colleagues and students to study global environmental and climate change. This means environmental sociologists must reach out to other sub-specialties within sociology, collaborating with other scholars, mentoring junior colleagues, and recruiting and training graduate students to work in climate related topics, and increasing their involvement in university consortia that address climate change.
- **Increase the presence of sociologists** in local, national, and international research and decision-making by clearly articulating the distinct contribution of sociological approaches, research questions, and contributions to climate change research.
- **Provide funding opportunities to develop and conduct research projects** that investigate the human dimensions of global climate change broadly defined, including small grants to encourage new projects, new investigator awards, and funding to develop collaborations, convene workshops, and offer short courses in new techniques for studying the human dimensions of climate change.
- **Develop an American Sociological Association (ASA) Committee on Climate Change** and draft an ASA position statement.
- **Facilitate sociologists' access to climate change research and policy networks** by fostering better internal networking among sociologists. This could include creating a glossary, directory, or database that identifies important organizations and lists sociologists currently involved in major climate change science networks and research consortia (e.g., CHDGC, SEDAC, CIESIN, IHDP, PERN, AAAS, NRC).³⁷

³⁵ For instance, in the 1990s Naomi Krogman and JoAnne Darlington found that fewer than 2 percent of articles published in the leading nine sociology journals addressed environmental issues; Thomas Dietz reported in 2007 that the representation of environmental research in major sociology outlets has not increased much since then; see Naomi T. Krogman and JoAnne DeRouen Darlington, "Sociology and the Environment: An Analysis of Journal Coverage," *The American Sociologist* 27, 3 (1996):39-55; Thomas Dietz, PowerPoint presentation at the "Symposium on Linking Environmental Research and the Behavioral & Social Sciences," National Research Council, Washington, DC, April 25, 2007.

³⁶ Javier Auyero and Debora Swistun, "The Social Production of Toxic Uncertainty," *American Sociological Review* (June, 2008):257-279; Sherry Cable, Thomas Schriver, and Tamara Mix, "Risk Society and Contested Illness: The Case of Nuclear Weapons Workers," *American Sociological Review* (June, 2008):380-401; Rhonda Evans and Tamara Kay, "How Environmentalists 'Greened' Trade Policy: Strategic Action and the Architecture of Field Overlap," *American Sociological Review* (December, 2008):970-991; Klaus Weber, Hayagreeva Rao, L.G. Thomas, "From Streets to Suites: How the Anti-Biotech Movement Affected German Pharmaceutical Firms," *American Sociological Review* (February, 2009):106-127;

³⁷ Committee on the Human Dimensions of Global Change; Socioeconomic Data and Applications Center; Center for International Earth Science Information Network; International Human Dimensions Programme on Global Environmental Change; Population Environmental Research Network; American Association for the Advancement of Science; National Research Council.

Recommendations for Forging Interdisciplinary Collaborations

It was widely recognized by workshop participants that climate change research in the natural sciences often fails to address the biophysical environment's effect on real people, and that social scientists are seldom consulted except as an afterthought in natural science and engineering research projects. It was equally acknowledged that social scientists tend not to seek out collaborations with natural scientists and engineers and often are uninformed about major research programs on climate change. The result is that the research of each community does not tend to be informed by the insights and resources available from the others. This is true not only between the social sciences and the natural sciences, but among the social sciences themselves. For instance, sociological research projects seldom incorporate spatial processes, behavioral analyses, or economic models. Inter- and intra-disciplinary collaboration in research institutes or interdisciplinary proposal writing might be a way to broaden sociologists' participation in climate change research. Specific sociological research projects might self-consciously expand their data collection by, say, adding a spatial or economic component to their research design or by including colleagues from geography, political science, anthropology, or economics on their research team.

Another critical need identified by workshop participants was for sociologists to be knowledgeable about natural science research on global climate change. The ability to engage the broader scientific community requires sociologists to be familiar with the specific tools, knowledges, and approaches that others bring to the study of climate change. This often necessitates knowledge of the language and technologies of other disciplines, for instance, familiarity with remote sensing and Geographic Information Systems (GIS), or material and energy flow analysis. In addition to ongoing training for current faculty members, participants discussed the importance of sociology graduate student education in the natural sciences. Workshop participants also acknowledged that no amount of knowledge about the tools or projects of other disciplines will serve sociology well without a means of connecting with colleagues in other disciplines and opportunities to collaborate. Funding agency invitations to sociologists to participate in interdisciplinary workshops, conferences, and collaborative proposals are additional means to facilitate sociologists' involvement in interdisciplinary collaboration.

- **Facilitate interdisciplinary collaboration and training:** Workshop participants often reported the added value in their own research of collaborations with researchers outside of sociology who are also engaged in global climate change research; these collaborations offered sociologists access to the ideas, models, and tools of specialists from other disciplines, and enriched the quality of the resulting sociological research.
- **Encourage sociologists to embrace multi-method frameworks** such as qualitative sociological research that incorporates GIS or remotely sensed data, research that relates data on the material and energy metabolism of societies to social structural and demographic variables (e.g., population density, urbanization, working times, social inequalities), and research that interprets data from ecological studies through the lens of power relations, and broadens definitions of "landscape" from the geological or biological to the political, cultural, and social.
- **Increase support of networks and collaborations** with natural scientists and engineers. This is important for knowledge, but also because current funding options often favor projects that include research from the natural sciences and engineering.
- **Increase training of sociologists in natural science research approaches** for current and future sociologists engaged in global climate change research. This is especially critical for sociology graduate students who need exposure to climate change research in the natural sciences.

- ***Fund workshops and summer institutes*** that facilitate the creation of interdisciplinary working groups to train and encourage collaboration outside disciplinary boundaries. These institutes would bring sociologists in contact with specialists in emerging cutting edge areas in other disciplines, including training opportunities for “translating” research ideas and designing projects that combine disciplinary approaches.

Recommendations for Capacity Building and Infrastructure Development

Sociologists who study the environment bring some valuable tools to the table, since they often use both quantitative and qualitative methods in their research. Sociologists also bring a critical approach and awareness of global climate change as both a social and physical phenomena. Sociology’s mixed methods, multiple scales, and varied data-gathering techniques make them well prepared to study global climate change. Despite the utility of these methods, in discussions of a future agenda for sociological research on global climate change, workshop participants found themselves repeatedly coming back to the issue of data. A primary concern was the lack of datasets that include indicators relevant to climate change research. For example, few datasets document how specific organizations, businesses, or communities contribute to climate change either in terms of emissions or in their activism, nor is there systematic information on their mitigation response capabilities, willingness to engage in adaptation policies, or adopt climate action plans. Participants identified a gap in multi-level data that could allow the study of efforts to curb emissions on macro levels or that document micro changes of individual consumption patterns or lifestyle choices. Participants reported a lack of spatially-rooted data in current sociological research and often reiterated the importance of using datasets that incorporated both social and biophysical variables. For example, datasets on land-use practices could provide information about individuals’ attitudes and beliefs about their land and their everyday practices and decisions, or surveys, like the General Social Survey, could geocode respondents to allow for spatial analysis of data. Data on social and policy formation dynamics in different countries could be used to build a system to monitor and study their changing responses to climate change impacts over the coming decades. Participants also noted a critical need for data-based research that examines the relationship between global climate change and public health; scenario development for health impacts; and strategies to reduce risks associated with nutrition, food security, and public access to water. They emphasized the importance of research on public health based on measureable datasets, in addition to conceptual critiques of the underlying structures that shape people’s access and right to medical care.

- ***Include social scientists and social science data collection*** in ongoing or planned collaborative projects such as those underway at Long Term Ecological Research Sites (LTERS), Urban Long-Term Research Areas (ULTRA), and the National Ecological Observatory Network (NEON).
- ***Include data collection on climate change*** in currently supported social science data infrastructure projects such as the General Social Survey (GSS), Panel Study of Income Dynamics (PSID), and the American National Election Studies (ANES).
- ***Organize follow-up workshops*** to bring together environmental sociologists with sociologists specializing in models and tools to inform the study of climate change such as GIS specialists, demographers, network analysts, and consumer culture researchers.
- ***Develop an interdisciplinary Social Environmental Observatory Network (SEON)*** that will provide large-scale funding and guidance to social scientists interested in building high quality, panel, international datasets

on the human dimensions of environmental and climate change and the interaction of human and natural systems; such an investment could greatly improve the capacity to advance interdisciplinary social science research.

- **Create a training institute** similar to the Inter-University Consortium for Political and Social Research's (ICPSR) Summer Program in Quantitative Methods of Social Research at the University of Michigan with workshops, training sessions, and courses by visiting faculty (sociologists and non-sociologists) dedicated to studying social dimensions of climate change. This could be done in collaboration with NSF Science and Technology Centers (STCs), Engineering Centers, Integrative Graduate Education and Research Traineeship (IGERT) programs, and Partnerships for International Research and Education (PIRE).



Appendix 1: Workshop Participants

Tom Baerwald, National Science Foundation
Nancy Beller-Simms, National Oceanic and Atmospheric Administration
Michele Betsill, Colorado State University
Steven Brechin, Syracuse University
Jeffrey Broadbent, University of Minnesota
Robert Bullard, Clark Atlanta University
Penelope Canan, University of Central Florida
JoAnn Carmin, Massachusetts Institute of Technology
Thomas Dietz, Michigan State University
Riley Dunlap, Oklahoma State University
Barbara Entwisle, University of North Carolina
Marina Fischer-Kowalski, Alps-Adria University
Dana R. Fisher, Columbia University
Ken Frank, Michigan State University
Eric Hanley, University of Kansas
Sharon Harlan, Arizona State University
Patricia Romero Lankao, National Center for Atmospheric Research

Marta Maldonado, Iowa State University
Sabrina McCormick, Michigan State University
Aaron McCright, Michigan State University
Linda Mearns, National Center for Atmospheric Research
Joane Nagel, University of Kansas
Kari Norgaard, Whitman College
Simone Pulver, Brown University
Timmons Roberts, College of William and Mary
Eugene Rosa, Washington State University
Joel Scheraga, Environmental Protection Agency
Rachel Slocum, St. Cloud State University
Paul Stern, National Research Council
Kathleen Tierney, University of Colorado
Beverly Wright, Dillard University
Richard York, University of Oregon
Sammy Zahran, Colorado State University

Student Associates

Anna-Lisa Aunio, McGill University
Xiaodong Chen, Michigan State University
Lindsey Feitz, University of Kansas
Monique Laney, University of Kansas
Philip Mancus, University of Oregon

Umar Moulta-Ali, Ohio State University
Vikrum Sequeira, University of Texas at Austin
Rachel Shwom, Michigan State University
John Tribbia, University of Colorado at Boulder

Appendix 2: Workshop Agenda

NATIONAL SCIENCE FOUNDATION

Workshop on Sociological Perspectives on Global Climate Change

AGENDA

FRIDAY, May 30 (8:30-5:30 & dinner): Stafford II, Room 595

MORNING

8:00-8:30 BREAKFAST (catered in conference room)

8:30-8:45 Introduction: Judith Sunley, Deputy Assistant Director, NSF Directorate for Social Behavioral and Economic Sciences; Frank Scioli, Senior Advisor, NSF Division of Social and Economic Sciences; Patricia White, NSF Sociology Program Director

8:45-9:45 Self-Introductions: All workshop participants

9:15-10:00 Climate Change Studies in Sociology

- What do we know about the sociological aspects of global climate change?
- What research is underway?

10:00-10:15 Break

10:15-12:30 Climate Change Studies Context: Agency Experts

- What are the resources available to climate change sociology researchers (foundations, agencies, funding sources)?
- Who are the audiences/policy actors to whom our work should be addressed?
- Theories and models of human and social dimensions of global climate change

12:30-1:30 LUNCH (catered in conference room)

AFTERNOON

1:30-5:30 Sociological Perspectives on Global Climate Change: Sociologists make five-minute individual presentations that identify:

- one major thing we know about the sociology of global climate change
- one major thing we need to know about the sociology of global climate change

EVENING

6:00-8:00 DINNER (off campus)

SATURDAY, May 31 (8:30-3:30): Stafford I, Room 110

MORNING

8:00-8:30 BREAKFAST (catered in conference room)

8:30-10:30 Working Sessions: Participants work in groups to draft statements responding to these questions which will become basis for Final Report.

- What do we know now—what are main bodies of knowledge about sociology climate change?
- What do we need to know—where can sociology make a contribution and what should be our future research agenda?
- What tools do we need to find out what we need to know?
- How do we increase sociology's broader participation in the human dimensions of climate change research?
- What next after this workshop?

10:30-10:45 Break

10:45-12:30 Working Session Reports

12:30-1:30 LUNCH (catered in conference room)

AFTERNOON

1:30-3:00 Open Discussion: Workshop participants, observers, audience

3:00-3:30 Final Wrap Up Session

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Michele M. Betsill
Colorado State University

Earth System Governance: A New IHDP Research Initiative³⁸

What do we need to know: What are the major sociological research questions?

In 2001, the four global change research programmes³⁹ declared in their joint Amsterdam Declaration an ‘urgent need’ to develop ‘strategies for Earth System management’. Yet what such strategies might be, how they could be developed, and how effective, efficient and equitable they would be, remained unspecified. The International Human Dimensions Programme on Global Environmental Change (IHDP) took up this challenge in March 2007 by mandating an international group of governance experts to develop a science plan for a new international long-term research project within IHDP: the Earth System Governance (ESG) project. This paper introduces the ESG with special attention to the potential contributions of sociology and sociologists to the challenge of governing global environmental problems such as climate change.

People, Places, and the Planet: We define earth system governance as the interrelated and increasingly integrated system of formal and informal rules, rule-making systems, and actor-networks at all levels of human society (from local to global) that are set up to steer societies towards preventing, mitigating, and adapting to global and local environmental change and, in particular, earth system transformation, within the normative context of sustainable development. On the one hand, earth system governance refers to an emerging social phenomenon that is expressed in hundreds of international regimes, national policies, international and national agencies, local and transnational activists groups, local community initiatives, and expert networks. At the same time, we understand earth system governance as a political project that engages a wide range of actors who seek to strengthen the current architecture of institutions and governance arrangements from the global to the local level. In both meanings, we see earth system governance as a demanding and vital subject of research for the social sciences.

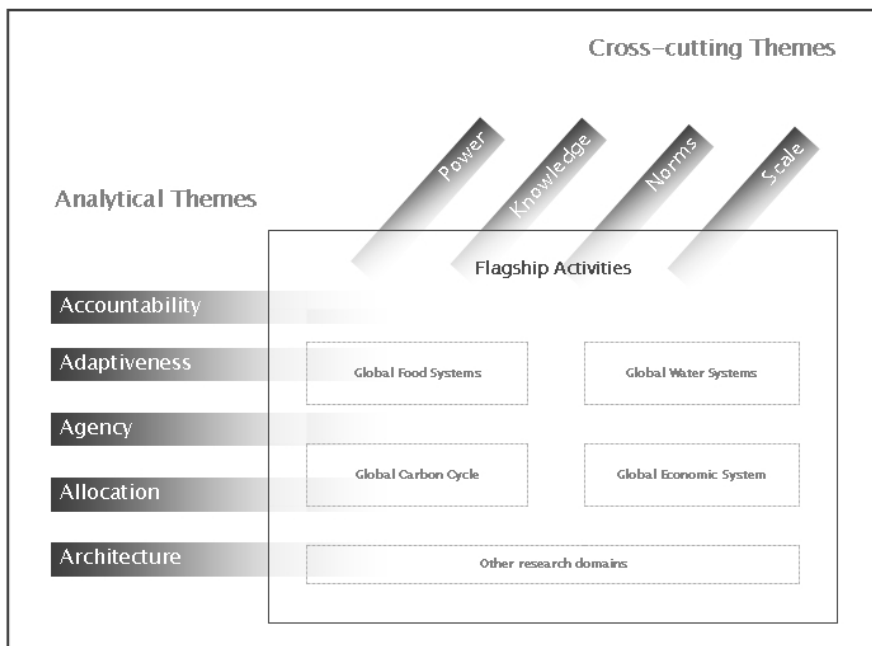
Such research is no easy undertaking. It must bring together a variety of disciplines—including political science, sociology, economics, policy studies, geography, and law. It must span the entire globe because only integrated global solutions can ensure a sustainable co-evolution of natural and socio-economic systems. But it must also draw on local experiences and insights and offer solutions to local governance problems. In other words, research on institutions and governance in times of earth system transformation must be about *people* who are drivers of global environmental change and at the same time part of any solution. It must be about *places* in all their variety and diversity, yet seek to integrate place-based research in a global understanding of the overall challenge to steer human interactions vis-à-vis earth system transformation. Eventually, this research will thus need to be about our *planet*. It is the task of developing integrated systems of governance, from the local to the global level, that ensure the sustainable development of the coupled socio-ecological system that the Earth has become.

³⁸ The Scientific Planning Committee for the Earth System Governance initiative includes Frank Biermann (chair), Vrije Universiteit Amsterdam; Ken Conca, University of Maryland; Bharat Desai, Jawaharlal Nehru University; Joyeeta Gupta, Vrije Universiteit Amsterdam; Norichika Kanie, Tokyo Institute of Technology; Louis Lebel, Chiang Mai University; Diana Liverman, Oxford University; Heike Schroeder, Oxford University; Bernd Siebenhüner, University of Oldenburg; Simon Tay, Singapore Institute of International Affairs, and Michele M. Betsill, Colorado State University; see <http://www.earthsystemgovernance.org>

³⁹ The International-Geosphere Biosphere Programme, the International Human Dimensions Programme on Global Environmental Change, DIVERSITAS, and the World Climate Research Programme. Together, these programmes make up the Earth System Science Partnership (<http://www.essp.org/>).

Conceptual Framework for the Study of Earth System Governance: The development of theories to understand, and of strategies to advance, earth system governance evolves today into one of the most important and possibly also most difficult tasks for the social sciences. The Earth System Governance Scientific Planning Committee has developed a conceptual framework based on the proposition that earth system governance can best be understood by combined research on five *analytical problems* with four *crosscutting themes* that can be explored in the context of four *flagship activities* (Figure 1).

Figure 1



We propose that a new research effort on the theory and strategies of earth system governance revolves around five key analytical problems. It involves questions of the emergence, design and effectiveness of governance systems as well as the overall integration of global, regional, national and local governance—that is, the quest for effective *architectures* of earth system governance. It also requires understanding the actors that drive earth system governance and that need to be involved—that is, the question of *agency* in earth system governance. Third, earth system governance must respond to the inherent uncertainties in human and natural systems; it must combine stability to ensure long-term governance solutions, with flexibility to react quickly to new findings and developments, and to learn. In other words, we must understand and further develop the *adaptiveness* of systems of earth system governance. Fourth, the more we confer regulatory competence and authority upon formal and informal institutions and systems of governance—especially at the global level—the more will we be confronted with questions of how to ensure the *accountability* and legitimacy of the governance systems that are created and made more effective. Simply put, we are faced with the need to understand the democratic quality of earth system governance. Fifth, earth system governance is, as is any political activity, about the distribution of material and immaterial values. It is, in essence, a conflict about the *access* to goods and decision-making processes and about the *allocation* of costs and benefits—it is about justice, fairness, and equity.

In addition, we have identified four crosscutting themes that are of crucial relevance for the study of each analytical problem but also for the integrated understanding of earth system governance. First, it is essential to understand how *power* relationships shape the formation and practice of earth system governance. Second, we must explore the role of *knowledge* and social learning in governance arrangements. Third, in exploring each analytical problem of earth system governance, researchers will have to deal with the role of overarching *norms*, values, and broader ideational structures. Finally, researchers must confront questions of *scale*, such as whether findings and hypotheses apply at all spatial and temporal scales and how governance arrangements interact across scales.

Finally, we propose a series of *flagship activities* consisting of focused, integrated studies of earth system governance in specific issue domains. These projects will allow for integration of the findings from research on the five analytical problems and four crosscutting themes in ways that will increase theoretical knowledge on the core elements of the overall system of earth system governance. The projects on food, carbon and water will serve as platforms for linking the social science research on earth system governance with other research activities in the broader earth system science community.

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

The Role of Sociology and Sociologists: Below are a number of examples of how the methodological tools and theories of sociology might contribute to the study of earth system governance as well as some specific areas of research that might be of interest to sociologists. These general issues could be applied to the specific problem of climate change in the context of the flagship activity on the global carbon cycle. These examples are meant to be illustrative of the range of possibilities and should not be viewed as an exhaustive list.

- Theories of organizational behavior can contribute to the analytical problems of agency and adaptiveness by helping us understand how firms, organizations and individual actors learn.
- The analytical problem of agency raises fundamental questions about the nature of authority in social structures.
- Hazards research and theories of risk can be used in the study of different societies' vulnerabilities and adaptive capacity in the face of environmental change.
- Which differences—gender, class, ethnicity, age, disability, religion, nationality and so on—are most relevant to the increased and new vulnerabilities created by global environmental change?
- Sociologists could contribute to our understanding of the role of knowledge in earth system governance through studies of how different actors produce and use knowledge to make decisions related to the natural world.
- What is the relationship between participation (or lack thereof) by marginalized groups in decision-making processes and the influence of governance arrangements on the co-evolution of coupled human-natural systems?

- Theories of social movements and social movement mobilization could inform research about the challenges and opportunities for involving civil society in governance arrangements when the problems of earth system transformation cut across multiple spatial and temporal scales.
- As market mechanisms become more prominent in the governance of global environmental change, how do the costs and benefits fall on the most vulnerable populations at a variety of spatial scales?
- What are the norms and ideals that shape the development and adoption of principles to govern access to natural resources at all levels of social organization and how do they reflect social, economic, political and/or cultural differences?
- Research on earth system governance can be carried out using a range of sociological research methods including discourse and content analysis, participatory action research, ethnography, social network analysis, advanced statistical techniques, case studies, agent-based modeling, spatial analysis, and scenarios.

Process and Next Steps: The Scientific Planning Committee for the Earth System Governance initiative was appointed by the IHDP Scientific Committee in May 2007 and charged with drafting the science plan for this new research activity. The Committee held three intense drafting meetings—the Netherlands (May 2007); Indonesia (December 2007); and United States (March 2008).⁴⁰ Our work builds on the legacy of the IHDP’s Institutional Dimensions of Global Environmental Change core project, which ran from 1996-2007. In addition, we have sought feedback on the conceptual framework from the research community as well as from practitioners in a variety of settings, including the 2007 Amsterdam Conference on the Human Dimensions of Global Environmental Change, a side-event at the Bali climate change negotiations in December 2007, a workshop and roundtable at the 2008 annual meeting of the International Studies Association, and several lectures and presentations by individual committee members. A draft of the science plan will be submitted to the IHDP Scientific Committee at the end of April 2008 and sent out for external review. Pending the outcome of the process, the IHDP Scientific Committee may endorse the initiative at its October meeting in which case the project would be officially launched at the 2008 Open Meeting of the Human Dimensions of Global Environmental Change Research Community in New Delhi, also in October.

⁴⁰ Generous funding for the drafting of this Science Plan has been provided by the IHDP (for meetings in the Netherlands and in Indonesia); by the International Studies Association (for a meeting in the United States); and by the Institute for Environmental Studies of the Vrije Universiteit Amsterdam (which hosted the secretariat and website of the scientific planning committee).

Steven R. Brechin
Syracuse University

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Introduction: When it comes to climate change/global warming I am actually quite pessimistic about our future. I do not see a global collection of societies – peoples, economies and governments - responding quickly or fully enough to avert a changing global climate. Consequently I believe significant social consequences will follow. It all becomes a matter of degree of outcome. And this is an important matter.

At the same time, my pessimism should not be mistaken for compliancy or a belief in a fatalistic outcome. I do not advocate doing nothing at all. We must try to make a difference and social scientists, including us sociologists, can help by both improving our odds of responding appropriately and diminishing the social consequences that will follow. The following reflections are thumbnail sketches of topics that perhaps should be explored in greater depth. I took this scattergun approach as a strategy to see if a few may “stick to the wall.” My subheadings are: Tipping Points; Bias against Teleology; Individuals to a System of Nations; Responding Before or After?; Understanding Public Attitudes and Values – A Conundrum; The Political Economy of the 2% Problem; and Institutional Theory and the Sociological Study of Complex Formal Organizations.

Sociologists do indeed bring the power of the sociological imagination to the study of social processes and outcomes. Our methodologies are diverse as our subject matter and provide powerful tools to pursue social inquiry. Sociology and sociologists offer a critical approach to understanding social life. Global climate change represents well the interactions of physical/natural worlds with those of the social, the core ingredients of environmental sociology. Environmental sociologists specialize at their intersection. With groups as the principal unit of analysis, we sociologists offer views to understanding how individuals function as part of groups or how various groups interact with one another. Here the work of Dana Fisher (2004) [*National Governance and the Global Climate Regime*] on national and international politics and climate change fits in as does Aaron McCright and Riley Dunlap, [and more recently Bill Freudenburg et al. on SCAM] clearly show the role of organized interests groups can influence both the public’s understanding of the problem and political processes themselves that help to derail needed policy action on climate change. This is sociology at its core and it provides important tools and perspectives to pursue greater understanding of the climate change problem as well as for designing solutions to combat its effects.

What do we need to know: What are the major sociological research questions?

Tipping points: I believe in the concept of “tipping point.” [see Malcolm Gladwell (2000) *The Tipping Point*] discussion. This is also called the logics curve, logistic function, or sigmoid function]. Of course this cuts both ways – in terms of the process of an accelerated climate change as well as delaying in us making significant impacts. Understanding both the science base tipping points regarding our global climate system and the socio-economic-political ones in terms of responses to slowing or reversing global warming/climate change become the critical task of all scientists, sociologists as well as for climate scientists. What needs to be asked are there enough “little thing” to be collected to make a key difference or do we need to focus on large-scale solutions? Or how most effectively can we achieve tipping points for responding to climate change?

The Sociological Problem of Predicting the Future - Bias against teleology: Interestingly, we all individually and collectively continue our average daily lives/acts and planning for the future as if nothing major will happen. This is likely a natural reaction since it is essentially impossible to predict what will happen and hence it is unclear how one should prepare for a different and unknown social reality. For example, we continue to invest as we do in our retirements that are based on our financial systems and on the assumption that the world economy will continue to grow. My wife and I have been investing huge sums of money in a cottage and property on Lake Michigan in Northern Michigan for our eventual retirement, assuming that the lake and area of rolling cherry orchards will maintain the physical and cultural qualities that we so appreciate presently. We would feel foolish indeed that we decided to do nothing or planned differently and our fearful predictions failed to come to pass. So we more or less blindly carry on. What other options do we have? Focusing on the future is a topic that sociology and sociologists do not seem to have much stomach for. In fact, it is typically avoided. While there have been a few renowned sociologists that have attempted to theorize about the future. The most well-known modern examples are likely Daniel Bell's *Coming of the Post Industrial Society*. Another is Ulrich Beck's *The Risk Society*. I believe the study of climate change, especially focusing on future changes, rubs up against a bias against teleology in our discipline. How can we as sociologists write about the potential of future realities without being labeled as promoting teleological thinking? Or perhaps climate change is very much teleological given that many events of the history lead to a future direction? This is a tricky problem. The bottom line is that sociologists should be "free" to speculate our collective future. What sort of academic interventions may be required to promote and protect that ideal?

Sociological Imagination and Responses – Individuals to a System of Nations: Personally, at the individual/family level, in an effort to help relieve our cognitive dissonance over our environmental future, our cottage is being built with the most affordable green practices and technologies available today. It in fact will be a LEEDS certified structure either at the gold or platinum level. While all of this is nice and makes us sleep a little better at night, we have no delusion that our single act will have much significance in the global picture. Even if hundreds of others did the same it would not make much of a difference. It would take individual acts into the millions if not billions to have a meaningful impact. How can we think about change at such a level? Might it be even beyond our capacity to comprehend? But is this not the stuff of the sociological imagination originally outlined by C. Wright Mills? The question here is how does one get billions of individuals to make the choices and decisions necessary to avoid the worst of global climate change? Is it from value change at the individual or even at cultural levels, changes in market structure/institutions, and choices, change in political processes and leaders, or changes in science and technology? Perhaps it is all these things? But with limited time and resources, where do we invest our intellectual, financial, and political capital? To me this remains the central question in our sociological investigation: *How does one promote effective change that affects the decisions and actions of billions of people – essentially everywhere?* Obviously some individuals and groups are guiltier than others and inequities in both problem creation and solution should be recognized. Still, how much should we depend on individual and voluntary decisions [read markets]? Can we succeed with such an approach? If so, what is the best path? How do we succeed in reaching the tipping point where all the decisions reduce our current carbon load? Or do we need to structure the institutions of societies globally so billions of citizens will make the correct environmental choice every time? If so, how do we accomplish that? Can environmental practices be imposed from the top down? Or must they be bubble up from the bottom? [See Barry Rabe (2004) *Statehouse, Greenhouse* (Brookings Institution)]. How might one get the two processes working together at the same time? These are critical questions that likely need to be answered.

Responding Before or After: How does one mobilize? One of the most pressing issues that I see can be summarized in this question: How do we as a society – as members of the public, civil society, and government; citizens and officials respond to an issue [or problem] *BEFORE* it is experienced as a concrete threat? We know from climate science that there is likely a tipping point in our climate system, where it shifts from the one we know, more or less, to another that we do not. Where in history have we as a nation, or any nation, mobilized to the possibility of a threat before it has become an actual threat, that is ... been proactive vs. simply being reactive? How can we make the investment in solutions so that we can avoid unknown shades of disaster? Typically it is difficult to muster the political and public support for solutions until after the problem exists. This may be a problem at the individual as well as institutional level. Y2K may be one example? How did we do that? From what I understand [and my knowledge here is very limited], was that while the threats were many and largely unknown, mostly there was no vested economic interest drawing lines in the sand. In fact, it was an economic windfall to particular players in the software industry. In short, with Y2K there was money to be made by correcting the potential problems vs. powerful sector of the economy – fossil fuel industry and the extractive industries more generally - whose bottom lines and perhaps entire future to be affected if action is taken. A key question for me is how do we engage these powerful economic interests in finding solutions instead of simply attempting to delay action? It may be worthwhile funding research to search for examples of pre-emptive socio-political-economic actions and the lessons learned from those efforts.

Another area of research should likely focus on the social disruption and consequence of a failure to respond appropriately... which I actually predict. If we wittingly or unwittingly take an adaptive approach to climate change, we need to think clearly about the social disruption that would emerge from climate change. I think that once a tipping point is achieved, change and its consequences will be experienced quite rapidly. There are of course, consequences in the poorer, developing south and the consequences experienced in the richer, more developed north. And what might be a particularly interesting examination would obviously be the interaction of the two. I fear that if the U.S. people and government are concerned now about issues of legal and illegal immigration, how will we respond as a nation to issues of dramatic change affecting the livelihoods of millions of people across the globe? How will groups in U.S. society respond to dramatic international turmoil and economic disruption and downturn globally? Without an expanding economic pie both domestically and internationally I am fearful that fear itself will take hold, and we will lose a collective sense of ourselves and breakdown on race, class and religious lines even more than we are currently. If our society—and the global collective – become dysfunctional the social consequence will be enormous.

Understanding Public Attitudes and Values Related to Global Climate Change: A Conundrum? In the more democratic countries, encouraging public understanding and support of global climate change may be critical to the process of forging national and international approaches to addressing the problem. More specifically, public support in particular may be critical in encouraging/requiring public officials to make decisive action on climate change. The last 15 years have been instructive in that we see that the public is very much influenced by public discussion – either from conservative forces [think tanks; certain political parties] or from more progressive ones [Al Gore; other political parties]; from campaigns of disinformation to efforts to provide a clearer message. The public is quite easily influenced and that disagreement alone can confuse the public and stall political and policy action. We have also learned that there are important powerful actors against any meaningful climate change policy. Climate change, as have environmental issues more generally, has also become politicized. Although this may be changing some as the Bush Administration is prepared to leave office, it remains largely a partisan or at least an ideological issue.

Climate change – like many issues of science – is complex and difficult for the lay public to understand. This makes discussion of it relatively easy to make confusing. Again McCright and Dunlap as well as Freudenburg [2007] have clearly demonstrated this. Here I like the work of psychologist Jon Croson at Stanford University, whose work is useful in that it makes clear why segments of the population are easily influenced one way or another. His work shows that the public have little ability to independently determine what scientific arguments and empirical evidence are sound or not. Hence the public takes cues and form their policy position based on their particular reference groups. Hence if you are an individual more aligned with environmentalism you are more likely to take your cues/positions and attitudes from environmental organizations. Likewise if you are more conservative in your political views you are more likely to take your cues from conservative individuals and organizations. Hence the position of these reference group organizations matter tremendously in shaping public attention and attitude toward these important issues. In a democracy, the ability of these groups to sow misinformation and confusion is difficult to counter. This leads to a secondary issue on the misappropriation of civil society legitimacy that I will not discuss here.

The Conundrum! While public support for climate change policies in the U.S. has been slow in developing, especially due to the very clever efforts of organized groups against such action, how do we explain the lack of progress made in reducing CO₂ in other countries outside the U.S. that have not experienced the degree of public controversies over climate change? Clearly having the U.S. government not becoming a party to Kyoto and playing a relatively minor role in current negotiations to construct a new treaty to replace Kyoto is not very helpful in creating global consensus regarding the politics of climate change. Still, why have other governments who have signed the treaty and publics who have been widely supportive of curbing greenhouse gases made little significant progress since in reducing their own emissions? In fact, a recent news article suggested that due to the rapid rise of oil prices, Italy is thinking about returning to burning coal [from oil] for power generation. If this policy is pursued it would be a step backwards. Is the fact that the U.S. government has NOT taken on a leadership role in this topic been a key problem? Or are there some other factors that need to be investigated to explain the lack of significant progress in CO₂ reductions even in pro-Kyoto countries? If so, what are they?

If the attitudes of the public, pro or con, seem to have little impact on actual CO₂ reductions, should our national strategy be less about developing public and political consensus on the issue of climate change and focus more directly on supporting economic, institutional, and technological change in the production and use of energy? Will green technologies/ ecological modernization provide the solutions we need? If so, what policies, institutions, norms, etc. need to be created to push for green technologies alternative energy sources and for greenhouse gases conservation? What strategies should be pursued? At the same time we need to think about the unanticipated consequences of green technologies? The social and environmental consequences from alternative energy production options need to be thoroughly researched given the current impact on world food supply and prices from the conversion to biofuels. [see Time, April 7, 2008: The Clean Energy Myth]. How do we avoid such “perfect storms” in attempting to pursue positive action?

The Political Economy of the 2% Problem: Stanford climate scientist, Stephen Schneider, likes to talk about the 2% problem. The two percent problem is that industries claim that they should not be required to shoulder the burden of climate change mitigation because they represent only 2% of the problem. Or why pick on us? Schneider responds by saying that 30 other industries argue the same. Taken in isolation there is little will to respond. Taken collectively, the logic becomes undeniable. Still, while the logic may be clear, the responses are not based on this logic but on politics. In his 2005 article in *Social Forces*, Privilege Access, Privilege Accounts, sociologist Bill Freudenberg discusses the issue of the industrial production of harmful externalities

and disproportionality. Basically, only a few bad actors produce the vast majority of the pollution in any given industry. In short, if one could clean up or eliminate these few bad actors in any given industry there would be significant reduction of harmful externalities to both people and the environment. But the question remains, how does one explain the existence of these incredibly bad actors especially when they harm the reputation of the entire industry? The answer lies largely with the power of diversionary discourse and political connections. If one criticizes poor performance, one must be criticizing the importance of jobs, economic development, and the capitalist system. It is also the case these firms are located in particular political contexts – especially at the local and state levels, with the political representatives protecting the future of these organizations. Hence the political economy of pollution emergences and change is made difficult.

Institutional Theory and the Sociological Study of Complex Formal Organizations: With the acknowledgement of the political economy of pollution and even the active efforts of third party organizations to represent the interest of polluting industries in civil society discourse and political responses, I think there is research that needs to be undertaken to explore organizational change through the applied use of institutional theory. We know from institutional theory [new institutionalism] (DiMaggio and Powell 1983, 1991) that organizations pick up new structures and practices from other organizations located in their particular organizational field (industrial systems). In short, over time, organizations within the same organizational field begin to look and act alike. Powell and DiMaggio outline three major isomorphic processes: coercive, mimetic, and normative. Coercive represents the authority of government to legislate or mandate change or compliance, usually in a particular field, e.g. health care. Mimetic processes refers to the voluntary decision-making that actors do, typically under competitive pressure of one sort of another, to copy the behavior or structures of others. Few actors typically invent innovations but rather adopt them from others by scanning their technical environment [i.e. following what their competitors are doing]. And finally normative processes is adoption of certain behaviors, ways of thinking, and behavior based on what is viewed as ‘best practice’ or professionally required. Here professional standards and activities are adopted because they seem extremely appropriate to do so. Failure to adopt these practices would likely signal to the larger environment that your organization is substandard. These are powerful processes that have not been tested, to my knowledge, for social change. Hopefully the application of this theory seems, at least basically obvious. What are the ways in which isomorphic processes could be applied to changing organizational practices in critical organizational fields? One could build off the fine work by Andy Hoffman, *From Heresy to Dogma* (2001 Stanford). On an organizationally related topic, I find considerable concern on the behavior of industry-sponsored third parties. When third party organizations, NGOs in particular, are formed to protect the narrow interest of particular business organizations at the expense of the larger public through disinformation, these organizations are appropriating the legitimacy found in civil society. They then use that legitimacy to promote the interest of their parent organizations. This is a controversial statement in that it remains unclear today what should be in or out of civil society. Still there is an appropriation here that should be critiqued. When does “civil society” not live up to its ideal of promoting the public good?

More Theoretical/Climate Change Topics as Background to other Scholarship: Finally this is a topic that may be beyond the scope of this workshop. I am currently working with others at the Maxwell School on exploring the theoretical relevance of the Intergovernmental Panel of Climate Change as an organization. The IPCC is a type of network organization that is based on the integration of government, civil society, and business interests. This is a new form of organizing that emerges largely out of Europe and represents a major new form of international relations. While governments play an important role, their authority legitimacy as the sole authority on all matters of international and political is being dramatically replaced in more a consensus model, not just of governments, but other stakeholders as well and work toward promoting the public good. This work is part of a larger effort on the sociology of international organizations.

Jeffrey Broadbent
University of Minnesota

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

The social sciences are developing considerable insight into human and social factors that drive global climate change. The basic cause lies in the human quest for economic and political security, and beyond that, for relative social status through consumption display. These social factors produce population growth, technological invention and increasing affluence, the physical drivers of impact on the environment (as noted by the IPAT formula and its predecessor in population biology, the Kaya Identity). We also know that humans, unless socially restrained, are prone to dump their waste into unprotected spaces (the environment) without paying for the negative effects (defined by economists as market externality). Over the past 150 years, as population has grown and waste increased and become more toxic, we have reached the limits of nature's absorptive capacity and started to change the very ecological systems that support life as we know it. These basic principles hold true across all types of societies and underlie our current climate change dilemma. Most people and societies around the world want the fruits of growth, and some actors pursue these goods with the most inhumane tactics imaginable. Whatever the method, though, the industrial system of mass production and consumption has become ironically self-destructive in its longer term ecological impacts. We know that systems of individualized competition tend to exacerbate environmental dumping and systems of laws and regulations have sometimes reduced it. But in the case of climate change, radical reduction in the dumping of greenhouse gas emissions into the atmosphere strikes at the very heart of contemporary industrial civilization. The human input to the needed geochemical change will require not only new technology, but massive conservation by high GHG output countries (not all of high per capita output). This simple fact implies a profound ecological rationalization and reorganization of national and world economy, politics, social patterns and cultures.

Climate scientists have conclusively demonstrated the geophysical principles of our dilemma. The European Union has proposed a goal of 50 (percent reduction of global GHG emissions) by 2050. Pragmatic social actors such as governments, legislatures, businesses and non-governmental organizations have begun to experiment with new sets of rules (formal institutions, sometimes proposed by political scientists), such as cap and trade. Despite these attempts, however, our planetary atmosphere presently remains on track for a disastrous increase in average temperature well beyond the danger line of two degrees Centigrade. For that reason, concerned researchers are beginning to look beyond market and institutional concepts, turning instead to the *dynamics of interaction* among the sectors and actors that produce societal behavior and its governing policies. This IHDP itself (the International Human Dimensions Program on Global Environmental Change, under the auspices of the United Nations) demonstrates this shift. Within it, starting in the mid-1990s, political scientists created a sub-unit to study the Institutional Dimensions of Global Environmental Change (IDGEC). But after ten years, the static concept of institution had outlived its utility. In 2007, the new IDGEC leader announced a change in analytical paradigm from institutions to the more fluid and dynamic concept of "earth systems governance." He described this new concept in terms of dynamic networks and relationships among actors. This shift defines a whole new research agenda particularly receptive to the distinct ideas and methods of Sociology generated by its relational perspective.

The social sciences have boiled the social dynamics of our collectively self-destructive behavior down to a fundamental model known as the Prisoner's Dilemma (aka the Tragedy of the Commons and the Public Goods problem). We know from social-psychological small group experiments with this model that people tend to defect

on promises to act in collectively beneficial ways to the extent that their immediate personal incentives to defect are high and their faith that the other parties will keep the promise is low. If the immediate material incentives to defect are kept stable, experiments show, compliance to the promise will be improved to the extent that actors increase their trust in each other through repeated games in which they both learn the terrible consequences of defection. In other words, moving away from impersonal self-seeking rationality, the actors have to develop relationships with each other that are mediated by trust. While trust may have a rational basis in past experience, at any given moment the pattern of trust among actors exists as a patterned network in society that is not reducible to self-interest. Therefore, as ways to control the self-destructive dynamics of a group, along with reducing the short term material incentives for defection, there also exists the possibility of building and intensifying the networks of trust conducive to cooperation toward the long term among the actors. While we know this much from experiments on small groups, though, we have no sure knowledge about how to apply the same principles to bigger, more diffuse groups, such as nations or global society. The indication of relevance, though, presents us with a fundamental hypothesis to structure research on the dynamics of larger-scale social interaction in general, as in this case as applied to the dilemma of global climate change. At the national and global scale, social dynamics become enormously more complex and difficult to adjudicate, and global climate change does not give us the luxury of repeated games.

What do we need to know: What are the major sociological research questions?

To respond to climate change, we need to know about more than the final binding decisions taken by authorities or the ecological effects of individual and social behavior. We need to probe more deeply, into the social demands and their representation that so strongly condition decisions and behavioral practices. Only by grasping these deeper social processes can we hope to devise ways to channel them in more beneficial directions. Yet, our understanding of them remains fallible at best. Different disciplines see social demand and its political effects through distinct paradigmatic glasses. Where economists and political scientists attribute social and political behavior to rational choices and formal institutions, sociologists see *patterns of relationships* at work. To explain the emblematic Prisoners' Dilemma, rational choice and formal institutionalism may suffice for the incentives and rules, but the emergence of trust and cooperation requires the relational perspective of sociology. There lies the distinct contribution of sociology to the study of these social processes. Because of its relational orientation, sociology is well prepared to study the networks and flows of interaction among social actors, sectors and institutions (structural analysis) and social categories of meaning (discourse analysis) as constituent inter-actor processes that construct macro-outcomes. For instance, sociology's relational perspective has sparked the study of: 1) large-scale social change; 2) social constructionism; 3) social movements; 4) social networks; 5) power structures (fields 2, 3 and 4 have recently started to spread to political science).

When we look at the problem from this perspective, many lines of inquiry open up. The crucial concern is to reduce the greenhouse gas emissions of national societies. For this macro problem, two alternative theories present themselves: the Treadmill of Production and Ecological Modernization. The Treadmill argues that a powerful interest bloc of producers, workers and consumers drives continual economic growth and heedless environmental exploitation. In contrast, the Ecological Modernization school argues that even such self-interested actors, when they become aware of the long-term destructive consequences of their behavior, can learn to adopt new sustainable practices. The Treadmill view assumes the primacy of conflict and the imposition of the winner's goals. But the Modernization view assumes the possibility of social learning through persuasion to cooperate toward collectively beneficial long term goals. Either process could potentially be effective for GHG reductions. The potential conditions of their effectiveness present a number of hypotheses for investigation.

Under a given international climate change regime or set of institutional rules, nations respond differently according to the respective conditions. The key knowledge transmission runs from the IPCC at the international level to receptor organizations in the different national cases, through them into prevalent discourse, participatory forums and advocacy coalitions, and finally into the content of decisions. The *strength of advocacy coalitions* (conflict) and the *functionality of participatory forums* (persuasion) should determine the effectiveness of this information flow into policy. Contributing to their effect should be a number of impinging social factors: the credibility and capacity of the national scientific community, the strength of civil society, the legitimacy of the national bureaucracy, the reliability of the rule of law, the institutions that aggregate and represent public demands (electoral rules, parties), and the existing patterns of diverse networks (information sharing, political support, mutual aid and authoritative guidance). For instance, one hypothesis is that nations with corporatistic political institutions (Japan, Sweden, Austria, Sweden), because of their participatory policy-making venues, should learn more readily and produce greener environmental decisions than other political systems. In addition, the effect of cultural fields of national discourse with their typical beliefs and judgments about climate change pose additional questions for investigation. For instance, are highly religious as opposed to secular cultures necessarily more resistant to accepting the reality of anthropogenic climate change?

One problem with conducting this type of inquiry has been the inadequacy of our methods. Until recently, the social sciences had no empirical method to study the variety of interactive, relational processes among actors that constitute macro-formations (nation-state bounded societies) and build up into macro-level behavioral outcomes. Over the past several decades, though, sociology has developed that, suitably tweaked, offers this research capacity: policy network analysis. This approach (developed by Laumann, Pappi, Knoke and others) allows the researcher to trace and compare the patterns and effects of different relational patterns and belief fields among actors as they contribute to large-scale decisions and social change. This kind of data permits the comparative testing of the posited hypotheses. The project on Comparing Climate Change Policy Networks (Compon, PI Broadbent) gathers matched empirical data on these patterns and fields in 19 countries and at the international level, as they react to climate change and its international regimes. This empirical study will bring evidence to bear upon the crucial questions enunciated above, while at the same time establishing a global network of research institutes on the social science of climate change and providing an open-use data set for further research on these issues. The Compon project is now collaborating on this effort with Climate Central, a project based at Princeton and Stanford Universities to improve natural science related public education concerning climate change.

Robert D. Bullard
Clark Atlanta University

Sociology of Global Climate Change: Toward an Environmental Justice Frame

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

There is widespread scientific consensus that global climate change is occurring. Climate change looms as *the* global environmental justice issue of the twenty-first century. Climate change poses special environmental justice challenges for communities that are already overburdened with pollution, poverty, and environmentally-related illnesses. The world's poorest countries of the Global South and most vulnerable peoples will suffer the earliest and most damaging setbacks, even though they have contributed least to the problem of global warming.

The most recent report of the Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2007: Impacts, Adaptation and Vulnerability*, identified key vulnerabilities associated with climate-sensitive systems, including food supply, infrastructure, health, water resources, coastal systems, ecosystems, global biogeochemical cycles, ice sheets, and modes of oceanic and atmospheric circulation. The IPCC also predicts the impacts of future changes in climate are expected to fall disproportionately on the poor, and communities in low-lying coastal and arid areas, with many who are highly dependent on farming, fishing or forestry seeing their livelihoods severely curtailed or destroyed.

Scientists predict droughts, wildfires, and dust transported between continents to cause locally severe economic damage and substantial social and cultural disruption and possible political conflict—including North-South conflict. Climate change around the world is creating a new category of people known as “environmental refugees.” The number of people forced to flee their homes because of extreme weather events is increasing globally. Over 2 billion people worldwide were affected by disasters in the last decade. In 2001, more than 170 million people were affected by disasters, 97 percent of which were climate-related. There are more “environmental refugees” (25 million) than “political refugees” (22 million). By 2010, the number of “environmental refugees” is expected to grow to 50 million and could reach as high as 150 million by 2050.

Most of these refugees are uprooted by gradual environmental shifts such as desertification, diminishing water supplies, and rising sea levels. Climate change costs. In the 1990s, disasters such as hurricanes, floods, and fires caused over \$608 billion in economic losses worldwide, an amount greater than during the previous four decades. Changing climates will negatively impact food production—making drought-prone regions especially vulnerable to food shortages and “food riots.” It will also harm fish and many types of ecosystems and threaten human health with a broad set of problems, including water shortages, increased injuries and deaths from severe weather such as hurricanes, heat stress, cold stress (hypothermia), as well as increasing death rates and cardiovascular and respiratory disease related to aeroallergens and worsening air pollution caused by the higher concentration of ground-level ozone (smog) that accompanies higher temperatures. Ground level ozone sends an estimated 53,000 persons to the hospital, 159,000 to the emergency room and triggers 6,200,000 asthma attacks each summer in the eastern half of the United States. Air pollution causes an estimated 50,000 to 120,000 premature deaths in the U.S. each year.

Approximately 600,000 deaths occurred world-wide as a result of weather-related natural disasters in the 1990s; and some 95 percent of these were in poor countries. There is evidence that climate change has already affected human health. The World Health Organization (WHO) estimates that the global burden of climate change

exceeds 150,000 deaths per year. Many diseases are highly sensitive to changing temperatures and precipitation, including vector-borne diseases such as malaria, cholera, diarrhea, dengue fever, Rift Valley fever, plague, and emerging infectious diseases such as hantavirus, Ebola hemorrhagic fever, and West Nile virus. Variable precipitation can compromise the supply of freshwater—increasing risk of food-borne and water-borne diseases. Nearly one-third of the world’s population lives with chronic water shortages that directly threaten human health, agriculture and economic development. Scientists predict an increase in global “resource wars” breaking out as potable water and oil become scarce and as price escalates. Fresh water is a commodity—more valuable than crude oil.

What do we need to know: What are the major sociological research questions?

The environmental justice movement was born in response to environmental injustices and the failure of government and the political system to respond fairly and equitably to social, economic, and health disparities resulting from industrial activity. Environmental sociology and disaster research fields, and the mainstream environmental and conservation movement for that matter, overwhelmingly dominated by whites, were slow to acknowledge the concept of environmental racism and apply the environmental justice paradigm to their research protocol and to real world environmental problems that confront low income, people of color, and other vulnerable populations. As a result, an entire field and movement (environmental justice), with race and social equity emphases at the center, was built to fill this research, policy, education, community outreach, and organizing gap.

Similar parallels hold true for the Climate Change Movement which emerged largely out of the mainstream environment and conservation movement. Because those most affected do not for the most part have a voice at the research, policy, and legislative table in shaping national strategies to address climate change, a parallel Climate Justice Movement has emerged from the convergence of climate change and environmental justice. This relatively new movement, with its diverse allies of researchers, scientists, educators, health professionals, analysts, planners, community activists, and others, has much to offer the nation in resolving climate change and many of the “legacy” problems that have resulted from industrial policies and human settlement patterns.

Sociological research is needed to better inform and provide data-based support for the response to climate change that include research on the association between climate change and public health (including mental health), scenario development to forecast health impacts and vulnerabilities, and development and testing of strategies to reduce risk. The issue of “who gets left behind before and after disasters strikes and why” is a core climate justice research and policy question. As seen in Hurricane Katrina that hit the Gulf Coast in 2005, the effects of climate change fell heaviest on the poor and people of color. The deadly pattern of climate change is also likely fall disproportionately on the poor and people of color across the U.S. who are concentrated in urban centers, coastal regions, and areas with substandard air quality—including ground level ozone.

A growing body of research supports the notion that the government response to Hurricane Katrina and the response to the subsequent flooding of New Orleans were not a fluke. Generally, research has been spotty on the impact of race on post-disaster relief, recovery, rebuilding, and reconstruction—particularly in southern the United States with its unique legacy of slavery, “Jim Crow” segregation, and entrenched white supremacy.

Clearly, race and place in the U.S. are interconnected. Vulnerable places often map closely with race. Place is racialized with benefits, resources, and opportunities unevenly distributed across the landscape. Businesses and employers are keenly aware of and contribute to racialized place. Although illegal, redlining

practices used by insurance companies, banks, and mortgage companies are built largely around racialized zip codes. Historically, racialized place buttressed Jim Crow and translated into white neighborhoods receiving libraries, streets lighting, police and fire protection, paved roads, sewer and water lines, garbage pick-up, swimming pools, and flood control measures years before black neighborhoods received these tax-supported services. Racist housing policies relegated many blacks to “low-lying” vulnerable places.

Katrina exposed a weakness in urban mass evacuation plans. Emergency transportation plans are built around car ownership. Car ownership is almost universal in the United States with 91.7 percent of American households owning at least one motor vehicle. American cities are not built for mass evacuations. Disasters highlight the problem non-drivers and transit-dependents residents face everyday. Transportation planners and social researchers fail “special needs” population before and after man-made and natural disasters strike. As in the case of Hurricane Katrina and similar disasters, emergency transportation planners generally fail the “most vulnerable” of our society, individuals without cars, non-drivers, disabled, sick persons, elderly, and children.

Sociological research is needed to answer other key questions: Will government response to climate change be fair? Does fairness matter? Does race and class matter? What lessons can be learned from environmental justice research, policy, and community organizing and their applicability to climate change work? Research is needed on institutionalized factors that shape strategies to reduce the direct and indirect impacts of climate change on vulnerable populations—issues surrounding “environmental refugees” and internally displaced persons (IDP), privatization and commodification of water, access to health care and insurance, reconstruction of damaged communities, increased competition for scarce resources such housing, food, energy, etc., marginalization of already marginalized communities, price gouging, predatory lending, banking and insurance redlining, and “wind vs. flood” insurance tug of war.

Penelope Canan
University of Central Florida

Ideas and Methods that Sociology Can Contribute to Climate Change Studies

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Communities, both as places and as affiliations, are arenas of social learning as well as spaces of contest and change. For global warming, the challenge for sociologists is to bring knowledge of global societal-natural system processes down to communities of action and social regulation. I hope we can respond to public clamors for ethical, scientific guidance in assessing a blizzard of competing and contradictory claims for lightening the carbon footprint of the (especially) American human community.

Sociology has never been more “relevant” or publicly valuable. It is a revolutionary time and our discipline cut its teeth on the “great upheaval” of the industrial revolution. During the current revolution, how can sociology frame the questions about climate change (Agrawala 2001) as well as contribute to solutions? My lens for our contribution is the sociology of community. I mean communities as *places for de-carbonization*, via communities of *affiliations* among “de-carbonists,” effectively networked for principled leadership in *sustainability communities*.

Human beings—the influential species in the Anthropocene—live their entire lives in groups. This is because the species is by nature social. These groups form communities that exist in both physical and social space simultaneously, in varying degree. These communities vary in boundaries, size, allegiance, focus, place, and rank. They also vary in their impact on the environment, directly and indirectly. However, the disciplines most directly involved in understanding human behavior, sociology, anthropology, psychology, were barely involved in defining the “Human Dimensions” of global environmental change. The result was a list approach without coherence that has not served well (Canan 2005).

What do we need to know: What are the major sociological research questions?

I. What are the Community Dynamics that Make for Sustainable Places? How can we support leadership in urban and regional de-carbonization and sustainable development?

A. Invest in creating/testing/improving comparative rubrics for measuring progress in de-carbonization and sustainable development. Begin with an inventory of what’s being measured, how, where, with what assumptions, at what scales? What do urban and regional decision makers need, e.g., correlates of decarbonization and “co-benefits/co-costs. Include data on community values, preferences, trade-offs, citizenship opportunities and methods for effective participation in the design of de-carbonization pathways.

B. Test this framework in “Middletown” extend NSF’s investment in the extremely valuable longitudinal record of community change in the US by adding regional carbon cycle dynamics to its development history. Based on the results of the Middletown Urban and Regional Carbon Management Study, create a template for comparative and historical place-based, process-oriented, and scale-sensitive research on the social drivers and management opportunities in the carbon-climate-human system. The result should be an Integrated Human-Carbon-Climate Impact Assessment Tool, helpful for a dialogic among social scientists, policy makers, civil servants, the public, and the media.

C. Organize this framework for comparison and information retrieval according to a simple extension of the POET mnemonic of the classic ecological model of community studies (Park and Burgess 1921, Bernard 1973) such that we P=Population; O=Organization; E=Environment; T=Technology; I=Institutions; and, C=Culture.⁴¹ The heuristic device of POETICs provides a handy referent for making comprehensive descriptions of different places that can locate the city/region within a larger continent, within a complex trans-border commercial trading regime, or a world system of social stratification, known as the developed and developing world (PEWS). Organizing questions and data collection according to POETICs provides an easy-to-remember device to encourage the systems thinking at the base of Earth Systems Science. Besides non specialists working in communities of various sizes, social scientists may see links between their topical interests and the de-carbonization challenge. The aim is to address the systemic questions of how material and socio-cultural conditions combine with natural features of a geographical place and ecosystem type.⁴²

D. Refine this model of Community-Carbon-Change in Middletown, USA with information from communities selected for relevant experiences in environmental disasters and severe climate changes, e.g., New Orleans, Mississippi coastal communities, fire damaged California, tornado-struck Greenburg, Kansas. Others, like Moloka'i, the first community the US DOE selected to test how community values could drive electricity self sufficiency (Canan and Hennessy 1982). Add sociological research findings to the database once they have been re-coded for geo- and socio-place locators.

E. Develop and maintain interactive database, organized by POETIC categories into which place-based human-carbon-climate system research can be available to permit meta-analyses, immediate access to we could reply academic practical inquiries like the following:

Dear all,

We are looking for information on cities in Asia which have developed climate change action plans, either on mitigation and/or adaptation. ...Once we have an overview we will share this with the Listserv. We are interested to find out (i) how many cities have such plans or are working on them, and (ii) whether such action plans adopt a co-benefit approach,

i.e. integrate air quality or other developmental objectives as co-benefits of the climate action proposed. Please send the information to meat cornie.huizenga@cai-asia.org with copy to alvin.mejia@cai-asia.org.

⁴¹ For similar sets of factors used in comprehensive overviews of the environmental impacts of human activities as captured by ecologists and biologists, see MacKellar 1998; Lebel 2003; Abler 2003; Lambin 2001; Geist and Lambin 2003. See also sociologists Rudel and Roper 1996; Rudel 2001.

⁴² Consider the life that comes to mind with PLACE NAMES like the Bible Belt, the Dust Bowl, the Rust Belt, the Pacific Islands, the Rocky Mountains. These place names evoke images of their unique configurations of topography, climate, natural resources, settlement size, demographic composition, ethnicities, cultural practices, languages, political and economic activities, wealth, governance structures, music, language, and even poetry. They certainly differ in their carbon budget dynamics. See Schulz (2006) for an empirical test of the POETICs of PLACE model applied to Japan's urban, industrial CO₂ emissions.

II. Promote the widespread understanding of communities as networks of power (for and against change) participating in a revolution of de-carbonization.

A. We actually have a peculiarly special teaching moment for our discipline. Network action is a powerful organizational force, especially useful for intentionally flexible responses to changing operating conditions. This is because network components can be selected and quickly “activated” as they were in creating the knowledge for implementing a global protective regime for the stratospheric ozone layer under the Montreal Protocol (Canan and Reichman 2002). Carbon IMBALANCE rides on the most complex of worldwide systems of economic, political, and cultural interests, with the dominant culture being globalized capitalism assisted by “multi-focal” growth machines. These deeply entrenched institutional systems (networks of existing practices) make challenge by even an activated public, interested media, and scientific consensus difficult.

Showcase carbon network research on CARBON COMMUNITIES and DE-CARBON COMMUNITIES in the journal of *Carbon Balance and Management* and through relationships with science journalists as laws, regulations, and codes are revised under the current “greening of America.” This work should bring credible evidence of the specific, policy-relevant (financial) connections between the decisions made, the decision makers, and the nature of costs and benefits at multiple scales and loci of governance.

B. Some applications of network theory and methods to climate change issues listed by scholars attending the GCP Workshop on Social Network Applications to Climate Change (2005) were as follows:

- ✓ Mapping power
- ✓ Identifying missing or weak clusters in policy making or implementation
- ✓ Locating shared values, worldviews
- ✓ Creating knowledge-sharing action teams
- ✓ Knitting networks for change
- ✓ Time and Place Stamps in Network Data
- ✓ Computational Laboratories

III. Support the nascent effort to build a research community dedicated to carbon dynamics.

Consider the recommendations in the “Mexico City Declaration,” as reported in “Responsibility, opportunity, and vision for higher education in urban and regional carbon management,” Canan and Schienke (2007) <http://www.cbmjournal.com/content/1/1/13#IDAQ3UJE>

JoAnn Carmin

Massachusetts Institute of Technology

Governance for Achieving Urban Climate Adaptation

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Until recently, most climate change scholarship has focused on one of two issues. The first is rooted in scientific debates on whether or not the climate actually is changing. Sociological research has enhanced our knowledge of this arena by looking at the ways in which interest groups have worked to affect climate-related knowledge, policy agendas, and political decisions in international and national contexts. The second dominant stream of scholarship pertains to ways to mitigate climate change, either through policies and technological innovations that will reduce GHG emissions or by altering demand. In this domain, sociologists have advanced our understanding through research in areas such as environmental risk perception and communication, environmental values, and the human dimensions of environmental degradation and protection.

In the past year or so, it appears that a shift has taken place in the general orientation and rhetoric of many international discussions and national deliberations. Rather than debating the veracity of the science, many countries have begun considering how national and sub-national governments can deal with the impacts of climate change that they believe are certain to take place. In other words, climate adaptation has taken a seat alongside of climate mitigation as a concern for many nations of the world.

In the period preceding a trip to Bali I noticed that a number of NGOs were expanding their efforts to address issues related to climate vulnerability, justice, and adaptation. While this shift in NGO activity peaked my curiosity and led me to initiate a modest study of the campaigns of environmental and non-environmental organizations, several additional events resulted in climate adaptation becoming an integral aspect my research agenda. First, I was contracted by the Europe and Central Asia Division of the World Bank to write a background paper on urban climate adaptation in the region. Second, I am teaching a class on urban climate adaptation. In addition to classroom work, my students are spending several weeks in South Africa where they are learning about the activities of municipal agencies and thinking about how routine practices and established programs can be linked to a climate adaptation agenda. The goal is that they will generate ideas about how climate adaptation can be best achieved in highly vulnerable (and under resourced) cities and develop tools that public officials can use to learn about adaptation and set their adaptation priorities.

I will draw on some of my current research on NGOs and recent experiences in Eastern Europe and South Africa to address what we know about climate adaptation, what I believe we need to know, and the ways that sociological scholarship is central to understanding two issues: urban climate adaptation and the contributions being made by NGOs to climate adaptation planning and implementation. While these issues draw on different bodies of theory, they are unified by the need to ensure that climate adaptation is a priority for cities, public officials are familiar with the need for adaptation, and government agencies and departments understand how they can use their existing capacity—including the contributions of NGOs—to move from planning to implementation.

What do we need to know: What are the major sociological research questions?

I. Achieving Urban Climate Adaptation: The impacts of climate change will not be limited to rural populations and agricultural areas nor will they only affect a few select cities that are situated in highly vulnerable locales.

Whether they are located in coastal or mountainous areas, or in the global north or the south, cities and towns throughout the world are vulnerable to climate impacts. To date, most climate change efforts have focused on national policy within specific sectors (e.g., agriculture, energy, water, health). While sound national and sectoral policy is important for setting priorities and shaping agendas, it does not account for the need to address urban concerns and the associated local actions required to prepare cities and citizens for the impacts of climate change.

To promote the economic vitality of countries and protect the well-being of their inhabitants, it is essential that local governments have the political will and capacity to adapt their cities in ways that account for the impacts climate change. Evidence from countries throughout the world suggests that some municipalities are integrating climate adaptation efforts into their existing efforts. In some cases, they are cultivating their internal capacity by developing dedicated teams to address climate mitigation and adaptation. In many other instances, climate concerns are integrated into municipal planning on a case by case, issue by issue basis. In still other instances, climate change is not being addressed nor are provisions being adopted that embrace practices associated with sustainable development.

The range and scale of activities involved in preparing cities for the impacts of climate change are unprecedented. To properly ready cities for climate uncertainties, public officials must attend to interdependencies between the built, natural, and human environments, including the social, economic, political, and cultural realities of daily life. Sociological research from a range of sub-disciplines offer points of departure for understanding the dynamics of urban climate adaptation and for assisting municipalities in overcoming some of the challenges that they will encounter.

For instance, urban sociology provides a means for understanding power and politics in cities. Theories in this domain inform our understanding of the forces shaping public and private uses of physical space and decisions about the built environment. They also can shed light on the ways in which relationships between governments, private interests, and civil society actors and organizations can facilitate or impede adaptation. A related area of scholarship pertains to public participation. Studies of urban communities offer numerous insights about designing participatory processes that can build trust and foster commitment among diverse populations. These insights can be used to inform the design of processes for creating and implementing adaptation programs and plans.

Drawing from scholarship in environmental sociology, studies of environmental injustice can help us better understand the inequities associated with climate change and ways that the impacts of climate change on vulnerable populations – particularly minorities and the urban poor – can best be addressed. Insights from development sociology will be useful in this context since they can help us identify measures associated with pro-poor development that can be adopted to ensure that the risks to vulnerable populations are minimized.

Several important questions that sociologists are well-equipped to address about urban climate adaptation include:

1. What explains why some municipalities are engaging in climate adaptation planning and action and other are not? What are the social and political dynamics shaping climate adaptation decisions and actions at the municipal level? What resources are required for municipalities to have sufficient capacity to plan and implement climate adaptation measures?

2. How does adaptation planning and action vary from one country and city to the next? Between the global North and South? To what extent is action contingent on perceived risk as opposed to projected vulnerability?
3. What approaches to participation and civic engagement in climate adaptation are being implemented? What approaches are most inclusive? Generating the most promising results?
4. What methods are municipalities using to assess the vulnerability of different subpopulations and what steps are being taken to address the specific needs of these groups? To what extent are the needs and concerns of residents of slums and informal settlements being accounted for in adaptation planning?

II. Climate Campaigns of NGOs: Over the years, NGOs have extended their efforts from the local to the global and from addressing nature conservation to working at the nexus of environmental protection, human health, and social justice. In many instances, these organizations have achieved visibility as a result of engaging in contentious acts or participating in global governance. However, more often than not, most NGOs operate at the national and sub-national levels and focus on issues related to their immediate social, political, and cultural contexts. Further, most engage in routine policy tasks, such as writing reports, meeting with public officials, and provide services such as maintaining natural places, disseminating information, sponsoring educational activities, and organizing local residents. While high visibility tactics can yield important gains, it is these more mundane tasks that have the potential to support and enhance local climate adaptation agendas.

In general, we tend to associate climate-related campaigns with environmental NGOs. This makes sense given that many transnational, national, and local environmental organizations have been working to raise awareness and alter policy in areas such as energy efficiency, GHG reductions, green design and technology, sustainable cities, and environmental justice. However, it appears that the range of organizations working on climate issues is expanding. With adaptation gaining a place on many agendas, a variety of NGOs working in fields such as development and humanitarian aid have initiated climate campaigns. Although their efforts may have the potential to promote local adaptation and attend to the needs of vulnerable populations, we have limited knowledge of their motivations, orientations, and goals and about the ways their activities may be affecting environmental campaigns and the climate adaptation efforts of municipalities.

Sociological scholarship provides us with theoretical and methodological foundations for studying the climate campaigns of NGOs. For instance, we have developed a robust body of knowledge about the characteristics of NGOs and SMOs, particularly with respect to their selection of strategies and tactics, their structures and resources, and, more recently, about the impacts they have had on political, social, and cultural outcomes in a variety of different issue arenas. The recent turn toward cultural and cognitive studies has further advanced our understanding by offering in-depth analyses of decision making processes and the strategic nature of NGOs while recent scholarship on networks and coalitions provides insight into the basis for alliance formation.

Some studies that focus on climate issues have been published by organizational and social movement scholars. At this point, the emphasis has been on the ways that different types of NGOs – from business associations to the religious right to transnational environmental NGOs – have affected national and international negotiations, public sentiment, and policy outcomes. However, the sweeping adoption of climate campaigns suggests that it is important to widen the scope of our inquiries. By drawing on our current knowledge of NGOs and SMOs, we can extend our research to better understand the characteristics and impacts of climate campaigns and activities, including the extent that these organizations are working in concert, representing local priorities,

and supporting municipal climate adaptation agendas. Therefore, some of the questions that we should explore include:

1. What rationale do non-environmental NGOs offer for engaging in climate-related campaigns? How are their campaign goals framed? In what ways do the campaigns of environmental and non-environmental NGOs vary?
2. Are non-environmental NGOs supporting or undermining the agendas and impacts of environmental NGOs? Are all of these groups competing for the same resources?
3. To what extent do NGO climate campaigns – both those of environmental and non-environmental organizations - account for the needs and preferences of the local populations they ostensibly represent? Support municipal climate adaptation?
4. In what ways do the campaign activities of a given NGO vary between the global north and south? Between developed and less-developed countries?

Thomas Dietz
University of Michigan

Global Environmental Change and Sociology: Substance and Method

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Macro-comparative analysis of anthropogenic drivers

Macro-comparative analyses of the anthropogenic drivers of global change are already among the most robust research areas at the interface of the social and ecological sciences.⁴³ I believe it is one of the most promising areas for continued development for several reasons.⁴⁴ It is:

- ❖ Strongly responsive to the “grand challenges” identified by the NRC and others.⁴⁵ This line of work examines environmentally significant consumption and how institutions and policy shape human stress on the environment. These are among the most commonly identified top research priorities. This work aligns well with efforts to develop mitigation policy.
- ❖ Highly interdisciplinary. While sociology is probably the strongest discipline contributing to this approach, there are also significant contributions from economics, political science, international relations, and geography. Ecologists are also engaging with in macro-comparative analyses of drivers (Liu, Daily, Ehrlich, and Luck 2003; Mikkelsen, Gonzalez, and Peterson 2007). Our group has had success in publishing in a variety of interdisciplinary venues (e.g. Dietz, Rosa, and York 2007; Dietz and Rosa 1997; Rosa, York, and Dietz 2004; York, Rosa, and Dietz 2005; York, Rosa, and Dietz 2003) as well as in core sociology journals. Thus the discourse around macro-comparative analysis is highly interdisciplinary and allows sociology to have a broad influence.
- ❖ Moving toward integrative theory. For most analyses the goal is to explain cross-national variation in anthropogenic stressors, such as greenhouse gas emissions or ecological footprint. The explanatory factors include demographic, economic, institutional, cultural, technological, and environmental variables, though not all these lines of analysis are equally well developed. This encourages synthetic theory. Further, there are moves towards explaining not just stressors but also ecosystems responses, which will ultimately require modeling coupled human and natural systems.
- ❖ Built on strong methods. Macro-comparative work has always been a basis for innovation in quantitative methods. Recently methods that span the qualitative and the quantitative are being deployed (e.g., Rudel 2005).
- ❖ Encouraging well developed theory. Broadly, one can contrast the suite of theories that argue that economic growth and related process lead to resolution of environmental problems (e.g. ecological modernization

⁴³ A recent review, on which this essay draws heavily finds over 100 books, chapters and papers providing empirical and/ or theoretical macro-comparative analyses of the anthropogenic drivers of environmental change, indicating that this is a very healthy area of research (Dietz, Rosa, and York In press).

⁴⁴ A recent issue of Human Ecology Review (www.humanecologyreview.org; V. 16, #1) has a special section devoted to macro-comparative analysis.

⁴⁵ These are reviewed in various National Academies reports (see especially Brewer and Stern 2005).

theory, environmental Kuznets curve theory, post-materialist theory) with the suite of theories that argue that continued growth will continue to degrade the environment (e.g., Blühdorn and Welsh 2007; Foster 1999;

- ❖ Schnaiberg 1980). Structural theories, such as world systems theory, are very much engaged and there are active efforts to understand the role the environmental constraints and institutional form plays. Recently, we have made a foray into using this approach to develop a new approach to conceptualizing sustainability (Dietz, Rosa, and York 2008).
- ❖ Providing a path to the problem of scaling. It is widely acknowledged that learning how to embed local analyses in larger contexts and, in a complementary way, learning to “down-scale” macro-comparative analysis to the regional and local levels is one of the most fundamental challenges in the study of coupled human and natural systems (Carpenter et al. 2009; Liu et al. 2007; Reid, Berkes, and Wilbanks 2006). The majority of work on coupled human and natural systems is done at the local level, and there are only a handful of efforts that synthesize across local studies (Chhatre and Agrawal 2008; Rudel 2005). Yet moving from the local scale is essential to capture the effects of contextual factors such as culture, political economy and institutions that are relatively invariant at the local level (Dietz and Henry 2008). Macro-comparative analysis also has limitations, but it is well suited to examine these factors. It is likely that the local and the macro will “meet in the middle” in analyses at the landscape level, and I believe many of the concepts, methods and theories developed at the macro-level will be critical to this new form of analysis.
- ❖ Yielding relatively robust findings. There seems to be a consensus that human population size has an elasticity of about 1 indicating it is neither irrelevant nor the dominant driver. Further work is trying to unpack the effects of population structure on environmental impacts. Most analyses cast doubt on the arguments that increased affluence/ economic growth lead eventually to reduced environmental impact, except perhaps in the case of local environmental impacts (e.g. local air and water quality).
- ❖ Important for assessments. The IPCC is driven by modeling exercises that have, at their heart, the Kaya identity, also known as the IPAT equation. While social scientists have been highly critical of IPAT, this line of analysis provides more sophisticated alternatives. The Millennium Assessment (Reid et al. 2005) strongly emphasizes the role of “direct” and “indirect” drivers.
- ❖ Data are available. As I will note below, much more could be done to develop the empirical base for this research. But much of the data needed is already developed for other purposes, and much of it is of high quality. Increasingly, it is possible to do panel analysis which, while not a panacea, can help a great deal in disentangling causality.

What do we need to know: What are the major sociological research questions?

Barriers to progress.

- ❖ Funding. This remains a cottage industry, with almost no funding for either individual and team research projects or gatherings of the community of researchers working in this area. Even modest funding could yield important advances.
- ❖ Data. The community has made good use of data available for other purposes, indeed is an exemplar of effective use of secondary data. However, a few targeted efforts might greatly enhance our ability to answer key questions. For example there are logical arguments that social movements and engagement in trans-

national scientific communities are important in shaping policy and thus ultimately environmental stressors. The arguments about the importance of culture are less well developed but are certainly plausible. We don't have reasonable ways to test these hypotheses at present, but we can imagine modest investments that would provide the data needed.

- ❖ Moving towards multi-level analysis. Along with direct investments in data needs identified by the community, federal research funders could require that all archived data collected with federal support include geo-codes. There are of course confidentiality issues but we are learning how to address those (Van Wey et al. 2005). For many data sets the addition of a simple geocode would be very low cost but over time would lead to a substantial growth in our ability to link data sets. In particular, geo-coded survey data on individuals or organizations would allow for multi-level analysis, and thus the effective linking of macro and micro level for more robust theory.

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Riley E. Dunlap
Oklahoma State University

The Conservative Assault on Climate Science: A Successful Case of Deconstructing Scientific Knowledge to Oppose Policy Change

What do we need to know: What are the major sociological research questions?

Environmental sociology has grown in prominence and credibility over the past two decades because it has become widely recognized that environmental problems such as climate change are “people problems”—they are caused by human behavior, viewed as problematic because of their impacts on humans (and, for some, their impacts on other species and ecosystems) and their solution requires collective action by humans (Dunlap 2007). Not surprisingly, the emergence of a mature environmental sociology has involved a rapid growth in theoretically informed empirical research on the causes, impacts and solutions to environmental problems (see, e.g., Dunlap and Marshall 2007).

These broader trends in our field are reflected in the case of climate change as well, although obviously environmental (and other) sociologists have been slower in focusing attention on it than on problems such as air and water pollution, deforestation, and toxic contamination which achieved prominence a decade or two before global warming was widely accepted as a problem. Nonetheless, the past decade has seen a surge of empirical research on the *causes* of climate change, with proponents of such widely divergent perspectives as World Systems Theory and Human Ecology providing important evidence of, e.g., national-level characteristics associated with CO₂ emissions. Indeed, this large body of cross-national research (too voluminous to cite) is arguably the most important sociological contribution to climate change our field has thus far produced. We are also seeing increasing attention to the *impacts* of climate change, with emphasis on its inequitable impacts both inter- and intra-nationally (e.g., Roberts and Parks 2007), and we can expect to see more work along these lines as Environmental Justice specialists continue to expand their attention from local toxics to global warming. Lastly, we are seeing more sociologists join with political scientists in examining the global governance processes necessary for achieving the effective climate change policies required for making any progress toward *solutions* (e.g., Fisher 2004)—although at this stage “adaptations” seem more likely than solutions.

Environmental sociologists have historically had a fourth major emphasis in addition to work on the causes, impacts and solutions to environmental problems, and that is to analyze the processes by which environmental conditions are recognized and successfully defined as problematic, or how environmental problems are socially constructed (Dunlap 2007). In the 1990s such analyses were the most visible sociological contribution to climate change research, as there was a plethora of studies of the social construction of climate change (see Rosa and Dietz 1998 and references therein). While such work provided valuable insights into the growing awareness of climate change and the emergence of the IPCC and climate science, it often made the point that climate science was highly “contested” (e.g., Taylor and Buttel 1992). Early critics of this work (Dunlap and Catton 1994:19-23) pointed to the inherent weakness of analyses that treated the competing claims of skeptics sponsored by conservative think tanks such as the Marshall Foundation as equivalent to those of mainstream scientists, and the problems posed by the relativist stance of strong constructivism for making sense of climate change debates.

While criticism of constructivist analyses provoked a bit of a backlash (e.g. Burningham and Cooper 1999), events over the past decade have made the shortcomings of constructivist research that analyzes competing

claims without evaluating their relative veracity and ignoring the interests supporting the “camps” issuing these competing claims more apparent (e.g., Demeritt 2006). The reason is that it has become clear that a small number of influential conservative think tanks, with the help of a modest number of “skeptic” scientists and support from the fossil fuels industry as well as conservative foundations, have been able to delegitimize mainstream climate science and derail effective climate change policy in the U.S.--both during environmentally friendly Presidential administrations (Clinton) and environmentally hostile administrations (G. W. Bush).

In response, a small body of sociological and social science research on what might be called the “deconstruction,” although “delegitimization” might be more accurate, of climate science by conservative think tanks and skeptic scientists has been conducted (e.g. Antilla 2005; Boycoff and Boycoff 2004; Lahsen 2008; McCright and Dunlap 2000; 2003). This research has provided preliminary insights into the counter-claims and tactics employed by those working to delegitimize the IPCC, climate science and advocates of climate-change policy, and well as the sources of support for their efforts, but much more work needs to be done and I believe it should be a priority for future sociological research on climate change.

The reason I make this claim is because if the interests that are opposed to dealing with climate change continue to be successful in delegitimizing climate change science and advocates for policy-making, our growing efforts to provide knowledge concerning the causes and impacts of and solutions/adaptations to global warming will have far less chance of informing intelligent public debates and policy deliberations.

The fact that climate skeptics (by which I mean not just the small number of scientists but their accomplices in conservative think tanks, conservative media, and the former Bush Administration) have thus far been incredibly successful is apparent not only from the fact that the U.S. remains an obstacle to international climate change policy-making, but that U.S. media have portrayed climate science as far more unsettled than media in other advanced nations (Dispensa and Brulle 2004) and the U.S. public expresses less concern over global warming than do citizens of other wealthy nations (Brechin 2003).

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Constructivist analyses continue to offer many insights into environmental issues (e.g., Hannigan 2006), but the limits of the relativist approach inherent in strong constructivism have now become apparent (e.g., Benton 2001). Therefore, it should not be difficult for environmental sociologists to supplement the analytical tools of social constructivism with those of social movements, political sociology and sociology of science in efforts to “deconstruct” climate change skepticism.

There are many tasks worthy of sociological attention, including but certainly not limited to the following:

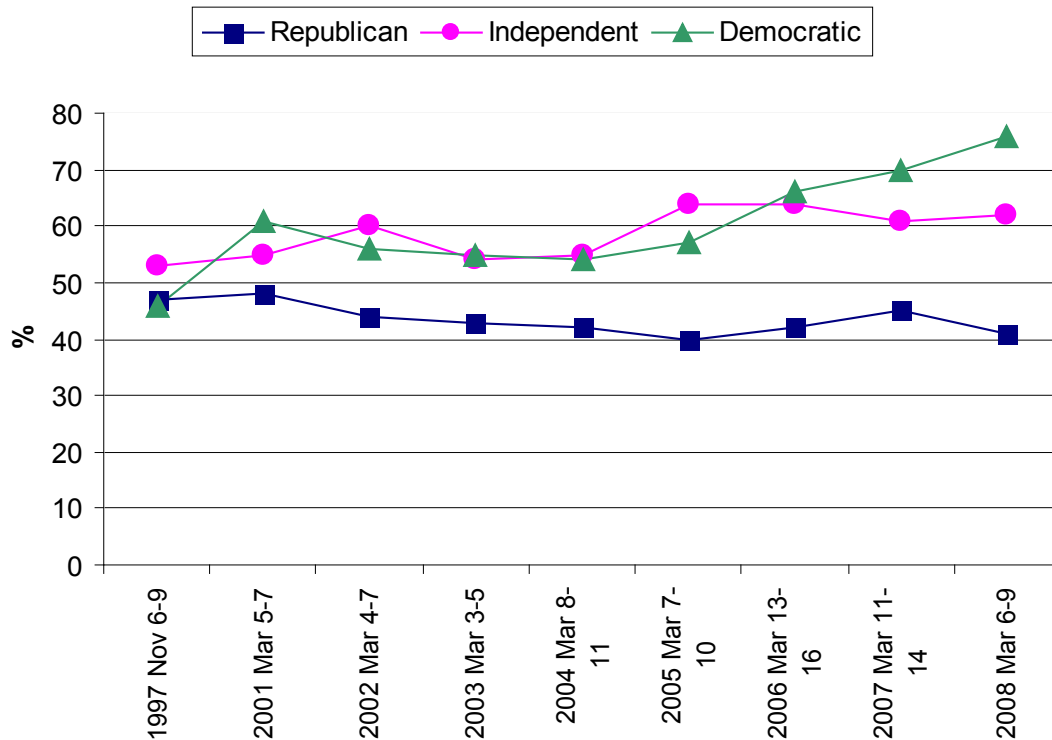
- (1) McCright and I (2000) presented the three major counter-claims that skeptics employed to delegitimize climate science from 1990 to 1997, but new ones have emerged since Kyoto—particularly the claim that it is “unfair” for the U.S. to cut carbon emissions if China and India do not, and a more recent claim (and begrudging acknowledgment that global warming is occurring) that we should focus on adapting to global warming since it cannot be stopped. Examining the evolution of counter-claims, particularly how they are developed by skeptics in response to the increasing credibility of global warming, should be a priority.

- (2) McCright and I (2003) also analyzed the ties between a small number of skeptic scientists and leading conservative think tanks, the tactics of conservative think tanks in promoting skepticism in general and the skeptic scientists in particular, and the manner in which both skeptics and the think tanks benefitted from a change in the political opportunity structure represented by the Republican takeover of Congress in 1994. Our preliminary analyses should be extended to the current situation and expanded to include a more detailed examination of the activities of key congressional figures such as Rep. Joe Barton and Sen. James Inhofe as well as the Bush Administration, all of which represent the institutionalization of a climate-change “counter-movement.”
- (3) Since our emphasis on the role of conservative think tanks as key agents of climate skepticism has come under criticism from Fisher (2006) for down-playing the role of the fossil fuel industry, more attention is needed to tease out the relative effects of Exxon Mobil and other corporations and those of conservative think tanks. This is particularly important now that fossil fuel front groups such as the Global Climate Coalition and the Cooler Heads Coalition have either disappeared or declined in prominence (Layzer 2007), Exxon stands in isolation from other oil companies in its opposition to climate change policy-making (Rowlands 2000), and conservative think tank leaders and political pundits assert that their skepticism toward climate science and opposition to climate policy-making stem from their beliefs that the former is not “sound science” and the latter will be harmful--rather than being motivating by financial support from oil companies (Shnayerson 2007).
- (4) Drawing upon the sociology of science and technical controversies, more detailed analyses should be conducted of the strategies and tactics of the skeptic and “mainstream” camps within climate science. Particular attention should be given to the former’s primary use of non-scientific outlets for their work versus the latter’s heavy reliance on traditional, refereed journals portends for scientific controversies. Controversies such as those surrounding climate change seem more likely to remain unresolved and impact both public consciousness and policy-making when they can no longer be resolved via peer-reviewed publications in scientific journals.
- (5) The long-run impact of the conservative (and Republican) assault on climate science and science more generally, particularly in terms of relativizing scientific knowledge, deserves attention. Conservative and corporate efforts to undermine climate (and other environmental) science reinforce cultural conservatives’ efforts to combat evolution and oppose various forms of medical research (Mooney 2005), and the result may be a long-lasting distrust of scientific information among major segments of our society.
- (6) The degree to which lay persons are affected by manufactured controversies led by corporations and conservative think tanks and spear-headed by advocates of skepticism employed by the think tanks and skeptic scientists affiliated with them warrants study. Are laypersons more likely to be reached by conservative think tanks through their websites, the media appearances of their spokespersons, or through friendly media such as Fox News, Rush Limbaugh and conservative newspapers such as the *Washington Times*? From whom do lay people take their “cues” on global warming, and which cues are most effective? Which sectors of the public are most susceptible to the skeptics’ message?

Very preliminary insight into some of these issues, as well as confirmation of the influence of those promoting climate skepticism, can be gained from recent Gallup Poll trends in perceptions of global warming, separated by political party identification (for question wording and additional trend data see Dunlap 2008).

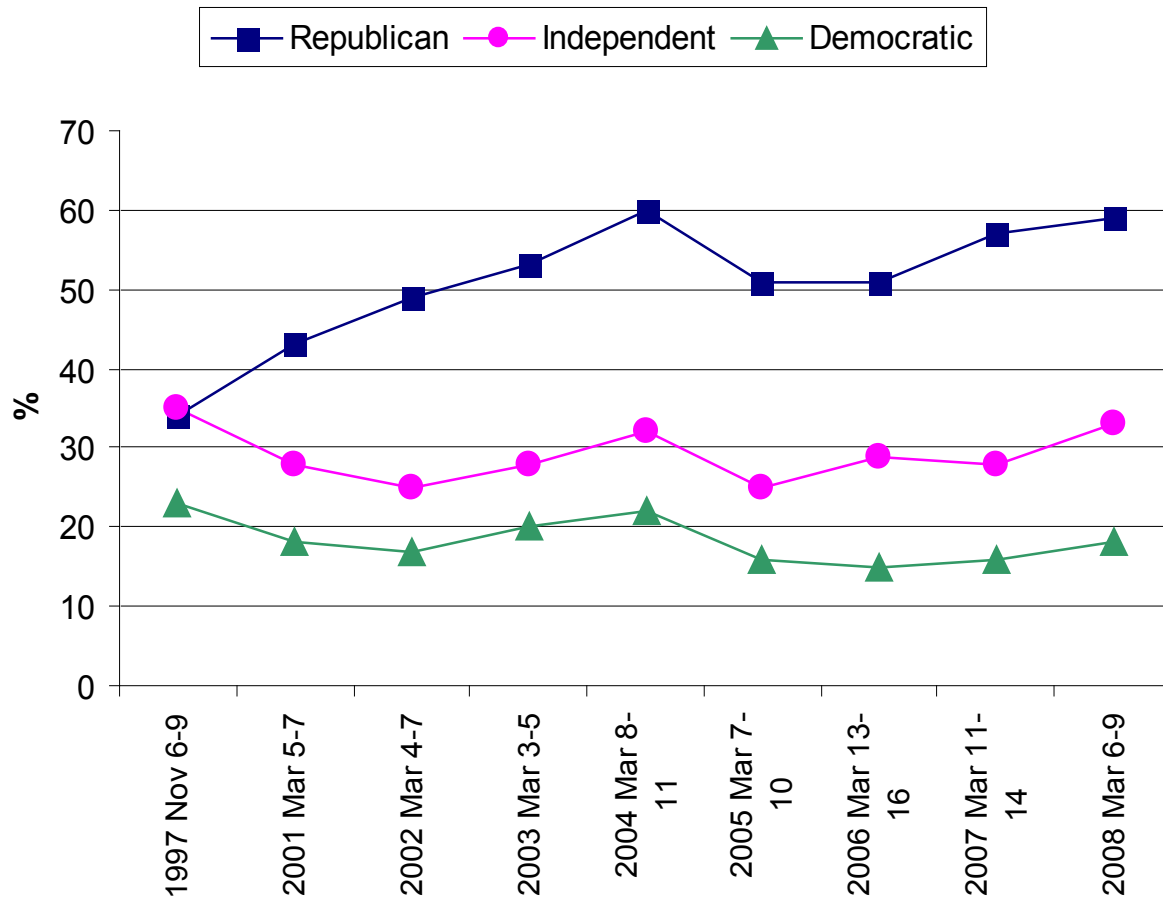
Overall there has been a modest increase in the percentage of Americans who believe that the effects of global warming “have already begun to happen” since 1997, from 48 percent to 61 percent. However, this upward trend masks very divergent trends among those identifying with the two major parties. While the percentage of Democrats believing that global warming is already happening has increased substantially from 46 to 76 percent, the percentage of Republicans holding this belief has declined from 47 to 41 percent!

Global Warming Has Already Begun



A clue to the sources of this rather dramatic divergence in the views of Republicans and Democrats concerning whether global warming is already occurring is shown in the next set of trend data on reactions to news coverage of global warming. When asked their views about news coverage of global warming in 1997, 31 percent of Americans responded that they felt news of global warming was “generally exaggerated,” a figure that increased to only 35 percent in 2008. But again, this very slight overall increase masks major differences between Republicans and Democrats. While there has been a sizable increase in the percentage of Republicans believing news of global warming is generally exaggerated, from 34 to 59 percent, there has been a slight decline in the percentage of Democrats expressing this belief, from 23 to 18 percent.

News of Global Warming Is Generally Exaggerated



Clearly Republicans and Democrats are reacting to news of global warming, including coverage of IPCC reports, very differently than are Democrats, and this helps account for their divergent views on whether global warming is already occurring. Results such as these emphasize the importance of addressing the issues noted above, for they suggest that a skeptical view of climate change has been transmitted to a sizable portion of the American public and it is unlikely to disappear as a result of ever-more-conclusive reports of global warming issued by the IPCC—boding poorly for the emergence of supportive public opinion that can facilitate policy-making.

Historically Republicans have been somewhat less likely to be concerned about environmental problems and to support environmental protection policies than their Democratic counterparts (Dunlap et al. 2001), but in the 1990s the gap began to widen. The divergence in views of global warming have become particularly sizable, suggesting that Republicans have been influenced by party leaders, conservative pundits and climate skeptics on this issue.

It seems likely that climate skepticism has become part of Republican and conservative orthodoxy, and thus may be hard to overcome. On the other hand, it will be interesting to see if Republican Presidential candidate

John McCain's acceptance of climate science and the need for climate-change policy will affect the views of rank-and-file Republicans, or if he will remain a global warming "maverick" within his own party.

Work in Progress

There is much to be done in analyzing how the Conservative Movement has managed to delegitimize climate science and demonize advocates of climate change policy, and I believe such work deserves equal footing with sociological research on climate-change causes, impacts, and solutions. I am in the midst of trying to make some minor contributions.

First, I have recently completed a collaborative study analyzing the links between environmental skepticism in general and conservative think tanks (Jacques et al., 2008). We located 141 English-language books published through 2005 that espouse environmental skepticism (defined as questioning environmental science and the seriousness of environmental problems) and examined their links to conservative think tanks. We found that 130, or 92 percent, of these books were linked to a think tank either by author/editor affiliation, publication by a think tank, or both. We are now conducting a study of books promoting climate change skepticism per se, which we expect will total nearly 60 through this year, and will again analyze their links to conservative think tanks.

Second, I am in the midst of an effort to update and expand on portions of the work Aaron McCright and I did in the 1990s, comparing the visibility of 12 leading skeptic scientists and 12 "elite" mainstream scientists in terms of media visibility and Congressional testimony.

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Barbara Entwisle

University of North Carolina at Chapel Hill

Local Perspectives on Global Climate Change: Modeling Neighborhood Dynamics

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

In considering the potential contribution of sociology to the study of global climate change, I start with the fact that the discipline is fundamentally concerned with people in context. Our theory, data, and tools are well suited to questions about how people respond to their local environments. And, indeed, climate change will be felt locally. The phenomenon is global, but its consequences spatially heterogeneous, and ultimately interact with characteristics of local environments in affecting the people who live there (CCSP 2008).

There is a long tradition within sociology of examining a variety of outcomes at the individual and household level within a larger context such as a neighborhood or community (Entwisle 2007; Mayer and Jencks 1989; Sampson et al. 2002) that might be readily adapted to the study of climate change impacts. In developed countries such as the United States, research has focused primarily on the effects of neighborhood poverty, racial composition, and turnover. Given appropriate measurement, it is straightforward to include measures of the biophysical environment within the general multilevel framework.

According to the latest IPCC assessment, the prevalence and severity of heat waves, cold snaps, drought, and storm-induced flooding are among the possible consequences of global climate change. Their consequences for the health and wellbeing of individuals depend on other characteristics of the natural and social environment as well as local adaptation and mitigation strategies. A recent review of multilevel studies of health showed a neglect of the biophysical environment, including features related to or potentially consequent from climate change (Entwisle 2007). An exception is a study by Browning et al. (2006), who used a multilevel approach to study heat-related mortality in the 1995 Chicago heat wave.

To incorporate features of the biophysical environment into the general multilevel framework, sociologists need to develop an understanding of local contexts as places, i.e., local *sociospatial* environments. A consequence of relying so heavily on survey and census data to characterize contexts is that these local environments are somehow disembodied, not rooted. To understand the consequences of climate change, or indeed to incorporate a more complete understanding of the biophysical environment more generally, requires us to “put people in place.” Most research examining the effects of local context on an individual outcome utilize social survey data. It is straightforward to geocode the locations of survey respondents and then incorporate information about the biophysical and spatial environment within a GIS. It is important to note that there are deductive disclosure risks associated with releasing the locations of survey participants, even just their zip code or county of residence (Van Wey et al. 2005).

What do we need to know: What are the major sociological research questions?

To make progress, sociologists need to broaden their conceptualization to include all dimensions of the local context, including dimensions of the natural environment. We need to consider that risks associated with the natural environment are multiple and complex, and further, that features of social context may combine with climate-related impacts to magnify, or mitigate, those impacts. If heat-related mortality is higher in poor neighborhoods with less commercial activity (and fewer air conditioned establishments where the elderly can

find refuge), we need to also consider the possibility that the heat index is probably also higher in these places, and air pollution worse. Multilevel studies that consider multiple aspects of the local environment, even multiple dimensions of the social environment, are quite rare (Entwisle 2007). We need to think of local contexts as “places,” socially interconnected and spatially situated. We also need to consider processes embedded in contexts at multiple levels.

Climate change as reflected in changes in the environmental conditions present in specific places will undoubtedly have many outcomes. I would like to draw attention to migration. Migration is both a response to environmental change and also, by determining patterns of settlement, a factor affecting exposure to place-specific risks of climate change. Environmental factors may act as “push factors,” contributing to a decision to move out of a particular area. They may also serve as “pull factors,” shaping the desirability of particular locales as potential destinations.

If people move as a consequence of climate change, the impact will be felt locally, but elsewhere as well. For instance, international migration into the U.S. may be stimulated directly and indirectly by climate variability and change elsewhere. Environmental refugees illustrate a direct impact, but indirect impacts are likely to be even more important. Given the size and persistence of migration streams from Mexico and other parts of Central and South America, for instance, it is important to consider the possibility that climate variability and change in these regions may further increase immigration pressures. A global perspective on climate variability and change is necessary even if ultimately, the concern is with impacts within the borders of the U.S. This is true not only with respect to issues of human settlement, but also with respect to health and welfare. Climate variability and change are global phenomena and impacts outside of the U.S. may have direct consequences for social systems within the U.S.

Migration is a micro behavior with potential consequences at a macro level. When people move from place to place, they change the local context in which they are themselves embedded as a kind of a swap. These moves have consequences for neighborhoods as well, both the origin as well as the destination. Schelling (1972), Bruch and Mare (2006), and Macy and van de Rijt (2006) have studied this process from the perspective of residential segregation. Unless replaced by households similar to them, the racial/ethnic composition of a neighborhood changes as households move out. There may also be consequences for other characteristics of places such as poverty. Neighborhood turnover may exacerbate the negative consequences of climate change.

One of the “truisms” about migration is that it is selective. Migrants are positively selected from places of origin. Those leaving particular areas are generally better off than those staying. So long as those places of origin have positive qualities, those leaving will be replaced by other in-migrants. If those places of origin are undesirable as potential destinations for other migrants, however, they will become increasingly disadvantaged as out-migration continues. Climate change will have a deleterious effect on some places, and may serve to advantage others (CCSP 2008). Depending on response, social inequality may increase as a result of dynamic feedbacks in the system related to the selectivity of migration. Across multiple social and spatial scales, marginal populations may be particularly likely to be affected by climatic events, partly because of their attachment to marginal environments.

At the global level, projected impacts of climate warming show countries that are already at significant disadvantage globally are the most likely to suffer from flooding associated with sea rise. Bangladesh is one example. At a regional level, when Hurricane Katrina struck the southern coast of the U.S., already marginalized populations were disproportionately affected. In New Orleans, the lower ninth ward was devastated and recovery has been extremely slow. The contrast with Bourbon Street is stark. In the examples just given, the joint

distribution of the population with respect to environmental vulnerability and economic and social disadvantage is an important part of the story. The poor are relegated to more vulnerable locations, which in turn expose them to greater risks, which in turn make it difficult to accumulate the resources to improve economically, and so on. Those who are better off are less vulnerable to begin with, and if disaster should strike, are in a better position to respond, and possibly move on.

Disasters large and small have the potential to exacerbate inequalities at multiple levels. Little is known about such dynamics, partly because they are not well suited to standard analytic approaches. The feedbacks undermine the assumptions of multiple regression, especially that the disturbance is unrelated to the included predictor variables. The usual “fixes,” for example the use of instrumental variables, do not work because of the interconnectedness of the system. Instead, sociologists are turning to microsimulation approaches such as agent-based modeling.

With these approaches, it is possible to examine the macro consequences of micro behavior, including residential mobility and migration, and the integration of micro and macro processes more generally. Through the use of “what-if” scenarios, it is possible to consider dynamic responses to climate change, including change that has not yet happened, but might happen, or may never happen. Agent-based models can link people and place by being made spatially explicit. In geography, for example, spatially explicit agent-based models have been developed to describe land use change in a variety of settings (Parker et al. 2008). Sociologists are just beginning to develop spatially explicit models, and this is an area rich with potential. Spatially explicit models of the dynamics of social inequality in the face of locally experienced climate change are a natural focus for sociologists.

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Marina Fischer-Kowalski

Vienna Institute of Social Ecology, Alps-Adria University

Climate Change, Social Metabolism, and Human Well-being

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

From the research tradition of “social metabolism” (Fischer-Kowalski 119-37), we understand the large role of carbon in industrial metabolism. Carbon is contained in two major components of societal material input, namely in biomass (used for human and animal nutrition, as fuel and for a large number of other purposes such as clothing and construction) and in fossil fuels. The total material input is 17 metric tonnes per capita annually in the European Union and 25 metric tonnes per capita in the USA. Biomass and fossil fuels amount to half of this input (Domestic Material Consumption, DMC; for the methodology of Material and Energy Flow Accounting, MEFA, see (Haberl et al. 199-213). As these carbon-containing materials are mainly used for combustion (biological or technical), they are quickly transformed into CO₂ or sometimes methane, and emitted to the atmosphere. Thus, among the wastes and emissions from industrial societies, CO₂ amounts to over 80% (Matthews et al. 2000). Substantially reducing carbon emissions, as required by climate change mitigation, is therefore not just a technical and economic issue, but implies a major change in social metabolism.

These are not “sociological” insights, but insights from an interdisciplinary socio-ecological approach in which sociology plays a major part. The role of sociology, in particular, lies in understanding the interrelation between societal structures and dynamics, and the scale and composition of social material and energetic metabolism. Regarding this interrelation, quite substantial empirical knowledge has already been accumulated, from comparisons across countries, across time and for subsystems within countries. The generation of such knowledge was facilitated by the fact that – given an appropriate conceptual and methodological model - the material and energetic metabolism of societies could be generated from data that are at least partly contained in (or at the base of) economic national accounting, or that can be gained from various other internationally available statistics. The statistical office of the European Union has agreed on shared methods, so there now exists a reliable database for its member states across the past 30 years (Eurostat et al. in press). For many other countries of the world, including the US, comparable data have also been compiled.

Among what we know is the following: We can identify a specific *metabolic profile* for highly developed industrial societies that can be expressed in per capita amounts of annual consumption of materials (in tonnes) and energy (in Joules). This yearly flow of materials replaces, maintains, or adds to existing infrastructure stocks, while the energetic component is burned. Despite continuing economic growth, these amounts in the past decade have shown a tendency to stagnate. Thus among OECD countries, the major driver of energy and materials use is not so much economic growth, but demography: growing populations raise materials and energy consumption on national levels. The second most important factor seems to be - in reminiscence to the very beginnings of sociology – population density (Weisz et al. 676-98). The higher a country’s population density, the lower its metabolic profile (This is, by the way, also true within countries: urban centres often have a lower metabolic profile than equally affluent rural areas). This can clearly be explained: the same standard of living in densely populated areas can be supplied with substantially less energy and materials needed for infrastructure (roads and transport vehicles, other supply and disposal facilities) than in areas with a scattered population. Moreover, the physically particularly intensive process of raw material extraction tends to happen in less populated areas. Under a perspective of sustainability and climate change mitigation, these findings are somewhat comforting.

But what we also know is the fact that the specific metabolic profile of agrarian or not yet fully industrialized countries (which contain about two thirds of the world population) is indeed much lower, by a factor 3-5, both materially and energetically. Many of these countries are currently on a pathway of transition from the agrarian to the industrial metabolic profile. They move on this pathway under very different global conditions than their European and New World predecessors in the past, and they move much faster: a process of transformation that took the United Kingdom 300 years was accomplished by Japan in 100 years and seems now to be completed by, say, Thailand, in 50 years. On the other hand, there is a certain international division of labour and a distribution of economic power that shapes development pathways in ways that are not yet fully understood. While sociologists like Wallerstein or Bunker discussed an exploitative core-periphery structure, biophysical analyses of material and energy flows suggest more complex relationships (Eisenmenger, Schandl, and Ramos-Martin 179-222) in which the roles and metabolic profiles of developing countries that serve as *extractive economies* differ from those of *labour supply economies*, a difference that again coincides with population density. In both cases though these countries seem to pretty much follow the historical industrial transformation pathway and may get trapped in a deadlock of newly built infrastructures that require a large amount of materials and energy with uncertain supplies and catastrophic implications for the world climate.

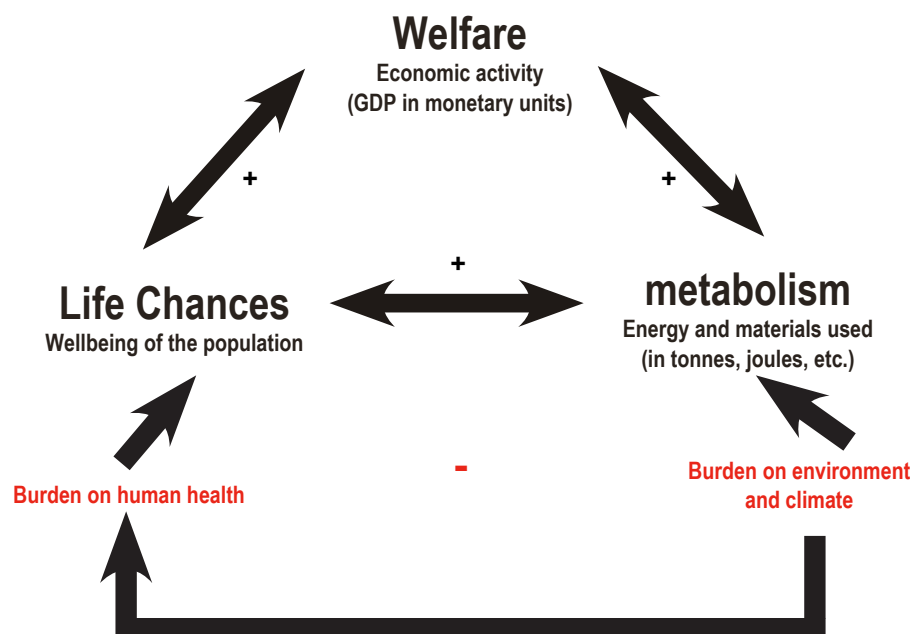
A last and very new finding that will still require additional in-depth analysis is just under publication (Steinberger & Roberts, submitted). In an analysis of a large number of countries worldwide (representing 80% of the world population), the authors found in the course of the past 30 years a systematic lowering of thresholds for high human development, as measured by the UNDP's Human Development Index (HDI) and each of its components, in terms of both primary energy input and carbon emissions. This is a very remarkable finding as the authors demonstrate that the reduction of energy / carbon required for "high development" is so strong that at present, and in the next decades, world energy consumption levels and carbon levels far under the Kyoto protocol requirements would suffice to allow for the whole world population to reach high human development levels. Global high development thus requires less and less total energy and carbon – while the global trend is towards dramatically increasing energy use and accompanying carbon emissions. The current trend is driven by metabolic and economic growth in industrialized and industrializing countries, mostly decoupled from human development goals.

What do we need to know: What are the major sociological research questions?

I see a key role of sociology in providing a different, and maybe more complex, picture of human well-being under conditions of environmental constraint than that provided by, for example, by economics. What this means can best be illustrated by looking at the "sustainability triangle" down below. While the "three pillars" of sustainability – the ecological, the economic and the social - are more or less commonly accepted, they are here interpreted in the specific systemic way of societal parameters interconnected by positive feedback, thus reinforcing each other and producing a non-sustainable growth spiral that may then lead to a massive negative feedback from climate change. This picture suggests a particular role for sustainability research to search for ways of "decoupling" the feedback between the three nodes.

Decoupling between *welfare* (i.e. economic activity) and *metabolism* (i.e. material and energy throughput) is a task for technology developers and economists. Decoupling between *welfare* and *life chances* (an operational interpretation of social well-being) is an issue for economists and sociologists. And, finally, decoupling between *life chances* and *metabolism* is a particular sociological challenge. In effect, all three axes need decoupling if we do not want to further face massive "rebound effects" as in the past where gains in efficiency are overwhelmed by, or indeed fuel (Ayres and Warr, 2005), economic and metabolic growth. In order to do our job, we need to

gain a better, multidimensional understanding of human life chances, conceptually and in terms of measurement and data. This would also allow addressing issues crosscutting various domains such as health, nutrition (food security, obesity), time-use and social integration.



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Dana R. Fisher
Columbia University

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

To date, sociology has made some useful contributions to our understanding of global climate change, building on research in other fields as well as that which is predominantly situated within the field of sociology itself. Since many of the scholars who have conducted these studies are participating in this Workshop, I will not summarize their work. Instead, I will focus on the ways that my work has contributed to our understanding of global climate change. Because sociology provides such a broad methodological toolbox for studying social phenomena, my research (as well as the extant sociological research on climate change more generally) has been able to contribute much more to our understanding of the human dimensions of global climate change. Overall, I believe that sociology as a field provides opportunities for research that focuses on multiple scales and incorporates mixed methods in ways that research in other disciplines, such as international relations and economics, cannot. In particular, by allowing for the combination of quantitative and qualitative methods and analyzing processes at multiple scales, sociological work on climate change can provide important insights. In addition, I believe that research that explores the increasingly complex case of climate change has the potential to contribute significantly to the field of sociology more broadly.

International Comparative Work: My earliest research on climate change came from an international comparative perspective. Some of this work contributed to the on-going discussion about the relationship between characteristics of nation states and their emissions (e.g. Roberts and Grimes 1997; Dietz and Rosa 2001; York et al. 2003a, 2003b). In particular, this study focused on understanding how we can explain the differing levels of carbon dioxide emissions in advanced industrialized nations. The paper concluded that the strongest predictors of emissions are measures of ecological efficiency, which tend to be associated with potentially less symbolic policy decisions (Fisher and Freudenburg 2004). In addition to this quantitative analysis, I also published *National Governance and the Global Climate Change Regime* (Fisher 2004), which adds an ethnography of the politics of climate change to the previously discussed quantitative analysis. This book focuses on the interactions among stakeholders involved in decision making on climate change in the United States, Japan, and the Netherlands. Coming from a sociological perspective, while incorporating the findings of scholars from other fields, it provides a deeper understanding of how each country's position on the Kyoto Protocol emerged by focusing on national politics and how they interact with international policy-making processes. The book concludes that understanding the international politics of climate change and the debates surrounding the Kyoto Protocol requires an exploration of domestic politics and policy-making processes within nation-states.

What do we need to know: What are the major sociological research questions?

Domestic Work on the Relationship between National and Sub-National Scales: More recently, I have continued my research on climate change decision making in the United States. The first step in this work is an updated and expanded version of the US chapter of the 2004 book, which was published in *Sociological Forum* in 2006. Here again, this research involved a combination of quantitative and qualitative data to understand climate change policy making. The paper concludes that climate change politics in the United States have been driven by the ways that natural resources are extracted and consumed at the state level. Building off of these findings, I am currently working on a project for the Norwegian Center for International Climate and Environmental Research (CICERO) that is focusing on the relationship between local initiatives to regulate emissions and national politics. The project aims to analyze the ways that the US Conference of Mayors and the International Council for Local

Environmental Initiatives are working to reduce carbon dioxide emissions in communities and cities around the United States. Through this project, I will be able to evaluate the connections (and disconnections) between climate change policy-making processes at different scales in the United States.

Collective Action around Climate Change: At the same time, I have expanded my work on collective action and protest to look at how individual citizens mobilize around the issue of climate change (for information about this on-going project, see Fisher et al. 2005; Fisher 2006b). So far, data have been collected in the United States, the United Kingdom, and Germany to understand mobilization and recruitment around this particular issue. Because I am applying a methodology that I have used to study protests that target issues as diverse as globalization, anti-war, and domestic politics, I am able to compare how climate change protesters are similar and different from others activists. As part of this project, I am analyzing the connections among climate change protesters. Preliminary findings of this research, which are based on data collected during the Step It Up Day of Action Against Climate Change in November 2007, include:

1. Climate change activists tend to participate in actions in their own communities, and do not tend to travel internationally to protest;
2. Most climate change activists have participated in collective action around the issue between two and five times in the past five years;
3. More than two-thirds of climate change activists have also participated in demonstrations about peace;
4. Most climate change activists are not involved in labor unions or groups;
5. About three-quarters of climate change activists identify themselves as being politically left-of-center; and
6. More than three-quarters of climate change activists have a university degree and more than a third have an advanced degree.

In addition, climate change activists are extremely civically engaged. In the past year: 99% reported signing a petition; 89% had contacted an elected government official; 74% had contacted an organization or association; 65% attended a public, town, or school meeting; and 65% voted in an election (during the non-midterm and non-presidential election year). I will continue to analyze these data (and the comparable data from protests in the UK and Germany) in the coming months.

Advocacy Networks and Climate Change Politics: Also, I hope to work with Jeff Broadbent on the Comparing Climate Change Policy Networks (COMPN) Project in the coming years. If funded, I will direct the United States case study for the project, which aims to analyze transnational comparisons of national policy responses to global climate change. The project will focus on the role of advocacy and civil society networks. It will build on much of my current research, incorporating quantitative and qualitative methods that explore multiple scales of governance. Because the US case will be conducted in conjunction with studies taking place in countries around the world, it has the potential to contribute significantly to our overall understanding of climate change policy making and the ways that domestic politics affect international politics (as well as vice versa).

Although I have focused this summary on the ways that my research has applied sociology to our understanding of global climate change, in terms of how sociology as a field can provide a more rigorous understanding of the interactions among scales of policy making, as well as provide a broader methodological toolbox than other disciplines, I would like to stress the importance of the converse as well. In other words, the extremely complicated issue of climate change and the complex policy domain that is emerging around this contentious issue presents a particularly interesting case for sociological study that has the potential to provide insights to sociology itself.

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Ken Frank
Michigan State University

Socially Embedded Environmental Action

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

It is individuals who take the actions that cumulatively contribute to climate change. These individuals might be the CEOs of major industrial businesses who are responsible for their company's contribution to pollution or rural farmers who, en masse, decide how much fertilizer to use, how to contain biogas, etc. Therefore to modify the human impacts on climate change we must understand individual motivations for action.

Our understanding of human decision making might start with economic theories of how people respond to incentives to pursue resources, psychological theories of why people take actions for their well being and theories from political science about how people respond to local institutions (Ostrom 1990). This would include such areas as risk management, rituals and local norms, and logical fallacies behind seemingly irrational behavior.

To the economic, institutional, and psychological base the sociologist can help us understand how the social contexts in which people are embedded affect their decisions. Members of our immediate social contexts provide support, resources, and information that contribute to our well being and help us pursue our goals (see the literature on social capital Coleman 1988; Lin 1999, 2001; Portes 1998). Therefore, people fundamentally want to take actions to at most gain status, and at least to avoid being ostracized by members of their immediate social contexts.

While Granovetter (1985) makes the embeddedness argument for economic action, I would extend the theory to environmentally impactful action which is often a function of trade-offs with immediate economic benefit. This embeddedness argument applies to CEOs who may take actions to conform to the norms in their immediate social circles. Critically, these norms may emphasize environmentally friendly behavior or immediate economic returns. I and my colleagues also observed how Vietnamese farmers responded to their social contexts in deciding whether to use organic or conventional techniques, the former becoming the norm, but requiring the forgoing of immediate gains to acquire the knowledge to successfully employ organic techniques.

What do we need to know: What are the major sociological research questions?

It is one thing to say that action is socially embedded, but it is another to empirically examine how embeddedness works. To my mind, a key limitation of the work on embeddedness has been to identify the relevant social contexts. For example, economists who have minimized the influence of peers on adolescents have defined peers as all members of a school (see Akerlof and Kranton 2002 for a notable exception). But sociologists have long been aware that peers can be more narrowly, and saliently, defined by social categories, course taking or direct social relations. In fact, new sociological theory suggests that adolescents may be more influenced by those with whom they would like to be friends than by their already existing friends who accept them for who they are (Giordano 2003; Frank et al 2008). Just so, we must identify the relevant social contexts for the range of actors who impact the environment. This will likely draw on various applications of social network theories and tools.

For the CEO is the relevant social context the board of directors, social relations, members of the family, members of community, or members of the church. For the rural farmer, is the relevant social context the community, kin, or others outside the community who offer new economic opportunity? Of course, members of

each social context may have effects, but we do not know who affects beliefs and who affects behaviors, and how and why. I believe sociologists are uniquely qualified to think about how to define the relevant social contexts in which people are embedded and the mechanisms (e.g. through norms or anticipated resource allocations) through which people are affected by members of their social contexts.

Sociologists can also address how social contexts are formed. For example, the friendship circles of CEOs may be established through educational and work experiences early in their careers (Frank and Yasumoto 1998; Kadushin 1995) or through participation in social organizations later in their careers. In this case, a sociological understanding of the phenomenon would attend to the ultimate social effects of access to educational or social institutions. Similarly, sociologists can help understand migration patterns that ultimately define the small communities in which farmers become embedded.

Sociologists can also attend to how people make decisions about to whom to allocate resources, including information, to others in their communities. Do people allocate resources to fulfill previous obligations or to advance themselves in their social contexts? Do they differentiate between close relations and other members of their social systems (Frank, forthcoming). The answers have implications for the efficiency of resource use and ultimately for environmental impact.

The agenda I have outlined is basic research because we need deeper understanding of socially embedded behavior to be able to anticipate the unintended consequences of policies and less formal action (Portes 2000). Much human behavior that impacts the environment is already understood as a by-product of economically motivated behavior. In this frame sociological motivations appear irrational. But sociological motivations are real and rational, and it is our job to understand them. The sociological frame can also inform the dynamic interplay between human action and environmental conditions, as the individual reaction to conditions is likely filtered by the immediate social context.

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Eric Hanley
University of Kansas

Economic Growth and Climate Change:

Exploring the Relationship between GDP and CO₂ Emissions

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

What do we know about the relationships between economic growth and carbon dioxide emissions? Most economists tell us that this relationship takes the form of an inverted-U, with per capita emissions increasing up to a certain level of income and diminishing thereafter. Having uncovered this type of inverted-U relationship between economic growth (measured in terms of per capita GDP) and a number of pollutants, economists have attached a specific label to this curve, referring to it as the environmental Kuznets curve (or EKC for short). Most of the empirical studies on CO₂ emissions that have been published in economic journals indicate that the relationship between per capita gross national produce (GDP) and CO₂ emissions takes the form of an EKC, with emissions increasing up to a certain level of income and diminishing thereafter. What this suggests is that there is a delinking of carbon dioxide emissions and economic growth at relatively high levels of income. Before discussing some of the factors which researchers have highlighted in an attempt to explain why per capita CO₂ emissions may diminish at higher income levels, I would like to challenge the basic finding that the relationship between economic growth and carbon dioxide assumes the form of an EKC in the first place.

The provocative idea that I am putting forward is that the relationship between economic growth and carbon dioxide emissions does not assume a quadratic form with emissions diminishing once a certain income level has been reached but rather takes a cubic form with emissions rising at low-income levels, stabilizing or dropping at middle levels, and rising again at high-income levels. I base this conclusion on findings generated from a pooled cross-sectional analysis of 92 countries for the period 1980 to 2004. These data were used to estimate the following fixed effects model:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + y_t + c_i + \varepsilon_{it}$$

where t and i are year and country indexes respectively, Y_{it} represents the natural log of per capita carbon emissions in metric tons, X_{it} is a vector of covariates, y_t is a vector of fixed year effects, c_i a vector of fixed country effects, and ε_{it} an error term (the model corrects for first-degree autocorrelation through inclusion of the lagged dependent variable as an independent variable). Results from this model, which are presented in Table 1, show that a cubic (i.e. N-shaped) functional form between GDP and carbon dioxide emissions fits the data well. Not only are the coefficients for the GDP-terms highly significant, the size and sign of the coefficients indicate increasing carbon dioxide emissions at lower income levels (up to \$18,000 per capita in constant US dollars), stabilization or reduction in these emissions at middle levels (between \$18,000 and \$32,000), and an increase in emissions at higher levels (above \$32,000). These findings call into question the optimistic assumption voiced by some researchers that economic growth can in and of itself mitigate some of the effects associated with global climate change.

Although a handful of studies have uncovered a cubic relationship between GDP and carbon dioxide emissions, the authors of these studies have discounted this finding on one or more of the following grounds: (1) the upward turning point in question lies beyond the range of observed values for income; (2) when certain

countries at a high level of per capita GDP (such as the United States and Canada) are excluded from the analysis, the cubic term is not significant; and (3) the N-shaped relationship is the result of data aggregation and thus does not describe the relationship between GDP and CO₂ emissions in any single country or subset of countries. The first criticism is highly relevant in regard to the analysis presented here. The coefficients presented in Table 1 suggest an upward turning point of \$32,000 which is very near the upward limit of observed values (only 1 percent of observations with a value greater than this amount). However, even when observations greater than \$32,000 or select high-income countries such as the United States, Canada, and Norway are excluded from the analysis, the cubic functional form continues to fit the data well. The N-shaped relationship uncovered in this analysis does not, therefore, appear to result from the presence of a few extreme outliers. Nor does it appear to be the result of data aggregation. Table 2, which displays statistics on the functional form that best fits the data from individual countries with a per capita GDP greater than \$12,000 US dollars as of 2004, shows that a quadratic, downward-U form fit the data in over half of the cases (53.1 percent). A cubic, N-shaped relationship fit the data, however, in more than one-third of the cases (37.5 percent). In short, the fact that an N-shaped relationship adequately describes the relationship between GDP and CO₂ emissions in a sizable number of high-income countries demonstrates that the functional form in question is not simply the result of data aggregation.

What do we need to know: What are the major sociological research questions?

One question that remains to be answered is, does the observed N-shaped relationship between GDP and carbon dioxide emissions hold once other covariates have been included in the equation? Existing studies have suggested that the following factors may explain why CO₂ emissions decline once a certain income threshold has been met:

(1) A sectoral shift from manufacturing to services. The argument here is that the shift from a manufacturing to a service economy results in an improvement of environmental quality since production within an economy dominated by services is likely to be less energy- and material- intensive than production within an economy based on manufacturing. Because the service sector tends to be larger where incomes are higher, the transition from manufacturing to services is expected to lead to reduced emissions of carbon dioxide at higher income levels.

(2) Urbanization. A number of researchers argue that urbanization is associated with a net reduction in CO₂ emissions on the grounds that spatial concentration leads to the more efficient delivery of goods and services in general and reduced transportation costs in particular. Because economic development is itself strongly associated with urbanization, any decline in emissions at higher income levels could be based at least in part on the fact that higher-income countries tend to be more urbanized than lower-income ones

(3) Trade. Proponents of the “pollution haven” hypothesis suggest that any observed reductions in environmental degradation at higher income levels are due not to structural changes in the economy or society but rather to the movement of pollution-intensive production from higher- to lower-income countries. According to this perspective, observed declines in emissions at higher income levels are illusory in the sense that they are a reflection not of real reductions in emissions but rather the spatial relocation of polluters from high- to low-income countries, leaving aggregate emissions unchanged.

Table 3 presents parameter estimates from a fixed-effects model which includes measures of sector size (agriculture and service measured in terms of value added as a percentage of GDP, with manufacturing as the excluded category), imports and exports (measured in terms of a percentage of GDP), and urbanization (measured in terms of percentage of the population living in urban areas). Spatial constraints prevent me from discussing all

of the findings associated with the coefficients presented in this table; suffice it to say that the N-shaped functional form continues to fit the data well even after the inclusion of these covariates in the equation.

Taken together, the findings presented here suggest that a cubic, N-shaped functional form better describes the relationship between GDP and CO₂ emissions than the quadratic, downward-U functional form that researchers regularly celebrate in the literature. If so, there is no reason to be sanguine about the possibility that aggregate carbon dioxide emissions will be diminishing anytime soon. Researchers who support the idea of an EKC for carbon dioxide sometimes suggest that it may be possible to “grow out” of problems associated with global climate change. The findings presented here not only indicate that most of the world’s population resides at points along the curve where increases in per capita income are positively associated with increases in CO₂ emissions, they also call into question the claim that per capita carbon dioxide emissions begin to diminish once a certain income threshold has been met. Skepticism regarding the claim that economic growth will eventually bring about a reduction in CO₂ emissions in turn implies that scholars and members of the public alike need to focus much more attention on policy instruments if reductions in aggregate carbon dioxide emissions are to be achieved. Since the early 1990s, governments have implemented a number of policies aimed at mitigating climate change, such as carbon taxes and emission trading schemes. Because researchers have largely failed to incorporate into their analyses direct measures of environmental policy, however, we know very little about the effectiveness of various efforts on the part of governments to reduce carbon dioxide emissions. It is toward policy-oriented research of this sort that scholarship needs to turn.

Table 1. Estimates from a fixed-effects model, 1980-2004 (lag term included, standard errors in parentheses). Dependent variable: per capita CO₂ emissions in metric tons.

	Model 3
Per capita GDP (thousands USD)	.1283*** (.0278)
Per capita GDP ²	-.0055*** (.0012)
Per capita GDP ³	.0001*** (.0000)
Lagged per capita CO ₂	.6470*** (.0705)
Constant	-.3916*** (.0981)
Number of observations	2223

* p < .05

** p < .01

*** p < .001

Table 2. Form of individual country regressions, countries with per capita GDP greater than \$12,000 as of 2004 only (time trend and lag term included; presence of linear, quadratic, or cubic trends indicates that regression coefficients significant at the 10% level or better).

	$\beta_1=0$	$\beta_1>0$	$\beta_1>0$	$\beta_1>0$	Number of countries
	$\beta_2=0$	$\beta_2=0$	$\beta_2<0$	$\beta_2<0$	
	$\beta_3=0$	$\beta_3=0$	$\beta_3=0$	$\beta_3>0$	
	null	linear, positive	quadratic, downward-U	cubic	
High-income countries	3.1 %	6.2 %	53.1 %	37.5 %	32

Table 3. Estimates from a fixed-effects model, 1980-2004 (lag term included, standard errors in parentheses). Dependent variable: per capita CO₂ emissions in metric tons.

	All Countries
Per capita GDP	.1117*** (.0225)
Per capita GDP ²	-.0043*** (.0009)
Per capita GDP ³	.0001*** (.0000)
Agricultural sector	-.0044*** (.0012)
Service sector	.0077*** (.0018)
Service sector ²	-.0001*** (.0000)
Exports	.0000 (.0008)
Imports	.0007 (.0011)
Urbanization	.0121* (.0049)
Urbanization ²	-.0001** (.0000)
Lagged per capita CO ₂	.6226*** (.0696)
Constant	-.5582** (.1921)
Number of observations	2223

* p < .05 ** p < .01 *** p < .001

Sharon Harlan
Arizona State University

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

I begin with a few observations about climate and climate change that seem most salient to me from a sociological perspective, although they do not all derive from sociological studies. My choice of these particular observations is influenced by my immersion in an interdisciplinary research environment in which I collaborate with biophysical scientists on studies of urban socio-ecological systems. Similarly, my views of what sociology can contribute to studying global climate change, and how sociologists can most effectively participate in influencing public responses, are also situated in my recent experiences of researching the relationships among climate, landscapes, and human health in cities.

1. Climate changes are occurring globally at multiple spatial and temporal scales. For example, it is widely accepted that the global average temperature has risen 0.5°C since the 1970s (McMichael et al. 2006). In roughly the same time period, however, changes in nighttime city temperatures compared to surrounding rural areas have been several times larger and most estimates of current differences at the urban-rural interface range from 1 – 3°C (Voogt 2004). Seasonally and in some cities, the temperature increases are much larger. Not only are cities experiencing chronic temperature increases, but global and urban warming are jointly responsible for more extreme heat events in cities. Those acute events are longer in average duration than they have been in the past and are also projected to be more frequent and intense in the future (Meehl and Tebaldi 2004).
2. Human systems and non-human systems are interacting at multiple scales to cause the socio-ecological changes that affect climate. Just as greenhouse gas emissions and land-use transitions are widely accepted as major causes of global warming (Kalnay and Cai 2003), temperature increases in and around cities have anthropogenic sources. The urban heat island (UHI) is primarily attributable to the replacement of naturally vegetated land cover with buildings and vast expanses of impervious surfaces that increase heat-absorption and heat-storage capacity (Voogt 2004). The UHI effect is also heightened by vehicles and energy use in urban households and industries that release heat near the ground. The UHI effect is spatially distributed unevenly over urban landscapes, resulting in substantial *intra-city* heterogeneity in climate variables, such as temperature and humidity (Stabler et al. 2005). Thus, urbanization contributes to meso- and micro-climate changes and these changes are more intense and variable within cities.
3. Climate and climate changes have important and unequal effects on the vulnerability of different groups of people that can be measured and perhaps explained by similar processes of social stratification at the global level and the very fine resolutions of individual neighborhoods and households in single cities. For example, the distribution of temperature, similar to many other environmental hazards in cities, is substantially correlated with the social class and race/ethnic composition of urban neighborhoods (Jenerette et al. 2007). In Phoenix, Arizona, affluent whites are much more likely to live in neighborhoods that have lower average temperatures and where they are exposed to many fewer hours of extremely high temperatures than low-income and Latino residents (Harlan et al. 2006). Intra-regional correlations between population characteristics and local differences in temperature and hours of exposure are primarily explained by vegetation cover and open spaces in the neighborhoods.

Two general points of particular importance for sociologists emerge from the foregoing observations. First, climate changes involve interactions of social and ecological variables at different spatial scales within specific social, cultural, and economic contexts. Although some social scientists truly do work at the macro-scale of world systems, for most sociologists, the sweeping global conclusions in reports by the Intergovernmental Panel on Climate Change (Confalonieri et al. 2007) will probably serve as the backdrop for local studies. Second, social choices about built and natural environments, as well as the allocation of environmental and economic resources among different groups, are very important in causing climate changes and determining the magnitudes of human vulnerabilities. In terms of how people are vulnerable, I only mentioned temperature above, which is one of the most studied relationships between climate and health and one in which the linkages are easiest to establish. (Even in this area, however, most studies rely on rather crude estimates of mortality to represent health effects and only a few social variables [e.g., age, disability, race] have been included in risk assessments.) There are other important dimensions of change and variability – humidity, precipitation, wind, sea levels, and storms of all types. Many of the health effects potentially related to these climate changes, such as food and water shortages, displacement, or increased exposure to pollution, have more complex relationships with social variables and are largely unexplored areas (McMichael et al. 2006).

Research on climate and people can benefit from sociological inquiries drawing on a variety of theories and methodologies in the social sciences. In my research on urbanization and extreme heat, I have found it useful to apply the same theories used by other environmental justice researchers. Political economy and political ecology underscore that urban spaces are arranged by powerful economic and political actors to create landscapes of many persistent social and environmental inequalities. Residential segregation manifests underlying social stratification processes, discrimination, and the manipulation of consumer tastes and lifestyles that influence risk and vulnerability to hazards. Vulnerabilities are linked to social inequalities, cultural traditions, laws, and social exchange networks that determine access to social and material resources that people may or may not have to manage or cope with the impacts of environmental stressors. Those with the least access to these resources are the most vulnerable to hazards (i.e., illnesses and death) of climate and climate change. Vulnerability can be measured at different spatial and social scales and it can focus on many dimensions of climate – temperature, drought, extreme weather events, and so forth.

I have analyzed US Census, social survey, and housing quality data to study the exposure of urban neighborhoods to thermal hazards but most of the data and methodologies for my studies were borrowed from other disciplines, such as geography (weather stations and Geographical Information Systems), geology (remotely sensed images of vegetation and surface temperature), and atmospheric sciences (Weather Research Forecasting models). My collaborators and I have used conventional statistical techniques to analyze the data but we also realize that system dynamics and agent-based models are better suited to projecting and simulating future outcomes and scenarios of change. Moreover, community participation research in specific places will help us to incorporate local indigenous knowledge into conceptual models. This brings me to my final point about what we need to know and how we can know it.

What do we need to know: What are the major sociological research questions?

I do not discount the idea that there are some important questions about the human dimensions of climate change that sociologists can study on their own. I believe, however, that a major part of our research agenda should be to initiate and co-lead interdisciplinary collaborations with biophysical scientists. As a practical matter, the biophysical and medical sciences will receive almost all the funding and attention for studying climate change and associated health risks. Therefore, if sociologists want to be at the main table, we need to

be innovators and collaborators. On humanitarian grounds, there is another reason why sociologists need to be involved in interdisciplinary climate change research. Effective solutions for adapting and mitigating the impacts of climate on people are not likely to be identified by single disciplines, whether they are social or natural sciences. Biophysical scientists have the data and methods to measure changes in earth systems, the timing, and where changes are likely to happen. However, they do not have the training or tools to connect their science to differential impacts on different kinds of people in different places. Their language (e.g., human drivers) and concept of what is social (e.g., population density) obscure the many ways in which people actually interact with the environment and with each other. People are relegated to mere abstractions, masking agency and diversity and separating us from the environment.

It is crucial for social scientists to set part of the overall research agenda, taking responsibility for framing interdisciplinary research questions that are important to us. Some biophysical scientists can be persuaded to use their technical knowledge to help us create environmental studies that combine state-of-the-art ecology and climatology with social, cultural, and economic analyses of individual actions, conditions, vulnerabilities, and adaptations to changes. This would be transformative research on environmental problems. Here are three interdisciplinary research topics concerning the historical evolution of climate hazards, current inequities in human vulnerability related to climate variables, and system models of future vulnerabilities based on projections of interactions among climate, ecological, and social variables.

- 1) How have global trends in urbanization changed land use/land cover characteristics, climate variability, and human vulnerability over time? The sociological part of this analysis is to understand the economic and political interests that transform natural environments into built environments that are hazardous for human habitation. Urban environments are heterogeneous and constantly changing due to human decision-making and lifestyle choices. For example, how do heat waves and hurricanes become large-scale health disasters?
- 2) How do human settlement patterns – e.g., migrations, urban sprawl, crowding, and residential segregation by social class and race/ethnicity – render low-income and nonwhite populations disproportionately vulnerable to climate-related health hazards on global to local scales?
- 3) How will climate-related health vulnerabilities affect population subgroups in particular places in the near- to long-term future based on different assumptions about climate change and feedbacks from human adaptations? The global climate scenarios give generalizations about which areas of the world and which types of populations are most at risk. System models, alternative futures analyses, and community participation research at the local scale will empower people to cope with climate change in their own communities and contribute to the connection of science with policy.

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Marta Maria Maldonado
Iowa State University

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Sociological analysis has revealed the complex ways in which social dynamics and structures of inequality are implicated in the production and distribution of, as well as in responses to environmental impacts, including global climate change. We know, for instance, that unequal development is tied to markedly unequal rates of consumption and fossil fuel use across nations and regions of the world, and thus, to substantial differences in greenhouse emissions, with the wealthiest 20% of the world's population being responsible for over 60% of emissions. As Roberts and Parks (2007) argue, "the issue of global climate change is fundamentally about injustice and inequality," which causes poor countries to suffer "the effect of a problem to which they contributed virtually nothing." We also know that the position of a country in the global economy is bound to affect its policy positions on global climate change (Roberts, 2001).

Similarly, research indicates that, while global warming is a threat to all people across the globe, some are bound to suffer its consequences more than others, with the poor, ethnoracial minorities, and women facing the heaviest burden. Unequal development, class, race/ethnicity, and gender inequalities give rise to varying levels and multiple dimensions of *vulnerability*. Not only do people in various social locations face different "initial conditions" (e.g., livelihoods associated with different levels of stability and resilience, different levels of health and nutrition, different levels of mobility), but they also have unequal abilities to protect themselves, different networks through which they access resources and information, different relationships with social institutions, and different levels of access to social protection (Cannon, 2000; Rashid and Michaud, 2000).

Sociological focus on the institutionalized and structural dimensions of inequality (that is, on how inequality is produced on a day-to-day basis, gets built into "business as usual," and becomes effectively invisible) has helped reveal the ways in which vulnerabilities to climate change are created. Sociologists have contributed to a body of knowledge on environmental inequality and environmental justice, which documents how race, class, and gender become entwined with the distribution of environmental impacts in various places, and how various vulnerabilities are shaped by social, cultural, and institutional factors. Such knowledge can be readily applied to the context of climate change.

What do we need to know: What are the major sociological research questions?

While we have a fairly good understanding of how power and inequality become linked to both environmental conditions and vulnerability, we have yet to articulate *how* our attempts to manage climate change should account for and be responsive to the differences in vulnerability that exist within and across countries and regions of the world.

Sociological research needs to explore one central question pertaining to the issue of vulnerability. How can those who are most vulnerable to climate change become less vulnerable? What kinds of structural, institutional, and organizational changes would reduce various kinds and dimensions of vulnerability in different regions and places? What obstacles or impediments exist to realizing such changes? What political mobilization strategies might be effective for creating change? There is also the empirical question of what dimensions of inequality become more salient in different places (we know that inequality structures, and the cultural factors that sustain them differ across geographic and sociopolitical contexts).

Climate change is bound to be a driving factor for what some have called eco-migration (Reuveny, 2007). As droughts, storms and floods intensify as a result of climate change, entire populations will be forced to migrate. How can countries prepare to address the ecological and social pressures associated with eco-migration? How can the vulnerabilities facing immigrant populations, especially those who are unauthorized and are thus disconnected from formal institutions, be reduced? What informal social networks operate in immigrant communities and how might these help people's ability to deal with disaster situations.

Sociological research is also needed on the question of what models of environmental governance might be most effective in engaging and including vulnerable populations and their particular conditions and concerns in efforts to address climate change. Another important research question (of practical importance) is how policies for addressing climate change are experienced and received by various populations.

How can inclusion be accomplished at all levels of decision-making (needs assessment, planning, implementation, enforcement and evaluation)? Sociologists' experience conducting community-based participatory research and participatory action research can help in identifying effective strategies for inclusion. These methodologies can also be useful in identifying local-level indicators of environmental change and for monitoring the locally-experienced, socially-mediated outcomes of climate change.

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Sabrina McCormick
Michigan State University

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Sociology, and the social sciences more broadly, can provide critical insight to understanding how we can slow climate change and sustain its impacts. The National Research Council points to four aspects of human dimensions of global change: (1) human activities that alter the Earth's environment, (2) the forces that drive these activities, (3) the consequences of environmental changes for societies and economies, and (4) how humans respond to these changes (Global NAS 2008). I am primarily interested in adaptation to the linked social and geophysical processes involved in climate change, as well as the ways in which adaptive processes can work in conjunction with the mitigation of warming. Although there is an endless array of sociological topics and research approaches relevant to these processes, my interests revolve around institutions, social inequalities, social conflict, and the social construction of health. I am primarily interested in using those theoretical frameworks as well as the tools provided by disaster research, social movements, and medical sociology.

Research on disasters helps articulate how we respond to sudden changes caused by warming or problems that grow over a prolonged period of time. While various such theories provide background and insight into climate change, they may also need modification to answer new questions. Broadly defined, disasters are "...non-routine events in societies or their larger subsystems (e.g. regions and communities) that involve conjunctions of physical conditions with social definitions of human harm and social disruption (Kreps 2001: 3718)." Although many facets of disaster research can contribute to our assessment of climate impacts, they are far too broad to encompass here. I am primarily interested in how disasters incubate during today's early phase of climate change as risks go unnoticed or unaddressed. Researchers have established that in the period leading up to an illness crisis or disaster, existing problems often considered systematically "normal" (Perrow 1984) go unaddressed. Beamish (2002) argued that many of these problems in the incubation phase can be characterized as "crescive troubles" that grow over an extended period of time and become recognizable only after government officials are trained to detect their occurrence. In these ways, climate crises may be similar to chemical contamination that Erikson (1992) has called a "new species of trouble." Consequently, an event that acts as an "internal" or "external" trigger generates an urgent threat by undermining not only the coping capacity of existing systems (Boin et al. 2005), but also the public trust in them. Such events exacerbate a structured set of social inequalities (Fothergill et al. 1999).

What do we need to know: What are the major sociological research questions?

These inequalities are situated within and across communities. But what does disaster research tell us about the communities impacted by disasters or about climate impacts specifically? Communities vulnerable to climate change represent growing targets of vulnerability (Perrow 2007). Affected communities respond first to disasters and crises, fundamentally shaping how crises expand or contract (Clarke 2003). Importantly, risk reduction for them is potentially distinct from populations vulnerable to other types of disasters. The scale, multi-factoral nature and temporal dimensions of climate-related disasters may vary significantly from other types. Community responses may also be distinct depending on context. Research on health social movements (Brown et al. 2007), and mobilization more generally, demonstrate that government framing (Zavestoski et al. 2004), media framing (Flic 2004), pre-existing social movement framing (Snow et al. 1986), and trust or distrust of government officials (Edelstein 2003; Brown and Mikklesen 1990; Zavestoski et al. 2002) determine how communities or movements

react. These principles may or may not hold for communities at-risk for the impacts of climate change. Connecting social movement studies to disaster literature could help inform how communities respond to climate-related events.

Human health represents one dimension of the risks posed by climate change. Although not all of the health impacts of climate change are detrimental (Haines et al. 2006), early estimates suggest negative health effects for many individuals (IPCC 2001). Climate change contributes to 160,000 annual deaths globally due to vector borne diseases, food insecurity, heat waves and other problems (Campbell-Lendrum et al. 2003). While epidemiologists have begun to demonstrate the effect of geophysical changes, sociological tools are better adept at articulating the social factors shaping outcomes. However, very little research has been done to identify what those social factors are and how they interact with environmental ones. My interests are in the social, cultural, economic and ecological mechanisms through which climate change is projected to increase disease risk and to identify the characteristics of resilience and weakness across types of health crises. Climate change will both exacerbate existing illnesses and create new ones. Research regarding the social construction of illness that shapes illness experience (Pierret 2003), health inequalities (House 2002; Phelan et al. 2004), processes of diagnosis (Stockl 2007; Madden and Sim 2006) and risk paradigms (Quah 2007; Smoyer 1998) inform how emergent illnesses are dealt with. Questions still remain regarding how sociological factors interact with climatological ones, how pre-existing social and health inequalities are exacerbated or alleviated, and how medical systems attuned to chronic illnesses and an aging population can shift to accommodate these new illnesses.

Adaptive measures to protect human health can also mitigate the impacts of climate change. Many examples demonstrate this, such as greater usage of mass transportation and walking that reduces automobile greenhouse gas emissions and urban obesity and diabetes. Tree planting, installation of green roofs and implementation of reflective surfaces in urban areas can both reduce heat-related illness due to the urban heat island effect and also mitigate climate change. Research has only begun to note these instances and has yet to explore the ways in which they can be achieved. Sociologists have a particular role in this topic due to their expertise in understanding how humans act in groups, such as those in which many of these activities take place. They also can inform questions of how institutional formations can shift to promote new behaviors.

Adaptation more broadly raises similar questions to those relate to addressing the health impacts of climate change. Sociologists are adept at dealing with the critical issues of level or scale of analysis that is particularly challenging to questions of adaptation. While the human contributions to climate change operate at the transnational level, their impacts are felt acutely at the local level. These differences in scale that cross cause and effect raise important questions about responsibility for adaptation and climate justice. Sociological theories of claims-making and the public sphere informs how these discussions take place across stakeholders and how power manifests itself in the actual outcomes of mitigation.

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Aaron M. McCright
Michigan State University

The Political Dynamics of Climate Change

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Climate Change Manifesto

The Western experience of modernity—e.g., economic growth, urbanization, technological development, democratic political systems, material prosperity, etc.—was made possible through globalizing industrial capitalism, which was predicated upon the insatiable extraction and consumption of vast amounts of fossil fuels for energy. In other words, the “modern” was made possible through fossil fuels. One effect of the extraction and consumption of fossil fuels is climate change. Indeed, climate change—arguably *the* social problem of the modern era—provides a fundamental critique of the Western experience of industrial capitalism. Given that “the modern” was sociology’s *raison d’être* and given that climate change is the quintessential social problem of the modern era, climate change **should be** the problem *par excellence* of sociology.

What We Know about the Political Dynamics of Climate Change. Scholarship on the political dynamics of climate change draws theoretical guidance from and contributes to sociological literatures in (a) environmental sociology, (b) social movements, (c) political sociology, and (d) sociology of science. More importantly, most existing research integrates insights from two or more of these sub-fields, making for richer and more powerful analyses. Methodologically, this area of scholarship relies upon narrative comparative/historical work, case study approaches, frame analysis, and basic statistical modeling.

While the environmental community (i.e., environmental movements, sympathetic scientists, and environmental policy-makers) and a majority of the general public (e.g., Program on International Policy Attitudes 1998) have acknowledged the reality of climate change for over a decade, some influential groups in the United States (and, to a lesser extent, in other countries like Great Britain and Germany) have denied the existence of climate change, often actively attacking climate science. For the most part, these groups are the fossil fuels industry and the American conservative movement (e.g., Austin 2002; Luke 2000). Yet, in recent years most fossil fuels corporations have ceased denying the existence of global warming and have—to varying extents—begun to “green” their messages (if not always their activities), sometimes via partnering with members of the environmental community (e.g., Levy and Egan 1998; Newell 2000). On the other hand, the American conservative movement (and the Bush Administration, in its institutionalized form) has continued its efforts (though not as vociferously as they were a decade ago) to challenge the reality of climate change—and more importantly, most substantial policy efforts to ameliorate this social problem (e.g., Mooney 2007).

The American conservative movement has successfully challenged the environmental community’s efforts via an effective use of the second dimension of power (Lukes 1974; see also Bachrach and Baratz 1970). Actors exercise this type of power by confining the scope of decision-making to only those issues that do not seriously challenge their interests. In this case, the American conservative movement—a heavily funded anti-environmental countermovement that defends corporate interests by promoting free market ideology and condemning government regulations (e.g., Austin 2002; Austin and Phoenix 2005)—effectively suppressed meaningful policy

action on climate change after the environmental community had already placed this issue on the national agenda. American conservatives (via control of the legislative branch in the mid- to late-1990s and then via control of the executive branch in the 2000s) did this by challenging climate science, underfunding environmental research, and changing the missions of existing environmental research programs (e.g., Brown 1997; Mooney 2007; Union of Concerned Scientists 2004a, 2004b).

Especially crucial to the conservative movement's success are three factors relevant to the political process model (e.g., McAdam 1982; Tarrow 1998) within social movements scholarship: framing processes, mobilizing structures, and shifts in the political opportunity structure. Briefly, the conservative movement has challenged the legitimacy of global warming as a social problem and the legitimacy of climate science more generally within an anti-environmental frame that promotes private property rights, emphasizes economic production, and rejects environmental regulations on market behavior (McCright and Dunlap 2000). Given the slow demolition of state authority and infrastructure and the rise of neoliberalism since the mid-1990s, this anti-environmental frame appears more salient than ever.

The American conservative movement has largely mobilized to challenge climate change policy via existing conservative think tanks that have historically been funded by conservative foundations and wealthy conservative families. Conservative think tanks have attempted to debunk the reality of climate change by producing and distributing hundreds of documents to policy-makers and the media, sponsoring press conferences, seminars, and speeches for policy-makers and attentive publics, and having their members appear on radio and television programs and deliver testimony at Congressional hearings. Perhaps most important, though, is the fact that influential conservative think tanks have enlisted the assistance of a handful of climate change contrarian scientists to challenge climate science (McCright and Dunlap 2003). These climate change contrarians have provided the conservative think tanks with some degree of credibility that has allowed these organizations to critique climate science itself (rather than an eventual policy later informed by scientific findings) (see McCright 2007). In a sense, this sort of ideological pre-emptive strike is akin to the types of strategic activities that tobacco and chemical corporations have performed for decades—techniques that Michaels and colleagues (Michaels 2006; Michaels and Monforton 2005) refer to as “manufacturing uncertainty” (see also Freudenburg, Gramling, and Davidson 2008).

The American conservative movement strategically took advantage of two specific shifts in the political opportunity structure to successfully promote its position that global warming is not a legitimate problem and we do not need a climate policy (McCright and Dunlap 2003). The 2004 federal elections brought on the so-called “Republican Revolution.” In the following years, Republicans controlled both houses of Congress, giving them control over all Congressional committees and allowing them to call hearings and compose witness lists. As a result, members of the American conservative movement—in particular, climate change contrarians—enjoyed a sizable increase in visibility in Congressional hearings on global warming. Thus, while Bill Clinton and Al Gore ran a relatively pro-environmental executive branch, American conservative movement members promoted their interests within the legislative branch. Later, the American conservative movement became further institutionalized in the federal government with the 2000 presidential election and the ascendancy of the George W. Bush administration.

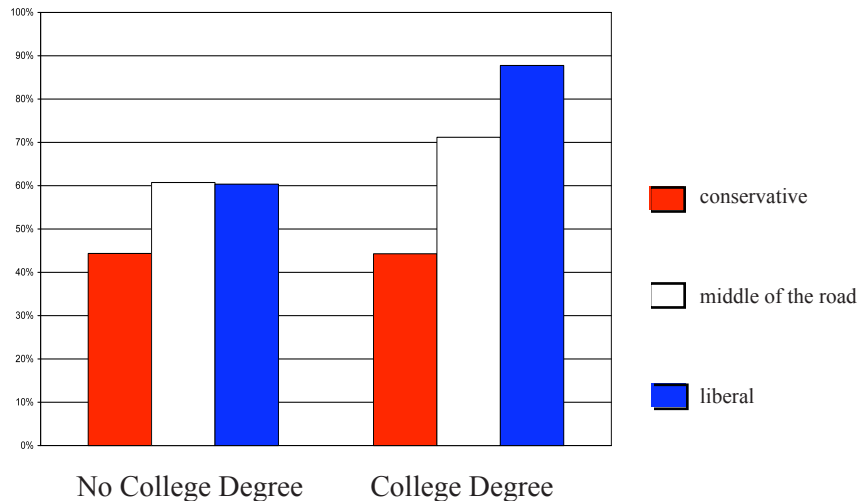
The American conservative movement exploited the media's balancing norm—which equates “objectivity” with presenting “both sides of the story”—to try to undermine public support for any potential climate policy (McCright and Dunlap 2003). Indeed, after the 1994 Republican Revolution and the concomitant rightward shift in our political culture, a small group of climate change contrarians—those scientists sympathetic

to the American conservative movement—have achieved a level of visibility in national newspaper coverage that outpaces their scientific contributions. By publicly challenging the claims of the mainstream scientific community, climate change contrarians create a sustained drama that journalists have been socialized to consider newsworthy and integral to a “good story.” In recent years, most news articles in major newspapers cite at least one well-known climate change contrarian. This journalistic practice produces a contrived storyline that breeds public confusion between what is widely accepted knowledge and what is a highly speculative claim and between what is a scientific judgment and what is a value judgment.

Overall, the political dynamics of climate change in the United States mirror the dynamics of technical controversies, as documented by Mazur (1981) and Nelkin (1984). Briefly, the environmental community and the conservative movement both utilize technical expertise as a crucial political resource; they both employ professional scientists to give their positions scientific legitimacy. As observers have seen, considerably more scientific evidence of climate change in the last decade has not significantly affected the position of the American conservative movement. In other words, the public climate change controversy—similar to earlier technical controversies—is less about the veracity of scientific evidence and mostly a conflict over competing values. Members of the American conservative movement promote economic growth, deregulation, and business dominance above most other values, and members of the environmental community prioritize values of ecological sustainability and social justice. In other words, the contemporary public controversy over climate change is not one that more science or more education will necessarily “solve” in the near future (see Nisbet and Mooney 2007).

We can illustrate this at the individual level with a brief analysis utilizing public opinion data from a representative sample of 1009 American adults in March 2007. Analysis of this Gallup Poll data reveals that we should be less sanguine about the likelihood that more education will necessarily correlate to greater understanding of scientific positions of climate change. Overall, 58.77% of respondents (593 of 1009) believe that the effects of global warming “have already begun to happen.” Yet, a closer look at self-reported political ideology by education level reveals a different picture, as shown in the following table. We commonly believe that a college degree gives its recipient greater scientific literacy, greater reading comprehension, and stronger critical thinking and analytical reasoning skills than those individuals without such a degree. While a college degree does seem to affect moderates’ and liberals’ beliefs that global warming has already begun, it has no such effect on conservatives’ beliefs.

Percent of Respondents Who Believe the Effects of Global Warming Have Already Begun to Happen by Education Level and Self-Identified Political Ideology



Self-identified conservatives with a college degree perceive the timing of global warming the same way as do those without a college degree. One reasonable interpretation of this is that conservatives' ideological position filters the science (data and scientists) to which they are exposed. Conservatives long past college may be less likely to weigh scientific evidence and international assessments as heavily as do their moderate or liberal counterparts. This could be due to their possible animosity to environmentalism, their greater support for laissez-faire economics, and their stronger desire to weaken the federal government. Younger conservatives who recently attended college during which they would have heard about climate change likely had a slightly different experience. These young adults might have attended private colleges (possibly fundamentalist Christian ones) where climate science was either ignored or disparaged. Others might have attended public schools, but they could have avoided such classes on environmental topics or they might have filtered the messages in these classes as just more propaganda from their liberal professors. At any rate, more research is needed to investigate this.

To sum, the American conservative movement has employed two-dimensional power to neutralize (if not remove) climate change from the national agenda. It has done so largely by attacking the science providing evidence of climate change. This has produced a situation of policy gridlock, where the federal government is just as close to implementing a feasible climate policy in 2008 as it was in 1993. In addition, while public awareness of global warming and public support for a climate change policy is relatively high, such public opinion is not immune from ideology. Self-identified conservatives and Republicans report much weaker support than do their liberal and Democrat counterparts.

What do we need to know: What are the major sociological research questions?

What Do We Need to Know About the Political Dynamics of Climate Change? Climate change ultimately is a social problem—one created by human activities, one perceived by human activities, and one possibly solved by human activities. As argued in the climate change manifesto in the box on page one, this global environmental problem is the quintessential problem of the modern era—the domain of sociological scholarship. We need further integration of environmental sociology, political sociology, social movement scholarship, and sociology

of science. Even more important, we need to shift scholarly attention to climate change further toward the core of our discipline. As the first generations of sociologists attempted to comprehend and deal with the major social dislocations of their time, we also need to do the same—lest we lose intellectual relevance.

Regarding the political dynamics of climate change, the following are some important questions that sociologists should be asking and answering. How will the existing trajectory of the problem status of climate change affect social, political, and economic attempts at mitigation and adaptation? We need to better understand the political dynamics across multiple levels of analysis—individual, organizational, national, and international. Furthermore, we need more comparative analyses of the political dynamics of climate change across multiple nation-states. We need more nuanced examinations of the ideological aspects of climate change. We need greater comprehension of the conservative movements' and the corporate sector's challenge to impact science more generally to better understand the context in which these groups attack climate science and the environmental community's claims about climate change. Historically tightly coupled with the American environmental movement on the left, what factors best predict when and how climate change will shift to become a non-partisan issue whereby political elites, general citizens, and NGOs on the left and on the right work together to successfully ameliorate it? How will an enduring ideological divide over beliefs about climate change affect our nation's attempts at climate mitigation and adaptation policy?

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Joane Nagel
University of Kansas

Genders, Disasters, and Climate Change

“Say what?! Gender and climate change? Doesn’t climate change affect everyone? It’s a global issue, not a gender issue.” These comments were made by a colleague a couple of years ago when I was beginning research on global climate change. While recounting a paper by Terry Cannon about the impact of the 1991 cyclone on women in Bangladesh, I wondered aloud whether or not there were gendered dimensions to global climate change. My colleague’s skepticism motivated this paper. Cannon (2002) noted that Bangladesh is one of the few countries in the world where men live longer than women, and she argued that women’s poverty and vulnerability to weather-related flooding are among the reasons why (see also Begum 1993). Natural scientists have hypothesized increased intensity of hurricanes and rising sea levels with associated coastal flooding are likely associated with global climate change (IPCC 2007; Knutson 2008; Santer et al. 2006; Li et al. 2009). This prediction suggests that research like Cannon’s on gender and disasters might be relevant to understanding the gendered aspects of vulnerabilities, impacts, and mitigation and adaptation strategies associated with climate change. In this paper I explore some of the implications of gender for the study of global climate change.

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Gender Matters: It should not be surprising that climate change might have a gendered face. Sociological research has documented many ways that gender matters in societies: work and labor force participation, health behavior and outcomes, family dynamics, civil and human rights, crime and delinquency, political attitudes and participation, discrimination, violence, consumer decision-making, and risk behavior, to name a few.⁴⁶ Sociological analyses of gender matters in social life have implications for understanding the human dimensions of global climate change. Women’s and men’s relative places in society and the moral economies that define their worth position them differently in terms of their vulnerability to the impacts of climate change, access to resources associated with recovery from climate-related disasters, and participation in the political processes that shape mitigation and adaptation policies.

Gender and Vulnerability: Researchers report that vulnerability to disasters—climate and otherwise—is highly influenced by the demographic and social characteristics of victims including race, class, gender, and age.⁴⁷ “Vulnerability is a function of the exposure (who or what is at risk) and the sensitivity of the system (the degree to which people and places can be harmed)” (Cutter et al. 2008:4). The International Federation of Red Cross and Red Crescent Societies estimated that of the approximately 140,000 killed in the 1991 cyclone in Bangladesh, 90 percent were women and children (Schmuck 2002). What were the factors that made women and children in Bangladesh so vulnerable to the storm, and are there gender lessons to be learned about the weather-related and flooding disasters that could result from global climate change?

What do we need to know: What are the major sociological research questions?

Gender and Material & Moral Economies: Women and men occupy different spaces in economies—whether

⁴⁶ For overviews of gender matters in social science, see Anderson & Collins 2006; Marchbank & Letherby 2007.

⁴⁷ Cutter et al. (2008:4) define *vulnerability* as “the pre-event, inherent characteristics or qualities of systems that create the potential for harm or differential ability to recover following an event.”

material (work) and moral (respectability). Women's domestic responsibilities and cultural expectations for their modesty can make them especially vulnerable to extreme weather events, particularly in the case of "hydro-meteorological" disasters such as floods or storm surges (Spring 2006). A number of material and moral economic factors combined to make Bangladeshi women especially vulnerable when the waters rose in 1991. They were responsible for the home—caring for children, finding food, water, and fuel, cooking meals, growing crops, tending livestock—which tied poor women to low-lying residences. Their mobility was limited by cultural definitions of women's proper dress, demeanor, and public visibility—their long, loose clothing restricted movement; they were ashamed to seek higher ground occupied by unrelated men; they could not swim. Women's relative poverty made them less resilient—they had poor nutrition, poor health care, and limited family support since divorced and widowed women were discouraged from remarrying (Cannon 2002). The Bangladesh case poses the general question: how do gender and class intersect in different national settings to create vulnerabilities and resiliencies to climate change?

It is not only in developing countries or the global South that gender economic dynamics shape vulnerabilities to disasters. Seager (2005) studied the hydro-meteorological and political disasters associated with Hurricane Katrina in 2005 in New Orleans. She noted that "Poverty combines with race and ideologies about gender to produce a metric of deep disadvantage in terms of mobility: even in a country as awash in cars as the United States, women are less likely to have a car or a driver's license than their male counterparts" (P. 30). Reports about post-Katrina New Orleans revealed a moral economy of raced and gendered valuations of worth, credibility, dangerousness, and deservingness that bears on many aspects of disasters, including those associated with global climate change. Officials and reporters described New Orleans as a "war zone" where "anarchy" reigned with dangerous Black men sniping, looting, and raping (see Tierney et al. 2006; Stock 2007).⁴⁸ Ransby (2006:218) found little sympathy for the presumed victims of this crime wave, Black women, who were depicted as "culprits in their own misfortune" because of their laziness, promiscuity, and irresponsibility rather than because of low pay, lack of jobs, and lack of affordable housing (see also Giroux 2006).⁴⁹ How do stereotypes, calculations of worth and blame, questions of responsibility, and notions of fairness shape plans for and responses to disasters in different national settings and in the international system? What are the implications of gendered and racialized meaning systems for understanding the impacts of climate change?

Gender and Climate & Disaster Policy: Although they can be more vulnerable than men, and thus have a perspective grounded in experience, women generally are not at the table in policy discussions of disaster planning, mitigation, or response. Carvajal-Escobar et al. (2008) report that women's voices are not often heard in discussions about the design of development projects to mitigate disasters despite their special knowledge of local landscapes and needs. For instance, women are the main producers of the world's staple food crops, working mostly as small farmers. Policies designed to address the impact of climate change on agriculture should, but seldom does, include representatives of these women small-scale farmers. Disasters disrupt local lives and economies in predictable gendered ways, so does rebuilding after the storm. Removing debris and reconstruction projects are much more likely to provide jobs to male workers. A growing literature on gendered dimensions of climate change stresses the importance of including women's needs, interests, and perspective in planning for

⁴⁸ The notorious murders in the Superdome were never documented, though several people died from natural causes or suicide, nor was there clearly documented evidence of widespread rape or sexual assault (Rosenblatt & Rainey 2005; Thevenot & Russell 2005). I would argue that racial cosmologies of Black male dangerousness, especially their sexual dangerousness, added fuel to the rumors of rape, looting, sniping, and overall mayhem that characterized much early reporting about post-Katrina New Orleans.

⁴⁹ Ransby also points out the resiliency of many whose lives were disrupted by Hurricane Katrina, including the support networks and mutual aid responses undertaken by many of New Orleans most vulnerable residents; for a discussion of the ways in which gender shaped the impact of Hurricane Katrina on men and women in New Orleans, see Read (2009).

mitigating and responding to disasters.⁵⁰ That much of this research is outside academic circles or in publications addressing women's issues, reflects [gendered] academic scientific interest more in the systematic study of the dynamics of climate change than in the systematic study of the details of its human consequences. How can we bring human dimensions of climate change more to the forefront of the scientific research agenda and funding priorities? What does social science need to do to make our work relevant and visible to climate change researchers? How do we make the research agenda and findings of academic and scientific researchers more cognizant of gender issues and more available and relevant to policymakers, public interest organizations, and service providers?

Gender and the Militarization of Climate Change: Gender is not synonymous with “women.” Masculine interests and masculinist organizations are front and center in climate change studies, preoccupations, and remedies. Fleming (2007) catalogs historical efforts (stretching back two centuries and beyond) of the U.S. and other governments to use and control climate for military purposes. These projects included timing war campaigns to weather forecasts, cloud seeding to create storms, and other techniques designed to shift weather patterns. He describes “a long paper trail of climate and weather modification studies by the Pentagon and other [U.S.] government agencies” in the 20th century. For instance, “In the 1950s the Pentagon convened a committee to study the development of a Cold War weather weapon,” and “During Operation Popeye in the Vietnam war, the Air Force flew more than 2,600 cloud seeding sorties over the Ho Chi Minh Trail to... ‘Make mud, not war’” (Fleming 2007:56). So-called “geoengineers,” who imagine and design massive projects to alter the global climate, are the contemporary incarnations of climate warriors. These mainly male natural scientists and engineers are described by Fleming as “The new titans who see themselves as heroic pioneers, capable of alleviating or averting natural disasters” by large-scale projects to stop global warming (P. 50). For instance, physicist Lowell Wood, a protégé of Edward Teller (father of the hydrogen bomb), who worked for 40 years at Lawrence Livermore National Laboratory, has suggested building up the Arctic ice by using large artillery pieces to shoot tons of sulfate aerosols or nanoparticles into the stratosphere to deflect the sun's rays and cool the planet or alternatively by hooking a 25-kilometer-long “sky hose” to a high-flying military superblimp to pump reflective particles into the atmosphere; another is chemist Paul Crutzen whose idea is to create a “minor nuclear winter” by shooting or ballooning millions of metric tons of sulphur each year over the tropics to simulate a Mount Pinatubo-scale eruption (Fleming 2007:48). There are a variety of problems with these kinds of schemes: they are likely to be expensive and ineffectual, they relegate any plans to mitigate or reduce greenhouse gases to the back burner; they might actually be dangerous;⁵¹ and they represent an imperialistic, militaristic bent—large-scale projects undertaken by one country to dominate the global environmental system, or as Fleming (2007:48) aptly summarizes, “basically declaring war on the stratosphere.” Imagine the response of these climate engineers or their government if France or China or Brazil planned to darken the sun's light to shade the planet.

The militarization of climate change studies is not only evidenced in geoengineering operations. Militarized responses to global climate change can be heard in warnings about potential threats to “national security”—as in the November 2007 Council on Foreign Relations symposium: “Climate Change and National Security: An Agenda for Action” (CNA—Center for Naval Analyses 2007) and the June 2008 “National Intelligence Assessment on the National Security Implications of Global Climate Change to 2030” (U.S. House of Representatives 2008). The institutionalization of a militarized masculinist mentality into the climate-related

⁵⁰ CIDA 2002; Climate Alliance 2005; Boyd 2002; Dankelman 2002; Denton 2002; Duddy 2008; GENANET 2005; Gurung et al. 2006; Lambrou & Piana 2006; Laudazi 2003; Masika 2002; Mitchell et al. 2007; Nelson et al. 2002; Reyes 2002; Rohr 2004, 2006; Roy & Venema 2002; Skutsch 2002, 2004; Villagrasa 2002.

⁵¹ Some of these schemes have been evaluated by natural scientists; for instance, Bala, Duffy, and Taylor (2007) predict decreased global mean precipitation as a hydrological consequence of geoengineered reductions in solar radiation.

policies and operations of government agencies can be seen in plans to protect borders from climate refugees or use rail guns designed during Ronald Reagan's Strategic Defense Initiative ("Star Wars") to fire tons of material into space to deflect the sun's rays. The implications for climate science and policy of the redeploying the resources of U.S. national labs previously engaged in nuclear weapons production and war games (e.g., Los Alamos and Lawrence Livermore) for climate change modeling and geoengineering projects are not innocuous, even when these facilities bring valuable technology and expertise to the research table. Sociological studies of organizational culture suggest that organizations bring their own agendas and worldviews to the problem at hand: to a man with a hammer, everything looks like a nail. Researchers need to ask: What perspectives and plans will the U.S. and other national militaries and their organizational apparatus bring to the policy table when planning responses to global climate change? (Climate security?) What strategies for addressing the effects of climate change should we expect from national weapons labs? (Geoengineering?) It is important to ask not only what is the role of gender in shaping vulnerabilities to climate change, but also what is the role of gendered institutions and ideologies in creating the world that will result from gendered responses to climate change?

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Kari Marie Norgaard
Whitman College

The Social Organization of Climate Denial

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Sociological knowledge about the human dimensions of climate change breaks into three broad areas concerning: human causes, human impacts, and human responses. Sociology, with its endemic focus on social institutions and culture, addresses each area with attention to the complex interactions between individual behavior and macro forces that are often overlooked by the rationalistic and positivist assumptions about social behavior made by economic and policy analysts.

While all three areas need attention, there is arguably greater sociological understanding of and consensus around the first: human causes of climate change. Here we know for example, which sectors of society generate most climate gasses, how this relates to economic activity and trends in the production of climate gases across time and space. Concerning sociological knowledge of human impacts of climate change we also know a fair amount. Scientific predictions concerning sea level rise, storm surge and intensity, and shifting weather patterns have to some extent been translated into descriptions of impacts to agriculture, disease patterns, and transportation systems. We know that those with less social capital experience the consequences of climate change most directly and forcefully. Social inequality also buffers the experience of climate change for those with greater social and economic resources, leading to the lived perception among the better off that the problem is less urgent than it actually is.

What do we need to know: What are the major sociological research questions?

It is the third area, the state of sociological knowledge as it applies to human responses to climate change, that is the most understudied, and I propose, in need of significant attention. What sociologists have identified is a widespread lack of public reaction to scientific information regarding climate change. By “reaction” sociologists include the widest possible range of reactions from planning by federal and state officials, to social movement activity, to individual behavioral change, or even acknowledging the information by letting it cross our minds or talking about it with friends and family. Climate scientists may have identified this as the most important environmental issue of our time, but it has taken over 20 years for the problem to penetrate the public discourse in even the most superficial manner. Yet the IPCC calls for reductions of 50 to 80% in greenhouse gas emissions by 2050. Although public concern is beginning to arise, climate change has been neither a policy issue, nor publicly salient in the broadest sense. Following Habermas, we can understand this failure of information to move through the public awareness and into policy outcomes as a failure of communicative action. But to understand both why it is happening, and what to do next, we must look to the sociology of denial. Most research to date has examined denial on the level of individual psychology. Yet what individuals choose to pay attention to, or ignore, must be understood within the context of both social norms shaping interpersonal interaction and the broader political economic context.

How we respond to information that is highly disturbing, information for example about a lack of certainty of our future survival, information that challenges the basics of our social organization, is a complex process. My work in Norway, supported by preliminary research in the U.S. indicates that people want to protect

ourselves from disturbing information in order to 1) avoid emotions of fear, guilt and helplessness, 2) follow cultural norms and 3) maintain positive conceptions of individual and national identity.

The people I interviewed described fears about the severity of climate change, of not knowing what to do, fears that their way of life was in question, and concern that the government would not adequately handle the problem. They described feelings of guilt for their own actions, and the difficulty of discussing the issue of climate change with their children. In some sense, not wanting to know was connected to not knowing how to know. Talking about global warming went against cultural norms of conversation. It wasn't a topic that people were able to speak about with ease - rather, overall it was an area of confusion and uncertainty. Yet feeling this confusion and uncertainty went against emotional norms of toughness and maintaining control. Furthermore, thinking about climate change threatens our sense of individual identity and our trust in our government's ability to respond. At the deepest level, large scale environmental problems such as global warming threaten people's sense of the continuity of life - what sociologist Anthony Giddens calls ontological security.

Ignoring the obvious can however be a lot of work. Both the reasons for and process of denial are socially organized. Denial is socially organized because societies develop and reinforce a whole repertoire of techniques or "tools" for ignoring disturbing problems. In the community where I did my research, collectively holding information about global warming at arm's length took place by participating in cultural norms of attention, emotion, and conversation, and by using a series of cultural narratives to deflect disturbing information and normalize a particular version of reality in which "everything is fine." For example, emotions of fear and helplessness can be managed through the use of selective attention; controlling one's exposure to information, not thinking too far into the future and focusing on something that could be done.

As a result of this kind of denial, people I have interviewed described a sense of knowing and not knowing, of having information but not thinking about it in their everyday lives. Overall this situation can be described as a "double life." Information from climate science is known in the abstract, but disconnected from, and invisible within political, social or private life.

Given what we know about both the severity of climate change and the need for immediate action, I propose that we as sociologists focus our attention on 1) understanding the complexity of human social response to disturbing information, especially the conditions under which this denial breaks down, and 2) the identification of leverage points for engendering response to climate science on the individual, community, statewide and national levels.

1) Attention to the Sociology of Denial We ought to devote resources to better understanding the public reaction to climate science, including especially the role of culture, talk, and emotion in the avoidance of information. Although there may be both social incentives and social resources for distancing oneself from and collectively ignoring disturbing information, denial does break down. 1) Under what circumstances does this occur? 2) To what extent are there cultural variations of denial of climate change (what is different between California and Texas, India and China), why is there less denial in Europe than in the U.S., 3) Are some aspects of climate change / ecosystem change not denied? 4) To what extent has new information affected how climate change is received and not? Methodologies that may be particularly useful here include extensive in-depth interviews together with content analyses and survey questionnaires.

2) Identification of Leverage Points Given existing knowledge of response barriers and new knowledge to be developed about the circumstances under which denial and reaction are most likely to occur, sociologists can focus our attention on the identification of leverage points for social response. For example:

Response Barrier: Gap between Information and Daily Life.

Possible Leverage Point: Impact Assessments, Disaster Preparedness, and Mitigation

Encourage planning at community, state and federal levels.

The development of impact assessments, disaster preparedness, and mitigation planning may serve to make climate information “real,” bringing it close to home. These actions are predicted to reduce the gap between such information and daily life, decrease the sense of a double reality, and bring home the impacts in economic, infrastructure, and physical terms.

Simone Pulver
Brown University

Transitioning to a Low-Carbon Economy: The sociological contribution

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

All would agree that the eighty percent cuts in global greenhouse gas emissions by 2050, which are described as necessary to avoid serious adverse impacts on the global climate system, will entail the restructuring of global, national, regional, and local economies. Sociology offers insights on the patterns, drivers, and obstacles to this restructuring, at both the micro-agent and macro-structure levels.

From a micro-agent, firm-level perspective, we understand the drivers of firm environmental behavior. Standard models point to four sources of pressure that cause firms to adopt environmentally friendly policies and practices. They include three external drivers: market pressures and opportunities, current and pending government regulation, and stakeholder pressures. Market pressures and opportunities can take the form of lowering costs of inputs and/or waste disposal, green marketing, and enhancing rent-earning characteristics of firms such as reputation or product quality. Firms comply with regulation to avoid the fines and penalties associated with noncompliance. Finally, stakeholder pressure, embodied in campaigns by environmental nongovernmental organizations (NGOs), local communities, or shareholder groups, can also drive changes in firm behavior (see for example Bansal and Roth 2000; Levy 1995; O'Rourke 2003; Prakash 2000; Pulver 2007). Transformational leadership is the fourth driver of firm greening, but unlike the other external forms of pressure, its origin is within the firm (Gladwin 1993; Weinberg 1998).

There are two primary ways to explain the mechanism linking external pressure to change in firm environmental behavior. The first models firms as rational actors with fixed interests based on their operational characteristics. Within this framework, variation in firm environmental behavior is the result of differences in external pressures, differences in firm operational characteristics, or a combination of the two (see for example, Baylis, Connell, and Flynn 1998). In contrast, new institutionalist models of firm behavior reject economic, rational actor theories of the firm and the idea of fixed interests based on firm characteristics. Rather, they argue that firm interests and drivers of firm action are constituted via a process of shared knowledge creation by a firm and other actors in its organizational field (see for example Hoffman and Ventresca 2002). When explaining variation in firm greening, new institutionalists highlight the intensity and density of formal and informal network ties between managers and other actors in their organizational fields, including competitors, suppliers, product customers, and regulatory agencies (Biggart and Lutzenhiser 2007), the key role of perceptions of issue salience (Bansal and Roth 2000), and the values of individual managers (Hoffman 2001) to firms' assessments of the benefits of ecological responsiveness. Thus, firms with similar operations, facing similar market, regulatory, and stakeholder pressures, may adopt diverging strategies because of divergent understandings prevalent in the particular economic, political, and socio-ideological networks in which individual firm managers are embedded.

Organizational and economic sociologists, as well as scholars in political science and business strategy, have used this standard framework of firm environmental behavior to analyze the climate strategies and practices of firms at the forefront of the business-climate change interface including oil companies, electric utilities, car companies, and the insurance industry (Rowlands 2000; Levy and Newell 2000; Levy and Kolk 2002; van den Hove, Le Menestrel, and de Bettignies 2002; van der Woerd et al. 2000; Austin and Sauer 2002; Engels 2006; Levy and Rothenberg 2002; Mills 2005; Pulver 2007; Skjaereth and Skodvin 2001).

What do we need to know: What are the major sociological research questions?

A bottom-up, micro-agent perspective provides insight on how individual firms respond in the face of climate change. However, the transition to a low-carbon economy implies wide scale, macro-structural change. Sociologists have tackled questions about environmentally-motivated macro-structural change from two directions, but no consensus exists on the possibility of greening the economy or on the top-down dynamics of ecological restructuring.

Environmental sociology offers two competing theories about the potential for ecologically restructuring the economy. On the one hand, treadmill of production approaches argue that the dual forces of inter-firm competition and unlimited wants lock capitalist societies into a single expansionary economic system. Theorists describe an economy of ever-increasing production and associate it with ever-increasing environmental impacts, in the form of environmentally damaging withdrawals (i.e., resource extraction) and additions (i.e., waste and pollution) (Schnaiberg 1980; Schnaiberg and Gould 1994; Schnaiberg, Pellow, and Weinberg 2002). In contrast, ecological modernization theorists envision the possibility of industrial restructuring, based on principles of ecology (Spaargaren and Mol 1992). The “emancipation” of ecological concerns from the economic sphere is the first step toward putting ecological rationality on equal footing with economic drivers. The next step is “to institutionalize ecology in production and consumption processes, and thus to redirect these basic economic practices into more ecologically sound ones” (Mol 1995, p.30).

Empirical studies have not yet resolved the theoretical debate between the two perspectives. Regional and industry case studies provide some empirical support for ecological modernization theories, documenting efficiency improvements in industrial production (Mol 1995; Sonnenfeld 1998). However, this body of case study research is critiqued for projecting economy-wide changes based on single industry case studies and for ignoring leakage, i.e. when environmental improvements in one sector lead to increased environmental damage in another (York and Rosa 2003). Focusing specifically on greenhouse gas emissions, cross-national quantitative analyses find that population and political economy variables, in line with treadmill of production approaches, rather than ecological modernization variables, such as state capacity and prevalence of environmental NGOs, best predict a country’s environmental footprint, including its carbon emissions (York, Rosa, and Dietz 2003).

Filling the gap between the robust understanding of the micro-agent, firm-level responses to climate change and the debate over the macrostructural consequences of firm greening and the possibility of transition to a low-carbon economy requires research in four areas:

- 1. Sector-wide research on firm climate policies and practices:** The large multinational corporations that have been the focus of firm-level studies are only one type of firm that will have to grapple with climate change. Transitioning to a low-carbon economy depends not only on leading firms, but also on those firms that vocally oppose action, and most importantly on the large group of follower firms that will either mimic leading proponent or opponent firms. Research thus needs to focus on the climate policies *and practices* of all firms in a sector. In the climate change arena, one hurdle to research on firm climate practices is the lack of standardized and comprehensive data on firm greenhouse gas emissions.
- 2. The climate practices of developing-country firms:** The environmental footprints of firms in industrialized countries are being eclipsed by those in the industrializing economies of Asia and Latin America, yet most research on firm environmental behavior has focused on firms in the United States, Europe and Japan. Research is needed to assess if standard models of firm environmental behavior characterize the operating

realities of developing-country firms. At a minimum, developing-country firms seem to differ from their industrialized-country counterparts in the relative importance of transnational dynamics. Extra-local resources—be they technology, environmental management templates, financing or expertise—seem essential to environmental innovation by developing-country firms (Pulver 2007).

3. **Orienting research in the development and political sociology subfields towards climate change concerns:** The research contributions of comparative development and political sociologists should be oriented towards environmental concerns. The patterns and drivers of economic growth and redistribution, that are the focus of research on comparative development, are relevant to understanding processes of transition to a low carbon economy. Development sociologists, concerned with the dependent variables of economic growth and redistribution, have theorized how state, market and civil society actors collaborate to promote leading sectors (Evans 1995) and pursue particular development outcomes (Haggard 1990). Likewise, world systems approaches and related perspectives offer insights into the long-term structural tendencies of capitalism, its crises, cycles, and regional shifts (Koehler and Chaves 2003). Finally, economic sociologists and others have studied the processes and dynamics of technology transitions in the early industrial age (Moe 2007) and the more recent IT revolution (Saxenian 1994). Research findings in these other sociological sub-disciplines can help environmental sociologists analyze the obstacles and pathways to promoting clean energy technology sectors and to moving economies away from fossil fuels. Questions to be addressed could include: When and how do state-private sector partnerships succeed in promoting clean energy sectors? What is the role for civil society? What are constraints on clean energy development imposed by globalization? Etc.

4. **A sociology of global climate governance and global carbon markets:** A basic insight of economic sociology is that social and legal environments underpin and structure markets (Fligstein 1996, 2002). A key venue for the creation of global carbon markets are the ongoing international climate change negotiations under the auspices of the United Nations. The interactions of state, market and civil society actors in international negotiations and intergovernmental organizations have historically been a domain of research in political science—in the environmental arena see for example the journal *Global Environmental Politics* and the MIT Press series on *Global Environmental Accords*—yet there are numerous opportunities for sociological contributions. Institutional, world systems, and social movements perspectives have much to contribute to a better understanding of international climate politics. For example, sociology's new institutionalism has been integrated into analyses of global environmental regimes (Meyer et al. 1997), global trade regimes (Chorev 2005), and global norm change (Finnemore 1996). World systems perspectives explain persistent inequities in international negotiations (Roberts, Parks, and Vasquez 2004). Social movements concepts like “framing” and “political opportunity structure” are used to explain movement effectiveness at the international level (Kay 2005; Evans 2005). However, with the exception of the recent volume by Roberts and Parks (2007), questions of global climate politics and global carbon markets have been ignored by sociologists.

In summary, I argue that sociology is central to revealing the pathways and obstacles to transitioning to a low-carbon economy. Environmental and economic sociologists have established robust models of firm environmental behavior. More research is needed to assess the connections between firm-level greening and the ecological restructuring of economies. In particular, I advocate for four new research directions: 1) sector-wide studies of firm climate practices; 2) research on developing-country firm environmental behavior; 3) the application of insights from development and political sociology towards the environmental restructuring of

economies; and 4) research on global climate governance and carbon markets.

Research in each of these four areas will enhance sociology's contribution to climate change scholarship. However, there is also an opportunity for cross-fertilization. Better understanding the causes and consequences of climate change will contribute to the discipline of sociology. First, it offers new opportunities to expand interest in and engagement with environmental concerns beyond the bounds of the subfield of environmental sociology. Second, much of sociology's theoretical tradition was developed within a nation-state framework. Global issues, like climate change, provide opportunities to take social theory to the global level.

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Timmons Roberts
College of William and Mary

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Sociologists have a potentially huge role to play in applying insights from our respective areas to understanding the massive social upheaval which looms ever closer. We need sociological insights to understand when norms and values have shifted strongly in the past, and why they did. We need sociological theories and methods to understand how knowledge and values influence beliefs and especially behaviors. We need to understand corporate and alternative culture and the media, how they shape public understanding of risk and options for action. We need to understand the role of public opinion in political demands. Sociologists can help us understand how inequalities of race, class, gender and position in the world economy lead to differences in vulnerability to climate change and in who will be able to respond and profit from the different phases of this disaster. We need to understand the Public Relations industry, the shape of corporations and their past, current and likely future responses. We need to understand the globalization of the world economy and where that leaves people in various places and situations.

Looking ahead, we need to forecast what will happen if this or that type of natural disaster is overlaid upon this or that social system of inequality and injustice. Most boldly, we need sociologists to get beyond describing what *is* and begin envisioning *what could be*, and figure out how to use our tools to help make this new society happen, and soon.

Sociologists have done some of this work, but so have geographers, political scientists, economists and communications and interdisciplinary people. We need to look beyond our disciplinary walls and work together with people across the academy and outside it, building *social science* capacity for the looming crisis.

What do we need to know: What are the major sociological research questions?

After decades of research, we now have quite good models of how the climate system works, and many very educated guesses about how ecological systems are going to be affected and how they might respond.⁵² In both cases we can base these guesses on evidence of what happened in the past: tree rings and air bubbles in Greenland's ice sheets tell us what happened to global temperatures over centuries and millennia. Fossil records tell us what happened when the climate shifted quickly and how many individuals and species died out. We also have some absolutely sobering archaeological and historical records of what has happened to human societies when the climate has shifted, including dead cities, collapsed civilizations, and some surprising adaptations.⁵³

What we entirely lack is a solid understanding of how *our* societies are going to respond to climate change. A body of research is emerging on how developing nations and resource-dependent communities are already beginning to *adapt* to climate change.⁵⁴ Britain's Climate Impacts Program (UK CIP) has worked on the interface between academia, governments, and business to attempt to understand how we can better respond to the

⁵² Many good sources summarize these findings. Good places to start are Mark Maslin's 2003 *Global Warming: A Very Short Introduction* (Oxford 2003), the 2007 IPCC report (UNFCCC 2007), and the 2006 Stern Report.

⁵³ Elizabeth Colbert *Field Notes from a Catastrophe*. 2005; Jared Diamond *Collapse* 2005.

⁵⁴ Neil Adger, Jouni Paavola, Saleemul Hug and M.G. Mace's 2006 book *Fairness in Adaptation to Climate Change*, Working Group II of the 2007 IPCC report, and many others now have begun to build this literature.

current and likely impacts of climate change. On the U.S. side we have no such thing: we need to chronicle the very first steps American localities are taking to build resilience and address the problem of climate change. For developing nations, a small literature is developing on what will be required to respond to climate change: most of these analyses describe a huge funding and technical capacity gap.⁵⁵ Multilateral (World Bank, GEF, ASDB, etc.), bilateral (USAID, DFID, GTZ, etc.), and private aid agencies (Oxfam, ActionAid, Christian Aid, etc.) are starting to think about “climate proofing” their billions of dollars of aid projects. There is great need for more research on these issues, and it’s a big part of my agenda.⁵⁶

But so far, we have not really figured out how we are going to change enough to avert the disaster that looms. To do so, the wealthy nations will have to cut our emissions of greenhouse gases by 80-95 percent by mid-century, just 42 years away. A very recent piece in *Nature* by Roger Pielke Jr. argues that technology will probably not come to our rescue.⁵⁷ We need to understand how to build *mitigation capacity* of nations and local communities, and institutions small and large.

However we sociologists are largely MIA (missing in action) from policy and action discussions now taking place in Washington, Brussels, and around the world. We environmental sociologists alone were never adequate to the task, and this is more than ever the case. I look forward to speaking about this problem in the past tense as we mobilize together to address this massive issue.

⁵⁵ Benito Mueller has various pieces on this, the UNDP Human Development Report 2007/2008 is quite good, Oxfam’s Kate Raworth did a piece in Spring 2007, etc.

⁵⁶ My two major recent projects are *A Climate of Injustice: Global Inequality, North-South Politics, and Climate Policy* (2008, MIT Press, with Bradley C. Parks); and *Greening Aid? Understanding the Environmental Impact of Development Assistance* (2008 Oxford University Press, with Rob Hicks, Mike Tierney, and Brad Parks).

⁵⁷ April 2008.

Eugene A. Rosa
Washington State University

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Part A1; Across the Social Sciences and in Larger Research Community: (1) *Global Environmental Change:* The human dimensions of climate change—the purview of the social sciences—are often conceptualized within a larger context, namely global environmental change (GEC). Recognized by an international intellectual and policy community GEC typically comprises two fundamental processes: cumulative effects and systemic effects (Turner et al., 1991). Cumulative effects are effects that are local in domain but so widely replicated that in sum they have global consequences. Tropical deforestation is not only one example of this type of change, but a cumulative effect that is coupled with climate change as both cause and effect. Systemic effects occur on large spatial scales or alter the function of large systems and global climate change (GCC) is an exemplar of this type of GEC. In all instances the concern is that human activities (anthropogenic drivers in the language of the international scientific community) are changing the natural environment and the climate on a global scale. Hence, a delineation of the human dimensions of GEC overlaps considerably (and is nearly equivalent) to a delineation of the dimensions of climate change.

(2) *Key knowledge bases across the social sciences:* There is considerable and steadily increasing understanding of land use and land changes due principally to the work of geographers and anthropologies. There is a comparable body of solid research on the issue of common property and resources uses that spans the social sciences (including sociology), but where anthropology and political science are especially influential. A third area of research showing considerable progress, almost exclusively the purview of political science, is knowledge of the international climate policy process and the formation and operation of international policy and regulatory bodies. Finally, there is considerable input—primarily by geographers into one of the most interdisciplinary topics (with input by biologists, ecologists, economists, engineers, and others) in climate change and GEC more generally: vulnerability, resilience, adaptation and, recently added, mitigation.

Part A2: What Does Sociology Know? This question is protean, capturing a broad set of concepts ranging from the very abstract to the very specific. At the **broadest level** sociology knows a great deal. It knows that climate shapes the location of societies, what they do, and what they can do (Rosa and Dietz, 1998). We also know that climate change is one of several grand risks facing all societies (risk is a context of outcome uncertainty embedded with human stakes). We further know that one defining feature of risk, uncertainty, cannot be eliminated. Most importantly we know that a variety of social factors and processes are the **key drivers** of global climate change. At a more **refined level** we know from the STIRPAT research program (see <stirpat.org>), from the industrial metabolism work at the Institute for Social Ecology (IFE), and from work in World Systems research (Roberts and Grimes, 1997) that the key human drivers (termed anthropogenic drivers in the GEC community) of climate change are the scale of population, levels of consumption, the pace of material flows, position of nations in the world system, as well as some other persistent physical and social variables—but with much less effect. We also know, despite claims in the economics literature (especially around the so-called “Kuznets Curve”) and in some versions of European sociological theory, that global warming will not be solved by following a “business as usual” path.

Unfortunately, despite the foregoing knowledge the inventory of sociological research on GCC is **remarkably meager**. While the discipline knows a great deal about the emergence and operation of structures and processes, about institutional design and practices, and about the connection between agency and micro

structures, painfully little of this knowledge has seen its way into the climate change literature. The meagerness of the sociological inventory is further revealed in comparison to other social science disciplines. The fields of political science, anthropology, geography, and economics have made nontrivial contributions to understanding the human dimensions of GCC—distancing them from sociology.

What do we need to know: What are the major sociological research questions?

Part A1. Institutional and Cultural Challenges: If sociology wishes to make a serious contribution to the understanding of the causes of GCC and to the development of solutions to GCC (rather than simply contributions of interest to other sociologists), then it must integrate itself into the larger GCC scientific and policy community. Also, sociology must re-emphasize its commitment to science as a discipline and be prepared to understand the general principles and uncertainties of climate and related sciences. Well-known to all knowledgeable observers is the verity that those social sciences, noted above, that have contributed most to understanding GCC have collaborated with scholars in the traditional sciences.

Part A2. Meeting the Demand for GCC Knowledge: A useful perspective, rapidly achieving centrality in science policy circles, is the idea of matching the trajectory and supply of science with demand—a demand that emphasizes the potential for societal benefit (Sarewitz and Pielke 2007). Sociology enters the GCC arena decades after the emergence of the problem and a scientific community to study it. That arena has already defined the role for the social sciences in general, sociology in particular, as **human dimensions** research with an emphasis on human or **anthropogenic drivers** of GCC. Thoughtful considerations of the human dimensions, especially by the National Research Council/National Academy of Sciences (NRC/NAS) have already provided a sketch of human dimensions knowledge “demand” that can be used as a gauge for supplying sociological knowledge.

Human Dimensions—Anthropogenic Drivers: An influential specification of the dimensions, and their need for research, was contained in the influential 1992 Report of the National Research Council/National Academy of Sciences (NRC/NAS, 1992). In particular, it listed these five dimensions (with minor modification) below:

- Population change
- Economic growth
- Technological Change
- Institutions (Political, Economic, Social)
- Culture (Including attitudes and beliefs)

Subsequent reports of the National Academy (NRC/NAS 1994, 1999) underscored the initial list, or expanded and elaborated that list:

1994

- Land use change
- Improving policy analysis
- Assessing vulnerability and adaptation

1999

- Understanding environmentally significant consumption
- Regional relevance of climate change assessments
- Assessing social and economic surprises
- Improving decision making
- Integrating human dimensions research with other research
- Improving geographic links to sociological and health data

Descriptions of each dimension can be found in the referenced documents. Some of these dimensions have recently been targeted for re-emphasis or revision and are described in detail in (Stern and Wilbanks, 2008)—which is also posted on the workshop website.

What Tools Do We Need to Find Out What We Need to Know? The most important tool sociology needs to develop is Global Climate Change (GCC) intellectual capital or person power: the development of a cadre of sociologists who are committed and trained to inform the human dimensions of GEC, including climate change. To effectively address climate change problems requires a focused effort on capacity building—meaning, primarily, the considerable expansion of trained researchers and practitioners supported by appropriate research facilities (Rosa, Kasperson, and Miles, 2007). Building such capacity poses some unique challenges to not only the social sciences but also to funding agencies and other support institutions. The existing sociological capacity to conduct climate change research is small in numbers and large in geographical dispersal. Yet, this is the principal base (augmented by training in the natural sciences) from which to expand sociological capacity. One model for capitalizing on this small and dispersed expertise would be to create a training institute (perhaps modeled on the ICPSR Summer Institute, the Inter-university consortium of political and social research at the University of Michigan) where workshops, training sessions, and courses could be offered to faculty and students by a collection of visiting faculty. The institute could be located at a single institution, such as with the ICPSR, or could rotate among institutions. Whether this is the most effective model or not, the key point is that the sociological capacity to conduct climate research will remain limited insofar as the capacity building issue is avoided.

Follow-up Steps to Workshop: One of the common experiences of the workshop was the discovery of useful, but dispersed people, tools, and resources of conducting GCC research. This experience should be captured and expanded upon in some way, perhaps by creating a clearinghouse or other mechanism within the American Sociological Association (ASA). The other more obvious follow-up step is to energize the working groups created at the workshop.

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Rachel Slocum
St. Cloud State University

The Sociology of Climate Change: Research Priorities

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Sociology's expertise in the study of social inequality, social change and scientific knowledge position it well to make important contributions to human dimensions of global change research. Sociology is poised to study and explain the institutions, norms, governance practices, forms of participation and social movements that emerge. The discipline is particularly well suited to study and propose organizational changes necessary to both mitigation and adaptation at local and state levels. Sociological methods enable us to learn about societal aspects of climate change through qualitative approaches as well as quantitative analysis and modelling. As human dimensions funding streams already privilege modelling, GIS, remote sensing and statistical analyses, research using ethnographic methods should be encouraged. Interviews, focus groups, participant observation, text analysis and participatory action research are all useful means to explore the socio-environment. Similarly, funding tends to support research with economic or behaviorist conceptual frameworks but should also support those studies grounded in social theory, an additional strong point of sociology.

We know that it is critical that adaptation and mitigation be addressed simultaneously. Adaptation is a term from biology, which while very appropriate for all life in the context of climate change, does not convey well enough the challenge facing a hierarchical human society that persists in radically altering the biosphere despite evidence that this will be catastrophic. Uneven development globally and uneven relations of power within societies mean people will understand, react and respond differently to the idea of the changing climate and they will also experience its effects differently. Biophysical processes in conjunction with capitalism, racial inequality, patriarchy, the legacy of colonialism and anthropocentrism all play a role in enabling the changes we are now witnessing as well as the varying impacts. Finally, uncertainty has been exploited to support inaction on climate change. Uncertainty must become the way we know the planet such that policymakers and citizens do not demand the eradication of what is unknown before they will act. Three broad areas in which social science research is needed include an exploration of 1) ethical and political questions around disaster, social change and the relationship between the differently human and more than human; 2) knowledge production on the changing climate; and 3) the relationship among mobility, inequality and development.

What do we need to know: What are the major sociological research questions?

Ethics and Politics: Questions of responsibility, generosity, care and relationship arise from human induced climate change. How we theorize the human, the more than human and the relationship among different beings is important as the earth warms and significant, even sudden, socio-ecological change occurs. How might people come to think beyond responsibility toward family and nation and toward other human and more than human life? As sociologist Nigel Clark (2007, in process) has pointed out, it is theoretically and ethically important to be able to both situate the human in relation to the long term geo-physical shifts that have moved the earth *and* to acknowledge human responsibility for anthropogenic emissions. Philosopher Elizabeth Grosz (2005) suggests that the nonmoral ontology of Darwin would not mourn extinction but would instead wait to see what might take the place of the extinct. Like Clark, she is interested in the creativity of nature, the way the biological incites culture to act. Research might also mobilize the concept of companion species (Haraway, 2007), for instance, to think through these relationships. Affinity politics across species and nations, like a climate politics drawing on the

attachment of northern peoples to the polar bear (Slocum 2004), or of indigenous people organizing around the right to be cold (Yusoff, 2007) might provide insights.

What can various theoretical frameworks bring to the conceptualization of responsibility in light of more frequent disaster? Some nations are obvious agents in climate change, many more people will be victims and some few will be beneficiaries. What politics are arising from recognition of responsibility at a distance (Massey, 2005)? What does it mean to live with climate change when we know some people in certain places are more constrained than others in their ability to adapt? Stephen Pacala (2008) uses the term genocide for what will most likely occur in the Sahel when shifts in rainfall patterns induce widespread and long lasting drought. What does society do with that knowledge? Invoking morality to stem disproportionate and unsustainable use of resources seems unlikely to motivate a sense and practice of responsibility. In the context of the changing climate, research exploring these dimensions of the human and the nonhuman, particularly those which pose philosophical questions, would be helpful.

Anthropologist Joseph Masco (2008) suggests that one cultural obstacle to a viable US response to climate change is its historical position as an atomic power and its perception of threat. Innovative research into what characteristics of US society or the American state prevent or enable a response to the risk of climate change should be undertaken. It would also be useful to know what forms of environmental citizenship and lay science are developing around climate change. What different politics are forming to confront the perpetual emphasis in the US on the individual's efforts to protect the climate? What progressive or reactionary politics of place (e.g. local food) are building around potential climate changes? What new security apparatus will be justified to deal with the places and people experiencing insufficient water, food and fuel supplies? What will a declining empire do? The concept of biopolitics (Foucault, 1997) in which the state and the institutions of society assume the task of making live and letting die could be deployed in sociological research. State response to the dislocations resulting from climate variability should be followed to document the climate biopolitics that emerge. Studies should render visible the new affronts to human dignity and civil liberties as climate change poses additional opportunities to justify the use of military power and surveillance. Will the changing climate be a provocation to neoliberalism and capitalism and in what form? What non-capitalist practices are developing in the wake of climate variability? What will response to climate vulnerability under neoliberalism look like? What adaptation measures might result from a neoliberal political economic regime? Given the US emphasis on behavioural change and personal responsibility to confront obesity, risk of HIV, drug abuse and poverty it will be important to understand how people are enrolled in adaptation in neoliberal ways that may exacerbate the consequences of climate change for various social groups. Will they be required to weave their own safety nets in the face of new diseases, heat waves, water shortages, melting and flood risks? What new institutions are developing that challenge and are complicit with neoliberalism?

The Production of Climate Knowledge: Important work across the social sciences has demonstrated how knowledge is produced locally and globally in different forms. Some have pointed out the centrality of global climate models to knowledge when the world's sense of climate change is far more varied (Demeritt, 2001). Research conducted collaboratively with indigenous communities that documents different forms of knowledge production and response to knowledge is important to bring into the climate debate (Batterbury, 2008). Studies in areas that will be significantly affected by climate change, such as the Sahel, islands like Tuvalu and the Arctic or the poor neighbourhoods of Philadelphia and Dhaka, that enable people who live in these places to be partners in the research and development of adaptation strategies as well as in the documentation of changes at the household-regional level should be encouraged. People in these places have ways of identifying environmental

changes that complement and make more complex the data obtained through quantitative analyses or questions asked via a Western scientific ontology (Ingold and Kurttila, 2000).

A persistent feature of US climate politics has been the refusal among many in the population to accept the role of humans in climate change and to acknowledge the need to abate those emissions. Interdisciplinary ventures to explore how biophysical and social science researchers communicate scientific knowledge are important. What has changed in discussions among the public and these communities over climate variability and climate impacts? What boundary objects (Star and Griesemer, 1989) are created to knit together disparate knowledge communities or what engaged universals are formed through which frictions of difference (Tsing, 2004) as groups with different social positions and knowledge attempt to enact change together? Science studies play a crucial role in revealing how the output of global climate models, for instance, become accepted wisdom (Lahsen, 2005). The suggestion that we should recognize the affective power of driving (Braun 2008) is a critical intervention, important to heading off moralistic arguments, but also a reality that has long frustrated urban planners and climate activists. The sociology of scientific knowledge seems often to tend toward critique instead of a process of mutual exchange and learning. The latter should be encouraged.

Mobility, development and inequality: Climate change will exacerbate social inequalities. In the US, poor people, some non-white populations, the elderly, the mentally and physically disabled, single women with children and people residing here illegally will be most affected by heat waves in cities, flooding, hurricanes and other disasters. What changes are or should be occurring such that these groups are not disproportionately affected? Studies exploring how the protective capacity of the state might be augmented (rather than just the adaptive capacity of the vulnerable) would be useful. Multi scale studies exploring vulnerability that results from changes that can be less definitively linked to climate variability should also be pursued. The gender dimension of climate activism and/or resistance to the idea of climate change as well as gender specific vulnerabilities should be researched. What enables women and men in patriarchal societies to accommodate the changing climate? What changes can be observed in gender relations in light of climate impacts? What gendered, household level ingenuity is occurring in the face of drought, heat or flooding?

Theorizing connections between race and climate is an area in which further research might be done. The different vulnerabilities of non-white populations in cities, coastal areas, deserts and the far north and the process by which those vulnerabilities developed and changed is an obvious area. The difficulty of pinning an effect to climate change may continue to make climate impacts a politically charged issue. What effect might this have on groups making claims that the (new) diseases or disasters they suffer are a consequence of climate change? Research might also focus on the connections being made by activist and academic communities between environmental justice and sustainability. Interest in local, regional or planetary sustainability and environmental protection has been the domain of predominantly white environmental groups. Blind spots about the work of race in a variety of human-environment issues (e.g. alternative food) persist. Evidence of connections being made between climate change and racial justice by environmental groups would be valuable. Environmental justice work, concerned with the disproportionate exposure to pollutants in of color and poor neighbourhoods has more recently turned to white privilege and climate change. Is outcry about the changing climate being mobilized within an identity politics or is it being incorporated into analyses in ways that theorize institutionalized racism, uneven development and the geography of environmental change?

The challenge of the varying mobilities of human and nonhuman life will be significant over the coming decades. Research on the ease or lack thereof in human and nonhuman mobility should be conducted. In North America, trees have moved across landscapes as glaciers advanced and receded, but they are now hindered by

development. The Inuit are less able to adapt than other social groups due to socio-economic factors (Ford, 2008) and the affective attachment to the cold, to ice, certain foods, the northern sunlight and darkness may inhibit mobility. What institutions within nested, shifting scales enable or prevent the movement of people from places that are no longer able to support their water needs?

Climate mitigation and adaptation strategies might be studied as part of a long series of international development initiatives. From this vantage point, the pursuit of carbon credits via joint implementation, among other programs, should be further investigated and ethnographies of the powerful—environmental regulators, public health, bilateral aid institutions, lending bodies—should be pursued. The cross border nature of water resources will, additionally, be an area in which analyses of power, race, gender, and participation will be important to examine. More broadly, resource user interactions with the environment around the world should be explored to understand the rules established around resource management, where vulnerabilities are likely to manifest and user flexibility and resilience (Bolin et al., 2008; Farley et al., 2008). Studies should be supported that use a political ecology approach: multi-method fieldwork to explore nature-society relations through the lens of power relations, multi-scaled processes, user practices, cultural knowledge and the material environment (e.g. Robbins, 2004; Rocheleau, 2008). This framework enables researchers to continue to study the intersections among, for instance, capitalism, development ideologies, environmentalism, global environmental changes and local livelihood strategies involving a variety of ways of knowing and managing land, forests, fauna and water in the context of climate change.

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Paul C. Stern
National Research Council

Notes for NSF Workshop on Sociological Perspectives on Climate Change

What do we know: What does social science bring to the table for studying the human dimensions of global climate change?

In March of this year, I coauthored a discussion paper for the National Research Council (NRC) Committee on Strategic Advice to the U.S. Climate Change Science Program entitled “Fundamental Research Priorities to Improve the Understanding of Human Dimensions of Climate Change.” My coauthor, Thomas J. Wilbanks, chairs the NRC’s Committee on the Human Dimensions of Global Change. The paper, which draws on a long series of NRC reports over two decades, offers a broad perspective on research accomplishments and needs that are fundamentally inter- and multidisciplinary, but that have plenty of room for input from sociology. This memo lists the research priorities we identified and adds brief comments to indicate roles for sociology in relation to some of the priorities. I can make the full discussion paper available on request.

A fundamental underlying point is that climate change is usefully understood as a process that creates risks to people, organizations, and communities, to things they value. Responses to climate change are usefully understood as risk management responses. In addition, human activities determine the risks through three main pathways:

- Biophysical transmission of risk—human activities “drive” climate change through emissions of greenhouse gases, land cover changes, and other factors affecting the heat balance of the planet.
- Socioeconomic shaping of vulnerability—human activities make people differentially vulnerable to biophysical hazards (e.g., development in hurricane paths, increased water demand in regions where water supply is tight and getting tighter, dependence on local food supplies when local agriculture is threatened)
- Socioeconomic shaping of response capability—socioeconomic processes distribute resources to respond, including money, information, emergency response capabilities, organizational flexibility, public policies, etc.

What do we need to know: What are the major sociological and human dimensions research questions?

Thinking of climate change in a risk management framework can open many avenues for sociological research to inform and improve society’s ability to deal with climate change. The discussion paper identifies three kinds of priorities for both fundamental and more action-oriented research.

Substantive Research Priorities for *Fundamental* Research

- (1) ***Improving the understanding of environmentally significant consumption*** (e.g., Why do we have smaller and smaller families living in larger and larger houses? How do cultural factors shape ideas of the good life in ways that lead to environmental consumption? What is the link between economic consumption and environmental consumption? How do production and marketing decisions for consumer products drive the behaviors that drive climate change?)

- (2) ***Improving fundamental understanding of risk-related judgment and decision-making under uncertainty*** (e.g., How do people and social groups develop an understanding of the various threats presented by climate change? What organizational factors promote or impede behavioral change in response to climate change information?)
- (3) ***Improved understanding of how social institutions affect resource use***
- (4) ***Improving the understanding of socioeconomic change as context for climate change impacts and responses, esp. technological change and land-use change***
- (5) ***Valuation of climate consequences and policy responses***

Cross-Cutting Fundamental Priorities

- (6) ***Observations, indicators and metrics*** for aspects of the human system that drive and are affected by climate change. The “observational system” in place for climate research does not include observations of the human drivers or of the human conditions that climate change may affect. Lots of data exist on human well-being, but the data rarely include the geographic coordinates needed to link to environmental data.
- (7) ***Non-linearities, feedbacks, and thresholds in system responses to climate change in a multi-causal setting***
- (8) ***Scale dependencies and cross-scale interactions***

Priorities for Action-Oriented Human Dimensions Research

- (1) ***Understanding climate change vulnerabilities: human development scenarios for potentially affected regions, populations, and sectors*** (various indicators of human population distribution, economic activity, and well-being could be geocoded, and predictive models developed to estimate what will be at risk at future times and places where climate change can be expected to produce hazardous events).
- (2) ***Understanding mitigation potential: driving forces, capacities for change, and possible limits of change*** (Technologists and economists assume that people will invest in energy efficiency, alternative sources, etc., when the technology is available and cost-effective—but actual behavior is more complex than that. How do other factors combine with technology and economics to shape the ability to turn around the drivers of climate change? How can they be used to help achieve mitigation goals?).
- (3) ***Understanding adaptation contexts, capacities for change, and possible limits of change*** (To adapt effectively to unavoidable climate change, people, organizations, and communities will have to change their habits and standard operating procedures. Consider New Orleans in the face of Katrina. What are the resistances to effective adaptation and how can they be overcome?).
- (4) ***Understanding how mitigation and adaptation combine in determining human system risks, vulnerabilities, and response challenges associated with climate change.***

- (5) *Understanding decision support needs for climate change responses and how to meet them* (“Decision support” means getting useful science about climate change and its likely effects produced and used. What is needed is contingent on the decision, the decision maker, the temporal and spatial scale, etc. In virtually all cases, new communication links and networks will be needed to educate the scientists about what information is needed, educate decision makers about what science can offer, and develop roles for those who can convey these messages and get the needed information to those who can benefit.
- (6) *Coordinating response efforts across scales*

The discussion paper also identifies four critical constraints on progress: limitations in total level of research support, data needs and limitations, connections with the basic social and behavioral sciences, and organizational barriers in the federal government. The second and third of these are particularly relevant for this meeting:

Disciplinary issues: Issues such as environmental consumption, land-use change, and valuation of environmental resources do not yield easily to discipline-specific concepts, theories, or methods, and as a result some of the social science disciplines, sociology included, do not easily link their concepts and tools to issues defined in these ways. For early-career scientists in such disciplines, work on climate change can interfere with career advancement because the most important publication outlets are interdisciplinary.

Data issues: Developing an interdisciplinary observational system for the human dimensions of climate could provide an important opportunity for addressing some of the disciplinary issues because analytic tools that are well developed in sociology (e.g., for analysis of multivariate and time-series data) could be applied to questions that were not previously tractable. Some of the research would prominently include sociological variables and thus move sociological research forward as a contributor to understanding of an important set of societal problems.

Kathleen Tierney
University of Colorado

Climate Change and Hazards: What We Know and Need to Know

The connection between climate change and natural and environmental hazards is an obvious one. Climate change and variation contribute to some hazards such as flooding, drought, heat waves, and wildfires and may be increasing the severity of others, such as hurricanes. Climate-generated environmental changes will amplify the impacts of future disasters; for example, sea level rise and the erosion of coastal ecosystems will intensify the impacts of coastal storms, and pest infestations and drought will make forest ecosystems more vulnerable to wildfires. Other climate-hazard interactions include feedback effects; hazards like wildfires and volcanoes influence climate through their effects on the atmosphere.

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

There is another way in which climate and hazards are related, which involves how insights derived from research on natural and environmental hazards can be transferred to better understand various dimensions of climate change as a societal issue. In fact, it may not be too much of a stretch to argue that a considerable amount of what has been learned—and not yet learned—about the societal dimensions of hazards and disasters is directly applicable to climate-related issues. Key areas of overlap include the following:

- Risk perception and awareness
- Risk communication
- Mitigation of negative impacts
- Agenda setting
- The role of politics and economics

Risk Perception and Action

US research supports the notion that hazards and their management do not rank high as issues, either for the public or for political leaders. This is especially true for parts of the country that are not highly-hazard prone. Even in areas where hazards are widely recognized and risk perception is high, other issues such as crime, schools, and jobs take precedence. Political careers are not based on advocating for disaster loss reduction, owing in part to the limited time horizons of most political leaders. Relative to other societal problems, hazards command only very limited media and public attention, except in the aftermath of major disasters. Even then, public concern is short-lived, focusing primarily on the plight of victims in the immediate aftermath of disasters.

Hazard risk perception and concern are influenced by a wide variety of factors, including education and other indicators of socioeconomic status; past experience with hazards; community attachment; gender; race; ethnicity; and family composition. With respect to technological risks, perceptions are also associated with trust in institutions, broader world views, and political beliefs.

Many of the most serious disaster threats, such as large earthquakes in urbanized areas, constitute low probability/high consequence events and are thus subject to the same perceptual biases that accompany other events and consequences falling within that category, in that occurrences that appear very unlikely tend to be ignored.

Common responses to the possibility of catastrophic events include “it won’t happen,” and “it may happen, but it won’t affect me.”

Unsurprisingly, the relationship between hazard risk perception and willingness to undertake loss-reduction measures is not a straightforward one, whether the unit of analysis under consideration is a household, a business, or a community. Whether awareness and concern translate into action depends on a number of other factors, including the capacity to act, where capacity is broadly understood as encompassing knowledge, belief in the efficacy of loss-reduction measures, leadership, networked capabilities, and economic resources. Activity is often context dependent; decisions made at higher levels of aggregation (e.g., the nation, the state and community level) affect capacity and provide incentives for actions at other levels.

Risk Communication

The field of risk communication spans many types of risks in addition to those associated with hazards, including in particular risks to life, health, and safety. The same general principles of effective risk communication (and lessons learned from risk communication failures) are transferable across various domains. Hazards and climate change have enough in common that lessons from the study of hazard risk communication should be immediately transferable.

Experience and research on hazard-related risk communication suggest the following: (1) scenarios, particularly those with visual impact, are good risk communication tools; (2) societal diversity is a critical factor affecting trust in individuals, organizations, and institutions involved in communicating about hazards; (3) ephemeral sources of communication, such as television and radio, are significantly less effective in communicating about hazards than print media; and (4) the information technology revolution has had a major impact on the risk communication process in several ways: that members of the public now have access to a wide variety of information sources (including peer-to-peer and social networking communication technologies); the distinction between information sources and information recipients has been blurred; and the role of more-institutionalized “experts” and “authorities” has likely been attenuated.

At the same time, some institutions have managed to become trusted sources of information concerning some hazards, particularly in the context of actual disaster events. For example, the National Hurricane Center, the US Geological Survey, and the National Weather Service are highly credible sources of information on hurricanes, earthquakes, and extreme weather events, respectively. In contrast, DHS appears not to have achieved credibility in the area of terrorist threats, and pronouncements by agencies such as EPA and FEMA tend to be regarded with suspicion (the “asymmetry principle” applies here: once trust is lost, it is very difficult to regain). Moves to establish a National Climate Service within NOAA partly constitute efforts to identify a credible and trustworthy source of information on climate-related issues.

Mitigation of Negative Impacts

The hazards and climate change communities unfortunately use the term mitigation in two different ways. In the hazards area, the term refers to actions that can be taken in advance of disaster events to reduce disaster impacts and losses or to avoid them entirely. Hazard mitigation measures include the relocation of communities or parts of communities, land-use policies, building code adoption and enforcement, and the retrofitting of hazardous structures. Mitigation is viewed as one phase in the cycle of disaster management; the other three phases are preparedness, response, and recovery. In the climate change field, the term mitigation refers to measures designed to reduce greenhouse gas emissions, while the term adaptation is used to describe activities that reduce the effects

of climate change on the natural and built environment. From a hazards perspective, the very broad use of the concept of adaptation by climate scientists serves to blur important distinctions among different types of adaptive strategies. This is especially true with respect to the types of activities that fall under the rubric of disaster mitigation.

Taking steps to mitigate the effects of disasters is difficult for several reasons. Mitigation efforts tend to be expensive, but more important is the fact that it is easier to oppose mitigation investments than it is to oppose response and recovery expenditures once a disaster has occurred. Compared with disaster preparedness measures (e.g., developing plans, stockpiling supplies, training) mitigation also tends to require specialized technical expertise—another reason why it is expensive. Additionally, of critical importance is the fact that within the US federal system, the adoption and implementation of many mitigation activities falls within the purview of local governments, and those governmental units are typically influenced most by the same real estate and development interests that are most likely to oppose mitigation. States and the federal government also play important roles in the mitigation process, but even in such cases the actions of local jurisdictions still have an impact. Moreover, until the passage of the Disaster Mitigation Act of 2000, federal funds for mitigation projects only became available to local communities after they had experienced disasters—and even then only for certain mitigation activities. Consequently, the current US hazard mitigation landscape is a patchwork of differing approaches in which some communities and regions are afforded protection from some hazards (but not others), while others remain vulnerable, often as a matter of conscious choice.

Agenda Setting

Reducing losses from disasters has been described as “a policy without a public,” in that no large grass-roots constituency has developed around the issue. Instead, disaster reduction moves on and off political agendas as a function of several factors. In some cases, elite groups consisting, for example, of scientists, engineers, and other technical experts are successful in mobilizing support (and neutralizing opposition) for loss-reduction measures. In others, policy entrepreneurs and political champions are able to persuade political leaders and members of the public to adopt hazard-reduction policies. These same groups and their political allies occasionally succeed in establishing institutions that are charged with advocating for loss reduction policies; the California Seismic Safety Commission is one such example. Additionally, as suggested in the preceding section, actions undertaken by federal and state governments can influence hazard-related policymaking at state and local levels.

While many policy advances have been made during non-disaster times, it is disaster events themselves that are often key factors in helping to set political agendas. The literature emphasizes the extent to which disasters open windows of opportunity for the advancement of loss-reduction policies, both because they make disaster-related issues immediately salient and because they (temporarily) weaken opposition. Skillful policy advocates can even capitalize on the occurrence of disasters in other parts of the world to advance local and national policies, as happened with seismic retrofit legislation in Los Angeles after the 1985 Mexico City earthquake and with US tsunami warning systems after the 2004 Indian Ocean earthquake and tsunamis.

Politics, Economics, and Hazards

Current scholarship in the fields of hazards and disasters emphasizes the ways in which disaster losses are produced not by so-called forces of nature but rather by normal societal processes that create and allocate risk. Disasters are not unusual events but rather are understandable and explainable in the context of the societies in which they occur: axes of development and underdevelopment, North-South power differences, the exercise of

political and economic influence, and the unequal distribution of the costs and benefits that flow “naturally” from decisions made by local, national, and international elites. In the US, Hurricane Katrina vividly illustrated this point, which had been made earlier by a number of disaster researchers.

Within the context of the current economic crisis, the US economic system has been described as privatizing gains and socializing losses. Not surprisingly, this is essentially what has been occurring with respect to hazards and disasters. Elites benefit from laws, policies, and practices that exacerbate the potential for future disaster losses, while taxpayers underwrite the losses when those disasters occur.

A political economy focus also reveals that under certain circumstances, when their own interests are in jeopardy, influential institutional actors can become advocates for disaster loss reduction, albeit on a limited basis. For example, the US insurance industry has sought federal government backing for catastrophic hazard insurance protection and engaged in efforts to promote the adoption of hazard mitigation measures through organizations such as the industry-sponsored Institute for Business and Home Safety. To the extent that insurers and re-insurers seek predictability in their own risks and their exposure to catastrophic payouts, their interests align with those of disaster loss reduction advocates in other sectors. In many respects, hazards management involves a continual search for ways of bringing about such alignments.

What do we need to know? What are the major sociological research questions?

Hazards and Climate Change: How Similar, How Different?

The foregoing sections have briefly summarized findings from the literature on societal dimensions of hazards that may inform our understanding of climate change issues. This effort at comparing hazards and climate change raises a number of questions, such as the following:

- To what extent is a hazards framework useful for understanding behavior with respect to climate issues? What are its strengths? Its limitations? Is climate change so different from other hazards that new theoretical and analytic frameworks are needed?
- What are the best strategies for communicating about climate issues with the public? With decision makers at different levels of government and within different sectors? Should climate change be included in “all hazards” risk communication and education efforts, and if so, how? What role does climate information (as opposed to other types of information) actually play in climate-relevant decisions? How much science is enough science?
- What are the respective roles of public opinion, experts, and interest groups in the climate change policy process?
- How can climate change remain on national, state, and local political agendas as other issues assume more pressing importance? If disaster events help focus the attention of the public and political leaders on hazard-related issues, can events that result from climate change, variation, and extremes be used in the same way by policy advocates?
- What are the characteristics of the climate change policy network? How do different elite actors and sectors align with respect to mitigation and adaptation choices? To what extent are their positions consistent with broader goals of climate change mitigation, adaptation, and sustainability?
- What actions can federal, state, and regional entities take to encourage information dissemination and the adoption of climate change mitigation and adaptation strategies? To what extent can local, state, and sectoral initiatives influence federal level decision making?

Beverly H. Wright
Dillard University

A Sociological Perspective on Global Climate Change: Equal Protection, a Challenge for the Future

What do we know? What does Sociology bring to the table?

There is now overwhelming scientific evidence that climate change is “real” and poses a serious global threat that cannot be ignored. Research has shown unequivocal evidence of the warming of the climate system, observing increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level. We also know the causes of climate change and the extent of the relationship between concentrations of greenhouse gases (GHGs) and aerosols, land cover and solar radiation, and changes in atmospheric concentrations that alter the energy balance of the climate system. Human activity has increased global GHG emissions since pre-industrial times and has increased 70% between 1970 and 2004.

We are also able to project a continuation of climate change due to global GHG emissions over the next few decades and can expect its impacts to continue even with current climate change mitigation policies and related sustainable development practices. It is expected that GHG emissions will continue at or above current rates, cause further warming, and induce many changes in the global climate system in this century greater than what we have observed in previous centuries.

We know that societies have always had to manage the impacts of weather and climate related events. We also know that adaptation options are numerous and diverse, but much more is needed to reduce vulnerability to climate change. As sociologists, this is where our work begins. How do we protect the most vulnerable in this climate change battle? It is of course, evident that vulnerability to climate change can be exacerbated by other stressor; Katrina was a perfect example. Racial minorities, the poor, the elderly, the sick, and children were left behind. Poverty and unequal access to resources, food insecurity trends in economic globalization, conflict and incidence of disease such as HIV/AIDS are identified by the most recent report of the Inter-governmental Panel on Climate Change (IPCC). According to the report, adaptive capacity is intimately connected to social and economic development but is unevenly distributed across and within societies. This is the greatest challenge for societies and poses the greatest challenge for sociological researchers. How do we answer the call for *protection for all*?

Katrina and its impacts, in a very powerful and revealing way, showed the world how race and class are intrinsically tied to policy. Moreover, it pointedly displayed how government policy can actually be harmful to the health and well being of vulnerable populations (i.e. racial minorities, the poor, sick and elderly, and children).

What single occurrence in the United States stands as a prototype of what is happening globally in response to extreme weather change? The poor and minorities will suffer more and bear the greatest burden of climate change impacts although they contribute less to its causes.

What do we need to know? What are the major sociological research questions?

Climate Change is a global phenomenon and presents problems for the world. For that reason, the response must be international. There are many policy options available to government to create the incentive to mitigate actions related to climate. However, climate change policy must take into consideration race and class impacts.

Hurricane Katrina offers important examples for study. I will review two:

- (1) Levee Protection
- (2) Hazard Mitigation Funds. Both examples clearly show how public policy impacts populations differently.

The Army corps of Engineers has been held largely responsible for the devastation from Katrina that occurred in New Orleans. For that reason, much attention has been given to their responses. Billions of dollars were spent over the last two years to repair the New Orleans levees with the expectation that they would be brought up to the pre-Katrina level of Category 3 hurricane protection. The recent report of work progress, however, showed something very different for the “majority” racial minority of the city of New Orleans. After two years, the only populations with significantly increased protection after billions of dollars had been spent were white and affluent. A more thorough investigation showed that existing policy only allowed the corps to work on projects already on line before Katrina. As it turns out, the on-line projects were all slated for the more white and affluent community. The larger, more vulnerable African American communities, two years after Katrina were in the same vulnerable state as before Katrina.

More recently, the citizens of New Orleans have uncovered another initiative that completely excludes them. The federal government/FEMA has a Hazardous Mitigation Fund that provides millions of dollars to mitigate flooding in communities. Site selections are based on participation in the National Flood Protection Program. Most homeowners in the city of New Orleans have flood insurance through the National Flood Insurance Program. In fact, the City of New Orleans has a higher than the national average participation rate.

The second part of the equation for a neighborhood to receive hazardous mitigation funds determines policy decisions that result in the exclusion of neighborhoods by race and is discriminatory. The number of claims submitted by neighborhoods for flooding is included in the analysis. Uptown neighborhoods where there were large concentrations of white homeowners before Katrina tended to flood every time there was a very hard rain. New Orleans East and the lower ninth ward, are much more vulnerable to hurricanes, but with few exceptions, never flooded when it rained before Katrina. Consequently, FEMA Hazardous Mitigation Funds that were intended to help the populations most vulnerable to hurricanes will not receive any of the hazardous mitigation monies. Once again, this benefits the more affluent and white populations. What is being experienced in New Orleans is a “policy surge” more powerful than the storm surge that could facilitate a permanent and systematic depopulation and displacement of New Orleans African American Communities.

Sociological research is needed to investigate the impacts of climate change on populations with emphasis on race and class. Research is needed to develop policy and evaluate policy for discriminating factors that negatively impact vulnerable populations.

The environmental justice research paradigm that places race and equity at the center of the analysis should be adopted for climate change using the impacts of Katrina as a model. Research is needed in the following areas: the right to return and internally displaced residents, replacement of public housing, reduced foot prints on the rebuilding of certain communities, access to health care, fresh food/supermarkets, insurance issues, contractor fraud, mortgage loans, and redlining.

A partial fix could be the setting of policies similar to the Environmental Justice Executive Order or a Climate Justice Executive Order. What if there were guidelines for Climate Policy similar to National Environmental Policy Act (NEPA) guidelines. Let’s Talk!!!

Richard York
University of Oregon

The Sociology of Global Climate Change: What We Know and What We Need to Know

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

Contemporary global climate change (GCC) is fundamentally a social problem in two senses. First, it is primarily driven by social forces. Second, it potentially has dramatic consequences for societies. The social nature of GCC is sufficiently complex – including economic, demographic, cultural, and psychological aspects – that it requires the full sweep of social scientific analysis to gain a comprehensive understanding of it. Thus, due to the clear social aspects of both the causes and consequences of GCC and due to the traditionally broad scope of sociological inquiry, it is of the utmost importance that sociologists are active in discussions about GCC. Sociological research has already contributed to our understanding of GCC, while there is still much we need to know.

One of the most important assets sociology has for our understanding of GCC is a diversity of theoretical traditions that provide insights into the structural nature of social processes. This theoretical heritage, when applied to environmental problems, like GCC, allows for a more nuanced assessment of human-environment interactions than is typically provided by the natural sciences. Perhaps one of the most general and important insights that sociologists provide is that GCC is *not* primarily a *technical* problem – as it is typically assumed to be among natural scientists, politicians, and the general public – but, rather, it is fundamentally a social structural problem.

Typically, discussions about climate change are undergirded with the view that solving the climate problem is primarily about improving fuel efficiency, developing low- or non-carbon energy sources, and storing carbon underground. This is what I refer to when I write that GCC is seen as a *technical* problem, because the clear underlying assumption is that further technological development is largely sufficient to address GCC and other environmental problems. When I write that, alternatively, GCC and other environmental problems are really *social structural* problems, I mean that our economic structure, demographic factors, and other social conditions and processes are ultimately the forces behind environmental problems, and that technical factors are only the proximate (and theoretically superficial) forces driving GCC and other environmental problems. For example, while over most of the twentieth century energy efficiency (as measured, for example, by GDP output per unit of energy consumption) improved around the world, energy consumption and greenhouse gas (GHG) emissions *increased*. Thus, addressing the superficial technical factors that contribute to GCC will not solve the problem, unless the underlying social structural forces are addressed.

A failure to understand the social factors that influence sustainability more generally can lead us to generate new environmental problems while trying to solve old ones. Unsurprisingly, given the technical focus of most GCC discussions, “solutions” such as expanding nuclear power and the use of biofuels are the ones most popularly discussed. However, environmental sociology has regularly pointed to the complex interconnections within societies and between society and nature. Thus, technical changes, such as substituting new energy sources for fossil fuels, will likely have diverse consequences, many of which will be unintended and potentially undesirable. If only technical changes are implemented (e.g., nuclear power and biofuels), we may find that we generate a new environmental crisis in attempting to solve the standing crisis of GCC. Thus, GCC cannot be dealt with in isolation from sustainability issues in general (or in isolation from other social problems for that matter). Social structure must, therefore, be the focus of our efforts to resolve environmental problems.

The social structural forces that influence GCC and other environmental problems can be conceptualized as those that affect the scale of human exploitation of natural resources and those that affect qualitative features of the human-environment interaction, such as metabolic exchanges between society and nature. Schaniberg's Treadmill of Production (ToP) points to the dynamic processes present in modern, particularly capitalist, economies that incessantly drive expansion. This economic growth is clearly linked to expanding energy and material consumption, and thus environmental degradation, including GHG emissions and consequently GCC. Foster's (extended from Marx's) Metabolic Rift points to the way in which modern, urbanized, particularly capitalist economies disrupt natural cycles, and thus undermine sustainability. The metabolic rift points to how sustainability can be compromised even before absolute scale of resource extraction and waste emissions overwhelm ecosystems. Thus, sociological theory points to how fundamental structural changes in the economic order are necessary to curtail the modern environmental crisis. In particular, economic structures that necessitate incessant growth (the ToP) and those that disarticulate processes of material and energy exchanges between society and nature (the Metabolic Rift), need to be replaced with economic structures that provide for human needs in a fashion that fits within the biophysical capacity of the Earth. In short, environmental problems cannot entirely be separated from social processes more generally.

What do we need to know: What are the major sociological research questions?

Despite this broad and general understanding of the forces that contribute to environmental problems, including GCC, that sociological theory provides us with, there is still much that we do not know. Although some of the key features of modern societies that contribute to GCC (and unsustainability more generally) have been identified, it remains unclear how those features are to be replaced and exactly what they should be replaced with. Although anthropogenic GCC is a problem that has emerged only in the modern era, anthropogenic environmental problems are age old. It is not the case that modern societies uniquely degrade the environment. We should not assume that the absence of the key structural features of our modern social order represents the presence of sustainability. We are far from understanding how to structure a society so as to make it sustainable, while providing a high quality of life for all people. Thus, the key challenge before sociology is not only to identify the forces that have contributed to the modern environmental crisis and unsustainability, but to identify how it is that societies can be restructured so as to become sustainable. This is no small challenge, but it is indeed a sociological one. The technical forces that contribute to environmental problems cannot be separated from their social substrate. Thus a sustainable social order must be found before a sustainable technical order will emerge.

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Sammy Zahran
Colorado State University

What do we need to know: What are the major sociological research questions?

According to the logic of collective action, voluntary groups are more likely to succeed if group participants accrue selective (excludable) benefits for participation in the group enterprise. In Mancur Olson's (1971: 51) words: "Only a *separate and 'selective' incentive* will stimulate a rational individual in a latent group to act in group-oriented ways." Olson (1971) explained the logic of collective action as a function of costs (C) or time, money and effort expended to produce a collective good; valued benefits that flow to individual participants of a group (V_i), and the relative advantages (A_i) an individual obtains from participation in the group enterprise. Prospects of success in voluntary groups depend on the advantages gained by individual participants, where $A_i = V_i - C$. If $A_i > 0$, the prospects of group success are good, with likelihoods of individual participation high. If $A_i < 0$, the group is likely to fail (absent selective incentives that induce participation).

The Cities for Climate Protection (CCP) campaign, sponsored by the International Council for Local Environmental Initiatives (ICLEI) is a voluntary collective enterprise that coordinates the climate change mitigation efforts of 800+ municipalities worldwide (ICLEI 2007). The CCP mission is to enlist "cities to adopt policies and implement measures to achieve quantifiable reductions in local greenhouse gas emissions, improve local air quality, and enhance urban livability and sustainability." The CO₂ target set for cities is a 20 percent reduction from 1990 levels (Collier and Lofstedt 1997; Betsill 2000). This "Toronto Target" is significantly more stringent than the Kyoto Protocol.

With 800+ municipalities worldwide working toward this reduction target, and an estimated 10 percent annual increase in the number of localities joining the effort (ICLEI, 2005), the collective benefits of the CCP campaign are potentially significant. In the United States, 100+ localities participate in this voluntary collective enterprise (see Map 1). By my estimation, the 100+ localities involved in the CCP campaign account for about one-fifth of all GHG emissions in the United States – at one-fifth of US emissions, this locally driven enterprise is of significant global consequence, and deserving of scholarly attention (particularly from sociologists).

What makes this local climate change collection action phenomenon interesting is that from a strictly rational choice perspective it is unclear why a local government would voluntarily assume the costs of climate change protection when: 1) reducing local emissions will not fully insulate a locality from the transboundary effects of global climate change; 2) the costs of climate change mitigation are higher than the expected benefits when participation is low and voluntary; 3) the collective benefits of climate protection (like temperature stability) are non-excludable, inducing free-riding; and 4) there is no federate assistance to offset the costs of climate change protection efforts – in fact, the US Congress prohibits use of federal monies for programs defined as implementing the Kyoto Protocol before ratification (Betsill 2000). With such powerful status quo incentives, why would a US locality join the CCP campaign? And, why would a US locality spend scarce resources on a social and environmental problem with dim prospects of payoff?

What do we know: What does Sociology bring to the table for studying the human dimensions of global climate change?

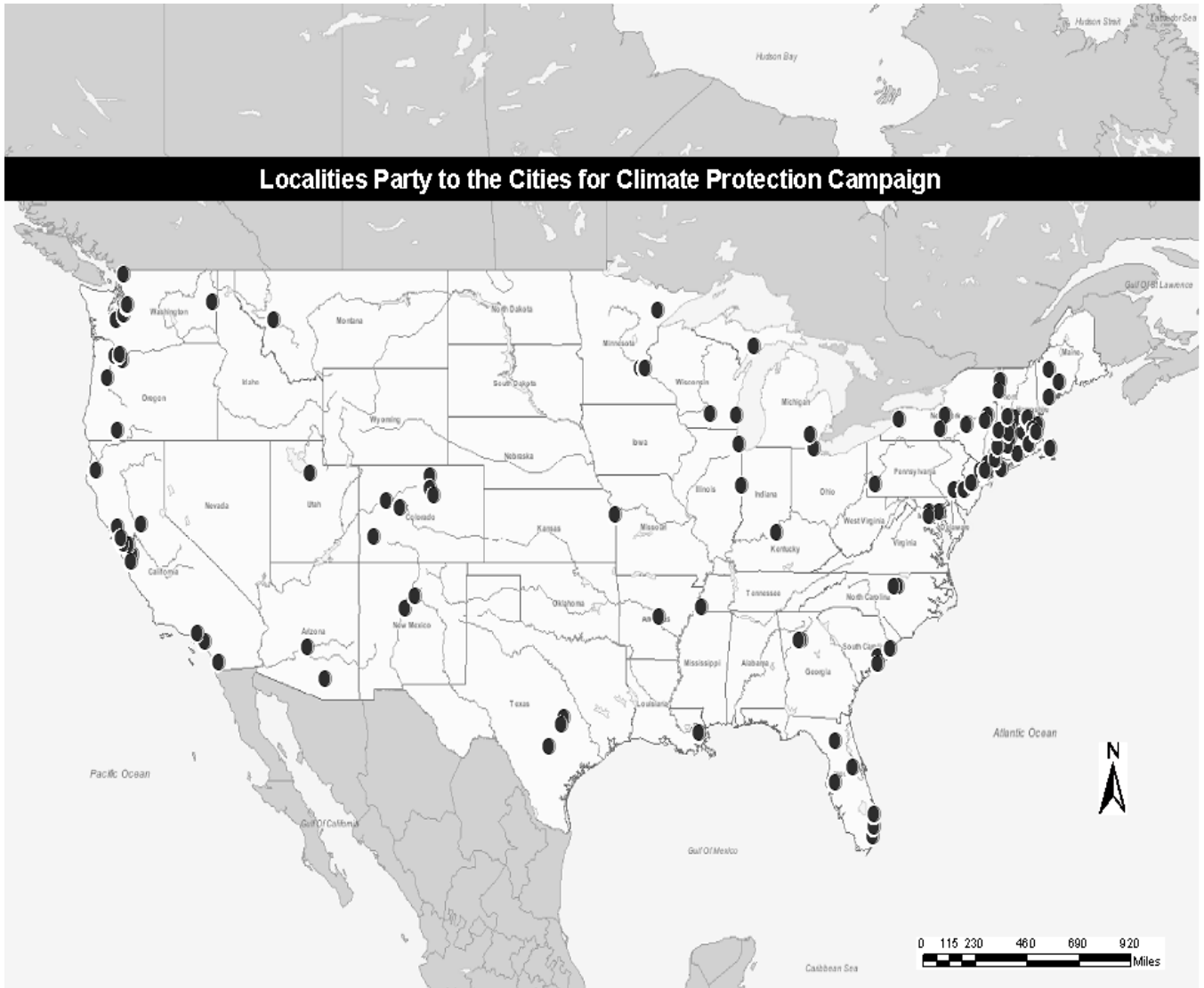
My colleagues and I have tried to answer these questions (see Zahran, Brody et al. 2008a; Zahran, Brody et al. 2008b; and Brody, Zahran, et al. forthcoming). Theoretically, our work is informed by the *human ecology* tradition in sociology. Methodologically, our work is nested in the *social indicators* tradition of sociology. In our

work, we argue (somewhat flatfootedly) that selective incentives to participate in the CCP campaign spring from three sources of human and natural landscape: the extent to which a locality is vulnerable to the *risks* of climate change and variability; the extent to which a locality contributes to the problem of climate change by way of anthropogenic *stressors* (like CO₂ emissions); and the presence of social and civic assets that capacitate a locality for action on GHG emissions.

We've collected, analyzed, and mapped many indicators that estimate notions of local risk, stress, and capacity (at various spatial scales). More recently, we've considered whether social and natural landscape characteristics of spatial neighbors affect local willingness to mitigate anthropogenic sources of climate change. Technically, from a collective action standpoint, it is irrational for a locality to absorb the costs of mitigation if the valued benefits of action can be diluted by the emissions activities of spatial neighbors.

Our statistical results confirm intuition – localities most at risk (to the expected impacts of climate change) are least responsible for the problem (in terms of CO₂ emissions), and localities least at risk are most responsible for the problem. These spatial cleavages may underwrite federal government inaction on climate change policy in the US. Many rudimentary questions and measurement objectives remain. And, applied sociologists have much to contribute.

One of the great advantages of Federalism is that states and municipalities have sufficient autonomy to experiment with climate change mitigation and adaptation endeavors. Organizational sociologists can inventory and assess the various schemes developed by state and local governments to address climate change, and identify least cost path solutions that minimize expected social and human costs that flow from climate change and variability. In the absence of proactive federal climate change policy, collective action scholars can suggest schemes and mechanisms that induce local and state experimentation. The future direction of climate change policy in the US is likely underway in the laboratories of state and local government. Sociologists have technical and theoretical skills to observe, measure, and analyze state and local policy experiments.



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