



A Dry-Year Option Program for the Lower Rio Grande Valley, Texas

Nishita Sinha, Ron Lacewell and Luis Ribera¹

CNAS Issue Brief 2018-01

May 2018

The demand for water has increased in the Lower Rio Grande Valley (LRGV) of Texas over time owing to urbanization and the accompanying rising population. In addition, short and erratic water deliveries from Mexico have had a detrimental impact on agriculture and the economy of Texas over the years. During 1992-2002, Mexico accumulated a water debt of 1.5 million acre-feet resulting in substantial economic loss (*Texas Agriculture*). Furthermore, water use in Mexico is projected to increase from a growing population and economy, and the issue of climate variability adds to the stress on the shared water resource.

In previous research, a probability distribution was developed for water deliveries in the next delivery cycle (2021-2025) using a multivariate time series model. The model predicts less than required annual average deliveries by Mexico in the next cycle. Based on application of the model, the probability that Mexico will deliver less than 300,000 acre-feet per year is as high as 60 percent and that of less than 350,000 acre-feet per year is 80 percent.

A market solution called the Dry Year Option Program (DYOP) is proposed to deal with the shortage situation in the near-term while making gradual efforts to revise the delivery mechanism, and improve irrigation efficiency. When using DYOP contracts, an initial payment guarantees the purchaser the right to lease water at a future date and at an agreed upon “exercise” price. These agreements bring certainty around water availability for the buyer for a mutually acceptable price.

Such an option program is currently in place in the Edwards Aquifer to help sustain the endangered species dependent on the aquifer. The farmers hold senior rights in the aquifer which provides the motivation for cities to enter into an option contract. In the case of LRGV, cities have the priority in the tiered system of the region, meaning they have a reliable water supply. For several cities, however, water is delivered by irrigation districts. Irrigation districts were primarily established to deliver irrigation water but started delivering municipal water later to exploit benefits from economies of scale. Reduced agricultural availability, as is the case during droughts, has consequences for LRGV domestic, municipal, and industrial (DMI) water distribution in that municipal water “rides on” agricultural water. The amount of municipal water in the distribution canals is significantly smaller than that of agriculture. Thus, irrigation water is used to charge the canal networks and effectively transport the municipal water downstream. A structural solution offered by the regional authorities is construction of storage facilities so that there is sufficient water for use for the cities between deliveries (*Region M Water Plan*, 2016). A likely less expensive alternative could be the use of water option contracts to ensure adequate availability of conveyance or push water in exchange for compensation to irrigation water users.

The provisions of a water option contract include listing of the agents involved in the contract and other related terms. In the case of the LRGV, irrigation districts and farmers will be the seller and cities the buyer of an option. The option contract may have a term of one year. Every year (likely at the beginning – April 1st), the cities that choose to buy the option will pay an upfront option price/enrollment fee to the Irrigation District and farmers. In the event of a drought so severe that push water is likely to become a challenge, the cities will call the option and pay exercise price

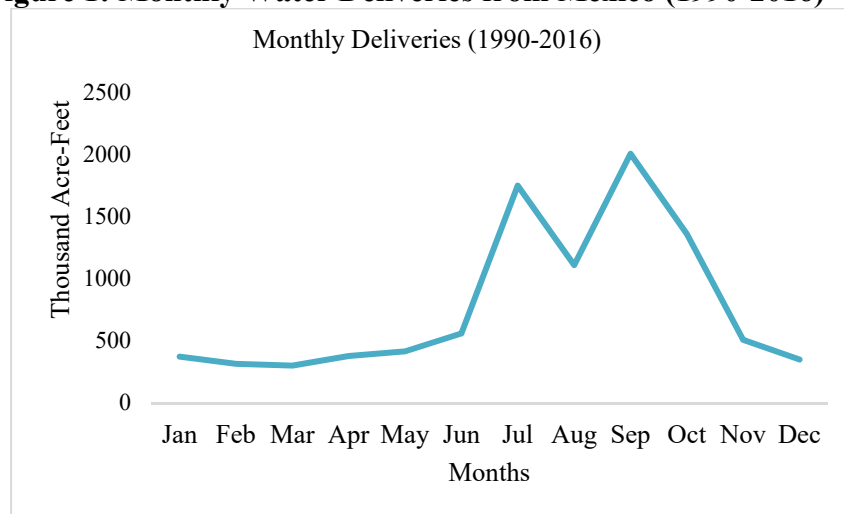
¹ Authors are, respectively, Doctoral Research Assistant, Professor, and Professor and Extension Economist and Director, Center for North American Studies, Department of Agricultural Economics, Texas A&M University/ Texas A&M AgriLife Extension Service. This research supported in part by the USDA, NIFA, Rio Grande Cap Project.

above the option price paid earlier. This requires estimation of option and exercise prices and finding the trigger date on which the option may or may not be called. The mean aggregate payment is estimated at \$150 per acre-foot of water. A part of this will be paid as an enrollment fee and the rest if and when the option is called. A likely division is 1:2; which puts enrollment fee at \$50 and implementation fee at \$100.

The trigger date, T (also the date of expiration of the option such that the option cannot be called after T) will likely be in the Fall-Winter season. The irrigation districts will let the cities know before the trigger date if there is sufficient water availability to cover for push water. If the irrigation districts believe that conveyance or push water is likely to become a concern in the foreseeable future, the cities will call the option on the trigger date of T. Once the option is called, the irrigation districts and participating farmers enrolled in the option program will suspend withdrawal of irrigation water from the canals so the canals remain charged and the water conveyance channel for the cities remains uncompromised. They will in turn receive exercise price per acre-foot of water not withdrawn.

Cotton and Sorghum together account for about 95 percent of the row crops' dryland acreage. Cotton is planted during February and March in the Valley and harvested during August and September. Sorghum is planted in the LRGV early due to the sub-tropical climate and insect problems, starting sometime in February. The rainy season in the LRGV starts in May and ends in October. The average rainfall in the LRGV ranges between 25-30 inches, while the majority of it falls in August and September. A large portion of water diversion from Mexico also occurs between May and October. Average monthly diversions from Mexico between 1990 and 2016 are shown in Figure 1. It is expected that by November of each year, the Watermaster will have a good estimate about water availability in the next year, for there is little addition to the reservoirs between November and April or May of next year.

Figure 1: Monthly Water Deliveries from Mexico (1990-2016)



The DYOP theoretically enhances the welfare of the cities as well as farmers and is cheaper than storage and conveyance projects. It will help diminish the uncertainty around water availability for cities and minimize losses of farmers in absence of irrigation water.