

Drought Enters Ninth Year in Birthplace of the Green Revolution Crisis for Farmers in the Yaqui Valley

By Ashley Dean

Water is the lifeblood of the Yaqui Valley in Sonora, Mexico, and as reservoir levels reach a strikingly low 13 percent of normal, the livelihood of farmers in the valley remains uncertain. Of the 225,000 hectares of highly productive agricultural land, only 23 percent has been planted for the 2003–04 crop cycle. Unemployment in this agriculturally dependent valley is rampant. The sustainability of a valley once highly regarded for its advanced agrotechnology and biological richness is now in question.

Snapshots of the valley today capture a bleak picture. Long stretches of fields once flourishing with rows of wheat remain unplanted. Reservoirs have reached critically low levels and weeds now poke out of the shallow waters. Water must be pumped *up* out of dead storage over the spillway in order to reach the canal outtakes that irrigate the valley, leaving many canals completely dry.



Oviachic Reservoir

Who gets water?

In the face of such a critical shortage, who gets to plant? For the 2003–2004 irrigation cycle, the National Water Commission mandated 18,000 hectares to be irrigated from the three major reservoirs. Recipients of this water comprised only Yaqui Indians with special water rights. In the remaining 206,000 hectares, only 47,000 hectares owned by selected collective *ejidos* and private farmers have been planted—irrigated by water extracted from 300 public and private wells throughout the valley.

In order to receive a planting permit from the government, farmers must prove they have access to a sufficient, minimum level of water and can pay the considerable pumping charges. Private well owners do not pay for water and can buy a planting permit more easily—they just need to provide a letter proving their well meets the minimum capacity level.



Unplanted wheat fields

Farmers relying on water from public wells are faced with more complicated equity issues. To minimize conveyance loss, the irrigation districts used distance from public wells as the criterion for water access. Farmers too far from public wells are simply not allocated water, which is necessary to receive federal agricultural aid, buy a planting permit, and apply for a loan from a credit union. Consequently, farmers have few options, and unemployment has become a major problem in the valley.

Government support

The Mexican government has done little to respond to the current water crisis. Farmers in the Yaqui Valley are not eligible for natural-disaster funding because the water level has not dropped below the requisite 10 percent level. The government has extended income support (US\$90/hectare), ordinarily offered to compensate for low world crop prices, to all, regardless of whether farmers planted or not. Additionally, farmers who cannot plant anything have received special support for environmental conservation (US\$55/hectare) under the condition that the fields are kept weed free. The issue of further support remains unresolved, and low-level protests have taken place throughout the valley.



Protests outside the Secretary of Agriculture Office, Obregon

With the recent arrival of welcomed winter rains, the government is providing seed and fertilizer for rainfed safflower and canola (which can be planted in winter) for those farmers unable to receive water from the irrigation district. The government hopes this program will help activate the economy.

How are farmers responding?

Short-term thinking still dominates in the valley despite the consensus among farmers that the drought could last for several more years. On an individual level, there is little investment in water-efficient technologies and farmers are still not pressing institutions like the International Center for Maize and Wheat Improvement (CIMMYT) to produce drought-resistant seeds. Nor are farmers switching to higher value crops, such as fruits and vegetables, which would allow them to generate more income per unit of water. The hesitancy to switch crops may stem from the difficulty of finding new markets and the associated elevated levels of risk.



Water pumped up out of reservoir

Farmers appear willing to deplete the reservoir if needed to ensure that they can make it through the current year's crop cycle. During previous longer dry periods, farmers gambled and generally were rewarded with a monsoon. In general, farmers are still trying to assess what is happening. It may take months, even years, before they decide what they are going to do in the future. Many do not know how many years they can go without being able to irrigate. In the meantime, they are trying to stay in farming as long as possible.

Long-term plans to improve water efficiency

New varieties of wheat and maize more adapted to drought stress offer important research challenges for the next decade. CIMMYT and other agricultural research stations have helped markedly increase the productivity of the valley by developing and introducing high-yield, pest-resistant varieties. Although farmers are still not demanding

the production of drought-resistant seeds, organizations like the Sociedad de Usuarios and Fundacion Sonora have financially supported CIMMYT for the development of these varieties. CIMMYT might have a variety ready for release next year, and it seems farmers would plant such a variety if available.

Other water conservation strategies include:

- applying two versus four supplemental irrigations for wheat;
- eliminating crop production during the summer due to high evapotranspiration rates;
- investing in water-efficient technologies such as the drip and pivot system (the government currently covers 50 percent of the installation costs); and
- switching to crops with more value per water allocation.



Drip and pivot system

Long-term actions include better planning, use, and management of aquifer water. The valley is also trying to get more control of private and public well pumping, requiring that each well come with an aquifer concession. Additionally, there are plans to build 140 new wells with the stipulation that any excess water be sold back to the districts in the valley.

Future of the Yaqui Valley



Aquaculture

Globalization and climatic shocks continue to bring change to the Yaqui Valley. The decline in water availability, especially when added to the drop in world commodity prices, reminds farmers just how vulnerable they have become to climate change and global markets. The recent introduction of aquaculture points to one way in which incomes within the valley could radically change in the coming years. The sustainability of this alternative, like the future of agriculture, remains speculative.

Yaqui Valley Sustainability Project

How to understand and respond to the Yaqui Valley drought crisis is one of a number of significant challenges facing this dynamic valley. Population growth, coastal modifications, urbanization, land-use change, and globalization also test the sustainability of the valley.

Researchers at the Center for Environmental Science and Policy (CESP) have spent over 10 years in the Yaqui Valley trying to understand the impact of these transitions. Initially attracted to the valley in 1992 to study fertilizer use, the breadth of study has expanded with the rapid demographic, economic, and ecological change that has taken place in the valley over the last 20 years.



City of Obregon, Sonora

With the assistance of a dozen funders, and through a multidisciplinary collaboration with partners in Mexico, the project continues to bring together the specialists needed to develop fundamental understanding and to explore management and policy alternatives that could increase human welfare and minimize resource and environmental risks in the Yaqui Valley. For more information on the Yaqui Valley Sustainability Project, please visit <http://yaquivalley.stanford.edu>.