

Arroyo Colorado Watershed, Texas

Long-Term Water Quality Modeling : Current and Future

Sept 2014

Background

The Arroyo Colorado watershed has an approximately 1,692 km² drainage area and is located in south Texas. It extends eastwards, from near the city of Mission, Texas, to the Laguna Madre. An agricultural watershed, its streamflow is sustained primarily by municipal and industrial effluents, as well as irrigation return-flow and rainfall-runoff. The watershed is important as a floodway and is also used for recreational activities such as swimming, fishing and boating. It is divided into two distinct segments, one of which is strongly influenced by tides. The tidally influenced segment has been identified by the Texas Commission on Environmental Quality (TCEQ) as having failed to meet water quality criteria required for its designated uses of contact recreation and high aquatic life.

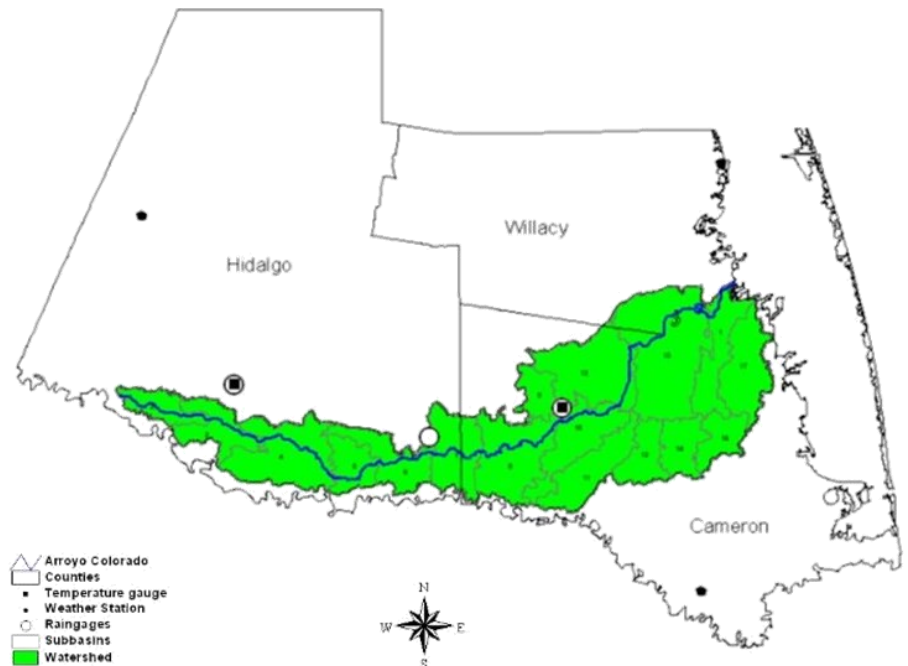
Hence there is a need to model the watershed in a comprehensive manner to provide a detailed a picture of the water quality (sediment, nutrients, dissolved oxygen, algal growth and bacteria) and to ultimately determine the source of pollutants. The performance of currently existing best management practices (agricultural and urban) in reducing pollutant loads, as well as the possible impacts of proposed future development scenarios, are also of interest.

Objectives

The objective of this study is to create a comprehensive, long-term, continuous hydrological model of the Arroyo Colorado watershed.

Methodology

The Soil & Water Assessment Tool (SWAT) model is utilized in conjunction with the Hydrodynamic and Water Quality (CE-QUAL-W2) model for this purpose. SWAT is being used to model overall hydrology for the watershed, while CE-QUAL-W2 is being used to model the segment that is tidally influenced. Blackland is responsible for SWAT modeling efforts, while the CE-QUAL-W2 modeling efforts are being led by collaborators at the Texas Institute for Applied Environmental Research (TIAER) at Tarleton State University. For the SWAT portion, three specific scenarios are being constructed and looked at: a baseline scenario which strives to replicate current conditions within the watershed, and two future projection scenarios for the area, one extending to 2015 and the other extending to 2025.



Current Status:

SWAT model calibration/validation procedures for the watershed baseline scenario output (streamflow, sediment and select nutrients) has been completed. Currently, the focus is on validating algal growth modeling as well as the future projection scenarios. Modeling bacterial loading within the watershed and validating will begin in the next phase.

Expected Outcome

It is expected that the validated model output for the baseline scenario will aid in painting a comprehensive picture of the water quality within the Arroyo Colorado watershed. In conjunction with output for the future scenarios, it is hoped that the findings can be used to propose and develop watershed management efforts.

Yamen Hoque
Texas A&M AgriLife Research
Blackland Research & Extension Center
yhoque@brc.tamtu.edu
254.774.6137
Blackland.tamtu.edu

TEXAS A&M
AGRI LIFE
RESEARCH

T
TIAER
TEXAS INSTITUTE FOR APPLIED ENVIRONMENTAL RESEARCH
Tarleton State University
A member of The Texas A&M University System