Binational Water Management Information System: Rio Grande\Bravo Basin

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Rio Grande Basin

Water Stress (m³/person/year)

2895 Km
An International River

- < 1850’s - Small impact of humans on the river
- > 1850’s - Dramatic changes began to occur
- 1900s
  - Treaties between Mexico & US
    - Convention of 1906: above Fort Quitman, Texas
    - Treaty of 1944: below Fort Quitman to Gulf
  - Dams constructed
    - Elephant Butte Dam: First major dam (1916)
- The River Today - Increasing tension over water supply
Binational Water Management Information System: Rio Grande Basin

Motivation

- Water scarcity over past 10+ years necessitates
  - Determining water availability in the basin
  - Developing new planning tools
  - Providing analysis for improved water management

Objectives

- Develop a comprehensive, bi-national, basin-scale database
  - Geo-referenced (GIS) Relational Database
    - Organized according to the basin principle
  - Watersheds delineated and hydrologic parameters calculated
  - Hydrologic and related data accessible for analysis (including time series)
  - Available to stakeholders
    - Mexican and US federal, state, and local organizations
- Assist in US-Mexican bi-national cooperation concerning water in the basin
Center for Research in Water Resources
The University of Texas at Austin

Project Collaboration

Participants
- University of Texas at Austin
- Comisión Nacional del Agua

Support
- Instituto Mexicano de Tecnología del Agua
- Instituto Nacional de Estadística, Geografía e Informática
- Universidad Autónoma de Ciudad Juárez
- North American Development bank
- Texas Commission on Environmental Quality
- IBWC/CILA
Rio Grande Basin

228,000 km² (Mexico) +
327,000 km² (US) =
555,000 km² (Total)
Regionalization for Large Basins

- Rio Grande DEM (30mx30m)
  - Basin > 500 million cells
- Too many cells to process
- Break it down
  - Regions < 50 million cells
ArcHydro

What is it?

Combine to represent a basin

Watersheds

Streams

Waterbodys

Time Series

Monitoring Points

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Regionalization (cont.)

- Delineate each sub-basin
- Define streams
- Establish connectivity
- Assemble into full basin

Rio Conchos Sub-basin
Over 5,000,000 time series records today
Water Quality Geodatabase

- Related to the Water Quantity Geodatabase
- Uses binational Water Quality criteria from
  - TCEQ, SEMARNAT, EPA, CNA, IBWC, USGS
Using the Geodatabase:
Physical Assessment Project

• Objective: Build and Utilize a “Whole Basin” Water Resources Planning Model to

  – Analyze Physical Opportunities to Improve Water Management in Rio Grande/Bravo Basin

  – Better Satisfy Water Management Objectives While Meeting Currently Unmet Needs in All Sectors, in All Segments, and in Both Nations
Physical Assessment Project
Steering Committee

University

U.S.

University of Texas at Austin

Mexico

Instituto Tecnológico y de Estudios Superiores de Monterrey

Environmental NGO

Natural Heritage Institute

World Wildlife Fund Mexico

Governmental Research

US Geological Survey

Instituto Mexicano de Tecnología del Agua

World Wildlife Fund Mexico

Instituto Mexicano de Tecnología del Agua
Physical Assessment Project Activities

• Develop Basin-Wide, Bi-National Tools
  - Database and Model to Evaluate Scenarios

• Develop Scenarios
  - Improved Water Management Opportunities

• Evaluate Scenarios
  - Physical Feasibility (First)
  - Economic and Institutional Feasibility (Second)

• Generate Recommendations
  - Water Management Improvement Options
Conclusions

• Bi-national Geodatabases Created for Rio Grande Basin
  - Water quantity and quality
  - Includes more than 5 million time series records
  - Shared among Mexican and U. S. federal, state, and local organizations
  - Illustrates US-Mexican binational cooperation

• Bi-national Geodatabase Used in Basin-wide Model to
  - Explore new approaches to improve water management planning in the basin
    • Comprehensive, outcome-neutral, model-based planning
    • System-wide analytical capability (database, planning models, and stakeholder-driven scenarios)