

The Future is Now! Making the Most Out of Current Activities and Planned Initiatives to Accelerate the Integration of Social Science Information into Weather Forecasts and Warnings

by **Kenneth Carey*** and **H. Michael "Mike" Mogil****

Integration of Weather and Society: How Participants Each View the "Elephant in the Room"

Although it may be seen to be a new thing, meteorologists have been using social science in their efforts to forecast and warn the public of hazardous weather for years. One reason for this was that almost forty years ago, a public affairs officer in the National Oceanic and Atmospheric Administration (NOAA), Herb Lieb, was selected to head up a fledgling group in NOAA called the Disaster Preparedness Office. He hand-picked a group of people to work with him who would work to take social science information and capitalize on it as they told the weather story to local officials, the media and even National Weather Service (NWS) meteorologists. The emphasis was on science, communication and "warning a call to action." In fact, individuals at many NWS regional headquarters, some governmental meteorologists and others were quick to become part of the effort. Not surprisingly, headlines started to appear in weather warning messages, action statements came into play and the NWS expanded its efforts to bring disparate groups to the table to enhance its warning program.

In the early 1970's, the NWS Southern Region also integrated the work

of Dr. B. F. McLuckie (Delaware University) and required all of its meteorologists to complete a course entitled, "Warning A Call To Action." The course (see <http://www.srh.noaa.gov/ssd/techmemo/sr215.htm>), taken via workbook at local offices, focused on improving the effectiveness of weather warnings. Simply put, it was no longer sufficient to tell people a tornado was coming. Instead, NWS forecasters had to provide actionable messages to gain the safety response they were eliciting.

People such as Neil Frank and Allen Pearson (directors of the National Hurricane Center and the now Storm Prediction Center, respectively) were among the many proponents of this approach. In fact, Neil Frank would often don the hat of an unsuspecting individual to assess societal perspectives concerning the warning and preparedness system. He used these in his many public talks about hurricane safety.

Many NWS forecasters and TV meteorologists also developed similar repertoires for their local area that keyed on societal and social impacts involved in warnings. Some "discoveries" included how people reconfirmed a weather emergency (going outside to look, calling a friend or family member) and even where

people lived. It was at this time that "mobile homes" were recognized as a unique safety hazard; so, too, was the rule to "outrun a tornado by driving at right angles to this path." The Wichita Falls tornado of April 10, 1979, demonstrated the folly of the latter rule.

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*Lightning near Watkins, Colo.
(Photo by Blake Beyea)*

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Culture, Weather and Climate: Anthropology's Contributions to Understanding our World

by Heather Lazrus*

Two of the fundamental things that all humans have in common are culture and our experiences of the atmospheric variations known as weather and climate. Humans are intrinsically connected to and affected by the weather and climate in spite of the technologies we have developed to buffer ourselves from their impacts. How does culture influence our experiences of weather and climate? How do those experiences in turn influence culture?

As an anthropologist concerned with these questions, I am following in the footsteps of one of my discipline's finest practitioners. Margaret Mead is most well known for her controversial work on adolescence in Samoa (Mead 1928) but her research there was just one example of her encompassing concern with how people live in our world, transforming and being transformed by their social and natural environments. She was also interested in how atmospheric hazards are differentially experienced by different people including how we create those hazards and mitigate their impacts. Three years before her death, Mead wrote a preface to a compilation of proceedings from a conference she helped to convene with top atmospheric specialists from around the world. The focus of the preface was on the interactions between humans and the Earth's atmosphere, as reflected in the title "The Atmosphere: Endangered and Endangering" (Mead 1980).

When I read Mead's words, I was

amazed how relevant they still are over 30 years later: "We are facing a period when society must make decisions on a planetary scale.... Today's natural catastrophes and environmental interventions affect the whole of human society – interconnected as it is in reality though not yet politically capable of acting in concert" (1980:xvii). Mead's call to action for a safer world is all the more urgent, for in spite of our significant progress we are still striving for a safer and more informed society when it comes to the impacts of weather and climate. While Mead evoked a planetary scale of concern, her insight reverberates across scales and has been born out not just in global climate negotiations, but also numerous local levels with the treatment of hazardous weather.

Weather forecasting and climate prediction have advanced remarkably, yet we still see loss of property and lives. Clearly, there are remaining questions about how weather and climate affect peoples' lives and how we respond to them. All human behaviors, including actions regarding weather and climate, are shaped by cultural and social contexts including technological, political and economic factors. For example, we communicate about weather using shared language and meaning, and we respond to impacts in ways that are politically and economically feasible. Anthropologists are concerned with the details of the context that shape our interactions with weather and climate. Anthropology is just one of several social science disciplines (also including geography, economics, communication, sociology, and

others¹) that provides a toolkit of theory and methods to address questions about hazardous weather and climate impacts as well as the more routine role of weather in everyday life.

I haven't always known what I wanted as a career. Instead, I found a discipline that let me ask and answer the questions that most interest me. I have always been interested in how people make sense of their world and how they deal with hazards. As a child, I started collecting newspaper articles about earthquakes and other hazards. Through the process of studying anthropology and receiving my doctorate in environmental anthropology from the University of Washington in 2009, I have learned the "tools of the trade" and think that anthropology has a great deal to offer in our pursuit of understanding the intersection between society, weather, and climate. A lot of people don't know what anthropology is, as the cartoon on p. 11 demonstrates. This is not a comprehensive introduction to the discipline, but I hope I can offer some insight into what anthropology is, what anthropologists do, and why anthropology is relevant to understanding weather and climate.

Incidentally, even though the discipline has nothing to do with ants (that would be myrmecology, a branch of entomology), to be honest I do feel badly about what I did to ants as a child! There was just one instance of ant abuse. It occurred on an insanely hot afternoon during the summer heat wave of 1988. My family was driving from Colorado to Pennsylvania and we had stopped in

Lincoln, Nebraska to refill my mother's coffee thermos. Very uncharacteristically, I took my childish frustration from the heat and long hours in the car out on a colony of ants, stepping on them as they tried to make their way through cracks in the sidewalk. There is a connection between weather and ants in my story, but I do not believe it is causally related to my chosen field.

What is Anthropology?

Anthropology is the study (from the Greek "logia") of humans (from the Greek "anthropos"), both past and present. Anthropologists are primarily concerned with culture. Culture is a broad term that can be understood as the learned, shared, symbolic system of values, beliefs and attitudes that shapes and influences perception and behavior. In the United States there are typically four subfields within the discipline of anthropology, including cultural anthropology, archaeology, linguistic anthropology, and physical or biological anthropology. A growing area of inquiry called environmental anthropology spans all of these subfields and involves combining expertise in environmental sciences with the tools for understanding the social and cultural dynamics of communities affected by environmental impacts and policy decisions (Townsend 2000). Environmental anthropologists and others across the subfields of anthropology are often interested in interactions between humans and weather and climate because of their centrality in our lives – for example, the role of weather and climate in the production and reproduction of culture, how they have influenced past societies, how we speak about them, and how they have influenced us physiologically.

What Do Anthropologists Do?

Anthropologists choose from a very large toolkit of theoretical approaches

and methodological techniques. We span the gamut from very positivistic science on one hand, to more relativistic science on the other. Usually our tools produce empirical data based on observations from our field sites - the places and communities we visit to conduct our research. Our observational techniques include qualitative and quantitative surveys and interviews to systematically collect data on core values, areas of cultural consensus, power dynamics, and social networks. We also employ a variety of participatory techniques to understand the lived experiences of the people we study.

Anthropologists select research methods that are appropriate to the research problem and are designed to answer specific questions. Interview questions, for example, are carefully crafted and calibrated to yield particular kinds of information – whether the questions are open-ended or multiple-choice affects the type of information they will elicit, as does the question order and especially how the questions are phrased. Cultural anthropologists often do ethnography (from the Greek "ethnos" meaning people), which involves collecting data through participant observation (observing and participating with the people we study) and interviews to gain insight about how culture informs daily life. Ethnographic data relies on and contributes to theory to understand social processes, structures and meanings. A recent ethnography of some National Weather Service offices demonstrated how different offices may have different "office cultures" that reflect how forecasters perceive themselves, science, and the production of knowledge about the future (Fine 2007).

Anthropology of Weather and Climate
In their introduction to an edited volume on the interactions between weather, climate, and culture,

anthropologists Strauss and Orlove affirm that "[o]ur complex forms of collective life influence the way that we are affected by weather and climate, creating both forms of vulnerability and capacities to reduce impacts" (2003:3). For this reason, weather and climate have long been within the purview of anthropologists who tend to work with people in communities that are more or less affluent and possibly more or less prone to weather and climate impacts. Mead (1980) may have been one of the first anthropologists to make an explicit link between a desirable and safe future, and the health of the atmosphere and the social vulnerability to atmospheric hazards. Although, others have been noting the mutually constitutive influence between humans and the atmosphere as long as the discipline has been around. For example, nearly a century ago Malinowski spent time in the Trobriand Islands and observed that a village's supreme chief commands "respect due to his tabooed or holy character, and by his possession of the dreaded weather magic through which he can make or mar the prosperity of the whole country" (1929).

More recently, weather and climate have emerged as a legitimate primary focus for anthropologists. Two examples are Strauss and Orlove's edited volume on *Weather, Climate, Culture* (2003) and Crate and Nuttall's compilation entitled *Anthropology and Climate Change: From Encounters to Actions* (2009). Anthropologists study the cultural, economic, and political realities of people's lives – these are the contexts within which people receive information about the weather (whether via environmental signals interpreted through traditional knowledge or from forecasts transmitted across new technologies). Anthropologists argue: "the cognitive

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Remembering the 1985 Mameyes Ward Tragedy in Ponce, Puerto Rico: What have we Learned?

by Miguel López*

It was a very rainy first week of October 1985. As a young teenager, rain was a fairly nice experience for me—no school, hot chocolate, tasty “Asopao” (Puerto Rican style gumbo) and playing football with my friends in the mud. My perception of flooding was about to change forever, though. As a matter of fact, this event was so important that the guy from The Weather Channel stated: “The storm caused a lot of trouble in the town of Ponce, Puerto Rico.” After that I just thought, “My God, I have never heard the name of my hometown in the The Weather Channel; this must be very bad.” It was.

Precursor torrential rains from 1985’s Tropical Storm Isabel caused Mameyes ward to collapse, burying homes and families. Somehow, turning the television on and watching our local channel 4’s (Wapa-TV) anchorman Guillermo José Torres and the rest of the crew with long faces said it all. It had been one of the worst tragedies in Puerto Rican history. Suddenly I felt really bad since I was having fun in the rain all week. It was real, and it touched my town and my people (see photo on p. 8).

Seeing on television the number of bodies that were being pulled out of the mud by cranes and watching a whole team of international rescue workers made me think, “Perhaps, rain is not supposed to be fun for everyone.” The evening of the tragedy, my neighbor Héctor went to Mameyes (18.022655°, -66.612803°) to tell people to get out of there because it was a

dangerous area. Most of the people had the misconception that they were going to be safe because it was a high place, an absolutely wrong assumption.

Witnesses said that in the middle of the night there was a thunderous sound and then the subsequent sound of homes coming down the hill. An old man called an AM radio station saying hysterically, “The hills have just come down!” following a comment from the radio commentator, “Please, don’t be so sensationalistic.” It was surely hard to believe that the whole ward had come crashing down.

A lot of mysteries and myths surrounded this tragedy. Here is a list of some of them:

- Authorities never found out the exact amount of homes and victims buried on the mud.
- The tragedy was foretold by a Puerto Rican preacher.
- Three days before the tragedy, a group of children from Mameye’s Head Start program drew a chilling account of the tragedy in different kinds of drawings.
- An explosion caused by a clandestine firework warehouse caused the tragedy. This rumor was supposedly corroborated by the fact that the French rescue dogs detected traces of gunpowder residues on the debris.
- The event occurred due to thunderous lightning after heavy precipitation and the fact that the ground was already debilitated because of the lack of a sewage

system. This theory is the most popular one to this day.

People who survived the tragedy were sheltered in the abandoned Ponce Intercontinental Hotel (18.021341°, -66.620224°). Coincidentally, this hotel overlooks the Mameyes ward. After that, they were relocated at several housing projects including “Nuevo Mameyes I” and “Nuevo Mameyes2” (New Mameyes).

We must think about this tragedy in terms of what can we learn from it. How many people are living in areas prone to this same kind of tragedy? Who is next? Can we avoid the loss of life and property?

Certainly, we can try to reach the people with the right information to get them to take action. Prevention and contingency plans need to be in place to minimize the impact of events of this nature. It is very important that we do not forget our history and that the people who tragically perished in this event did not die in vain. Mameyes will never be forgotten.

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From the Director: Long Term Hurricane Impacts and Perceptions of Risk

by Jeffrey K. Lazo*

In connection with several ongoing research efforts, I've been thinking recently about how hurricane impact information is communicated to inform people for the decisions they need to make. Before hurricane season, information about hurricanes tells people how to get ready for the upcoming season and what they'll need to do in the short term if there is a hurricane. During the season, hurricane forecasts and warnings generally deal with things happening in the next 5-7 days. It crossed my mind though that perhaps there is not much effort to communicate one aspect of important information about hurricanes that vulnerable people should consider—the long-term impacts of a hurricane. My thoughts on this topic materialized while I was doing survey development for a study on the Hurricane Forecast Improvement Project (HFIP).

The aim of HFIP is to improve hurricane track and intensity forecasts. Possibly \$200 million will be spent on this primarily physical science research effort over the 10-year life of the program. HFIP researchers are trying to improve models of hurricane intensity and track to better forecast storm surge, to identify potential rapid intensification, and perhaps better understand rain-fed flooding and associated tornadoes. Ultimately, researchers want to improve the hurricane forecast in order to give people better information so they can make better decisions; as is often taken for granted, they believe in general that improved forecasts and warnings will encourage people to make the "right" decisions.

Given this significant investment in research, we are interested in the potential economic benefits of HFIP. To get at this, we are going "into the

field" in the next couple of weeks with a survey of the general public in hurricane vulnerable areas about their understanding and use of and values for potential improvements of hurricane forecasts.

Building on prior survey work on valuing improved hurricane forecasts, we've conducted more than a few focus groups and one-on-one interviews for survey development over the last six months or so. In May I was in Tampa, Fla., and in July and August I was in Miami. Prior work on earlier aspects of this research included focus groups and one-on-one interviews in Miami and New Orleans (and Charleston but I'll skip that for now). There are interesting differences in hurricane experience and perceived risks in these different locations.

- According to <http://www.hurricanecity.com>, Miami is affected by a direct hit once every 7.32 years. In Miami, most respondents noted Andrew as the most memorable and important hurricane. In fact, many accurately remember the year Andrew occurred (1992), where they were, what they were doing, and how it affected them (18 years later!). While many didn't experience the direct impacts of Andrew most of them knew someone who did. Many also remember Katrina, Wilma, or any of numerous other hurricanes that have impacted Miami. But Andrew was THE hurricane in people's thoughts about impacts and seemed most likely to drive their response behavior. Many folks also commented on how they or people they knew were still affected by memories of that event. One lady who lived in Homestead in 1992 vividly remembered spending the night in a closet with her young daughter, wondering if they were going to live. I am not a doctor (OK I am, just not the right kind to make this judgment), but I suspect she was suffering from some form of post-traumatic stress syndrome.

- According to <http://www.hurricanecity.com/city/miami.htm>, the average years between direct hurricane hits for New Orleans is 12.64 years. I conducted New Orleans focus groups in April 2003, two years before Katrina (OK – sometimes survey development takes a long time!). A number of respondents in New Orleans remembered Hurricanes Betsy (1965) and Georges (1998). Those memories didn't seem to be as vivid or "traumatic" as Andrew was to Miami participants. Even with that, what I remember most about New Orleans respondents was that many seemed almost fatalistic. Driving across New Orleans in 2003 to get to the focus group facility was difficult to say the least due to gridlock during rush hour. Focus group participants noted this several times and said (not quite a direct quote but pretty close) that if there was a hurricane "basically we are scr_wed;" and look what happened in New Orleans in 2005. I wonder sometimes how the 18 people I met there in 2003 fared during Katrina. Perhaps I don't want to know.
- According to <http://www.hurricanecity.com/city/miami.htm>, the average years between direct hurricane hits for Tampa is 19.86 years. Given that it appears to me that it has been 40 years or more since a hurricane hit Tampa [Donna (1965), Alma (1966) and Gladys (1968)] it isn't too unreasonable that participants in Tampa for the most part didn't seem too concerned about hurricanes or what would happen there. Some even mentioned that, because of the curvature of Florida, Tampa can't get hit by a hurricane! They seemed generally unaware that, of anywhere in all of Florida, Tampa is perhaps at the highest risk from storm surge impacts—so much so that much of Clearwater may simply be gone following a major hurricane and the resulting erosion from storm surge.

In each of these cities, people's experiences helped form their perceptions of their current risks

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The Disaster Preparedness Office also worked closely with organizations such as the Natural Hazards Center at the University of Colorado at Boulder (Dennis Mileti) (<http://www.colorado.edu/hazards/resources/web/relief.html>) and with people such as Eve Gruntfest (currently at the University of Oklahoma Social Science Woven Into Meteorology Program). It also created movies, slide shows and literature that started to fold in the social science aspects linked with weather emergencies.

Then, later in the 1970's, while replying to Congressional correspondence, Mike Mogil (who was working at the NWS headquarters in Silver Spring) had an epiphany. Instead of simply replying to what was becoming a common request at the time, "Our community needs its own warning radar," Mogil decided to educate the congressional office and the local community on the integrated warnings approach that was evolving. Crafting a two-page reply that did not focus solely on overlapping radar coverage circles, he described the myriad of efforts underway to protect the community. At the time, these included, but were not limited to, a network of weather offices, Skywarn spotter training programs and spotter groups, satellite and radar observation systems, interactions with local officials and the media, NOAA Weather radio, awareness programs, safety literature and more. In fact, the staff member of the congressional office was quick to comment on how valuable the letter was in describing a complete NWS program.

The letter was not easy to craft because it involved talking with local and regional NWS officials, various program offices and others.

But once it was developed, it easily became a framework for explaining the NWS' integrated warning system to others in Congress, the media and elsewhere.

The NWS wasn't alone in its efforts. TV meteorologists, a few social scientists and others laid the groundwork what would eventually become a march toward a fully multi-disciplinary approach to hazard mitigation. But, what was missing from these early efforts was a strong national support system. Efforts were more opportunistic and keyed on the efforts of a few individuals. It also involved transforming a mindset focused on meteorology or hydrology alone into one that recognized the importance of a multi-disciplinary approach to the warning problem.

Recent Efforts/Successes to Connect the Weather and Climate Enterprise with Society

Our nation and our public, private and academic weather and climate enterprise have demonstrated numerous noteworthy efforts destined to link weather with its societal impacts. At the recent 35th National Weather Association (NWA) Annual Meeting held in Tucson, Ariz. (<http://www.nwas.org/meetings/nwa2010/>), societal impact research and public policymaker interaction with weather forecasters were among several showcased topics. In his presentation, "Leveraging Emerging Technologies to Better Address the Societal Impacts Focus of NWS Warnings," Michael Hudson, chief operations officer for NWS Central Region, highlighted the challenges of communicating information about severe weather and flooding threats using social media and other emerging technologies. He also provided a summary of instant messaging (e.g., NWSChat) and social media (e.g., Twitter Storm reports) in leveraging emerging technologies to enhance warning services nationwide. He keyed on how NWS efforts will

enable more effective infusion of societal impacts in the communication of severe weather information.

Jennifer Lee, meteorologist, at the NOAA/NWS Huntsville, Ala. weather forecast office, presented an evaluation of the overall warning system based on two tornadic events near Huntsville. Her paper focused on decisions made by the NWS, the emergency management community, and other first responders during these two events, including the response to these decisions by the general public. While the decision support services provided by NWS Huntsville were important, the resulting action taken by the public was just as crucial. So, Lee further investigated these public actions along with other societal impacts pertaining to the two tornado events. Her findings included the need for improved situational awareness, better use of observing systems (e.g., Dual-Pol ARMOR radar located at the Huntsville International Airport), training for 911 operators on what exactly to ask a caller who has a storm report, and continued Integrated Warning Team (IWT) meetings to keep the lines of communication constantly open between the NWS, media, and emergency managers. If adopted, these actions will enhance future NWS decision support services, leading to improved public awareness and reaction to such life threatening weather events, not only in the Huntsville area, but nationwide.

In his presentation, "Estimating Potential Severe Weather Societal Impacts using Probabilistic Forecasts Issued by the NWS Storm Prediction Center (SPC)", SPC Director Russell Schneider, examined SPC severe weather forecasts from 2000 to present and the potential for estimating likely societal impacts when combined with high resolution population data derived from the 2000 U. S. census. One facet of the study was to examine the combination

of severe hazard probability and population density as an integral measure of the likely societal impact on a given day. In addition, Russell contended that identification of key population density thresholds for more populated urban, urban and rural areas will allow additional quantification of the potential threat.

Specifically, the potential for catastrophic impacts due to a tornado in a population-rich urban area can be estimated through the combination of information on the threshold areal coverage and the forecast probability for tornadoes and strong tornadoes. Damage, injury and fatality data for historic severe weather events can be used to examine the statistical effectiveness of the societal impact estimates. His conclusion is that these efforts can be used to quantify the likelihood of major societal effects and can and should be used to translate SPC meteorological forecasts into parallel impact-based products. Although not a real-time operational product, the Northeast Snowfall Index Scale (NESIS) developed by Paul Kocin and Louis Uccellini (<http://www.ncdc.noaa.gov/snow-and-ice/nesis.php>) integrates a similar approach to the impact of a major snowfall on northeast U.S. metropolitan areas.

Taking the Next Steps – Leveraging Recent Recommendations/Best Practices

The stage is almost set for harvesting the interest, passion, and importance of integrating social science and weather, thanks to several organizations that are developing plans in this area. Social science and societal impacts are woven completely through the draft of the new NWS Strategic Plan, and the NWS Science and Technology Roadmap, a look ahead to 2025. NOAA's Science Advisory Board (SAB) Social Science Working Group authored a 2009 report, "Integrating

Social Science into NOAA Planning, Evaluation and Decision Making: A Review of Implementation to Date and Recommendations for Improving Effectiveness". In the SAB report (see http://www.sab.noaa.gov/Reports/2009/SAB_SSWG_Report_FINALtoNOAA_041609.pdf) one can find a number of practical steps for strengthening social science impacts involving weather forecasting and warnings. These include: (1) conduct a social science needs assessment; (2) develop and implement a strategic plan to strengthen and integrate social sciences; (3) develop a system to identify and track social science full time equivalents; and (4) ensure progress toward meeting social science capacity targets by instituting performance metrics based on increasing NOAA's value to society. To improve the integration of social sciences, the SAB recommended that a suite of structural actions be taken: (1) create an Office of Societal Impacts external to line offices and have that office report directly to upper levels of NOAA leadership; (2) establish a standing Social Sciences Working Group of the SAB; (3) build social sciences into NOAA's Cooperative Institutes and Joint Institutes; and use special-purpose internal committees of NOAA social scientists only as a short term measure. The SAB further indicated that, "The social sciences are essential for quantifying and improving the monetary, human and scientific value of NOAA products and services."

The National Science Foundation (NSF) has plans to create a strategy to support the social sciences over the next decade. Myron Gutmann, assistant director for NSF's Directorate for Social, Behavioral and Economic Sciences, told those gathered for the a recent annual meeting of the American Sociological Association that this is an "unparalleled time" in terms of interest across the sciences in working with social scientists on some of the

top issues of the day. While the NSF is best known for its support of work in the physical and computational sciences, it has long been a significant player in the social sciences, too, with close ties to academia. The agency funds tens of millions of dollars of research a year and supports everything from basic research by senior scholars to dissertation fellowships.

Where Do We Go from Here?

It is becoming quite clear that now is the time for our weather and climate enterprise to take advantage of these and other integrative efforts. So, it make sense that the community interested in the integration of weather and social science (e.g., NWS, NCAR, researchers, WAS*IS alumni) consider doing the following:

- Create a searchable database containing examples of events, activities, publications, links and historical efforts demonstrating weather and social science integration
- Develop an implementation plan to meet the strategic goals set out by key stakeholders, such NSF, NOAA, NWS, the media and emergency managers.
- Hold webinar/Go-to Meetings™ with various groups of stakeholders to exchange ideas, foster collegiality/sharing, interaction, and hands-on activities
- Hold regional meetings highlighting that focus on regional, geographical or topical subjects most relevant to that area
- Continue to focus on these integrated efforts at various meetings, e.g., AMS Annual Meetings, NWA Annual Meetings, AMS and NWA Broadcaster Conferences
- Define "capacity" issues. Identify the roles and responsibilities for each of the organizational/agency partners, and what kinds of support they could offer.

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- Promote pursuit and support for interdisciplinary projects linking weather and the social sciences to other sciences, to include assisting with proposals for NSF grants and funding for environmental research
- Share information about efforts like WAS*IS in various publications, including the AMS Bulletin, NWA Digest, Weatherwise magazine, FEMA publications and other journals

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Photo of the 1985 Mameyes Landslide; See Mameyes Ward article on page 4. (<http://upload.wikimedia.org/wikipedia/commons/9/98/Mameyes.jpg>)

Contribute to WSW

To contribute a research article, program highlight, historical/interest article, editorial, photographs, or a book review, please contact Emily Laidlaw at laidlaw@ucar.edu.

Conferences & Opportunities

Call for Presenters: Weather and Society * Integrated Studies Emergency Management (WAS*IS) EM workshop

Host: 2011 National Hurricane Conference

Date: Exact Dates TBD; Week of April 18-22, 2011

Location: Atlanta, Georgia

For More Information: Please visit <http://www.hurricanemeeting.com/>

A Weather and Society*Integrated Studies Emergency Management (WAS*IS EM) workshop will be held during the 2011 National Hurricane Conference in Atlanta, Georgia. This one-day workshop will include presentations from a variety of disciplines including emergency management, meteorology, and social sciences and workshop sessions will be open to all National Hurricane Conference attendees. Participation is encouraged from those interested in learning more about the societal impacts of hurricanes and emergency management.

The workshop will: Introduce the WAS*IS concept to the EM community; demonstrate successful collaborations between emergency managers, National Weather Service, media, social scientists, and others; share best practices and real-world examples of new decision support resources, tools, and processes; discuss the challenges faced in coastal and inland communities and share innovative methods for addressing those challenges; and improve and facilitate ongoing relationships among emergency managers, researchers, and stakeholders in meteorology and the social sciences.

Presentations and speakers are currently being sought for the workshop. Ideal topics will demonstrate real-world examples of integrating social sciences and improving societal impacts. Particular emphasis will be on projects, research, and applications that pertain to emergency managers and their coastal communities. For more information, please contact Rebecca Jennings at Rebecca.jennings@dhs.gov.

Jobs & Opportunities

Mendenhall Research Fellowship in Natural Hazards

The U.S. Geological Survey (USGS) is currently accepting applications for the Mendenhall Research Fellowship Program. The Mendenhall Program provides an opportunity for recent Ph.D. graduates to conduct concentrated research in association with selected members of the USGS professional staff. Mendenhall Fellowships are two-year appointments with a competitive salary and benefits package. Mendenhall Fellows are also granted project expense funds appropriate to the scope of research to be conducted.

Researchers with an interest in natural hazards, risk and vulnerability, and disasters are encouraged to apply to Research Opportunity 43 - “Vulnerability of Coupled Human-Environmental Systems to Natural Hazards” at the following URL -- <http://geology.usgs.gov/postdoc/2012/opps/opp43.html>. The objective of this research position is to develop innovative methods for characterizing the temporal and spatial dynamics of socioeconomic systems and their linkages to natural processes that put human communities and ecosystems at risk. Please contact Nathan Wood at nwood@usgs.gov for more information. Please note that the application closing date is December 30, 2010.

and planned behavior. While we talked about what they would like in terms of information on hurricane track, intensity, timing, surge and size, amongst other hurricane characteristics, we didn't talk much about what the long term impacts of a hurricane would be. Yet it was the long term memories of prior hurricanes – or lack thereof – that largely seemed to drive their responses.

It struck me that potentially impactful information is not communicated as part of the hurricane forecast and warning process—information about what the “real” impact on your life will be if a hurricane hits your area may shape behavior in ways that we don't think about when giving watches and warnings. Maybe that isn't the role of the “warning” system—perhaps it really only fits in the realm of mitigation—but if forecasters and public officials want people to make informed decisions, perhaps information on long-term impacts should play a role.

Should people be told, “Yes, you will need to evacuate and that may be an inconvenience. When you come back you may have to get a new roof or carpets?” And then, perhaps, also tell them something like, “If you don't evacuate, if you live, you may well have nightmares for the next ten or twenty years every time you hear a heavy rain on your roof or the house shakes in a strong wind.” “If you don't evacuate, you may be without water, air conditioning, toilets, cold food, electricity for days ... or weeks ... maybe longer.” How far should this go? How about, “When you do get back from evacuating, Your house and maybe even your street may be gone. The trees will all be gone and will take 30 years to grow back. Your insurance may not cover all of your losses, and you may be without work for weeks or months.”

As cited in Peacock et al. (2005), Lindell and Perry (2004, p. 127) conceptualize risk perception in terms of “certainty, severity, and immediacy of disaster impacts to the individual, such as death, property destruction and disruption of work and normal routines.” For the most part hurricane risk communication (watches and warnings at least) focus almost exclusively on the “immediacy of disaster impacts” and not long-term effects. And thus people also seem to focus on these when discussing planned behavior if a hurricane threatens. They are aware of potential death and injury, property damage, and disrupted work and routines, but for the most part, these seem to be in the nearer term—say within a couple weeks of the hurricane.

Morrow and Stanley state, “The concept of risk is complex and difficult to explain in ways that are convincing and that subsequently lead to effective risk avoidance. Even in cases where the risk is well defined and consequences are high, some people do not take the recommended action. As one example, emergency managers have a challenge convincing some people in areas threatened by hurricane surge to evacuate. Hurricane Katrina was predicted to make landfall on the Mississippi coast with over 20 feet of surge. A mandatory evacuation was ordered. Nevertheless, many residents refused to leave, and more than 200 died there.”

From focus group work, we can tell that in thinking of hurricane risks, individuals do so in terms of personalized risk and not only probability times severity. They conceptualize their risk in terms of their past experience (Andrew in Miami, certainly Katrina now in New Orleans, and lack of hurricanes in Tampa). But it isn't clear to me how much of this experience drives their current plans or potential responses in

future hurricanes.

If you lived through Andrew or Katrina, would you respond differently than someone who didn't have that memory or experience? And would having more information about the long term impacts of a hurricane lead people to behave differently before an imminent threat or even during an eminent threat?

What if risk communication included a focus on long-term impacts as well? Perhaps some of HFIP's \$200 million could be spent on better understanding how information can be shaped to get people to respond to hurricane threats “in the right way,” and perhaps communicating long term impacts should be a part of that. There are a lot of people who have been thinking about this a lot longer and a lot more clearly than I have. I would be interested to hear their thoughts on this!

A final note: It was amusing (to me at least) that several times when I told people in focus groups that I am from Colorado they said something like, “I could never live there with all the snow storms and people killed in avalanches!” I guess it may all be about perceptions!

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Culture (continued from pg 3) and symbolic aspects of weather and climate deserve as much attention as the responses to specific weather events or conditions, since these two are ultimately inseparable” (Strauss and Orlove 2003:6). It is important to understand the cultural (e.g., myths, tradition), economic (e.g., poverty, affluence), and political (e.g., marginalized from power, decision-maker) contexts to know how people will perceive, understand, make decisions, and act when faced with weather or climate impacts.

In general, there are three broad and overlapping areas in which anthropologists have engaged with weather and climate in their research. One is the study of people’s specialized knowledge about weather and climate that is not necessarily informed by Western science and may have developed over thousands of years of inhabiting and observing one’s natural environment. This is a segment of a field of research on people’s local, indigenous or traditional knowledge about the natural world and is sometimes called “ethnometeorology” or “ethnoclimatology.” This knowledge is local, situational, and embedded in a cultural context (e.g., Berkes 1999). An interesting example of ethnometeorology comes from an interdisciplinary team of anthropologists and meteorologists who learned that the traditional technique used by Peruvian potato farmers in the Andes to forecast rainfall and crop yield relied on the influence of El Nino on the visibility of the Pleiades during the festival of San Juan in late June (Orlove et al. 2002).

Another area of research is on risk perception. Risk is perceived according to cultural values and beliefs. For example, short-term forecasts can be used strategically

in the context of uncertainty to meet organizational, political, or operational goals (Rayner 2003:284). Roncoli et al. (2003) describe how probabilistic seasonal forecasts in Sahel-Sudan Region are interpreted through the lens of farmers’ own concerns so that they do not necessarily receive the message intended by the forecasters.

Vulnerability to the adverse impacts of weather and climate constitutes the third research focus in which political economy and environmental issues are foreground. Oliver-Smith describes vulnerability as “the conceptual nexus that links the relationship that people have with their environment to social forces and institutions and the cultural values that sustain or contest them” (Oliver-Smith 2004:10). Vulnerability may be more about the social, political, and economic context than about the impact itself. A recent report from the UN Deputy Emergency Relief Coordinator that between 55%-65% of all annual global disasters are weather related, 500 million people are affected annually, and the numbers are increasing.² Those who are the most impoverished and least powerful in the global arena are also those who inhabit the most marginal environments and are least able to buffer themselves from the impacts of hazards. My own recent research with people in Nanumea, an atoll in the Pacific island country of Tuvalu, examined local perceptions of risk and responses to vulnerability in the context of global climate change impacts including sea level rise and shifting weather patterns (Lazrus 2009).

Weather-Climate Continuum

From an anthropological point of view – or even a social science perspective in general – the scientific and epistemological distinctions between weather and climate break down. As one non-social scientist, but keen observer of people’s experience of

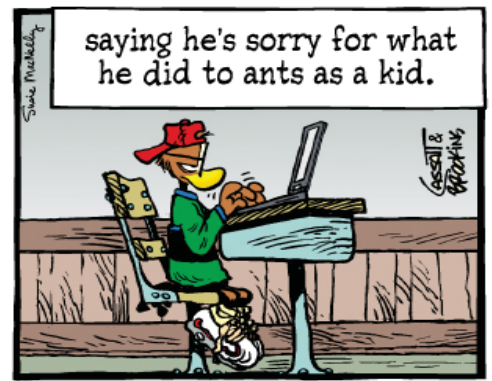
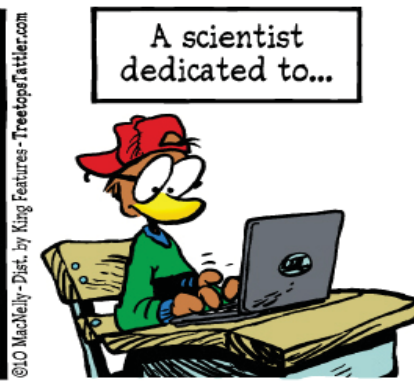
the weather, told me: “weather is the climate’s delivery system.” In other words, from our perspective there is a weather-climate continuum that is experienced daily by the people we study who may not have the scientific finesse to make the distinction between weather and climate. Indeed, the distinction may not be culturally salient or even necessarily useful. Understanding this has implications, for example, for how policy makers introduce climate change initiatives into the public sphere.

Engaged Science for a Safer World

“In reality, the physical sciences need the social sciences more than ever, because people want to know what a changing climate means for themselves, and their families” (Glantz 2008).

Anthropological work can be highly relevant and engage other academic and students from disciplines, professionals, and members of the public. Uncovering the cultural backdrop against which people formulate their worldviews and make decisions, such as whether or not to drive in a snowstorm or evacuate when a hurricane warning is issued, can help scientists and public officials better understand how to provide relevant information and motivate appropriate behavior.

The renowned climate scientist Stephan Schneider was one of the participants in Mead’s conference in the mid 1970s. He too recognized the contributions of anthropology and other social science disciplines to human safety and wellbeing in a world dominated by weather and climate, saying: “Let’s discover our differing value systems, and then look for a foundation of shared values where we might find a way to live together” (Nuzzo 2005).



Becoming an anthropologist
(Courtesy of <https://www.shoecomics.com/>)

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Footnotes

[1] See Lazo (2009) for a broad view of social science disciplines and their contributions to understanding human interactions with weather and climate.

[2] 'Press Conference by United Nations Deputy Emergency Relief Coordinator on Recent Floods in South Asia', United Nations Press Conference, 9 August 2007. http://www.un.org/News/briefings/docs/2007/070809_Wahlstrom.doc.htm Accessed 10/9/2008.

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The purpose of *Weather and Society Watch* is to provide a forum for those interested in the societal impacts of weather and weather forecasting to discuss and debate relevant issues, ask questions, and stimulate perspective. The newsletter is intended to serve as a vehicle for building a stronger, more informed societal impacts community.

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About SIP

All aspects of the U.S. public sector, along with the nation's economy, are directly and indirectly affected by weather. Although the economic impacts of weather and weather information on U.S. economic agents have been loosely documented over the years, no definitive assessments have been performed, and information generated from the previous studies is difficult to locate and synthesize.

SIP, initiated in 2004 and funded by NOAA's U.S. Weather Research Program (USWRP) and NCAR, aims to improve the societal gains from weather forecasting. SIP researchers work to infuse social science and economic research, methods and capabilities into the planning, execution and analysis of weather information, applications, and research directions. SIP serves as a focal point for developing and supporting a closer relationship between researchers, operational forecasters, relevant end users, and social scientists concerned with the impacts of weather and weather information on society. Program activities include primary research, outreach and education, and development and support for the weather impacts community.

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