

# Emerging Decadal Climate Information:

## What's the Potential for Flood Risk Management?

Graham Andrews<sup>1</sup>, Heather Lazrus<sup>2</sup>, James Done<sup>2</sup>

1: University of Washington 2: NCAR Mesoscale and Microscale Meteorology Laboratory



### INTRODUCTION

Climate predictions on decadal and regional scales will provide new information about the climate system on decadal (2-30) year timescales, as shown below in Figure 2. However, several roadblocks prevent the use of climate information by decision makers. We interviewed 20 flood control managers in central Colorado to:

- 1) explore the potential of decadal climate information and
- 2) see if decadal timescale climate information shares the same barriers to use as seasonal climate information

Flood management along the Colorado Front Range is complicated by urban areas of high population density and complex hydrologic and climatic conditions at the foot of the Rocky Mountains. Results indicate that several criteria for whether or not climate data is used (Cash et al. 2002) also apply for decadal climate information. In addition, we identify two further criteria that are important for the usability of decadal climate information.

### FIVE CRITERIA FOR USEFUL SCIENCE

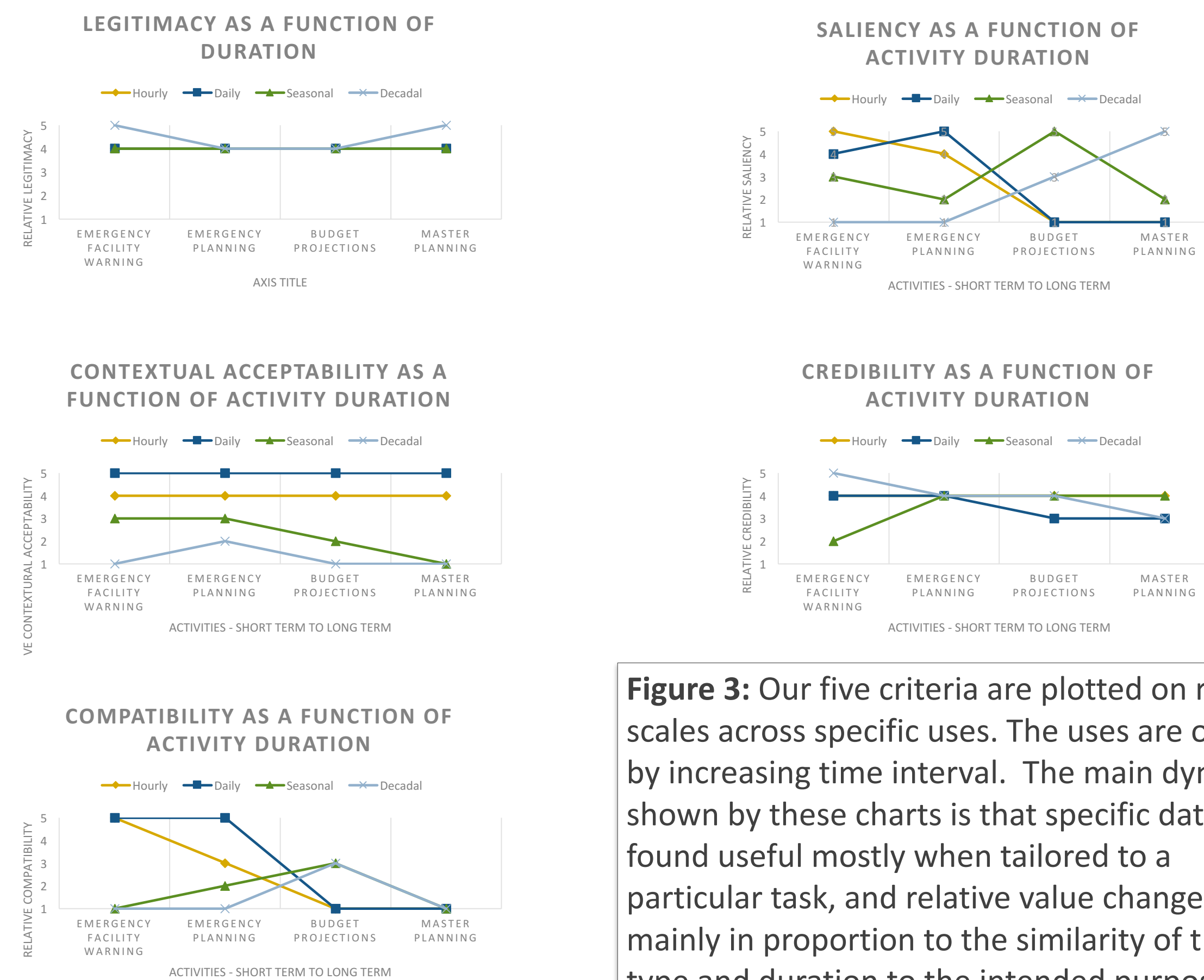


Figure 3: Our five criteria are plotted on relative scales across specific uses. The uses are ordered by increasing time interval. The main dynamic shown by these charts is that specific data is found useful mostly when tailored to a particular task, and relative value changes mainly in proportion to the similarity of the task type and duration to the intended purpose.

### RESULTS - continued

**Compatibility - How well the new data fits with existing processes, mathematical models, decision-making processes, and required activities**

Because of the interaction of sediment with large scale flood events, fire and drought are both predictors of sediment loads which need to be included in the hydrologic sediment modeling that might predict how the floodwaters move under the actual conditions at that time.

**Contextual Acceptability - How well the new data fits with existing political, financial, and social forces**

"We will only do a project if the local government requests it first... Most of them prioritize projects that remove people from danger or repeated flood zone. Otherwise it's normal politics, whoever knows someone."

### DISCUSSION

The two new criteria, compatibility and contextual acceptability, came into view through the interview data because of the physical and political complexity of flood management in Colorado. Compatibility becomes needed because of physical complexity: Interviewees pointed out the need to understand the dynamics of fire, erosion, snowmelt, and sedimentation in addition to the traditional rainfall and hydrology of flood prediction. Similarly, Contextual Applicability becomes needed because of political complexity: Interviewees noted the multi-jurisdictional decision making that is part of their work, leading to political complexity. Interviewees described their funding and citizen support as being tenuous, placing flood managers in the position of negotiating and collaborating with other agencies, such as those that oversee recreation and transportation, in order to get capital projects proposed, funded, and developed.

The five criteria illustrate the importance of tailoring scientific information to its end users, not least because each of the five criteria is subjective. Further research will continue to explore how decadal climate information in particular can help satisfy these five criteria for usable scientific information.

### REFERENCES & ACKNOWLEDGEMENTS

This research is part of Understanding Decision-Climate Interactions on Decadal Scales (UDECODE) project which is funded by the National Science Foundation under Grant Number AGS-1419563. For more information, please see our project website: <https://www.mmm.ucar.edu/udecode>  
 Cash et al. (2002). Saliency, Credibility, Legitimacy and Boundaries: Linking Research, Assessment and Decision Making, Harvard University Working Papers  
 Questions or comments may be emailed to [danielgandrews@gmail.com](mailto:danielgandrews@gmail.com)

### URBAN DRAINAGE & FLOOD CONTROL

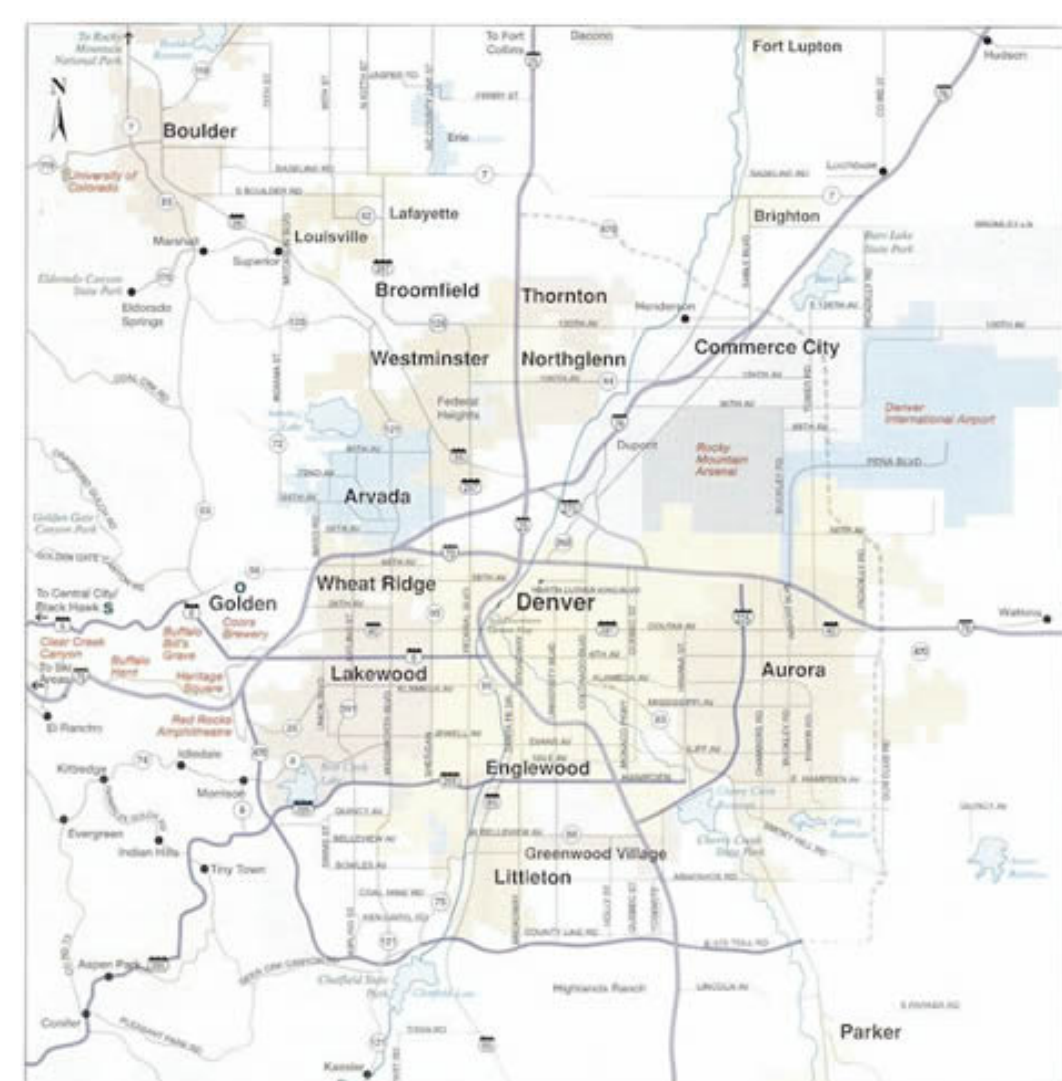


Figure 1: The Urban Drainage and Flood Control District in central Colorado works with local municipalities in our study location to help manage flood control and drainage

The Urban Drainage and Flood Control District was established in 1969 and collaborates with 33 different cities on master planning, funding, and maintenance for major flood control works.

### RESULTS

Interview results corroborate the three criteria needed for climate information to be used by decision makers identified by Cash et al. (2002): Credibility, legitimacy, and saliency. Results also indicated two additional criteria: Compatibility and Contextual Acceptability. These five terms are defined and illustrated with an example from the interviews below.

**Saliency - How relevant the information is to decision makers**

"Many people in their 50s and 60s had never seen a flood on St. Vrain [River] and didn't believe they were in the floodplain because they had lived their whole life there and never seen a flood. [One person told me:] 'I fought against you for 15 years on this project, thank god you won because my house would have flooded.'"

**Credibility - How authoritative, believable, and trustworthy the data and its source are considered to be by decision makers**

"Give us an executive summary, even one that says 'We don't know yet' so we can cite it when talking to others. 'Yeah, if they've written in this little document that I can be like someone else said it, and they're a science person.'"

**Legitimacy - How "fair" an information producing process is and whether it considers appropriate values, concerns, and perspectives of different actors**

"We don't use NOAA maps, we use the data Urban Drainage provides to us. They're the experts in the industry."

### DECADAL SCALE PREDICTION

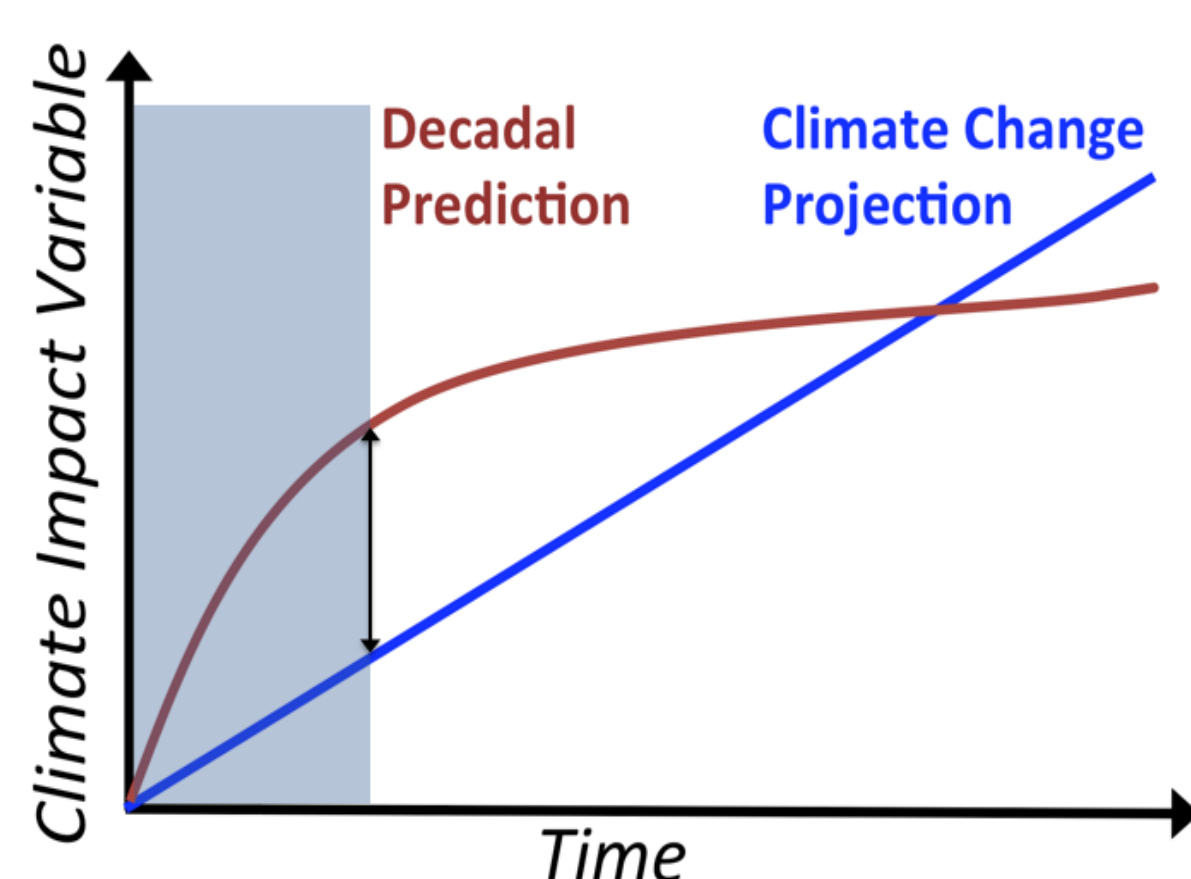


Figure 2: Decadal climate prediction is the prediction of climate variations between 2 and 30 years. It promises to tell us more about "what happens on the way to" the long term climate change projected global values. There may be significant differences between the projected average climate and decadal prediction which goes above and below that average.