

**Communication Challenges and the Use of Climate Tools:  
A Survey of Emergency Managers and  
Broadcast Meteorologists in Coastal Louisiana**

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Coastal Louisiana sits at the nexus of multiple weather and climate hazards, making it one of the most vulnerable environments in the world. The region experiences hurricanes and storm surge, heavy rainfalls and flooding, hail, tornadoes, and other damaging wind. Climatological hazards include drought and brown marsh, sea level rise, and the prospect of warmer temperatures and changing rates of extreme events. A compounding factor is subsidence along Louisiana's coast, which is causing impressive rates of relative sea level rise (Morton, Bernier, & Barras, 2006) and rapid land loss. As a result of land loss, future hurricanes can be expected to hit cities with higher intensities (Knutson et al., 2010) and bring larger storm surges to urban locations. The prospect of warmer temperatures will also increase the capacity of the atmosphere to store water vapor, potentially leading to more heavy rain events (Wang, Zhao, & Gillies, 2016; van der Wiel et al. 2017).

Louisiana's unfortunate likelihood for weather and coastal crisis makes it the ideal area to study communication. The people of coastal Louisiana need access to information that helps them make what could be life-saving decisions about what precautions to take and when to evacuate. Information is essential for recovery and long-term planning as well as for an immediate crisis. Because of the importance and value of information in confronting weather and climate hazards, this project examines the use of climate tools for communicating information about extreme events. The principal focus of the project is the use of climate tools and communication by emergency managers (EMs) and media-based meteorologists (also known as broadcast meteorologists). Both groups are at the forefront when severe weather or climate events occur; they are the trusted source of information on which the general public and

government officials rely. Broadcast meteorologists communicate weather and climate information to the public daily. EMs enter the process when weather is severe.

Communication difficulties are especially likely to occur and to create problems in crisis situations. An exercise in crisis communication found mistakes including incomplete, contradictory, and incorrect information, which can occur due to poor or misinterpreted information (Abbink et al., 2004). This highlights the importance of interpreting climate tools correctly and communicating those interpretations clearly and accurately.

## **Research Questions**

In order to better understand the communication of emergency managers and broadcast meteorologists related to weather and climate tools, this project conducted a survey to assess the understanding of weather and climate, primary sources of information, perceptions of climate tools, and preferences for training.

## **Method**

### **Participants and Procedures**

The participants ( $N = 19$ ) were EMs ( $n = 11$ ) and broadcast meteorologists ( $n = 8$ ) in coastal Louisiana. The study was conducted by sending links to an online survey to the primary EMs in 26 parishes along or south of the I-10 and I-12 corridor in Louisiana in Fall of 2018. The response rate for EMs was 42%. Links were also sent to 38 broadcast meteorologists at 11 different stations that serve coastal Louisiana, for a response rate of 21%.

The meteorologists had more education overall than did EMs, and more college coursework and degrees related to climatology. Both groups had been in their current positions for an average of 10 years, but the EMs had 21 years in their general occupation compared to 13 for the meteorologists. Most broadcasters and EMs were in current or comparable positions

during past floods, hurricanes, drought, tornadoes, other damaging wind, hailstorms, heat advisories, hard freezes, and frozen precipitation.

## **Measures**

Participants completed scaled items to describe their understanding of weather and climate, and the understanding of their primary audience. They rated their reliance on sources of information such as local and national media, the internet, and government sources. The questionnaire described and presented examples of nine climate tools such as the hurricane cone of uncertainty, the sea level rise viewer, and marine forecasts. Participants rated the tools based on their usefulness, their personal understanding, and audience understanding. Participants also identified their preferred forms of obtaining new information about weather and climate tools.

## **Results**

**Understanding:** Meteorologists rated their understanding as strong to excellent and EMs rated their understanding as moderate to strong. The participants believe their primary audience has a moderate to strong understanding of weather and climate.

**Information Sources:** Federal sources and local media are the most commonly used sources of information about weather and climate. Sources used least frequently include phone apps, social media, and experts at a local university. Broadcasters are more likely to use small, specialty internet sources, while EMs are more likely to use local and state officials,

**Weather and Climate Tools:** The most frequently used tools, when they are relevant, are the Hurricane Cone of Uncertainty, Surface Weather Maps, and Convective Outlooks. The least used tools are SurgeDat and the Sea Level Rise Viewer.

The tools judged to have the highest quality and most usable information are the Hurricane Cone of Uncertainty, Surface Weather Maps, and River Flood Data, which were

between moderately useful and very useful. The bottom-rated tools were Sea Level Rise Viewer and Long Lead Outlooks, although their scores are close to moderately useful,

EMs and meteorologists believe they have moderate to excellent personal understanding of the tools, with the Hurricane Cone of Uncertainty and Marine Forecasts topping the list with scores in the strong to excellent range.

Participants were asked to identify their primary audience and then rate their understanding of the tools. Eleven identified the general public as the primary audience, three identified local or parish leadership, and three listed both the general public and government officials. These audiences are perceived to understand the Hurricane Cone of Uncertainty, Marine Forecasts, and River Flood Data the best.

Finally, EMs and meteorologists rated how easy it is to explain the tools. The easiest tools to explain are the Hurricane Cone of Uncertainty and Marine Forecasts; the hardest are Long Lead Outlooks and the Sea Level Rise Viewer.

**Training Preferences:** The most preferred source of new information about weather and climate information is websites, followed by webinars and email, followed by face-to-face meetings, phone, and finally video.

## **Discussion**

Emergency managers and broadcast meteorologists are important links in the communication of weather and climate information to government officials, the general public, and other decision-makers. Their role is especially important when extreme events occur and clear, accurate information is essential for protecting lives and property. This study examined the understanding and perception of climate tools in coastal Louisiana as well as the challenges of communication around extreme events.

Not surprisingly, considering their training and job responsibilities, meteorologists believe they have greater understanding of weather and climate than do EMs. Interestingly, however, the understanding of the primary audience is judged to be as strong as it is for EMs. This may be a function of the location of the survey. Coastal Louisiana has experienced multiple extreme events in the past 15 years, and this may lead experts to believe that the public has an improved understanding of weather and climate as a result of those events.

Federal sources are used regularly by EMs and broadcast meteorologists. Because NOAA agencies such as the National Weather Service and the Storm Prediction Center are the primary source of data about weather and climate, the stakeholders appear to be using the best-available source. EMs and broadcast meteorologists also rely heavily on local media, a finding that is consistent with research by Edwards et al. (2019) who found that water managers in the same region rely heavily on commercial sources. Because decision-makers use local media, this finding highlights the need for meteorologists to interpret climate tools correctly and to communicate information effectively.

EMs and broadcast meteorologists have a finite amount of time and energy to examine climate tools for their jobs and, consequently, must prioritize some tools over others. These stakeholders in coastal Louisiana show a high degree of consistency in their perceptions of nine different climate tools. The tool that emerged as the “favorite” is the Hurricane Cone of Uncertainty. It is used with regularity, is well-understood by the stakeholders and their audience, and is relatively easy to explain. Interestingly, all of tools were judged to have at least moderately valuable information. All of the tools address weather and climate concerns that are important to coastal Louisiana.

The less-favored tools include the future-oriented Sea Level Rise Viewer. This may reflect the stakeholders' focus on the "here and now" of weather and climate events.

Additionally, the Sea Level Rise Viewer did not include data about the Louisiana coastline until 2015 (NOAA, 2015) and the stakeholders may not be aware of the change.

Several limitations to this project should be noted. The first is that, although the response rates are adequate, the sample size is small because the population was small. Second, the findings are specific to EMs and broadcast meteorologists in coastal Louisiana. Additional research should be conducted to determine whether the results of the current study can be generalized to other coastal areas.

This study did not examine the actual or objective understanding of climate tools by EMs or broadcast meteorologists. It is possible that they perceive greater understanding than exists. Because of their importance in communicating weather and climate information to the general public, government officials, and other decision-makers, continued training in climate tools is warranted.

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