

Adaptation and Mitigation Responses to Climate Change:
Complements or Substitutes?

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Inside this issue:

Op-Ed, Elke U. Weber	1-2
Research Highlights	3
CRED Researcher Interview: Elizabeth Keenan	4-5
Outreach Highlights	6
Inside CRED	7-8
CRED Welcomes: Dr. Christoph Ungemach	8



Adaptation to climate change refers to actions taken to protect life or property against possible adverse impacts of climate change, such as intense storms or hurricanes, resulting winds or flooding, or more gradual risks like sea-level rise, i.e., actions that *reduce the impacts* of climate risks. Mitigation of climate risk, in contrast, refers to actions taken to *reduce the likelihood as well as likely magnitude* of global increases in temperature and extreme weather events, by individual or collective action that reduces the concentrations of greenhouse gases, either by reducing emissions or by increasing their absorption.

Traditionally these two responses to climate change have been seen as quite distinct. The last four assessment reports of the Intergovernmental Panel on Climate Change (IPCC) had separate working groups to evaluate adaptation vs. mitigation responses to climate change. More than distinct, adaptation and mitigation have sometimes been seen as responses that may compete for citizens' as well as policy makers' attention. An implicit assumption about the two types of risk management responses has been that mitigation is the preferred option that reduces the likelihood and magnitude of climate risks. Adaptation, in contrast, is sometimes seen as a necessary short-

term response in some local context that reduces climate risk impacts, but something that should perhaps not be encouraged too broadly, for fear that it would draw attention and resources away from long-term mitigation activities. Economists refer to such behaviors that compete for attention as substitutes, as more engagement with climate risk adaptation planning and implementation would reduce planning and implementation of climate risk mitigation.

This line of reasoning has some logic, but there is increasing empirical evidence that it may not be correct. Rather than being substitutes, adaptation and mitigation responses may in fact be complements, in the sense that greater engagement with local climate risk adaptation measures on the part of citizens or government officials can *increase* rather than decrease their willingness to engage and invest in mitigation actions. Empirical evidence about such a positive connection comes from recent field studies in Britain and the United States.

ClimateWise® is a foundation-supported initiative in the United States that helps local communities prepare for climate change by conducting extensive workshops that focus on minimizing and preparing for inevitable climate impacts, i.e., help with the development of climate change adaptation strategies and tactics at the local level (Doppelt et al., 2009). ClimateWise® workshops have been held in several regions in the Western states of California, Oregon, and Montana. One of the unexpected results of these workshops is an increase in participants' interest in reducing the magnitude of climate change by reducing their greenhouse gas emissions, an increased openness to consider mitigation measures. Completion of the workshops, with its consideration of

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Op-Ed (continued)

existing or potential climate change impacts to the local economy, human health, ecology, food supply, safety, and other components in the context of adaptation planning appears to help participants realize the real and local costs of climate change as well as the limitations of their communities' adaptive capacity. Discussion of climate impacts in the context of feasible protective adaptation responses thus appears to generate motivation for mitigation as a natural next step.

Similar results are reported by a recent study in Britain, where researchers interviewed a large representative sample of the general public, assessing their perceptions and beliefs about climate change and their behavioral intentions to reduce their personal energy use (a mitigation action, as it will reduce greenhouse gas emissions). Some of the individuals (about 20 percent) had experienced recent flooding in their local area, while others had not (Spence et al., 2011). The authors assumed that residents would see flooding as evidence for climate change, consistent with media coverage and increasing scientific evidence of a link between changes in average global temperatures and the likelihood of severe rainstorms that have given rise to flooding events observed in the UK with increasing frequency and severity over the past decade. As one might expect, concern about climate change was greater in the group of residents who had experienced recent flooding. This group also reported less uncertainty about whether climate change was really happening. Most relevant for our discussion here was the following result: Residents who recently had to deal with a climate change hazard, namely flooding, presumably both dealing with damages but also considering and possibly implementing ways to reduce future vulnerability to flooding, were not discouraged by this experience, but instead felt more positive that their actions and behaviors could affect climate change than residents who had not experienced any local flooding. This more positive assessment of the effectiveness of their actions vis-à-vis climate change in turn translated into greater reports of willingness to mitigate climate risks by reducing their personal energy use.

These examples suggest that concerns with adapting to climate change do not and need not drive out concern for and attention to mitigating climate risks. Quite contrary, engagement with the local impacts of climate hazards and planning how to reduce vulnerability to these risks can increase individuals' and communities knowledge and acknowledgment of the magnitude of these risks, but also and perhaps more importantly their feelings of control. In the context of planning protective action, community members are motivated to examine the full range of present and future climate hazards. Protective responses with benefits that are local and that outweigh their costs typically exist. Therefore, considering climate risks, in the context of adaptation planning, need not engender the wishful thinking or other defense mechanisms such risks often elicit when considering the much more difficult and sometimes overwhelming task of reducing greenhouse gas emissions (Swim et al., 2011).

Efforts like the ClimateWise® workshops that help people reduce their vulnerability to climate risks, a service with a huge need especially in developing countries where vulnerability is high, need not worry that they distract from the more important task of mitigating climate risks. While there might be some competition for funds between these two risk management responses, any such downside may well be made up for by the increases in local awareness about climate impacts and perceived control that adaptation planning and measures provide.

References

Doppelt, B., R. Hamilton, S. J. Vynne, C. D. Williams and M. E. Koopman. 2009. Preparing for Climate Change in the Upper Willamette River Basin or Western Oregon: Co-beneficial Planning for Communities and Ecosystems. <http://www.geosinstitute.org/images/stories/pdfs/Publications/ClimateWise/UpperWillametteBasinReport3-24-09FINAL.pdf>

Spence, A., Poortinga, W., Butler, C., & Pidgeon, N. (2011). Perceptions of climate change and willingness to save energy related to flood experience. *Nature Climate Change*, 1.

Swim, J., Stern, P., Doherty, T., Clayton, S., Reser, J.P., Weber, E.U., Gifford, R., & Howard, G.S. (2011). Psychological contributions to understanding and addressing global climate change. *American Psychologist*, 66, 241-250.

Research Highlights

The Impacts of Higher Temperatures

As evidenced by the work of Li, Johnson and Zaval, which was covered in the April 2011 CRED Newsletter, local temperature can play a role in people’s belief in global warming . A study by Rick Larrick and his colleagues shows yet another important role that temperature can play. They found that higher temperatures can also lead to more aggression through unconscious processes. In baseball, pitchers are more likely to retaliate if their teammates have been hit if it is hot. Larrick and his colleagues propose that heat-induced anger leads pitchers to see more intent and provocation when a teammate has been hit—and to be more inclined to seek revenge. The authors explain, “In this study, we analyzed data from 57,293 Major League Baseball games to test whether high temperatures interact with provocation to increase the likelihood that batters will be hit by a pitch. Controlling for a number of other variables, we conducted analyses showing that the probability of a pitcher hitting a batter increases sharply at high temperatures when more of the pitcher’s teammates have been hit by the opposing team earlier in the game. We suggest that high temperatures increase retaliation by increasing hostile attributions when teammates are hit by a pitch and by lowering inhibitions against retaliation.”

To read more about Richard P. Larrick, Thomas A. Timmerman, Andrew M. Carton and Jason Abrevaya’s paper entitled “Temper, Temperature and Temptation: Heat-Related Retaliation in Baseball,” visit:
<http://www.psychologicalscience.org/index.php/news/releases/pitchers-bean-more-batters-in-the-heat-of-the-summer.html>
<http://blogs.wsj.com/ideas-market/2011/03/04/in-the-heat-beanballs-fly/>
<http://www.scientificamerican.com/article.cfm?id=a-batter-for-a-batter>

New EPA sticker to include “gallons per 100 miles” measure, citing the MPG Illusion as motivation

Motivated by the research of CRED PI, Rick Larrick and his colleague, Jack Soll, the EPA has included a fuel consumption rate in terms of gallons per 100 miles on its new vehicle labels. The EPA’s website stated that “Unlike MPG, consumption relates directly to the amount of fuel used, and thus to fuel expenditures.” To read more, visit the EPA’s website at: <http://www.epa.gov/otaq/carlabel/42of11017.htm>

The new EPA sticker and the impact of Larrick and Soll’s research has received widespread media coverage. To learn more, visit the following websites:

<http://www.scientificamerican.com/blog/post.cfm?id=what-the-epas-new-window-stickers-g-2011-05-26>

<http://www.grist.org/gallons-per-mile>

<http://www.scientificamerican.com/article.cfm?id=window-shopping-for-electric-cars>

<http://blogs.smithsonianmag.com/science/2010/09/time-to-stop-measuring-fuel-economy-in-mpg/>



The new fuel consumption rate feature on the EPA label

Image source:
<http://www.epa.gov/otaq/carlabel/42of11017.htm>

CRED Researcher Interview

Elizabeth Keenan, CRED Visiting Scholar, Spring 2011

Where are you originally from?

While I was born on the east coast just outside of D.C., I grew up in San Diego, CA surrounded by two great parents, six siblings and a grove of avocado trees.

Where are you currently studying and what is your field of study?

I am about to start my third year as a Ph.D. student in Behavioral Marketing at the Rady School of Management at UC San Diego. My research interests include judgment and decision-making within the frame of the environment and conservation. Specifically, I have been exploring the motivations behind different types of prosocial behaviors, as well as green consumerism and consumption.

Where did you obtain your Bachelor's degree and in what program?

I have a B.S. in Biology with a focus in marine ecology from Loyola Marymount University in Los Angeles and a Master's in Marine Biodiversity and Conservation from Scripps Institution of Oceanography at UC San Diego.

What did you do between completing undergrad and starting your doctoral studies?

I spent ten years communicating marine science and conservation in classroom, field, and aquarium settings –as a high school teacher, a SCUBA Divemaster and eventually as a department director at the Aquarium of the Pacific in Long Beach, CA. After completing my Master's degree, I chose to continue my studies at the doctoral level because I wanted to better understand the factors that play a role in individuals' feelings, attitudes, and actions when faced with environmental challenges.

Why did you choose to be a visiting scholar at CRED?

I have been familiar with CRED research for a number of years, beginning with meeting Dr. Elke Weber at the



BDRM conference in San Diego in the spring of 2008. Last fall I had the pleasure of meeting Drs. Eric Johnson and Shahzeen Attari at the Carlson Sustainability Summit at the University of Minnesota, where they presented on inspiring work that alerted me to number of potential synergies between my interdisciplinary interests and those of CRED investigators. This solidified my desire to collaborate with CRED researchers, as they draw on both social and natural sciences in order to tackle real world environmental issues, and I believed that being a visiting scholar at CRED would be an ideal way to participate in impactful research and share my knowledge/experience while being exposed to a unique center.

What projects did you work on at CRED (and with whom) and how is environmental decision making part of your research?

In my few months at CRED, I began work on a cross-cultural study with Shahzeen Attari and Elke Weber that is building off a national study they are conducting (along with Dave Krantz) on social dilemmas. Many environmental decisions are social dilemmas that exist not only in our

CRED Researcher Interview

(continued)

own country but across borders as well, and we are working to gain a better understanding of how these dilemmas function in different settings. Additionally, I had the opportunity to begin working with Lisa Zaval on follow up studies related to the “Local Warming” paper that she published with Ye Li and Eric Johnson. I am excited about where these projects are headed.

What are your future plans? Are you working on or planning any collaborations with CRED investigators?

In addition to continuing to work on the above projects I started while at CRED, I hope to continue to hone my research skills and develop novel studies that look at different aspects of environmental decision-making. I am confident that the collaborations I started at CRED will continue on in the future and am hopeful that new ones will evolve over time.

What did you like most and least about living in New York City?

The best part of living in NYC was getting a chance to work with all of you at CRED. I felt very welcomed and part of a great team. Everyone was gracious with their time, input and knowledge. Beyond the walls of Columbia, I loved the diversity of NYC—from the people (a subway ride or walk down the street was always a fun adventure), to the food (thank goodness I walked so much), to the weather (wow – I’ve never seen trees bloom like that). What a great place.

One last thing you would you like to add that you want us to remember:

Well, a little birdie asked if I would mention that I once (or maybe more than once) played as a contestant on the Family Feud. Ironically, it was not with my immediate family, which is large, but with some relatives.

Most importantly, remember: “It’s never too late to be what you might have been.”

– George Elliot



From left to right: Shahzeen Attari, Jenn Logg, Lisa Zaval, Elizabeth Keenan, Galen Treuer, Raymond Crookes, James Cornwell

Outreach Highlights:

July 8, 2011- Sabine Marx and Victoria Rosoff presented on the Principles of Climate Change Communication at River Summer 2011, New York City.

June 25, 2011- Elke Weber, Invited Address, WGII/WGIII Expert Meeting on Economic Analysis, Costing Methods, and Ethics, Inter-governmental Panel on Climate Change (IPCC) in Lima, Peru.

June 2011- Shahzeen Attari, Invited talk, National Energy and Utility Affordability Conference, Fort Lauderdale, FL; Public perceptions of energy consumption and savings

May 2011- Bob Meyer presented at the Initiative for Climate Change Adaptation Research Using Social Science (ICARUS) in Ann Arbor, MI.

May 5, 2010- Elke Weber, Invited Address, Prince of Wales's Business & the Environment Programme, University of Cambridge Programme for Sustainable Leadership, New York Senior Executive Seminar, Glen Cove Mansion, Long Island, NY,.

May 2011- Roberta Balstad, plenary address at the World Social Science Forum in Bergen, Norway, and discussed her CRED research.

April 28, 2010- Elke Weber, Executive Luncheon Keynote Address, Garrison Institute, Climate, Mind and Behavior Project, Century Association, New York NY.

April 2011- Shahzeen Attari, Invited talk, Environmental Protection Agency, Region 10, Seattle, WA- Human behavior and energy consumption: Understanding decisions about energy

April 2011- Michel Handgraaf, Invited talk at 3TU Spring School, Rotterdam, the Netherlands- Private Payment versus Public Praise: Effects of reward type on energy conservation.

March 30, 2011- Ben Orlove gave keynote talk entitled "Clima, Agua y Energía: Perspectivas sobre Tres Elementos Interrelacionados" (Climate, Water and Energy: Perspectives on Three Interrelated Elements) in Lima, Peru at the Conference on Climate Change and Water Scarcity: Human and Social Challenges in the Peruvian Andes

2010 to 2011- Bob Meyer : Stormview, the hurricane simulation prototype ,was demonstrated this past year in both environmental science and business classes at the University of Miami and the University of Pennsylvania. We anticipate these being developed into formal case-study modules that will be broadly disseminated over the web.

NEW MEDIA OUTREACH:



February & May 2011, Kenny Broad and Ben Orlove were interviewed for 1 hour in Spanish by Luis Castilla of Earth and Sky (www.earthsky.org). It will be edited into a short (~5 minute) television program for the general Spanish-speaking public in the US, Caribbean and Latin America. About half of it focused on perception of hurricane risk, on forecast communication and on individual and community preparedness.

Inside CRED:



CRED Congratulates Dr. David Hardisty

David Hardisty successfully defended his dissertation on Thursday, May 12, 2011.



Dave Hardisty and his committee: (From left to right) Daphna Shohamy , David Krantz, David Hardisty, Eric Johnson, Elke Weber



Congratulations to CRED Co-Director Kenny Broad, National Geographic Explorer of the Year

Environmental anthropologist Kenny Broad and the late underwater photographer Wes Skiles were named "Explorers of the Year," a new award presented in recognition of their extraordinary achievements in exploring and documenting the Blue Holes of the Bahamas in 2010.

To read more, go to: http://www.eurekalert.org/pub_releases/2011-06/uomr-ngho62411.php

Inside CRED:

Shahzeen Attari will be tenure-track faculty member at the School of Public and Environmental Affairs (SPEA) at Indiana University, Bloomington starting Fall 2011 (see: <http://www.indiana.edu/~spea/>). She will continue to research human behavior and energy consumption at IU, and hopes to remain an active member of the CRED family. She thanks you for two amazing years, and is looking forward to many more!



Photo courtesy of Jenn Logg Photography (<http://jennlogg.weebly.com/>)

CDS/CRED postdoc, Kirstin Appelt, and CRED graduate student, David Hardisty, will be married on July 17, 2011.

Congratulations Kirstin and Dave!!!



Jenn Logg is leaving her position as CRED's Program Coordinator and will be attending the doctoral program in Management at UC Berkeley's Haas School of Business.



Victoria Rosoff will be moving to Ithaca, New York where her husband, Craig, will be pursuing his MBA at Cornell University. She will continue to work with CRED in a part-time capacity from Ithaca.



David Hardisty will be moving to California and working as Acting Assistant Professor at the Stanford Business School, in Marketing and Management.

CRED Welcomes:



Christoph Ungemach

Dr. Christoph Ungemach will be working as a postdoctoral research scientist at CRED and CDS. He will be seated at CDS (Uris Hall) and can be reached via email at cu2144@columbia.edu.

Christoph received his Ph.D. in Psychology at the University of Warwick (UK) in June 2008. In his dissertation he investigated decision making under risk and uncertainty involving small probability outcomes and evaluated how existing choice models can account for the different behavior observed in experiential and descriptive choice paradigms.

After his Ph.D, Christoph worked for three years as a Research Fellow at the University of Warwick investigating the role of the decision environment in decision making under risk. Using a wide range of experiments in the lab and field his work showed that preferences are constructed from comparisons with samples from memory. These results challenge standard economic theories and provide support for psychological models like decision-by-sampling.

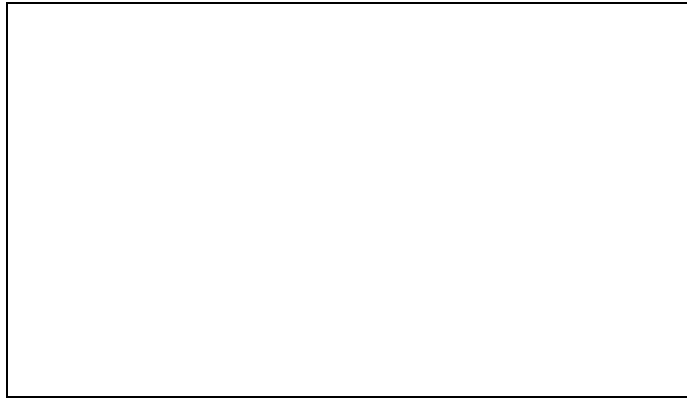
His current research focuses on choice architecture related to environmentally-relevant decisions, investigating how structural features of decision environments can trigger different choice processes and behavior. This work will evaluate potential cognitive and motivational interventions and how they can be combined in order to overcome documented decision biases and encourage individuals to make better environmental decisions (e.g. reducing their energy consumption or carbon emissions).



Center for Research on Environmental Decisions

CRED is an interdisciplinary center that studies individual and group decision making under climate uncertainty and decision making in the face of environmental risk. CRED's objectives address the human responses to climate change and climate variability as well as improved communication and increased use of scientific information on climate variability and change. Located at Columbia University, CRED is affiliated with The Earth Institute and the Institute for Social and Economic Research and Policy (ISERP).

CRED was established under the National Science Foundation Program Decision Making Under Uncertainty (DMUU). Major funding is provided under the cooperative agreement NSF SES-0345840 and NSF SES-0951516.



Send in your updates for the
next CRED newsletter!

Your stories could be featured in the next issue!

Please send your updates to Victoria Rosoff at :

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