Gaps in Public and Emergency Managers Flood Communications and Perceptions

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Abstract: Despite significant investments in early forecasting systems, the loss of lives, livelihoods, and property as a result of floods persist, and impacts are exacerbated by errors in communication. Addressing this issue requires a clear understanding of communication gaps between emergency managers and the public—key end users of flood forecast information. This study explored comprehension of flood-related terminology, communication methods, and sources of flood information. Using data from a nationally representative public survey of 918 U.S. respondents and a survey of 64 emergency managers, the findings reveal discrepancies between how emergency managers' perceptions and the public's actual understanding of flood terms, their preferred communication channels, and trusted information sources. Insights are critical for emergency managers, National Weather Services (NWS), National Oceanic and Atmospheric Administration (NOAA), and other government officials to improve flood risk communication and better protect lives and property.

Keywords — communication gaps, emergency managers, flood hazard, flood terminologies, information sources

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INTRODUCTION

Flood hazards are increasingly frequent across the United States, causing substantial loss of life and widespread damage to property, livelihoods, and ecosystems [1]. While accurate forecasting is vital, effective communication is equally critical for preparedness and response aimed at safeguarding communities. Clear, accessible language grounded in accurate forecasts is essential for successful flood risk mitigation [2]. Community resilience relies not only on the accuracy and timeliness of messages but also on the effectiveness of communication methods [3]. However, the use of technical jargon in warnings and preparedness materials hinders public understanding. In response, NOAA's National Weather Service (NWS) has invested heavily to improve flood forecasting and early warning systems. Yet, studies show that enhanced forecasting alone does not consistently lead to appropriate public action, underscoring persistent communication gaps—particularly between local emergency managers and the public, who are the primary users of forecast information [4].

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Effective flood hazard communication should convey essential details, including the type of hazard, affected areas, timing, source, and clear, actionable guidance [5,6]. Emphasizing the need for clear, consistent terminology is critical, as public interpretations often diverge from emergency managers' intended communication goals [7]. Equally important is the use of appropriate and inclusive communication channels to reach all community members, especially vulnerable populations with limited access to traditional platforms. Furthermore, trust in information sources significantly influences the public's willingness to take protective actions. This study investigates gaps between public understanding and emergency managers' perceptions regarding terminology, communication channels, and source credibility in effective flood hazard communication.

METHODS OR PROCEDURES

We conducted two surveys to explore gaps in flood hazard communication between the public and emergency managers. The first survey targeted a nationally representative sample of 918 U.S. residents recruited through Prolific, an online human-subject recruitment platform. The survey included questions about their past experiences with flood hazards, perceptions of flood risk, understanding of commonly used flood-related terms, preferred communication channels, and trusted sources of flood information. The second survey was directed at emergency managers (n = 64) who had experienced a FEMA-declared flood disaster within the past 10 years. This survey focused on the communication methods they use to share flood information with the public, their sources of flood hazard information, and their perceptions of how well the public understands flood terminology.

RESULTS

In our public survey, we asked respondents to select the correct definitions for seven flood hazard terms: areal flood, bankfull, flash flood, flash flood emergency, flood stage, flood warning, and flood watch. Among these, *flash flood* was the most widely understood, with approximately 88% of respondents correctly identifying its meaning. Similarly, about 82% correctly understood *flood watch*. Both *flood warning* and *flash flood emergency* were correctly identified by 63% of respondents, while 58% accurately defined *bankfull*. In contrast, far fewer respondents correctly identified the meanings of *flood stage* (26%) and *areal flood* (22%). We also asked emergency managers to estimate the percentage of their community members who they believe understand each of these flood terms. Our findings (Fig. 1) show that emergency managers' perceptions aligned with public understanding for only two terms: *flood warning* and *flash flood emergency*. However, emergency managers significantly overestimated the public's understanding of *flood stage* and *areal flood*, and underestimated public comprehension of *flood watch*, *flash flood*, and *bankfull*.

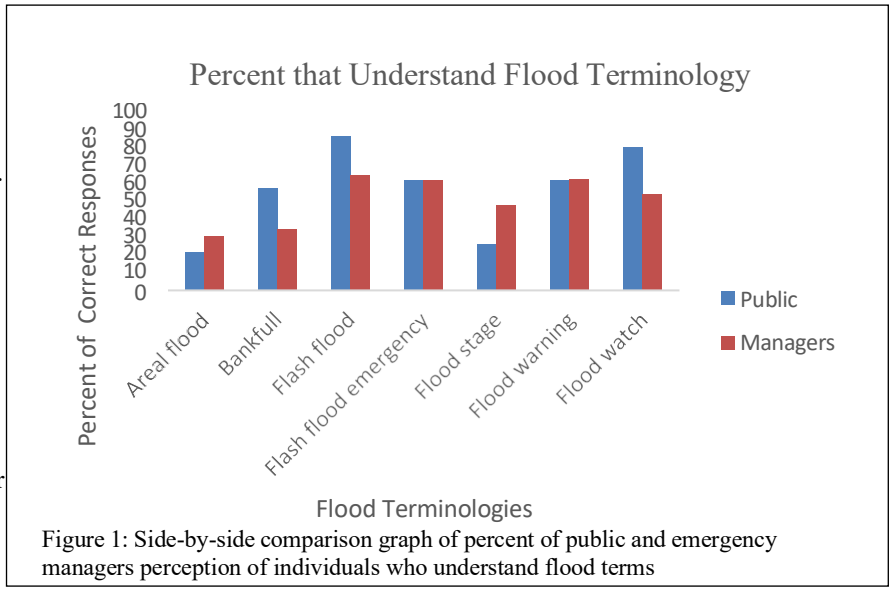

Figure 1: Side-by-side comparison graph of percent of public and emergency managers perception of individuals who understand flood terms

We also asked public survey respondents to select their preferences among ten channels for receiving flood hazard information: text messages, informational mailers, public meetings, local TV news, weather apps, radio news, emergency alerts, the internet, social media, and public awareness campaigns(shown in Figure 2). The most preferred channels were text messages (58%) and emergency alerts

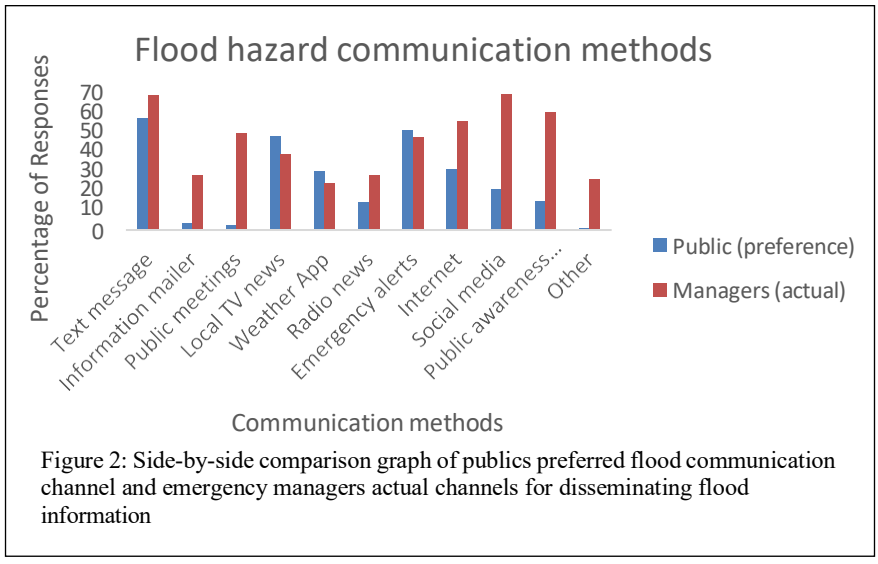

Figure 2: Side-by-side comparison graph of publics preferred flood communication channel and emergency managers actual channels for disseminating flood information

(52%). About one-third of respondents selected weather apps and the internet as preferred channels, while less than a quarter chose social media, radio news, public awareness campaigns, informational mailers, or public meetings. In contrast, emergency managers stated that they most frequently used social media (87%) and text messaging (70%) to distribute flood hazard information to the public. Their least used channels included informational mailers (28%), weather apps (24%), and radio news (28%). Our analysis revealed a notable mismatch: aside from *text messaging*, the channels most frequently used by emergency managers—such as *social media*, the *internet*, and *public meetings*—are among the least preferred by the public.

We also asked public survey respondents to select their most trusted sources of flood hazard information from a list of 16 different sources (Fig.3). Similarly, emergency managers' were asked to identify the sources they rely on to receive flood information for dissemination to their communities (Fig. 4) Findings revealed that the *NWS* was the most trusted source of flood information among the public, and it was also the primary source used by emergency managers.

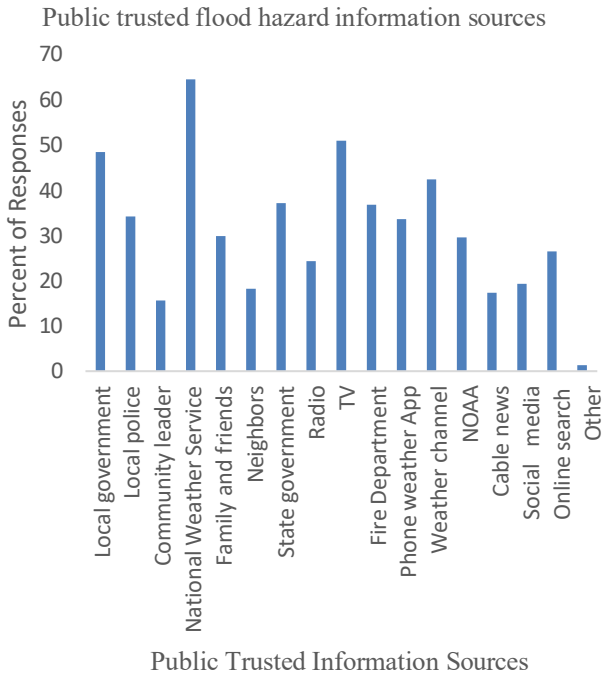

Figure 3: Percentage distribution of public's trusted flood hazard information sources

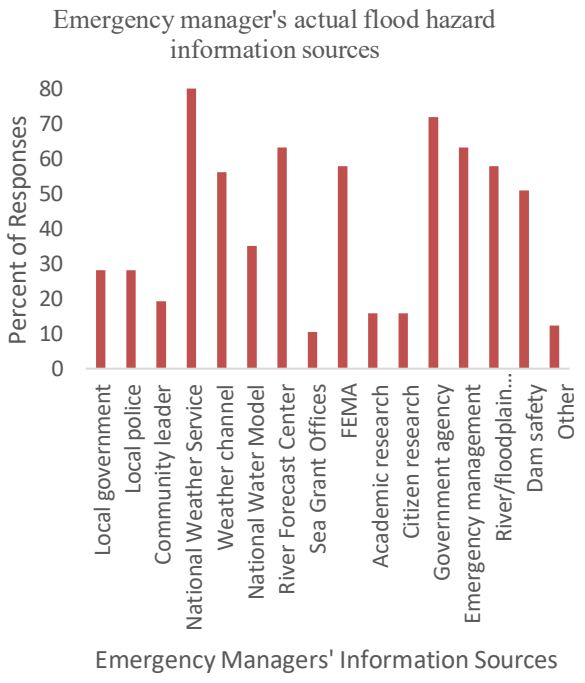

Figure 4: Percent distribution of emergency managers actual flood hazard information sources

DISCUSSION

Our study identified significant gaps in flood hazard communication between emergency managers and the public, particularly in two key areas: the public's understanding of flood-related terminology and the channels used to disseminate flood information. Emergency managers often either overestimate or underestimate their assessment of how well the public understands commonly used flood terms, which may result in reduced decision-making efficacy during flood events. Therefore, emergency managers should strive to reduce or explain technical terminologies or jargons necessary for communication in crises. Specifically, they should provide clear explanations and sufficient detail in their messages to ensure people understand the problem, why it should matter to them, so they can respond appropriately, ultimately helping to protect lives and property during flood events. The study also highlighted a major disconnect between the communication channels preferred by the public and those most commonly used by emergency managers. The public tends to favor channels they can easily access, which may increase the likelihood of receiving timely alerts and updates. To improve the effectiveness of communication, emergency managers should consider incorporating the public's preferred methods of receiving information. This approach can help ensure that more residents receive critical warnings promptly, which can lead to better preparedness and more lives saved.

Additionally, including and acknowledging trusted sources in hazard messaging—such as the NWS—can enhance credibility and encourage the public to take appropriate protective actions based on the information provided.

CONCLUSION

This study examined communication gaps between emergency managers and the public regarding flood hazards, focusing on three key areas: flood terminology, communication channels, and sources of flood information. Emergency managers often overestimated the public's understanding of terms like *flood stage* and *areal flood*, assuming more people were familiar with these terms than our survey results showed. At the same time, they underestimated the public's grasp of terms such as *flood watch*, *flash flood*, and *bankfull*. These misperceptions are concerning, as they can lead to miscommunication and poor decision-making during flood events. We also found a significant mismatch between the public's preferred communication channels and those most used by emergency managers. Except for text messaging, the methods frequently employed by emergency managers were among the least favored by the public. To improve the effectiveness of flood warnings, emergency managers should consider using the communication platforms most preferred by residents, ensuring timely and accessible information that supports informed decision-making. Finally, the National Weather Service (NWS) was identified as the most trusted source of flood information by both the public and emergency managers. Incorporating trusted sources like the NWS into public messaging can enhance credibility and increase the likelihood of appropriate responses during flood situations. In conclusion, effective flood communication should involve clear and simplified messages, delivery through the public's preferred channels, and inclusion of trusted information sources. These components are essential to encouraging the timely actions necessary to protect lives and property during flood events.

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