# Stakeholder engagement and applications for the Evaporative Demand Drought Index (EDDI)

**Heather M. Yocum and Imtiaz Rangwala**

University of Colorado-Boulder Cooperative Institute for Research on Environmental Sciences (CIRES) and NOAA ESRL Physical Sciences Division

heather.yocum@colorado.edu

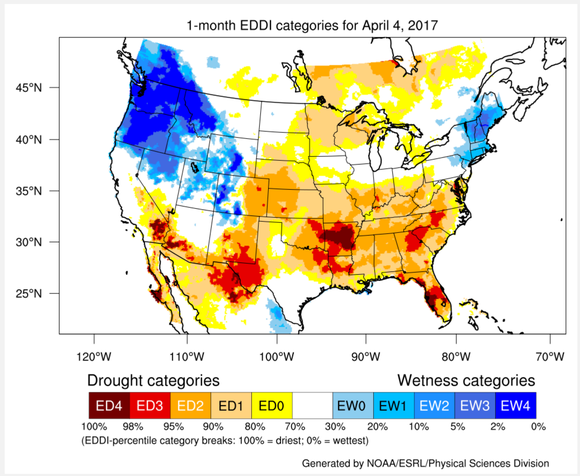
## Introduction

How can **stakeholder engagement** be used in practice to develop or refine research into usable information products?

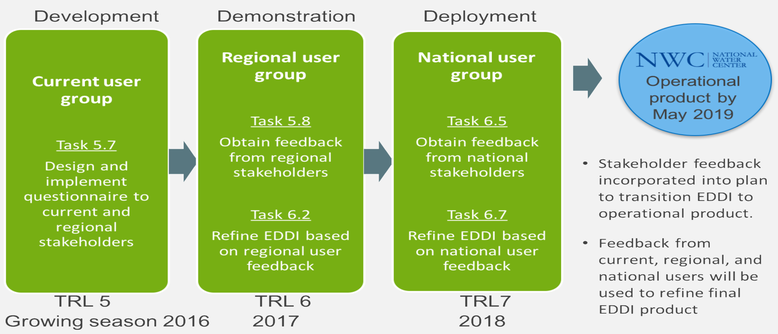
This poster describes how stakeholders engagement informs both product design and the transition-to-applications or operations (R2A or R2O) process for the Evaporative Demand Drought Index (EDDI). This occurs through (1) formal, structured social science research (e.g., interviews and surveys) and (2) via repeated interactions between the EDDI science team and various users in the agriculture, fire, and water management sectors, as well as with other information providers (e.g., USDM, NIDIS, Western Water, boundary organizations). The use cases highlighted here demonstrate practical ways to engage with users and use feedback during different stages of project design and development to reach project-specific goals.

## Evaporative Demand Drought Index

EDDI is an experimental drought monitoring and early warning guidance tool. It examines how anomalous the atmospheric evaporative demand ($E_0$; also known as "the thirst of the atmosphere") is for a given location and across a time period of interest. EDDI can serve as an indicator of both rapidly evolving "flash" droughts (developing over a few weeks) and sustained droughts (developing over months but lasting up to years).



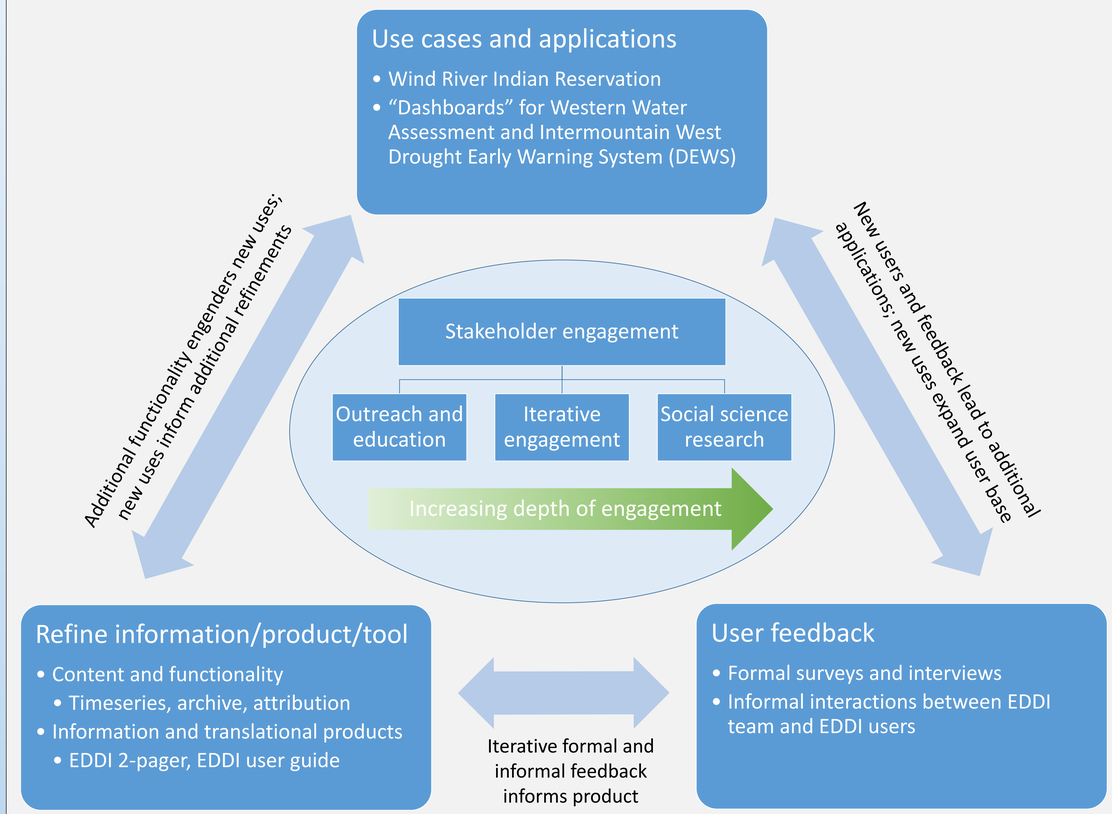

Stakeholder feedback is an integral part of the formal Transition Plan to operationalize EDDI, and comprises part of the Tasks and Milestones used to move from one Technical Readiness Level (TRL) to the next and to identify user needs and preferences for information content and delivery, as well as user-interface design.




- Stakeholder feedback incorporated into plan to transition EDDI to operational product.
- Feedback from current, regional, and national users will be used to refine final EDDI product

## Stakeholder-driven design

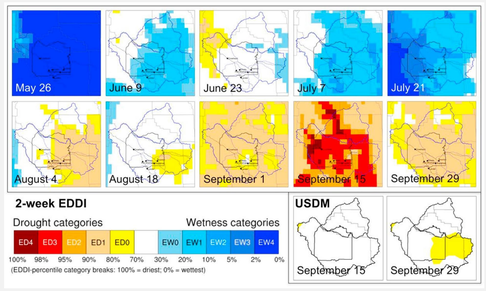
An iterative process of user engagement characterized by different levels or depth of engagement shapes the design and process. This leads to an expansion of EDDI functionalities, an enlarged user base, and additional uses or applications, each supporting the other.




## Applications and use cases

**Wind River Indian Reservation**

EDDI maps added value for tribal water engineers because they showed rapidly evolving dry conditions that matched the timing of impacts on the ground. Their requests for easily-digestible information about EDDI resulted in a 2-page handout explaining the product to a broad user base.

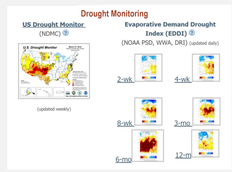


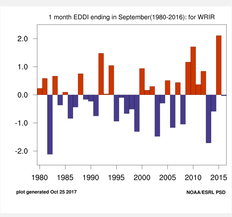

Courtesy of McNeeley & Dewes et al. 2017

**Boundary Organizations**

Stakeholders who use EDDI to provide information to their own users have facilitated outreach to new users and identified new functionalities.

- Western Water Assessment arranged an outreach webinar, and worked with NIDIS and CLIMAS to put EDDI on regional Climate Dashboards, and contributed to a (non-technical) user guide.
- Colorado Natural Heritage Program and state climatologists have driven development of the timeseries, archive, and attribution functions.




## Discussion and Implications

- R2A or R2O efforts informed by stakeholder engagement can **leverage the synergies** between user feedback, tool refinement, and new or expanded uses and applications.
- **There is no single right way to engage users.** Engagement with stakeholders and users can be tailored to enhance or refine the goals of the project. Different levels of engagement can all contribute to user-driven design.
- **Multiple interactions increases tool usability.** Users often need some training and engagement to effectively interpret and apply tools. Repeat interactions, exposures (e.g., webinars), and interpretive resources (e.g., EDDI 2-pager, EDDI User Guide) enhance a user's understanding of the tool and thereby foster an increased usability.

## For more information:

- EDDI website: www.esrl.noaa.gov/psd/eddi
- EDDI 2-page handout: http://wwa.colorado.edu/publications/reports/EDDI_2-pager.pdf
- Wind River case: McNeeley S.M., C. Dewes, C. J. Stiles, T. Beeton, I. Rangwala, M. Hobbins, C. Knutson (2017). Anatomy of an interrupted irrigation season: Micro-drought at the Wind River Indian Reservation. Climate Risk Management, doi.org/10.1016/j.crm.2017.09.004
- For additional information, or to get EDDI maps for your area of interest, contact Mike Hobbins (mike.hobbins@noaa.gov)

## Acknowledgements

- NOAA-ESRL, CU, and CIRES
- NIDIS, Western Water Assessment, and Desert Research Institute
- NOAA Joint Technology Transfer Initiative (JTTI) Program
- EDDI Team: Mike Hobbins, Andrea Ray, Heather Yocum, Daniel McEvoy, Justin Huntington, Imtiaz Rangwala, Candida Dewes, Joe Barsugli, Jeff Lukas
- The stakeholders who have given us feedback on these projects