U.S. Senate Committee on Commerce, Science, and Transportation

Weathering the Storm: How Can We Better Communicate Weather to Enhance Commerce and Safety?

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Chairman Thune, Ranking Member Nelson, and distinguished members of the committee, it is a privilege to provide my experience and perspective to you today. Thank you for the invitation.

The perspective I bring to this panel is that of both a behavioral scientist and meteorologist. My research has focused primarily on how members of the U.S. public understand weather risks and choose to respond to them. Today, I will provide a brief overview of some pressing issues in weather communication, especially for tornado risk.

Our country has made significant investments in weather research, observing and prediction, and the benefits have been vast. For example, where we once were unable to warn people before tornadoes touched down, we now offer around 13 minutes of lead-time on average (Erickson and Brooks 2006). Tornado fatality rates have dropped considerably (Brooks and Doswell 2002). Improvements in the detection and prediction of weather hazards are therefore critical to continued improvement in societal outcomes.

That said, it is clear that improvements in technology alone will not resolve all of the problems we face in creating a resilient nation (NRC 2006). In fact, events with excellent forecasts can still have potentially devastating outcomes. One event that makes this abundantly clear occurred on May 31, 2013, a day that largely fell beneath the national consciousness, but shook the field of meteorology deeply.

11 days before May 31, on May 20, an EF5 tornado ripped through Central Oklahoma, killing 24 people in the City of Moore – 7 of whom were children in an elementary school. The ensuing national media frenzy, combined with several evenings of storms to follow, left the collective nerves of Oklahomans shattered. I experienced this personally as I was there finishing my PhD at the time.

Already on-edge, matters got out of hand quickly on May 31 when a two-mile wide tornado touched down about 30 miles west of Oklahoma City, a metro area of about a million people. Helicopters flying around the storms captured this scene:

Photo credit: KWTV Oklahoma City, 2013.

Other photographers around the area captured these images of traffic, some going through flood waters to escape. Of the people who died on May 31, most were killed by drowning as they attempted to seek shelter from the tornado (NOAA 2013).

What you see in these images are tens of thousands of people spontaneously fleeing and causing traffic to come to a standstill as far south as Norman, 20 miles away. The tornado ended up lifting as it came toward Oklahoma City, but if it had not, the number of people killed could have climbed into the hundreds, plausibly reaching the number of people lost in Hurricane Katrina. And this is in the most tornado-savvy population in the world, with access to the best technology and communication networks. The warnings and forecasts were fantastic. While it seems easy to pin this on the tornado that had happened 11 days before, this event occurred against a backdrop of marked shifts in the response behaviors of the population in preceding years.

The only way this event could have been caught and mitigated against ahead of time is with two complementary improvements to our weather infrastructure:

(1) An improved capability to transfer research *in social and behavioral sciences and the humanities, including risk communication and decision sciences,* into meteorological operations, and
(2) An improved ability to observe and predict the world of people as we observe and predict the atmosphere.

To the first point, many decades of basic research have been developed pertaining to disasters, vulnerability, and risk decision sciences, but a field of people trained in physical sciences are unlikely to have the skills to find, make sense of, and apply this work to practice. It is almost literally a kind of foreign language. We should leverage extant investments in this human-oriented research, including that funded by NSF, to increase the effectiveness of our meteorological infrastructure. To do this, we need to incorporate more people with skills in these disciplines and give them a voice in decisions about meteorological practice. We must also partner with NSF and our academic partners to translate basic research to applications in meteorology.

To the second point, it is often said that all disasters are local. Each place in our country is better adapted to certain kinds of hazards than others. Each place will have a unique history and trajectory with different hazards, and different communication strategies will

therefore be appropriate in different places. One of the key strengths of the NWS is its geographical diversity, with 122 field offices spread across the country, allowing forecasters to have some nimbleness to serve the unique needs of their populations. To leverage this localness, we need to provide forecasters with information about their people, with best practices, and with up-to-date recommendations for working with our private sector and emergency management partners to promote resilience. The public safety mission of the NWS will be achieved through these partnerships. The Weather Service cannot, and does not, implement its core life-saving mission alone (NRC 2003). We should couple pre-event monitoring with an NTSB-like capability to conduct post-disaster assessments (NRC 2012) so this life-saving enterprise is not left to merely guess about how they can do their jobs better.

Thank you again for the opportunity to provide remarks today, and I welcome questions from the committee.

References

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