
AWRA 2011 ANNUAL WATER RESOURCES CONFERENCE
Albuquerque, New Mexico

November 7-10, 2011

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**IMPACTS OF CLIMATE CHANGE ON SUSTAINABLE WATER QUALITY IN THE RAPIDLY URBANIZING
ARROYO COLORADO RIVER WATERSHED ALONG THE US-MEXICO BORDER REGION, TX**

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ABSTRACT: The South Texas-Mexico border region relies on water supplies from the Rio Grande river to meet its municipal, agricultural and industrial needs. However, the generated wastewater effluent is largely disposed into the Arroyo Colorado river, which is a tributary of the Rio Grande river. The Arroyo Colorado River is the sole source of freshwater inflow into the ecologically sensitive Laguna Madre estuary. Rapid urbanization has increased pollutant loadings into the river and this trend is projected to continue in the future as the population of South Texas-Mexico border region is expected to double in the next decade. In addition, climate change models predict that while the total annual precipitation is likely to stay the same, there will be an increase in the intensity of storms as well as an increased duration between the storm events (longer periods of drought). These climate induced hydrologic changes will alter the non-point source pollutant loadings into the river. In addition, the temperature of the region is expected to increase by more than 4o C over the next century. The temperature increases will enhance biogeochemical kinetics in the stream. Of particular interest in the degradation of organic carbon (e.g., biochemical oxygen demand) into inorganic forms (CO₂) which in conjunction with elevated atmospheric CO₂ (due to global climate change) will lead to more acidic conditions in the river and cause disruptions to ecological integrity. The primary goal of this study was to develop a model to evaluate the synergistic effects of urbanization and climate change on the water quality of the Arroyo Colorado River. The model results indicate a greater need for proper management (greater treatment) of wastewater to reduce impacts under altered climate regimes.

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