

One Economist's Entreaty for Increased Research on Weather Risk Communication

HIV/AIDS, radon, nuclear power accidents, drug side effects, climate change. What do these issues have in common? They have all been the focus of meaningful risk communication research. For a range of hazards like these, diverse agencies and researchers have invested time, money, and brain power to understand how people understand, perceive, and respond to the risks as well as to information about these hazards. This research has been used to improve communication about the risks and to change behavior in the public interest.

How are these issues different from communication about the weather? First, with the U.S. public getting some form of weather information over 300 billion times a year, none of these hazards is the subject of nearly as much information transmission as the weather. Second, (until recently perhaps) there has been virtually no science-based research on the communication of weather risks to guide or improve that communication (at least in the public domain).

Why does this matter to the weather enterprise? The basic function of the broader weather enterprise as articulated in the National Weather Service (NWS) Mission Statement is to “provide weather, water, and climate data, forecasts and warnings for the protection of life and property and enhancement of the national economy.” If we think of the provision of weather information (including forecasts and warnings) as a form of risk communication, then this means the weather enterprise is all about weather, water, and climate risk communication.

But what is this risk communication? It is the multifaceted process of the creation and flow of information about risks to inform better decision making, where risks are generally thought of as “the probability of an adverse effect and the magnitude of that effect.” This sounds an awful lot like weather information generally provided—the likelihood and magnitude of an adverse (weather) effect—remembering that weather information can range from forecasts about a cloudy, cool day to a tornado or hurricane warning.

But although this definition of risk is reasonable from a technical perspective, it is functionally inadequate. Thirty or more years of risk communication research has definitively shown that most people do not conceive of or make decisions about a risk by thinking of it simply as a probability times a magnitude. A much broader range of “risk attributes” constitute risks and affect risk decisions including dread, voluntariness, control, efficacy, and subjective probability as well as a range of socioeconomic characteristics such as gender, culture, and community outrage. So focusing almost solely on communicating the likelihood and the magnitude of a weather risk, from a risk communication perspective, is likely to fail to motivate behavioral changes (such as evacuating areas subject to storm surge or finding shelter in place from tornado winds).

In reviewing the development of risk management (and communication) as a field of practice, Baruch Fischhoff (1995) characterized 8 stages in that development: 1) all we have to do is get the numbers right, 2) all we have to do is tell them the numbers, 3) all we have to do is explain what we mean by the numbers, 4) all we have to do is show them that they have accepted similar risks, 5) all we have to do is show them that it is a good deal for them, 6) all we have to do is treat them nice, 7) all we have to do is make them partners, and finally 8) all of the above. (As much of risk communications has focused on getting people to deal

with health or technical risks, I am not sure how much steps 4 and 5 apply to weather communication.)

Reflecting on this developmental sequence, what stage is the weather forecasting community at with respect to risk management and communication? While there is a range of individual approaches across the weather community, I suspect that the vast majority of weather researchers focus on 1 (get the numbers right) while weather forecasters and broadcasters also focus on 2 (tell them the numbers) and some of 3 (tell them what the number means). Over the last few years—as evidenced by the existence of this journal and more efforts in the community to partner with the recipients of weather communication—at least some parts of the enterprise are step 7, making partnerships.

Regardless of how much skill we have in creating the numbers (i.e., step 1), given a lack of research and understanding on how people get, interpret, and respond to the numbers, do we even know if we have done a good job in (step 2) telling them the numbers or (step 3) explaining what the numbers mean (much less making them partners)?

Whose responsibility is it to communicate weather risk in a manner that integrates an understanding of human behavior beyond a “tell them the numbers” mentality? By its history and actions, by its mission and vision statements, and by lack of other responsible actors, I would say it is the weather enterprise’s responsibility to ensure that the meteorological information the enterprise creates is carried all the way through to “behavioral changes perceived to be in the public interest.” I do not think the enterprise can do this without advocating for and supporting risk communication research and practice just as much as advocating for and supporting weather modeling and forecasting research.

And if responsibility for adequate communication of weather risk to end users sometimes seems beyond the weather enterprise’s domain (and budget constraints), let us not forget the Italian court that recently convicted seven prominent geological scientists and disaster experts to six years in prison for failing to adequately warn residents of the risk before an earthquake struck. Could actors in the weather community in the United States or other countries end up at some point with similar liability? You may think that could never happen in the United States. Most Americans did not think a Katrina-type disaster could happen either! Regardless of how passionate we may think the Italians to be, responsible, well-informed communication adequate to the needs and capabilities of end users is not an option but a requirement.

Compared to other foci of risk communication, the weather enterprise is woefully behind in understanding and researching communication processes (just think about NWS communications still issued using all caps text). So to meet the goals and responsibilities of the weather enterprise, it is time to take risk communication seriously and make it a core activity. This may require hard choices in an era of tight budgets but that is also the time when important and difficult decisions can have the biggest impact.

That said, I would suggest that rather than funding a wide range of primary research on what seems to be useful and relevant weather communication topics, the weather community should reach out to the entire community of risk communication experts and find out what they already know so we do not reinvent the wheel. And as the weather enterprise reaches out to social scientists and in particular communication researchers, we should consciously take advantage of the extant literature—the low-hanging fruit—rather than acting as though we are creating a new field of understanding.

Among other reasons for doing so is that it likely is more cost effective (here is the economist in me talking) and ultimately faster to applications and operations than new primary “most recent weather disaster driven” research. The transfer and application of accepted wisdom from risk research should be the first step for the weather community. Second should be applied research guided by existing knowledge. That is with respect to questions not fully resolved elsewhere in the risk communication body of knowledge but where new work in the weather arena could be used to help build this body as well as

advance weather risk communications. Third, if there are truly unique aspects of weather risk communication that have not been raised in other risk communication research domains, primary research should be supported to solve these unique challenges and broaden the domain of risk communication.

This prioritization is taking largely a least-cost approach. Of course decisions on research priorities should also consider potential benefits of the application of new knowledge to the weather problem. For instance, if applying the extant knowledge only saves one more life a year now, whereas new primary research can save 100 lives a year but will not be operational for 10 years—there is a cost–benefit consideration to choosing the right path. We really do not even know where the highest likely payoffs are to guide investments in weather risk communication research.

That said, it seems to me that we are much more likely to save 100 more lives a year with new operations or products based on risk communication research costing a million dollars a year than we are based on meteorological research to marginally improve forecast accuracy costing tens of millions of dollars a year. So if the weather enterprise is really interested in saving lives and property and not just interested in meteorology, it is time to make risk communication as high a priority as research on hurricane intensity.

On a different track, after about four years on the job, my term as editor for *Weather, Climate, and Society* (WCAS) has ended. During my time with WCAS, I have handled about 55 manuscripts (I think this is less than any of my coeditors) and worked with over 200 peer reviewers. I never appreciated before how much work a journal editor does! Still, I have benefited immensely in learning about the peer review process from the editor's side as well as learning a little about the science in the extremely broad range of manuscripts I have been privileged to "handle." For this experience, I would sincerely like to thank Roberta Balstad for her outstanding leadership and support, my coeditors (Ben Orlove, Kirstin Dow, and Lisa Dilling) for their professionalism (and humor when needed), the incredible staff at the American Meteorological Society (AMS; including Melissa Fernau, Jason Prevost, and Barbara Ballard in particular who supported my editorship), the peer reviewers without whom the process truly would not work, and of course the authors who have submitted manuscripts. I can only hope that I have helped the process and served WCAS in a balanced and professional manner. I look forward to the increasingly important future this journal holds in the AMS portfolio!

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REFERENCE

- Fischhoff, B., 1995: Risk perception and communication unplugged: Twenty years of process. *Risk Anal.*, **15** (2), 137–145.