

ACTIONABLE SCIENCE

An Analysis of Drought Exposure, Impacts, and Adaptation in the South-Central U.S.

LSU

College of the Coast
& Environment

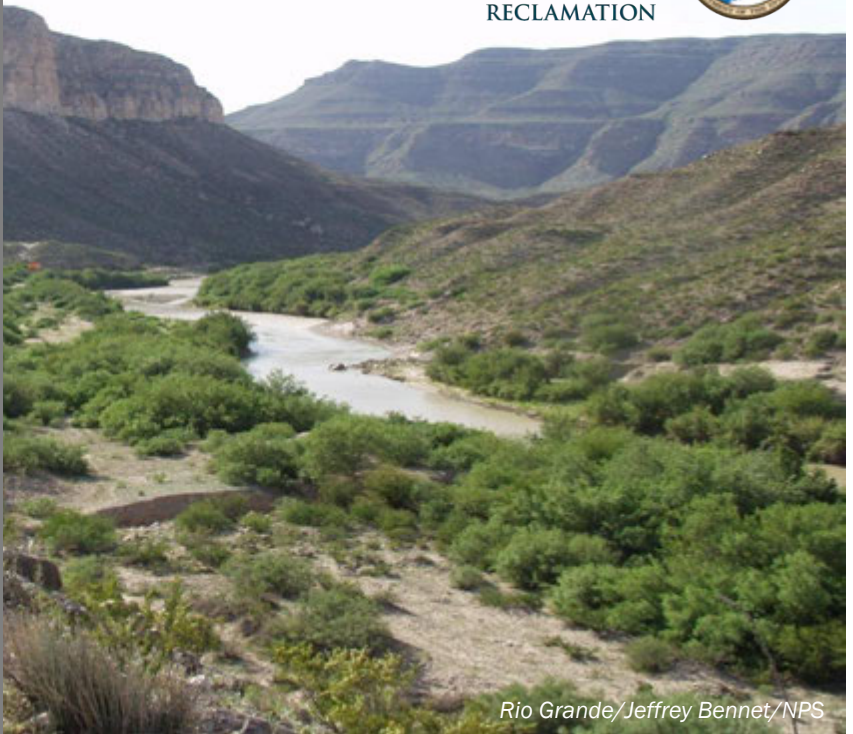


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Drought is one of the most damaging natural disasters on earth. Understanding community resilience to drought is critical as drought frequency and severity increase. Community resilience describes how well communities respond to and recover from hazards, but it is largely understudied in reference to drought. In response, a collaboration of scientists from Louisiana State University studied factors that influence community resilience to drought over space and time in the south-central United States. These efforts aim to improve the understanding and communication of drought's impacts on communities and bolster their preparedness to this understudied hazard.



BUREAU OF
RECLAMATION



Rio Grande/Jeffrey Bennet/NPS

KEY ISSUES ADDRESSED

Drought indices offer one way to communicate drought severity. Because they compile data on rainfall, snowpack, streamflow, and other water-supply indicators into a single value, indices have become the preferred tool for decision-making among resource managers (Rohli et al., 2016; Bushra et al., 2019). However, index metrics do not provide explicit insight into how diverse, dynamic human communities will be affected by drought. By bridging the gap between index metrics and human systems, communities can evaluate their resilience to drought. Further, because human communities are not static and drought occurs as a prolonged event, examining impact over time is critical.

PROJECT GOALS

- Use real-world data to validate drought indices' ability to predict community damages
- Explore what factors influence community resilience to drought across a diverse region over time
- Advance efforts to create a universal method to assess community resilience that incorporates both natural and social systems

DROUGHT COMPLEXITIES

Understanding the multifaceted impacts of drought, from crop damage to human migration, and community capacities, can inform more effective preparation.



Farm in Batesville, TX/Lance Cheung/USDA

PROJECT HIGHLIGHTS

Drought Index Effectiveness: Correlation analysis between drought indices and drought loss data reveals drought indices' ability to predict impact depends on location.

Spatial Differences in Resilience: The resilience inference measurement (RIM) model revealed high resilience to drought in central Oklahoma and eastern Texas and low resilience in eastern Oklahoma, Arkansas, and Louisiana.

Resilience Factors: Analyses show that socioeconomic and agricultural factors significantly influence community resilience. For example, more affluent, economically diverse, metropolitan areas appear more resilient.

Growing Disparity in Resilience: Data from 2000 to 2015 revealed that resilience gaps widened over time. Counties that had high initial resilience scores saw them increase over time, while counties with low initial scores saw them decrease. The decreasing resilience score of communities with initially low-resilience may be due to not having the resources needed to recover from the initial impacts of drought before more impacts ensue.

Collaborators

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- USGS South Central Climate Adaptation Science Center
- National Science Foundation

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LESSONS LEARNED

Policymakers should explore the resilience factors, such as those related with socioeconomics and agriculture, when devising their local and regional adaptation strategies to drought. Communities significantly reliant on agriculture economically should pursue sustainable farming practices and consider opportunities to diversify the job sector.

Low-resilience communities are at higher risk of continually declining in resilience in the wake of drought and should be prioritized in regional efforts to build community resilience. High-resilience counties can serve as resources for other counties through strategy- or capital-sharing.

Acquiring the necessary data posed a significant challenge. The research team not only had to downscale index data to the county level, but also ensure comparability over multiple time periods. The work's publications make excellent resources for other scientists aiming to reproduce similar efforts.

NEXT STEPS

- Transform findings into effective decision-making tools, management plans, or policy suggestions for planner and policymaker use
- Improve RIM model by incorporating other relevant socio-ecological variables that are widely applicable
- Empirically explore the relationship of drought, drought impact, and community resilience to climate change, human migration, and other human-nature connections

For more information on this project, contact Nina Lam (nlam@lsu.edu) or Volodymyr Mihunov (vmihun1@lsu.edu)



Travis County, TX/Maude Dinan/USDA SWCH