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Term Project Proposal
Urbanization in the Lower Rio Grande Valley

The Lower Rio Grande Valley refers to the three county area immediately west of the Rio Grande outlet into the Gulf of Mexico (Cameron, Willacy, and Hidalgo Counties). This is one of the most densely farmed regions in south Texas but also a region experiencing rapid population growth. The region primarily relies on the water of the Rio Grande for both domestic and irrigation water. Additional resources, like brackish groundwater and recycled water, are becoming more common but because of the high cost still represent a very small portion of the regional supplies.

The Rio Grande is operated using the Amistad and Falcon Reservoirs to store and manage the water supplies used on both the US and Mexico sides of the border. The TCEQ Watermaster rules dictate how water is allocated to users from the storage pools of the reservoirs. Municipal, Industrial, and Domestic users (DMI) are given the highest priority and irrigation users are designated the remaining water. Irrigators in the Valley like to say that they're the 'users of last resort.' As a result, DMI demand has a direct impact on availability of water for irrigation. Water can be converted permanently from Irrigation use to DMI use both as land is developed and by a process called 'exclusion.'

Urbanization in the region can be characterized by land area, based on land use metrics like developed area versus farmed area and population density. However, this has limited utility in terms of water resources evaluation, because land can be farmed without added irrigation water and the land measure is in other was imprecise. In general, water rights are associated with irrigated land, usually 2.5 feet per acre. Some irrigation districts (the entities that divert and distribute water to municipalities and farmers) allow farmers to consolidate their share of water on smaller portions of their farmland in order to facilitate growing a higher value crop, especially in years where scarcity is anticipated.

The conversion of water rights from irrigation usage to municipal usage is expected to increase over coming decades, but it is difficult to estimate the rate at which this will happen in relation to development of alternate resources. I would like to use historical land use and water rights data to develop a model that relates conversion of water rights with the rate of land development. Other metrics that could be useful are crop types, vegetable and commodity prices, precipitation and reservoir storage. This data will be useful for water planning in the region, projecting the availability designated for irrigation use and the availability designated for DMI use.