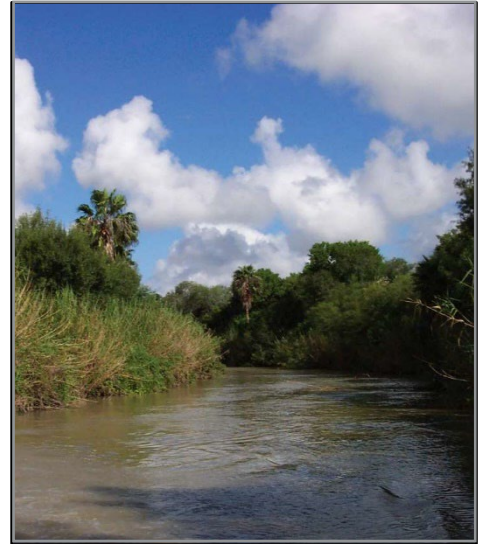




Best Management Practices (BMPs) and Water Quality Parameters of Selected Farms Located in the Arroyo Colorado Watershed

Agriculture in the Arroyo Colorado Watershed

The Arroyo Colorado watershed extends from western Hidalgo County through Cameron and Willacy counties before reaching the Laguna Madre. The land draining to the Arroyo includes city landscapes, cropland, coastal prairies/wetlands, grassland, and riparian corridors. The Laguna Atascosa National Wildlife Refuge and several parks are located within the watershed providing native habitat for several endangered semi-tropical plants and animal species. The Arroyo Colorado also provides numerous recreational opportunities and attracts a large number of tourists annually. Agriculture, municipal and industrial activities all contribute to water quality concerns and impairments in the Arroyo Colorado. Irrigation return flows from agricultural fields were identified as a major pollution source to the watershed because they can carry excess sediment, fertilizers and pesticides into the Arroyo Colorado. Agricultural producers can improve water quality of the Arroyo Colorado by implementing best management practices (BMPs) that reduce nonpoint source (NPS) pollution from their land. Several demonstration projects implemented since 2006 have characterized irrigation return flow quality and BMP effectiveness at field and sub-watershed scales. These activities were conducted to spur BMP implementation described in the Arroyo Colorado Watershed Protection Plan.



Irrigation poly pipe used during an irrigation event.

Objectives

A main source of pollution from agricultural runoff is nutrient leachate. One demonstration project focused on identifying the effect of agricultural management practices on NPS pollution from surface irrigated farms in the Arroyo Colorado watershed. The objective of the study was to obtain water quality information (parameters including: total dissolved solids, nitrates and nitrites, orthophosphate phosphorus, total phosphorus, and total Kjeldahl nitrogen) from irrigation water runoff in six agricultural fields during the 2009 and 2010 growing seasons.

BMPs Implemented at Demonstration Sites

- | | |
|--------------------------|---------------------------|
| Crop rotation | Irrigation management |
| Crop residue management | Irrigation with poly-pipe |
| Nutrient management | Subsurface drainage |
| Pest management | Vegetation filter strips |
| Irrigation land leveling | |

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Results

The predominant irrigation system in the Lower Rio Grande Valley is surface irrigation. Primary BMPs adopted by irrigating farmers in the Arroyo Colorado watershed are conservation crop rotation, irrigation land leveling, the use of poly-pipe and nutrient management. During this project, only one site had filter strips at the lower end of the rows which received irrigation runoff. The main results of this study are listed below.

1. Results indicated that the irrigation water contained high concentrations of nitrates, nitrites, orthophosphates, total phosphorus and total Kjeldahl nitrogen prior to application, but concentrations varied between irrigation events.
2. Nitrate, nitrite and total Kjeldahl nitrogen load increases from fields were small. Runoff volume significantly influenced nutrient loadings. Therefore, nutrient losses can be reduced through runoff management.
3. Orthophosphate and total phosphorus loads were extremely low for all sites during both years, but they were influenced by runoff volume. High total dissolved solids likely resulted from higher furrow flowrates that produce increased erosion and sediment transport. These higher flow rates also result in higher nutrient loadings of orthophosphates and total phosphorus. The use of poly-pipe can reduce erosion, facilitate irrigation management and may have an influence on orthophosphates and total phosphorus.
4. Groundwater nutrient concentrations fluctuated from year to year and from irrigation to irrigation, but remained low. Sites with nutrient management implemented as a BMP exhibited the lowest groundwater nutrient concentrations.

Recommendations

Producers can implement multiple BMPs to protect Arroyo Colorado water quality. Combining multiple practices will improve nutrient reduction in runoff water. Simply using just two practices such as land leveling and the use of poly-pipe will help facilitate irrigation management and have an impact on improving yields and profits. The two BMPs that reduced nutrient runoff the most were nutrient and irrigation management. Nutrient management typically consists of applying fertilizer at a specific rate according to a soil analysis test. Irrigation management includes controlling the total amount of water applied to the land focusing on using non-erosive flow-rates, thereby reducing runoff.



Runoff resulting from an irrigation event being measured.

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