

Large scale irrigation modernisation

Mexico

water scarcity impact



Reduced withdrawal	●
Reduced consumption	
Improved water quality	
Increased productivity	●
Net basin benefit	

volumetric impact

1 183 M m³/yr

capital cost

\$770 000 000

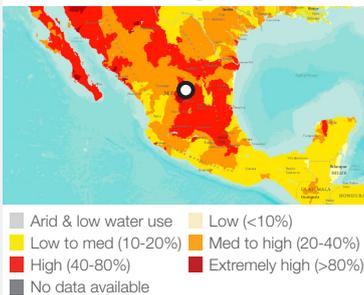


estimated unit cost of water

¢59/m³



Water Stress Mexico



Water Stress Map:

F. Gassert, P. Reig, T. Shiao, M. Luck and M. Landis, 2015. "Aqueduct Global Maps 2.1."

Confidence level

● Low ● Medium ● High

Water Scarcity Impact Key

● Main ● Minor

Credits

We would like to acknowledge Rita Cessti of the World Bank for their input in the preparation of this case study.

Project Overview

The \$770 million public-private funded irrigation modernisation project was implemented in 30 out of 31 states in Mexico to increase the competitiveness of the irrigated agriculture and achieve higher farm productivity and revenues. The project implemented a suite of improvements to the irrigation infrastructure in order to improve the productivity per unit of water.

In addition, operational responsibilities were decentralized and the irrigation infrastructure was transferred to local water user associations (WUA); a key requirement for the financing provided by IBRD (World Bank).

The locally prioritized improvement plans by the WUAs delivered the rehabilitation of the irrigation system supplying water to 427 100 hectares of farmland. The reduction in leakage in the system coupled with improved on-farm water management made 1 183 million m³ of water available for use and directly benefitted 1.1 million irrigation farmers.

The project costs were shared; 50% of the project costs were borne by National Water Commission, 18% by the state governments, and 32% by the local farmers via local water user associations. The IBRD provided US\$ 303 million in finance for the project.

Key Elements

- Diversification into crops that are higher value and have lower water demands.
- Modernization of existing irrigation infrastructure to promote a more efficient use of irrigation water.
- Public-private finance of local irrigation infrastructure through a matching grant system.
- Improved monitoring of water usage and more accurate water charges.
- Decentralization of operational responsibility through the transfer of the ownership of irrigation infrastructure to WUAs.

Key Outcomes

- Up to 123% increase in productivity per cubic metre of water withdrawn due to higher value crops and improved application of irrigation water.
- Higher income arising from increased productivity of irrigated agriculture and diversification into high-value crops.
- Reduced abstraction of groundwater for irrigation use by 250 million m³.
- Enhanced participation of water user associations in operations and maintenance and infrastructure investment decisions.



Intervention Features

- Education, training and capacity building
- Irrigation metering

Project Levers

(1) Crop diversification and intensification

Diversification to high-value crops and crop intensification led to increased net productivity per cubic meter of water withdrawn on 157 000 hectares of participating farmland. An investment of US\$38m was made to deliver this.

(2) Shared investment costs for infrastructure improvements

The local farmers made up front cash contributions via the Water User Associations, accounting for 32% of the total project budget. The Federal and state governments provided finance to cover rest of the project costs on matching grants basis.

(3) Modernisation of irrigation systems

US\$557 million were spent towards rehabilitation and modernization of 5 main barrages, 483 km of main irrigation canals, 2,600 wells, and 10 km of drainage canals. This resulted in 26% reduction in leakage.

Coupled with training for better farm management, it also delivered on farm improvements, such as pipelining, drip irrigation, micro sprinklers, improvements to on-farm drainage and land levelling. It cost US\$180 million and resulted in 18% reduction in withdrawals.

(4) Water Supply and Usage Monitoring.

Over 12,000 devices were installed to enhance the monitoring of water use within the irrigation network. These enabled WUAs to monitor the water availability and to make better decisions on water allocation and the setting of water tariffs.

(5) Decentralisation of operational responsibility

Decentralisation of operational responsibility following transfer of ownership to local Water User Association was key a requirements of the finance. The WUAs, formed of local farmers, are responsible for 100% of the operational and management costs and 65% of the maintenance costs with National Water Commission responsible for the remainder.

Outcomes and Challenges

Changes to on-farm water use resulted in a 16% reduction in water abstraction costs, coupled with diversification into higher value crops this helped increase the agricultural productivity 123% per cubic meter of water used and 44% increase in revenue per hectare of irrigated farmland.

Improvements to irrigation infrastructure resulted in 26% increase in conveyance efficiency. The on farm improvements, such as irrigation timing and crop selection, increased the irrigation application efficiencies between 14% and 49%.

This resulted in an increase in availability of water in the irrigation system by 1 183 million m³ per year, which is being used to restore reservoir water levels to improve reliability of supply in drought years.

The interventions have commonly reduced the volume of return flow from fields, reduced leakage and increased irrigable areas. Thus whilst productivity per unit of water withdrawn has increased, the net benefit to water scarcity is more limited.

Engaging poor farmers was a challenge for the project due to the co-financing requirements. However, farmers have responded positively to the tariffs, with 85% reported to consider the tariffs set by the WUA to be fair.

The internal economic rate of return (IERR) for the project has been estimated at 17%, highlighting the economic benefits of the project.



Above: Irrigation canals in Mexico
(© Prentis T. (Tom) Keener, Jr Flickr)