

Drought Monitoring and Response in Hawaii Maui - October 6, 2022

Representatives from the National Drought Mitigation Center (NDMC), the USDA Southwest Climate Hub, East-West Center, Clark University and the Institute of Pacific Islands Forestry hosted a series of drought workshops in October 2022 on four Hawaiian Islands. The third meeting was hosted at the Office of Economic Development in Kahului, Maui. Participants represented a variety of agricultural and natural resource management agencies including community based conservation organizations, USDA Natural Resources Conservation Service and Farm Service Agency, Maui Soil and Water Conservation Districts, County of Maui Department of Water Supply, Hawaii Land Trust, Hawaiian Electric, Kahikinui Hawaiian Homestead Association, Mauna Kahalawai Watershed. Prior to the meeting, participants noted what they hoped to gain from the meeting on Maui, including:

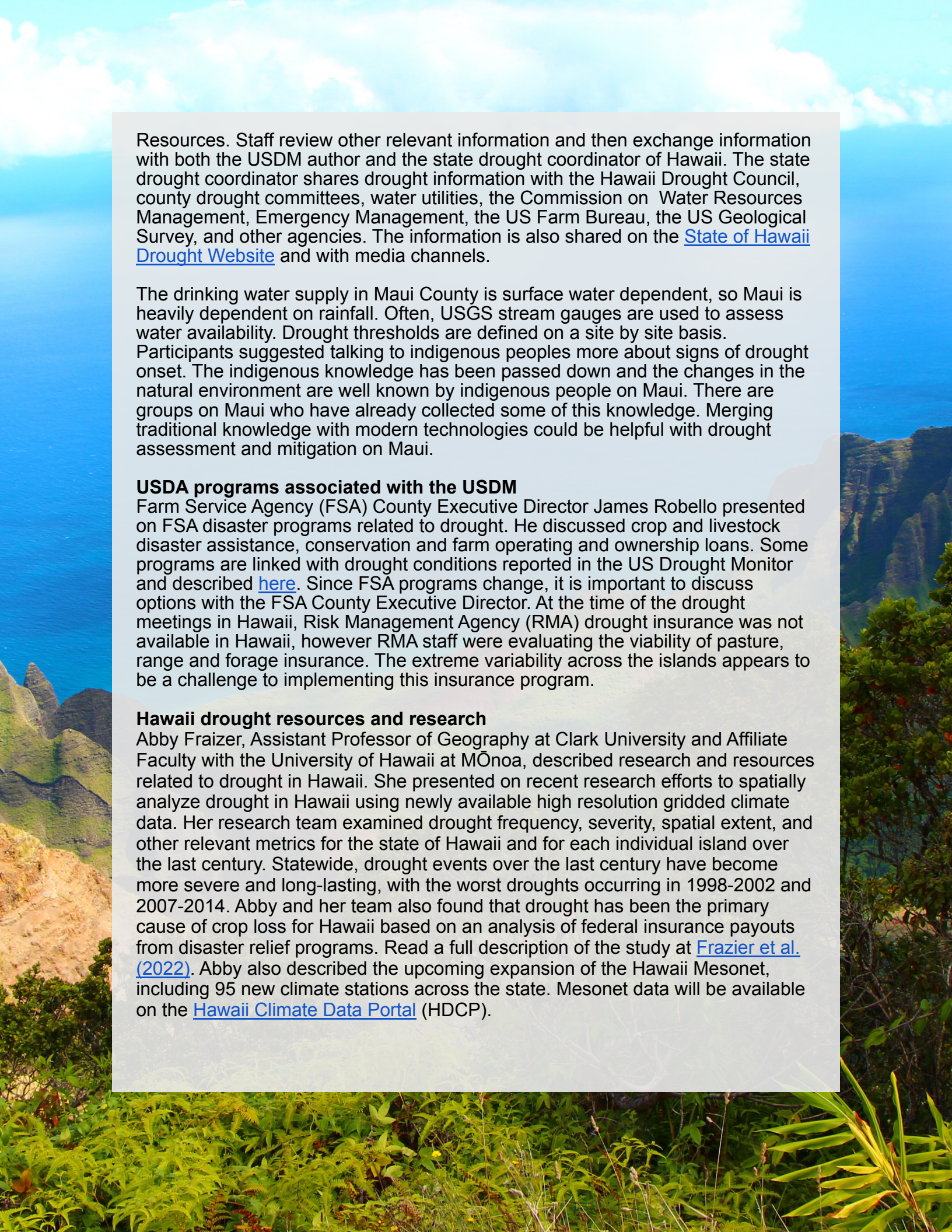
- Increased knowledge of the U.S. Drought Monitor, data collection and opportunities for involvement
- Increase knowledge about drought research and resources available to agricultural producers
- More information on how to create drought resilience plans
- Education about available tools to project drought impacts in developing drought/water supply shortage plans
- General information and resources about drought patterns and impacts to Hawaii's lands for land management purposes

United States Drought Monitor production and process

Brian Fuchs, climatologist and USDM author, with the National Drought Mitigation Center (NDMC) discussed how the USDM describes drought conditions by historical percentiles that are expressed in a map with different severity categories. The USDM map shows how severely dry different areas are, compared to normals for the location and time of year. The map expresses drought in four categories, each with increasing severity: moderate, severe, extreme, and exceptional drought, as well as abnormal dryness, which is used to depict areas going into or coming out of drought. The more severe drought categories indicate more unusually dry conditions and lower historical percentiles for the data being analyzed. Each week a single author analyzes physical data, such as precipitation statistics, streamflow, soil moisture, vegetation health, groundwater, and other variables. The author also considers local expert input and impact information when analyzing the physical data. Each Thursday morning the most recent map is released on the USDM website. For more information, please visit the [USDM website](#) or the NDMC's [tutorial](#) on the USDM.

How drought monitoring works in Hawaii

Drought is a normal part of the climate and can occur anywhere. In Hawaii, USDA staff report drought conditions (precipitation, range conditions, etc.) to the Honolulu Weather Forecast Office and Hawaii Department of Land and Natural



Resources. Staff review other relevant information and then exchange information with both the USDM author and the state drought coordinator of Hawaii. The state drought coordinator shares drought information with the Hawaii Drought Council, county drought committees, water utilities, the Commission on Water Resources Management, Emergency Management, the US Farm Bureau, the US Geological Survey, and other agencies. The information is also shared on the [State of Hawaii Drought Website](#) and with media channels.

The drinking water supply in Maui County is surface water dependent, so Maui is heavily dependent on rainfall. Often, USGS stream gauges are used to assess water availability. Drought thresholds are defined on a site by site basis. Participants suggested talking to indigenous peoples more about signs of drought onset. The indigenous knowledge has been passed down and the changes in the natural environment are well known by indigenous people on Maui. There are groups on Maui who have already collected some of this knowledge. Merging traditional knowledge with modern technologies could be helpful with drought assessment and mitigation on Maui.

USDA programs associated with the USDM

Farm Service Agency (FSA) County Executive Director James Robello presented on FSA disaster programs related to drought. He discussed crop and livestock disaster assistance, conservation and farm operating and ownership loans. Some programs are linked with drought conditions reported in the US Drought Monitor and described [here](#). Since FSA programs change, it is important to discuss options with the FSA County Executive Director. At the time of the drought meetings in Hawaii, Risk Management Agency (RMA) drought insurance was not available in Hawaii, however RMA staff were evaluating the viability of pasture, range and forage insurance. The extreme variability across the islands appears to be a challenge to implementing this insurance program.

Hawaii drought resources and research

Abby Fraizer, Assistant Professor of Geography at Clark University and Affiliate Faculty with the University of Hawaii at Mōnoa, described research and resources related to drought in Hawaii. She presented on recent research efforts to spatially analyze drought in Hawaii using newly available high resolution gridded climate data. Her research team examined drought frequency, severity, spatial extent, and other relevant metrics for the state of Hawaii and for each individual island over the last century. Statewide, drought events over the last century have become more severe and long-lasting, with the worst droughts occurring in 1998-2002 and 2007-2014. Abby and her team also found that drought has been the primary cause of crop loss for Hawaii based on an analysis of federal insurance payouts from disaster relief programs. Read a full description of the study at [Frazier et al. \(2022\)](#). Abby also described the upcoming expansion of the Hawaii Mesonet, including 95 new climate stations across the state. Mesonet data will be available on the [Hawaii Climate Data Portal](#) (HDCP).

Pacific Drought Knowledge Exchange

Ryan Longman with the Center for Pacific Islands Studies, University of Hawaii at Manoa discussed the [Pacific Drought Knowledge Exchange](#) (PDKE). This program seeks to facilitate drought knowledge exchange and enable collaborative relationships among drought stakeholders in Hawaii and other Pacific Island nations. At the front lines of global climate change, the Pacific Islands experience a range of impacts, including not only drought, but sea level rise, flooding, climate-induced migration, and wildfire. PDKE was created in an effort to help the region combat these impacts. The four key aspects of a knowledge exchange include 1) sector- and geography- specific climate information, 2) better and more comprehensive information, 3) improved technical assistance, and 4) a more collaborative information-transfer environment through participation in knowledge co-production. The PDKE engages with regional stakeholders (e.g. watershed partnerships, forest reserves, national parks) to document drought stories, lessons learned, and relevant research; and to produce site-specific Climate Change, Climate Variability, and Drought (CCVD) portfolios in order to co-develop usable tools and educational items.

Summary and next steps

Workshop organizers ran a group activity related to main needs in the region. Through the discussion they were able to identify main themes and recommendations:

Agriculture

- Increasing carbon sequestration through planting forests and food trees to mitigate local climate, enhance food production, and perform ecological services
- Planting specific crops based on resource availability (i.e. rainfall data)
- Implementing soil health practices to increase soil moisture
- Installing cross fencing to promote better grazing management with ranchers
- Planting more drought tolerant species in pasture lands as well as trees (silvopasture) to reduce evapotranspiration in forage species and increase carbon sequestration
- Planting more native Hawaiian, drought tolerant plants that use little moisture to thrive
- Converting industrial agriculture to permaculture and water wise production methods
- Developing an accurate model to calculate carbon sequestration in grazing lands to allow ranchers to monetize rangeland carbon credits similar to people planting trees

Water Management

- Promoting watershed protection and management
- Increasing water scarcity solutions such as water recycling, catchment

- systems, capturing roof runoff
- Implementing more advanced and efficient irrigation water management such as using soil moisture sensors to increase irrigation efficiency
- Restoring forest cover to enhance infiltration and reduce runoff
- Controlling invasive ungulates

Other

- Supporting fire prevention measures.
- Sharing tools for drought awareness, including increasing drought outreach and education
- Increasing drought impact reports.

The group discussed next steps and recommended three main next action steps:

- Supporting fire prevention and sharing information about fire and drought, such as through the firewise community efforts
- Enhancing drought outreach and education, especially educating community leaders
- Investigating a Hawaii Drought Learning Network

Frazier, A. G., Giardina, C. P., Giambelluca, T. W., Brewington, L., Chen, Y.-L., Chu, P.-S., Berio Fortini, L., et al. (2022). A Century of Drought in Hawai'i: Geospatial Analysis and Synthesis across Hydrological, Ecological, and Socioeconomic Scales. *Sustainability*, 14(19), 12023. MDPI AG. Retrieved from <http://dx.doi.org/10.3390/su141912023>

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