

Modeling of Stream Flow and Water Quality of the Arroyo Colorado, Texas

Background

The Arroyo Colorado watershed has a history of poor water quality. The impairment of water quality is due to the presence of high levels of bacteria and low dissolved oxygen that is responsible for fish kills. The low Dissolved Oxygen (DO) is mainly attributed to the nutrient loading from the agricultural fields, wastewater treatment plants, and urban storm water flows. The excessive bacteria originate from poorly treated wastewater, failing septic systems, and untreated wastewater from some of the colonias. The project seeks to identify the best management practices that control the pollution of water in Arroyo Colorado.

Study Area Description

The Arroyo Colorado flows through Hidalgo, Cameron and Willacy Counties in the Lower Rio Grande Valley of Texas into the Laguna Madre. It is located in the southern Texas coastal plain and is characterized by long, hot summers and short, mild winters. Mean annual precipitation ranges from about 21 to 27 inches. The soils are clays, clay loams, and sandy loams. Most soil depths range from about 63 to 78 inches. The flat terrain is extensively cultivated. Grain sorghum and cotton are the main crops. Sugarcane and citrus are also cultivated in some areas. About 40 % of the cultivated fields are irrigated. Water for irrigation is taken from the Rio Grande and moved through canals to the fields. Urbanization is extensive in the western and central parts of the basin and the important cities are Mission, McAllen, Pharr, Donna, Harlingen, and San Benito. There are 21 permitted dischargers in the Arroyo Colorado Basin.

Impact

The watershed is modeled with the Soil and Water Assessment Tool (SWAT) model using 18 years of data. After validation of model results for stream flow and water quality, scenario trials will be conducted with a suite of best management practices aimed to reduce the water pollution in Arroyo Colorado. Some of the typical best management practices are:

- Conservation Crop Rotation
- Filter Strip
- Residue Management
- Irrigation Water Management
- Irrigation System
- Irrigation Tail Water Recovery
- Nutrient Management
- Pest Management
- Irrigation Land Leveling
- Subsurface Drain
- Irrigation Pipeline
- Grade Stabilization Structures
- Pasture and Hay Planting

Partners

- Texas AgriLife Research
- Texas Soil and Water Conservation Board
- Texas Water Resources Institute
- Arroyo Colorado Watershed Partnership
- Texas Commission on Environ. Quality

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