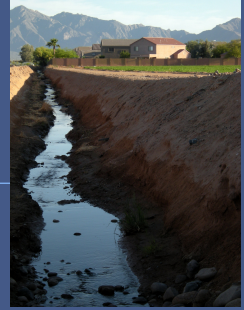


Understanding Agricultural Vulnerability in the Southwest

A policy brief by Decision Center for a Desert City, a unit of the Julie Ann Wrigley Global Institute of Sustainability at Arizona State University.



In the Southwestern United States, the agricultural sector has historically been the largest single demand for water and energy.

Agriculture is vulnerable to climate change because of the direct dependence of farm production on rainfall, streamflow, and snowpack. In central Arizona and elsewhere in the West, irrigation and large-scale water storage and conveyance infrastructure (e.g., dams, canals) introduce additional complexity to the policy context.

While irrigated agriculture in central Arizona has been protected from year-to-year variability in precipitation through large investments in water infrastructure—such as the Hoover and Roosevelt dams and the Central Arizona Project aqueduct—the prospect of long-term shortage conditions on the Colorado River, or prolonged local drought, throw the future security of the agricultural water supply into question.

As central Arizona agriculture has become increasingly dependent on surface water infrastructure, groundwater infrastructure maintenance has often been put on hold, limiting the flexibility of response to surface water availability.

Farmers' choices are affected not only by water rights and access, but also by increased pumping costs due to rising energy prices and insecurity of land tenure. Many farmers are now disincentivized from making irrigation efficiency improvements because they hold short-term leases on land owned by urban developers.

In the Phoenix metro area, a slowdown in the urban economy (especially housing construction) happened at the same time as an upsurge in farm commodity prices, shifting opportunity for expansion and associated water demand back to the agricultural sector.

Global increases in commodity prices underscore a growing concern that farmland is being lost while global food and fiber demands are still increasing.

Although market signals are critical in central Arizona farmers' decisions, uncertainties and interdependencies potentially impede planning and responsiveness in the agricultural sector.

Key Messages

In the Southwestern United States, the agricultural sector has historically been the largest single demand for water and energy, two climate-sensitive resources.

The vulnerability of agriculture to climate change is intimately linked to urban land and water resource planning locally.

Local responses to immediate crises in resource availability must also consider the longer-term tradeoffs in the diversity of social, economic, and environmental benefits.



Even with this extensive infrastructure, research demonstrates that some farmers are already experiencing water scarcity; however, drought is only one of several important dimensions of water stress.



Choices made by farmers will have implications for land and water use far into the future.

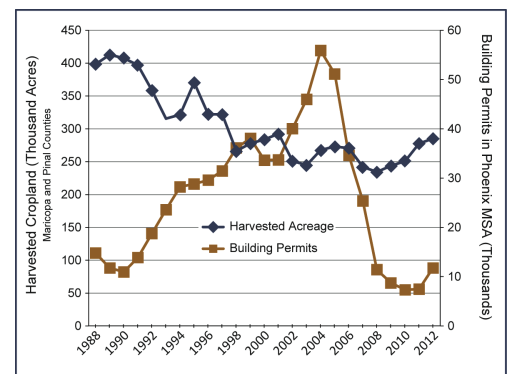
Local and national policies that inform decision making by farmers about such issues as water resource management, technology adoption, and cropping strategies are important in addressing the vulnerability of agriculture. Additionally, policy makers at the municipal, state and national level must consider the multiple economic, social, and ecosystem functions associated with continued land use in agriculture.

The multiple functions of agriculture are no less significant—indeed, may be substantially more so—in arid climates and during periods of intensified inter-sectoral competition for scarce water supplies.

Cities across the United States are under pressure to evaluate the benefits of maintaining farmland in the context of urbanization.

When agricultural land is paved over, flexibility in both land and water use is lost. Water used in agriculture can simultaneously contribute to groundwater recharge, scenic open space, urban heat mitigation, and wildlife conservation.

Agricultural activities can also support local economic diversity and vitality, as illustrated by the rebound in urban and peri-urban farming in the Phoenix area during the recent contraction in the housing market—as illustrated in the adjoining figure.



Addressing the vulnerability of agriculture to climate change is not simply a concern of the agricultural sector.

In considering a future of increased water competition, cities in Arizona and states in the West should not disregard agriculture simply on the basis of its water intensity. Costs and benefits of water and energy for agriculture should be evaluated as a part of the urban system, considering the potential gains through agricultural retirement but also the diverse roles of agriculture around urban areas.

- **There is a need for expanded discussion of agricultural multifunctionality: the recognition that agriculture has the potential to play a part in economic growth, environmental integrity and social vitality in the American West.** Farm sector representatives can and should explore how changing soil, water, and crop resource management can contribute to these multiple benefits in urbanizing areas.
- **Farmers and water managers are well-positioned to respond proactively if given incentives for innovation, experimentation, and learning.** More attention is needed, both in science and policy, to define the specific practices, land uses and incentive structures that can improve agricultural and urban synergies while increasing resilience of both sectors to climatic stress. The full potential of better information and state-of-the-art technology cannot be realized without addressing the long-term incentives of farmers and other agricultural professionals.
- **It is vital that local and state governments establish public forums in which agricultural, environmental, and municipal interests can work together to formulate resource management policy in anticipation of increased water scarcity.** Farmers in close proximity to cities need to feel that municipal and state planners value agricultural activities and that the urban sector is willing to work with farmers to discover possible pathways to maintaining viability. Extreme climate events and associated competition over scarce resources tend to exacerbate inter-sector conflict, but also provide opportunities for collaboration.

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For more information visit: <http://azfarmersurvey.wordpress.com> and <http://dcdc.asu.edu>.

This research is supported by the National Oceanic and Atmospheric Administration under CSI Award #NA110AR4310123 and the National Science Foundation, under award number SES-0951366. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Oceanic and Atmospheric Administration or the National Science Foundation.