



**Title:** **Summary Report: Outcomes from Integrating Socioeconomic Assessments to Build Community Resilience in Mitigating Drought in Hawai'i**

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## Summary of Findings

- 1. Background:** In 2010, the State of Hawai'i experienced severe drought with the El Niño-Southern Oscillation (ENSO) event, and the state was already reeling from six drought emergency declarations in the previous eight years, and nearly persistent drought in Hawai'i Island. Relief from the drought comes from heavy rainfall anomalies that have resulted in seven presidential flooding disaster declarations in the same period. The State of Hawai'i's closest point to the continental United States is more than 2,500 miles and the geographic remoteness demands that Hawai'i's disaster management sectors prepare for situations where relief assistance may not arrive for more than a week. Hawai'i is at risk from multiple hazards that impact infrastructure, such as water distribution and irrigation systems, and drought persists for periods of months to years, it is critical for Hawai'i to develop long-term strategies that increase food security and water availability, especially in the face of potential impacts from climate change. The analysis of the socioeconomic impacts of drought provides important lessons for integrated disaster risk reduction approaches and climate adaptation planning that focus on building resiliency.
- 2. Methods:** Although the greatest effects of the drought occurred in the agricultural community, the extent and degree of drought on communities, culture, and livelihoods were not previously well understood, and plans suffered from the inability to remedy the impacts. With support from the NOAA Climate Program Office Sectoral Applications Research Program and the National Integrated Drought Information System, the University of Hawai'i Social Science Research Institute conducted a socioeconomic assessment on the impacts of the drought using key informant interviews, surveys, and social mapping of the agricultural sector—the sector most impacted by drought. The agriculture sector is the only sector that has recorded data related to drought. The data are based on reported losses recorded by the US Department of Agriculture as part of the drought relief program. This means that impacts are recorded only for the farmers and ranchers that have access to the relief assistance programs, not necessarily to the full extent of those impacted by the drought. The ability to analyze the full impacts of the drought are limited by availability of data and by the lack of other metrics to easily quantify losses, especially in sectors besides agriculture, such as health (farmers/ranchers without access to health care because of financial losses) and ecosystem services (lack of water impacts on flora and fauna that maintain a healthy ecosystem that can cope with extreme weather events).
- 3. Key Findings:** The investigation revealed several key findings: 1) effects of drought exacerbate a tenuous land management system for the agricultural community; 2) localized impacts are not merely financial and economic, but have emotional, legal, cultural, political, and social implications; 3) primary impacts to agricultural producers extend throughout the community and approaches to address drought risk requires local community engagement; 4) recovery periods, which may be several years, are not reflected in agricultural, relief assistance, and land use planning; 5) recovery and resilience are hampered by cascading hazards and cumulative impacts from extreme events that are considered separately rather

than cyclically; and 6) survivor stories provide key lessons for preparing and mitigating future drought risk.

**1) *Effects of drought exacerbate a tenuous land management system for the agricultural community***

- i. Many of the farmers and ranchers lease the land that they cultivate. The value of the land in Hawai'i is so expensive that the property owners have a clause in their leases that they are able to terminate the leases with thirty-day prior notice. Since agriculture requires hard labor and economic inputs, the policy does not provide protection for those who do not own land and further offers a disincentive for engaging in farming activities.
- ii. Large landowners and those with ten-year or more leases are eligible for disaster relief assistance. Because large landowners have more land for diversification or access to loans using land as collateral, they are not as vulnerable to the impacts of drought as farmers and ranchers who lease the land for their crops and cattle. The short-term leases prevent access to hazard mitigation and drought relief funds due to funding restrictions. This results in the severity of impacts being far greater on those who have the least access for financial support to cope with drought.
- iii. The lack of financial security for the agricultural community will result in disincentives to work in this sector, and will ultimately impact food security.
- iv. In addition to land management, many of the agricultural systems do not have access to irrigation nor do water resources extend into these communities. Access to water complicates the availability of lands for use in the agricultural sector.

**2) *Localized impacts are not merely financial and economic, but have emotional, legal, cultural, political, environmental, and social implications***

- i. Even though the impacts are primarily financial and economic, the workers in the agricultural sector experience other severe impacts. The loss of financial investments and labor take a huge emotional strain on those working in this sector.
- ii. Coping with drought means more intense labor during the drought, such as hauling water to remote fields, moving cattle, and gathering feed. The added time in the fields has affected family relationships, with losses of time for family activities. The financial losses compound the ability of the farmers and ranchers to meet extended family obligations. There is no time for vacations or leisure activities. The added stress can increase conflicts among family members.
- iii. People with an affinity for animals, such as horses and cattle, became emotionally stressed when they could not supply the water and feed needed for their animals, and as they watched their animals become distressed and die.

- iv. There were reports of increased depression, which exacerbated the inability to find solutions for response and recovery.
- v. Communities experiencing drought would either form more collaborations to aid each other, such as using crops that can't be sold for feed for cattle or exchanging food and labor, or have increasing conflicts, such as disputes over land ownership.
- vi. Losses of local foods and plants used for cultural ceremonies and celebrations are noticed in drought communities; however, those who purchase agricultural products had to pay higher prices or use different flowers. These issues were noticed but the public in Hawai'i does not yet understand the long-term changes in the way that the communities living in drought-affected areas do.
- vii. Many of the families still engaged in the agricultural sector do so because their ancestors have practiced farming and ranching for generations. The drought disrupts the farming and ranching cultures.
- viii. The drought environment is more prone to pests, such as weeds and other invasive species that demand less water and require more labor to rid the environment. If not effectively managed, these pests threaten health of ecosystems.

**3) *Primary impacts to agricultural producers extend throughout the community and approaches to address drought risk requires local community engagement***

- i. The people who engage in agriculture must purchase supplies and materials to run their operations and further provide goods and services to markets and distributors. When the water is reduced, there may be needs for additional supplies---water distribution lines, water bladders or containers, feed---but there are fewer funds to purchase new equipment and pay personnel. There are fewer products or outputs to sell, and this has resultant impacts on the community. The community becomes affected.
- ii. Since water is still distributed and seemingly unaffected in the urban and peri-urban areas, there is a distortion of the severity of the impacts and disassociation of drought. Efforts to engage political leaders lack political will because of the disconnection of the impacts from localized communities to the broader public.

**4) *Recovery periods, which may be several years, are not reflected in agricultural, relief assistance, and land use planning***

- i. As discussed in the first finding, many of the agricultural leases are short-term, and once impacted, the recovery period varies by crop and livestock impacts. Some crops may be able to recover by the next planting cycle, but others may require several years.
- ii. Reproductive cycles will be severely impacted in livestock. Many ranchers in Hawai'i earn their income by selling calves to ranches on US continent. The drought-affected females may stop reproducing, have

delivery complications, and have complications with future pregnancies. The calves born during drought will be under weight and may not fully mature.

- iii. Relief assistance is provided based on the amount of loss after the loss has occurred. Critical timing for addressing issues will be during the event before the impacts are too severe to be able to recover. For those who do not have access to leases, there are no programs to provide relief assistance and funding for recovery.

**5) *Recovery and resilience are hampered by cascading hazards and cumulative impacts from extreme events that are considered separately rather than cyclically***

- i. For Hawai'i, drought is often associated with the El Nino-Southern Oscillation variability. Not only will there be droughts during this time, but there are enhanced conditions for tropical cyclones. When storms occur, the water will not penetrate the hardened soil, and there are floods, mudflows, and landslides. Additional hazards occur before recovery from the drought, and complicate the ability of the individual farmer, the community, and the agricultural sector to recover.
- ii. In addition to the drought, the number of "vog" days in Hawai'i seemed to increase with the volcanic disruption. The tropical flower market was first affected by the volcanic gases. Responses to aid the plants required washing the plants, but there was a lack of water with the drought. The combination of volcanic eruption with the drought made response and recovery more difficult.
- iii. The volcanic ash further harmed plants by leaving sulfites and flourides on grasses used for cattle feed and in water sources. These chemicals caused death among herds. Again, there were not enough fresh water sources or rainfall to help the natural system deal with the gases and toxins from the volcano.
- iv. The tools, equipment, and supplies for farming and ranching should be able to last several years before replacement was needed, but the volcanic gases resulted in need for replacement of fencing and posts. The cattle, trying to get to grass or water sources, would easily break fences that had already been degraded by chemicals from the volcano. Farmers and ranchers that were having difficulty dealing with the increased burden and expenditures associated with the drought did not have the additional funds to more frequently replace supplies and equipment.

**6) *Survivor stories provide key lessons for preparing and mitigating future drought risk***

- i. Those who survived the drought found innovative solutions, such as new methods for crop protection or temporary "land swaps" to allow grazing.
- ii. Grass-fed cattle are able to bring higher profits in markets and sale to high-end restaurants. If the grass is planned ahead of time and herds are

rotated among different pastures, the grasslands will provide land protection from runoff and sedimentation. Herds that are culled can survive drought in these pastures.

- iii. The survivor stories revealed the ways in which those we spoke with were able to access resources to deal with the problems during severe drought. Issues emerged of land management and food security, as well as incentives to keep people working in the agricultural sector. Those that survived had the ability to access additional resources to aid in providing feed or additional water.

#### **4. Recommendations:**

During the course of research, solutions for many of the key findings were recommended. These recommendations occurred in more than one discussion throughout the course of the project.

##### **1) Change Land Use and Lending Policies**

- a. Since the land management issue in Hawai'i has caused difficulty for those leasing to access funding, there should be special compensation to farmers for losses in income from lease terminations to provide incentives to remaining in agriculture.
- b. There should be a special fund that allows borrowing to stave off the severe impacts of the drought.

##### **2) Improve Access to Water**

- a. The most severe impacts to crops are those in areas without irrigation systems. Water storage systems and increasing distribution lines may be helpful. Costs of building reservoirs are largely prohibitive; therefore, smaller catchment systems may be useful for storing water locally.
- b. Drip irrigation is a lower cost technique if there is some access to a water source that helps to restrict use.

##### **3) Develop Functional Cooperatives through Effective Community Organizing**

- a. By developing cooperative organizations, there are increased opportunities to develop skill exchanges, land swaps, equipment sharing, as well as collaboration to build awareness and understanding of issues with leaders. Many of the issues related to drought are not understood well, and therefore, policies do not address the problems. Cooperatives can help to bring awareness to governance systems and have a bigger voice when working to gain assistance.

##### **4) Create easy access to education, training, and technical support using intergenerational approaches**

- a. Many agricultural workers are over-burdened with work, especially during drought situations, and could use administrative assistance to use

computers, fill out forms, and search for grants and relief assistance. Land grant extension agents would be one area for finding localized assistance.

- b. The University provides training through all of the campuses and agriculture extension agents for assistance. More effort to work with communities on drought issues would be helpful.
- c. Intergenerational approaches that build awareness throughout the educational system on the problems of drought and importance of food security will provide more awareness of the importance of sustaining the agricultural system in Hawai'i.

**5) Recognize the Opportunities created by the Recognition of Climate Change**

- a. There is broader awareness of climate change. Those working in the agricultural sector have seen consistent changes and more intense drought and have been asking for information on climate change. There are opportunities for considering collaborations with other sectors, or non-governmental organizations. There may also be funding opportunities for drought research, relief, recovery, hazard mitigation, and climate change adaptation projects by partnering with different researchers and collaborating on projects through climate change resilience funding streams.

**6) Use drought mitigation, hazard mitigation, disaster risk reduction (DRR), and climate change adaptation (CCA) to have awareness of social justice**

- a. Modifications in eligibility for Relief Assistance will assist those farmers and ranchers at most risk from impacts of drought and hazards. The non-landowners and short-term leaseholders have greater limits on their ability to survive through a drought period due to the lack of land and collateral for borrowing. Drought mitigation actions that address the needs of the most vulnerable populations will need to take these situations into account and find alternative ways to provide assistance.
- b. Develop Special Accounts for Coping with Drought at the state level will be needed to deal with issues of persistent drought and increasing extremes in climate that cause impacts to multiple hazards. Consideration of the most vulnerable groups will be important in order to ensure access to risk reduction tools and funds. Since the agriculture sector is severely impacted by drought, special considerations for funding among the at-risk communities will be essential to maintain any food security throughout the state in dealing with extreme events.

**7) Support Innovative Solutions**

- a. Alternative methods for coping with drought impacts have emerged in the agriculture sector. There need to be funding sources and technical assistance available to take advantage of these advances to enable the agriculture sector to become more resilient to impacts of drought and disasters.



There are opportunities for the State of Hawai'i to take advantage of local skills and knowledge to address drought and disaster risk. As trends continue for increased disaster risk from extreme climate events, it will be important for the agricultural sector to build in some flexibility to find resources to deal with impacts. The agriculture sector involves large landowners and companies that contribute to the State's economy, but further provide essential sources of food that need to be secured. When Hawai'i experiences disasters, it may be weeks before additional supplies and materials reach the state, which makes it imperative that Hawai'i continues to support its agriculture sector in order to build food security.

In the interviews and discussions conducted as part of this project, participants from the agriculture community have revealed that there are significant risks, especially to the most vulnerable communities, but there are also significant opportunities to reduce these risks and longer term impacts. By developing risk reduction measures to multiple types of hazards, especially drought, in the agricultural sector, Hawai'i can build community resilience that will enable survival and sustainability in the future.