

# COMMUNITY ENGAGEMENT AND EDUCATION

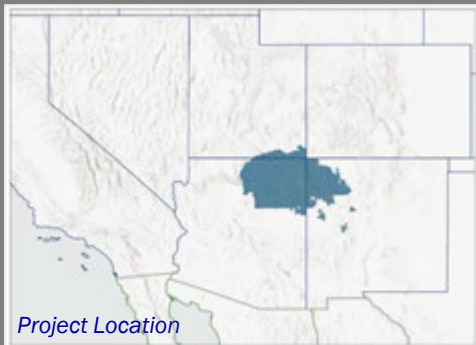
## Co-Developing the Drought Severity Evaluation Tool for Use on the Navajo Nation



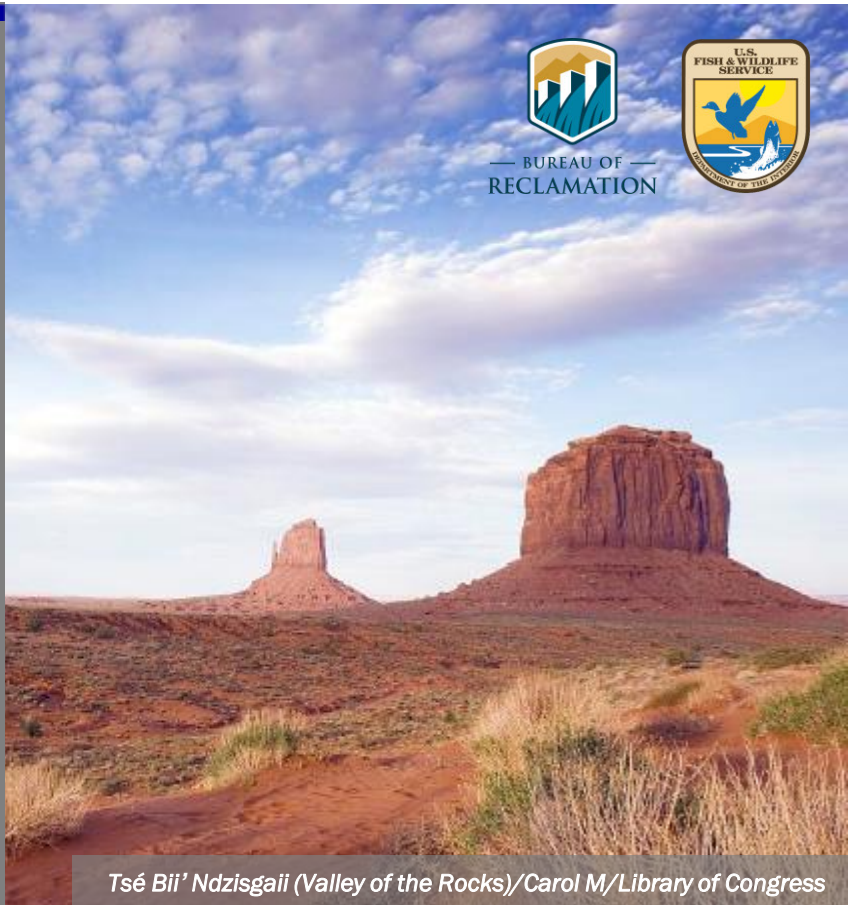
Climate Engine®



Monitoring drought on the Navajo Nation is critical to declare drought emergencies and effectively manage natural resources. However, existing tools that process drought data often require extensive expertise and time from resource managers and can miss important nuances across large, diverse landscapes, like the Navajo Nation. In response, the Navajo Nation Department of Water Resources (NN DWR), NASA's Western Water Applications Office (WWAO), and the Desert Research Institute (DRI), sought to co-develop a user-centric tool for monitoring drought severity adapted from the Climate Engine. The process resulted in the Drought Severity Evaluation Tool (DSET).



BUREAU OF  
RECLAMATION



*Tsé Bii' Ndzisgaii (Valley of the Rocks)/Carol M/Library of Congress*

### KEY ISSUES ADDRESSED

Available drought monitoring tools often produce data for spatial scales that fail to capture the nuances across the Navajo Nation, potentially excluding communities that meet drought emergency designation criteria and misinforming management decisions.

The partnership with NASA and the NN DWR began in 2015 when NASA's DEVELOP Program created the first iteration of the drought tool using the R Shiny platform. However, updates to the tool related to downloading, processing, and analyzing the data required extensive programming experience.

There is a long history of exploitation carried out by non-Indigenous researchers with Indigenous communities. These experiences contribute to distrust of outsiders and prompted the team to strive for restorative and reciprocal collaboration and authentic co-development in drought tool creation.

### PROJECT GOALS

- Center the local knowledge of NN DWR
- Adapt the Climate Engine to create the DSET for analyzing satellite data, climate models, and ground-based NN DWR precipitation data
- Train resource managers on tool use and improve tool with user feedback

## YOUNG PEOPLE POWER

High school students learning about DSET have the opportunity to share their experience with others at community gatherings, expanding the reach of drought information and public engagement.



"Water is Life" Water Tank on Navajo Nation/Carlee McClellan/NN DWR

## PROJECT HIGHLIGHTS

**Intentional Co-Development:** The team maintained consistent engagement through frequent meetings and visits to the Navajo Nation. Such efforts ensured mutual understandings of goals, needs, and local landscape characteristics critical to designing a user-centric and effective tool.

**Spatially Relevant:** Creating DSET from Climate Engine included adding the Navajo Nation administrative boundaries to analyze data at more precise scales for use by local decision-makers. DSET was also designed to incorporate data from the 85 rain gauges NN DWR has dispersed across the Nation to generate more accurate precipitation measures.

**Fostering User Capacity:** The team held multiple workshops to train resource managers to use the tool and serve as feedback opportunities to improve the tool. The team made an extensive user-guide, as well as tutorial videos and user stories, with the introductory video spoken in the Navajo language.

**Navajo Centered and Sustained:** Not only does the team consist of Navajo scholars and resource managers, but Navajo high school students are now learning to use DSET to understand what is occurring around them.

## Collaborators

- Navajo Nation Department of Water Resources
- NASA Western Water Applications Office
- See online for full list of collaborators

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## LESSONS LEARNED

Tool maintenance, outreach, and funding often extend beyond the source grant timeliness and capacities. Further, the financial and operational responsibility to maintain tools should not fall on the user communities, especially those navigating disproportionate resource or financial constraints. As such, partnerships should be created to ensure the fair, long-term sustainability of the tool.

To reduce harm inflicted by non-Indigenous researchers, centering the abundance of knowledge within the community, as well as the community's needs and visions - as opposed to moving from the assumption that the non-Indigenous researchers' knowledge should be prioritized - is essential. Project leads and researchers meeting regularly, and learning about and supporting existing operations and workflows of Navajo partners, were critical aspects of this project's success.

The team included staff devoted to tool-use training and capacity building. The additional team support allowed sufficient focus on developing training and outreach materials, planning feedback sessions, and feedback implementation.

## NEXT STEPS

- Explore ways to extend the capacity necessary to support the long-term use of DSET
- Continue to showcase data-driven resource management through a case study developed by the OpenET project, a tool that supplies accessible satellite-based estimates of evapotranspiration (ET) to improve water management across the western United States

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