Climate Information for Disaster Management: Bridging the Weather and Climate Timescales *(A CLIMAS, NWS Western Region, and FEMA Region IX collaboration)*

OVERVIEW

The Federal Emergency Management Agency (FEMA) Region IX (CA, AZ, NV and Pacific Islands) has based its disaster management preparations on weather information for decades. Climate information, which conditions weather risk, however, has been underutilized. Hurricanes, atmospheric rivers, floods and other climate-related extremes commonly strike Region IX and have lead to 154 federal disasters between 1964 and 2007. Climate phenomena like El Niño Southern Oscillation (ENSO) and the Madden Julian Oscillation (MJO) in combination with past and current conditions provides untapped opportunities to leverage climate information to help FEMA better monitor, anticipate and prepare for potential disasters.

The Climate Assessment for the Southwest (CLIMAS), the National Weather Service (NWS) Western Region, and the Response Division of FEMA Region IX are collaborating to co-design a hydroclimate dashboard that integrates into FEMA diasater management, stewarded by the NWS, and studied by CLIMAS.

PROJECT OBJECTIVES

1. Enable the use of climate information in FEMA Region IX disaster management
2. Evaluate the use and usefulness of a co-designed
3. climate information productCritique theories of the co-production of knowledge and climate services within a climate case study
4. Develop best practices that inform scaling the integration of climate information across FEMA regions

CO-DESIGNING THE DASHBOARD

Accessing, interpreting and disseminating climate information are common problems, ones also faced by FEMA Region IX. These challenges have emerged, in part, because climate information is copious, difficult to interpret, and often generated outside the specific decision context. Research suggests that adapting this "loading dock" of information requires a more explicit treatment of context. This project studies and addresses these challenges by applying the six "Principles of

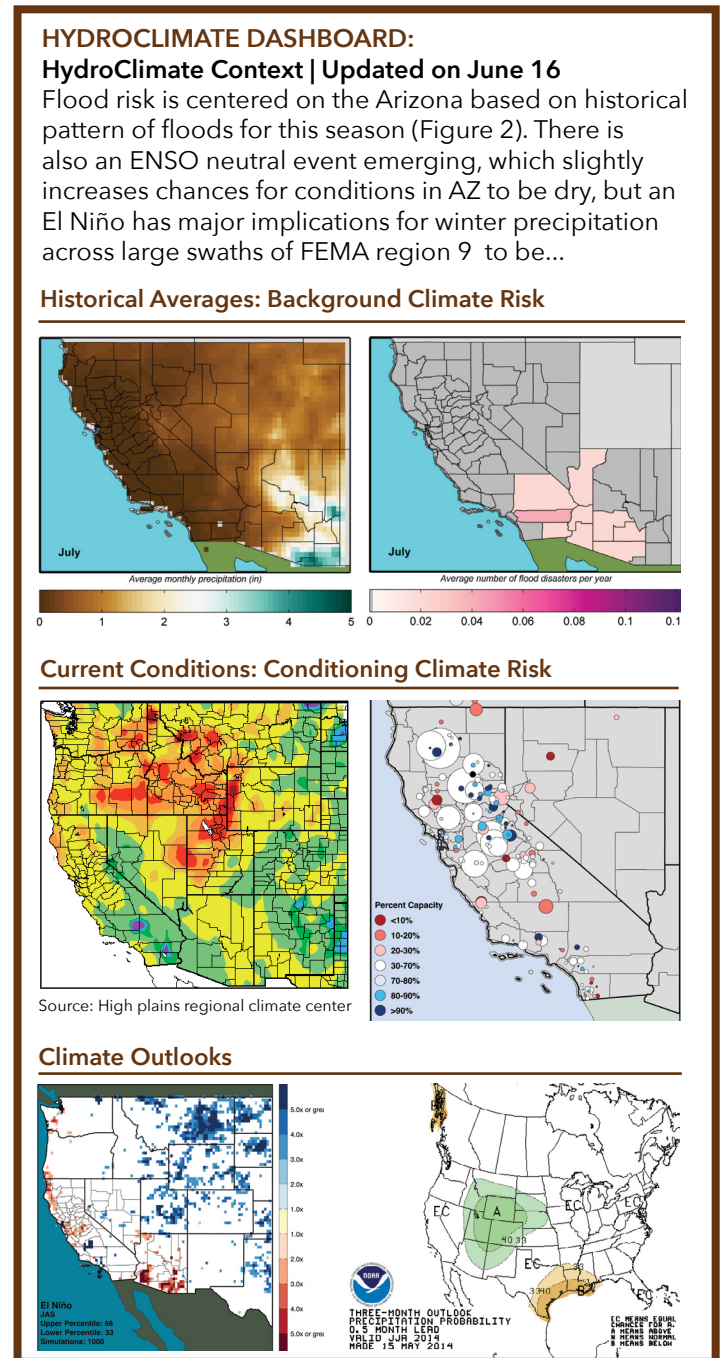Effective Decision Support endorsed by the National Research Council (2010).

HYDROCLIMATE DASHBOARD:

HydroClimate Context | Updated on June 16
Flood risk is centered on the Arizona based on historical pattern of floods for this season (Figure 2). There is also an ENSO neutral event emerging, which slightly increases chances for conditions in AZ to be dry, but an El Niño has major implications for winter precipitation across large swaths of FEMA region 9 to be...

Historical Averages: Background Climate Risk

Current Conditions: Conditioning Climate Risk

Source: High plains regional climate center

Climate Outlooks

Figure 1. Mock Draft of the HydroClimate Dashbaord. Not shown are maps related to MJO and other climate phenomena and conditions that influence risk.

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PRINCIPALS OF DECISION SUPPORT: KEY TENETS TO OUR PROCESS

1. ***Begin with users***. Assessed FEMA information use and NWS capacity to steward climate services
2. ***Prioritize process***. Co-designed the Dashboard, balancing FEMA needs and NWS expertise/ capacity
3. ***Link producers and users***. Focused on advancing interactions between FEMA, NWS, and CLIMAS
4. ***Build connections across disciplines***. Integrated social and climate science expertise
5. ***Seek institutional stability***. Designed the project to tap into and enhance NWS capacity
6. ***Design for learning***. Programmed an evaluation phase to refine the product and study its use

TAILORING THE DASHBOARD: INSIGHTS FROM FEMA

Context | Synthesis | Interpretation | Interaction | Credibile Source | Taining | Timescale
Current conditions is best understood within historical context – Filter overwhelming information into concise narrative – Articulate "what it means" – Routine communications is preferred to automation– Information needs to be credible to move up the FEMA foodchain – increase climate literacy – Monthly climate information meshes with FEMA Watch Officer shift changes

FEATURES OF THE DASHBOARD

The Dashboard is not a dumping ground for all things climate. There are 12-14 maps selected from the assessment that leverage existing data or required new proudcts and divided into 5 components.

1. ***Synthesis:*** A narrative written by the NWS synthesizes climate conditions and possible impacts, drawing on the presented data and expert judgment

2. ***Climatologies***: These maps communicate seasonal and temporal dimensions of risk by presenting historical averages of precipitation, large and flash floods, and FEMA disaster declarations
3. ***Current Conditions***: These maps provide the climate context that either amplify or dampen the impacts of an extreme event. A wet previous month that saturate soils, cause streams to have high flow, and fill small reservoirs is a riskier situation than if the opposite conditions prevailed
4. ***Seasonal Forecasts***: These maps highlight ENSO and MJO and other season outlooks
5. ***Climate in Context:*** These maps present past months in which conditions were similar to the current month and assess if a FEMA disaster occurred. An past analog enables FEMA to conduct further research and place current conditions in a historical context, facilitating FEMA communication

NEXT STEPS

Capitalize on the emerging El Niño to evaluate the Dashboards' use
Depending on evaluation conclusions, expand to other regions including the Pacific Islands
Build out Dashboard to integrate information on fire, drought, and hurricanes incorporate
Test other methods for developing analog years

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