

Nonpoint Source Pollution in the San Marcos River

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GEO 2426: Fundamentals of GIS
Texas State University-San Marcos
Fall 2010

General Problem Statement

- Urban runoff from impervious cover goes straight into the San Marcos River, where TXST students recreate
- Students and San Marcos residents unaware how their actions can affect the environment
- Study area: **San Marcos River Watershed**
 - Source in Spring Lake in San Marcos
 - Meets up with Guadalupe River in Gonzales County

Background

- Biggest sources of nonpoint source pollution: agriculture and urban runoff
- Urban runoff includes oil from cars, fecal matter (including from domestic animals), lawn pesticides, etc.
- After it rains in San Marcos, levels of fecal coliform (bacteria in the colon) are highest
- Sources: <http://www.pollutionissues.com>
<http://www.sanmarcosrecord.com>

Research Questions

- Where is water quality worst in the San Marcos River Watershed?
- What contributes to water contamination?

GIS Data Sources

- Wells in Texas: Texas Water Development Board
- River and stream segments: Texas Parks and Wildlife
- City limits: Capital Area Council of Governments, Texas Commission on Environmental Quality
- Texas counties: Texas Parks and Wildlife

Non-GIS Data Sources

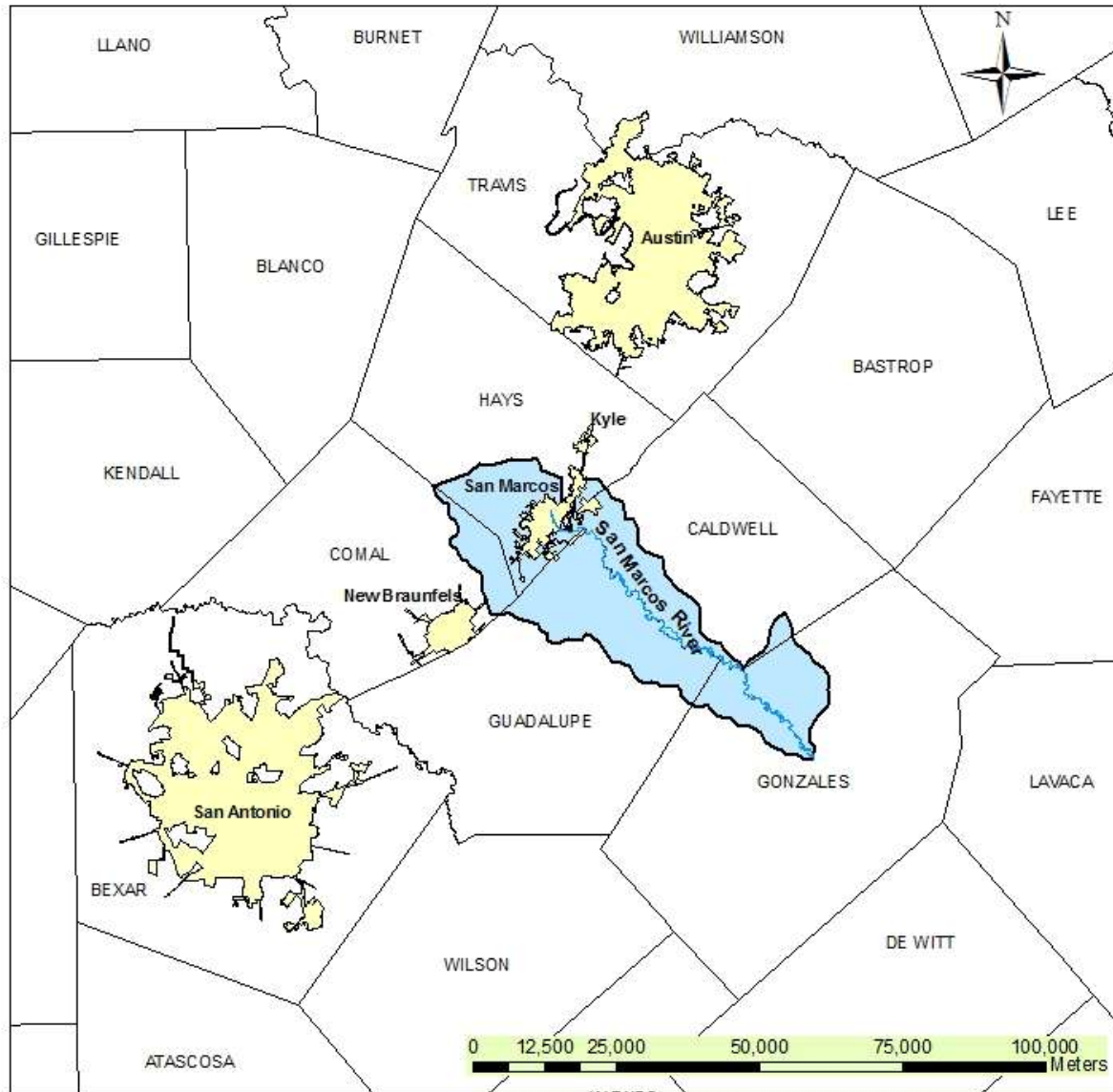
- Well water quality table: Texas Water Development Board
- SMR Watershed boundaries image: Guadalupe-Blanco River Authority

Analysis Techniques

- Creating the SMR Watershed layer: georeferenced then created new polygon shapefile
- Wells, San Marcos River, Minor Streams, and Cities layers were all clipped to the SMR Watershed layer
- Table of water quality data joined to well locations layer
- Merge city layers for locator map
- Classify well quality manually to represent hazard levels

Results

Context: Location of the San Marcos River Watershed



The San Marcos River Watershed covers part of 5 counties: Hays, Caldwell, Comal, Guadalupe, and Gonzales. The San Marcos River headwaters lie in Sping Lake in San Marcos, TX. In Gonzales County, the river joins the Guadalupe River.

Legend

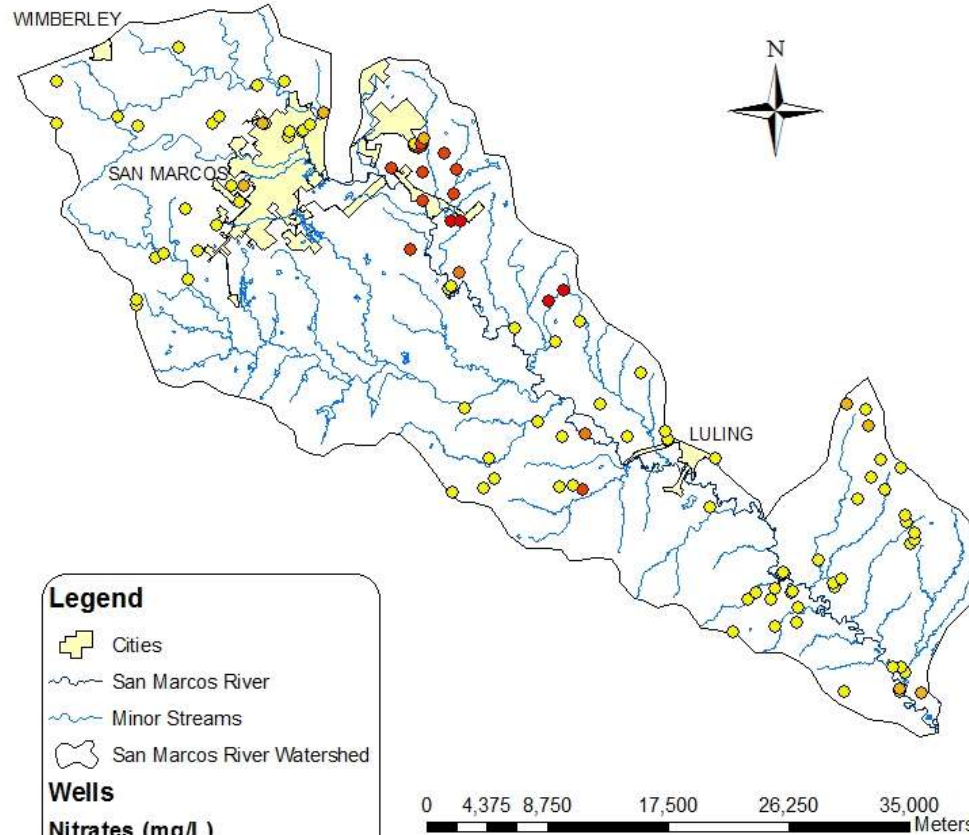
- San Marcos River Watershed
- Texas Counties
- Central Texas Cities
- San Marcos River



San Marcos River
www.edwardsaquifer.net






Map by Alix Scarborough
December 2010
Projection: NAD 1983,
Texas Statewide Mapping System

San Marcos River Watershed: Well Water Quality



Map by Alix Scarborough
December 2010
Projection: NAD 1983,
Texas Statewide Mapping System

Hazard Levels

Map depiction	Nitrates in mg/L	Explanation
	Less than 10	Safe for humans and livestock (But > 4 are an indicator of possible pollution sources)
	11-20	Generally safe for human adults and livestock, but not infants
	21-40	Should not be used as a drinking water source but short-term use acceptable
	41-100	Risky for adults and young livestock
	Over 100	Should not be used

Explanations adapted from

http://extension.usu.edu/files/publications/factsheet/NR_WQ_2005-23.pdf

Conclusion

- Nitrates appear to be most present directly downstream from urban areas
- It would be helpful to test urban runoff right as it enters the river, then test for similar toxins downstream
- Biggest challenge: Finding data
- More commonly-studied areas have more data available (Edwards Aquifer, etc.)