VALLEY WATER SUMMIT
TAKING ACTION ON WATER SUPPLY ISSUES

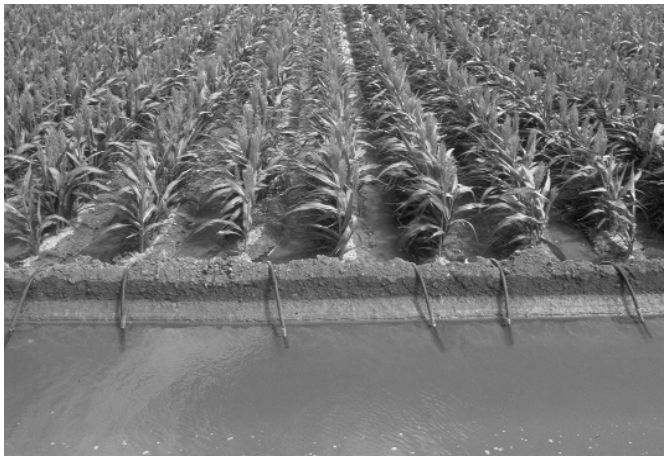
White Paper

On-Farm Water Applications

Problem Statement

The need for efficient on-farm water management has been intensified by a reduced supply of water made available to agricultural producers in the Lower Rio Grande Valley (LRGV) due to drought, urban growth, and Mexico's noncompliance with the 1944 Water Treaty.

- Non-delivery of water per the 1944 Treaty with Mexico has reduced farm acreage. As a result, local economic damage is estimated at $1.48 billion during the last 11 years and more than 4,100 jobs are lost each year.[1]
- Both the irrigation delivery system and on-farm methods built and developed over the last 100 years hinder producers' ability to maximize water-application efficiency.
  - Originally designed for furrow irrigation, the system presents challenges in using modern methods requiring less water, albeit with more frequent applications. For example, with drip, micro-jet, and sprinkler systems, water must be available on demand and many canals are sometimes low or empty. If water is kept in the canals year-round, the losses in the canal will likely exceed that saved in the field.
  - Simultaneous demand from many farmers, with adjacent farm turnouts, reduces head pressure in canals/laterals and increases on-farm percolation losses.
  - On-farm losses due to deep percolation and evaporation result from the extended water time required for fields that are large or not precisely leveled.
- Farmers are limited to one primary source of water – diversions from the Rio Grande.
- Efficient irrigation systems (e.g., drip and Low Energy Precision Application or LEPA) are expensive investments.
- Reduced rainfall and increased reliance upon irrigation water have increased salts in soils, which in turn lowers product quality and farmers' revenues from crops.
- Lack of training on most efficient on-farm systems (e.g., evapotranspiration, irrigation scheduling, and crop selection).



Facts

Currently, local farmers irrigate 475,000+ acres of land with approximately 615,000 acre-feet (AF) of diverted irrigation water – both values are significantly less than those observed in recent years. Overall, irrigated acreage in the LRGV is down about 100,000 acres over the last 10 years. Further, the reduced water translates, for some crops, into an increased proportion being grown under dryland conditions, which are lower-yielding and more vulnerable to growing seasons with little rainfall. As an example, the percentage of total irrigated cotton acreage has declined over the last 10 years by 20% so that today, only 40% of cotton lands in the LRGV are irrigated. Many farmers have had to shift their limited irrigation water from lower value crops like cotton and grain to higher value crops like sugar cane, vegetables, and citrus.

Most LRGV farmers rely on irrigation districts (IDs) to deliver water (for a fee) from the Rio

Grande to farm turnouts. Only about 10% of agricultural producers divert their own water from the Rio Grande and relatively few groundwater wells exist in the area. Local crops are primarily irrigated with furrow-irrigation techniques, even though the adoption of newer water-saving technologies (e.g., drip, micro-jet sprinklers, and center-pivot systems) is increasing. These improved technologies are currently estimated to be utilized on most of the cantaloupe and honeydew melon acreage, a large portion of the watermelon acreage, an increasing number of onion acres, and more than 1,500 acres of citrus. Under normal water supply conditions and with improvements to the irrigation districts' delivery system, it is estimated that more than 226,000 AF of water could be saved on farms per year.

Potential Solutions

- Increase funding and cost-sharing programs via the Texas Water Development Board or the U.S. Department of Agriculture Environmental Quality Incentives Program (EQIP) to help fund and implement on-farm irrigation conservation practices.
    - Sponsor field-size demonstrations of new technologies.
    - Help purchase on-farm technology (e.g., mobile pumps and filter systems).
- Replace open canals with pipelines in the ID delivery system so water will be available at all times and at constant head pressures. This will allow for increased adoption of drip, micro-jet, sprinklers, etc., and will allow fields to be furrow-irrigated faster, which reduces percolation losses.
- Increase the use of on-farm water measurement and price incentive programs.
- Require Mexico to comply with the 1944 Water Treaty.
- Increase water rates for users to provide invest ment funding for infrastructure improvements.
- Develop water marketing to facilitate water sales and transfers between irrigation districts.
- Develop other sources of water (e.g., retainment ponds to capture and store rainfall and groundwater wells).
- Adopt water-saving application technologies and invest in related education for farmers. LEPA and associated training can increase on-farm water application efficiency, while monitoring soil moisture and potential evapotranspiration and using these data to schedule irrigations can increase the efficiency of agricultural irrigation.
- Invest in agronomic and irrigation research, and modify production practices.
    - Expand development of drought-tolerant sugar cane, cotton, citrus, and other crops.
    - Incorporate deep chiseling and apply mulch to vegetable crops.
    - Use smaller fields, ID scheduling, and precision leveling to reduce percolation.

Barriers to Solutions

- Lack of concerted effort to obtain state and federal funding to assist on-farm conservation.
- Improvements in the infrastructure of irrigation districts may have to be made before on-farm conservation efforts will succeed.
- Reluctance to raise rates due to political and economic concerns will limit capital investment.
- Lack of conservation incentives: under non-volumetric rates, farmers do not receive the benefit of saving water; benefits are transferred to water-right holders and irrigation districts.
- ID rules and institutional constraints on moving water between districts.
- High costs (purchase and operational) for on-farm water application and distribution systems.
- Lack of knowledge and experience with improved on-farm water-distribution systems.
- Lack of research on optimal irrigation strategies for alternative crops in this region.
- High-value crops tend to use large volumes of water (and will continue to be grown).
- Soil salinity is not necessarily reduced if the amount of water irrigating the fields is reduced. This is because salts that accumulate over time are leached or flushed out by higher volumes of water.

[1] These values assume 350,000 ac-ft per year average minimum deliv ery, incorporate a 41% conveyance loss, and apply a $652 and 0.02 jobs per ac-ft loss impact. Source: John R. C. Robinson. "*Alternative Approaches to Estimate the Impact of Irrigation Water Shortages on Rio Grande Valley Agriculture.*" Texas Water Resources Institute. SR 2002-015. College Station, TX, 5/17/2002