The Jordan River Basin

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Outline

- Developing a Geodatabase

- Water Evaluation and Planning - WEAP

- A Successful Case Study

- Future work

The development of a watershed-scale database

- Increase data exchange related to the management of hydrological information systems

- Access to: climatology, water availability, water uses, hydraulic infrastructures and watershed properties

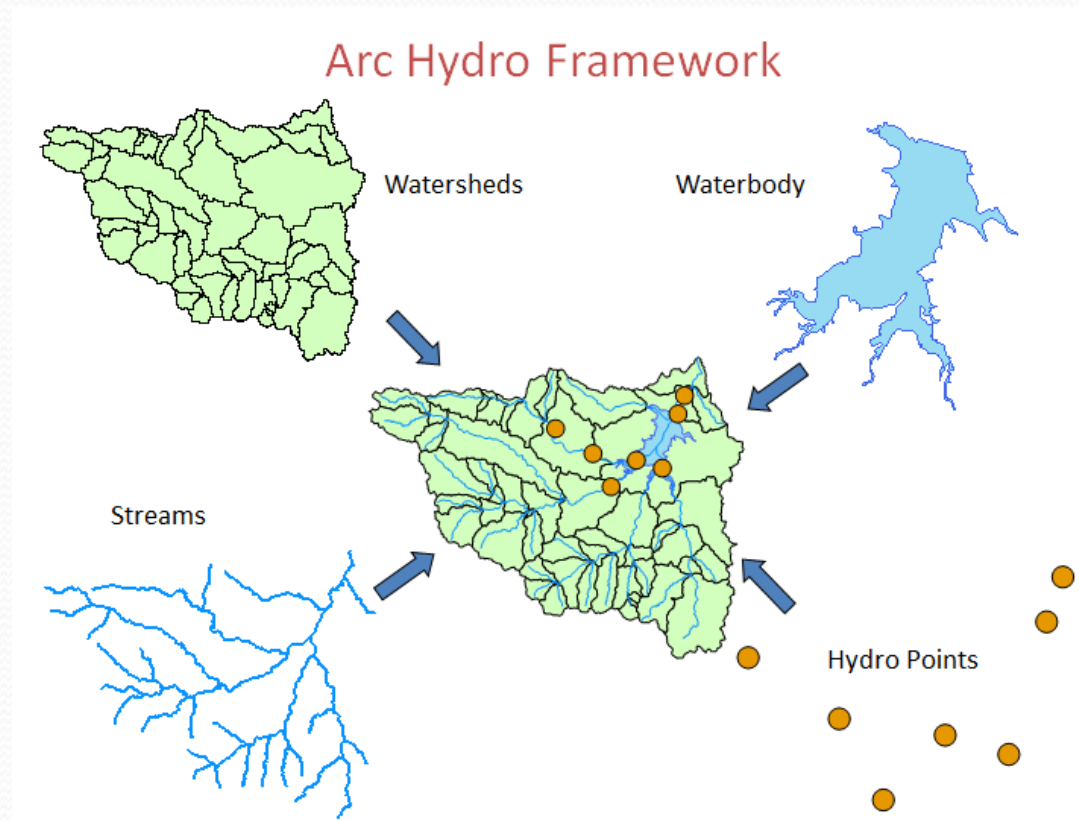- Promoting multi-national cooperation

ArcHydro data model

Linking Geographic Information Systems and Water Resources

GIS

Water Resources
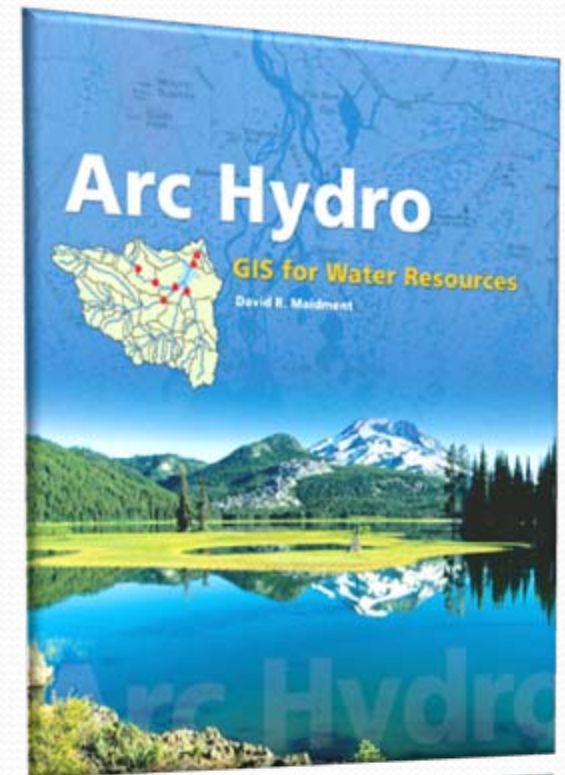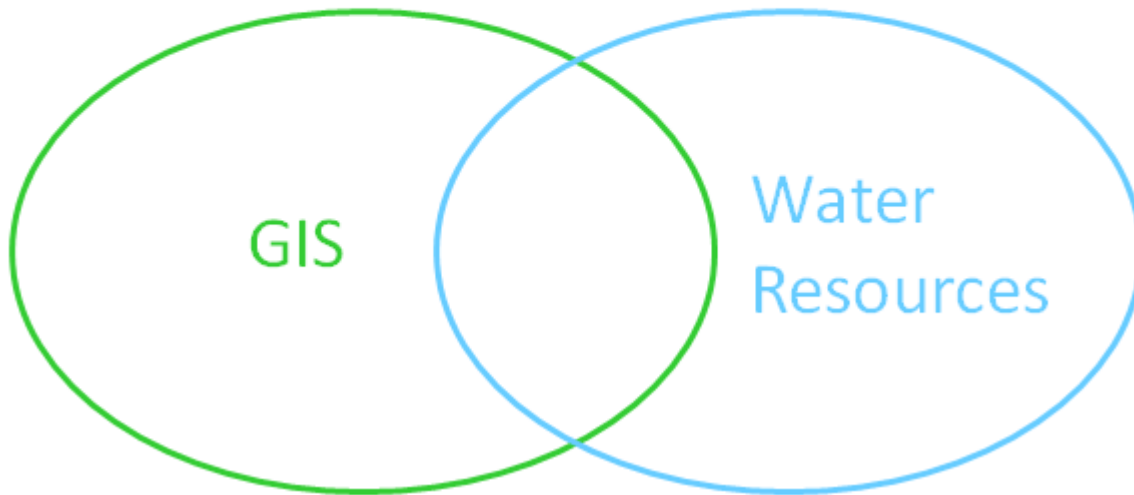
ArcHydro data model

- Facilitate the integration of spatial and temporal data of a hydrologic model into a relational database

Arc Hydro Framework

Watersheds   Waterbody

Streams

Hydro Points

Variable Definition table

- Catalog of time varying parameters (e.g. streamflow, water levels, concentrations, etc.)
- Each variable is indexed with a HydroID

VariableDefinition

HydroID
VarKey
VarName
VarDesc
VarUnits
Medium
DataType
IsRegular
TimeStep
TimeUnits
NoDataVal
Vocabulary
VarCode

Attributes of VariableDefinition

OBJECTID	HydroID	VarKey	VarName	VarDesc	VarUnits
1	6874	<Null>	Streamflow	NWIS Daily Streamflow	cubic feet per second
2	6875	<Null>	Water level	Water levels	feet above mean sea level
3	6876	silica	Silica	Silica concentration as SiO2	mg\L
4	6877	calcium	Calcium	Calcium concentration as CaCO3	mg\L
5	6878	magnes	Magnesium	Magnesium concentration as Mg	mg\L
6	6879	sodium	Sodium	Sodium concentration as Na	mg\L
7	6880	potass	Potassium	Potassium concentration as K	mg\L
8	6881	AvgWL	Groundwater level	Averaged groundwater levels	feet above mean sea level
9	6882	<Null>	Particle track	Particle track through subsurface	<Null>
10	6883	Z_Value	Depth	Depth below ground surface	feet

Record: 14 ◄ 0 ► ►1 Show: All Selected Records (0 out of 10 Selected)

TimeSeries table

- Each measurement is indexed by space, time, and type
- Space = FeatureID
- Time = TsTime
- Type = VarID

VarID provides information on the variable

TimeSeries
FeatureID
VarID
TsTime
UTCOffset
TsValue

VariableDefinition
HydroID
VarKey
VarName
VarDesc
VarUnits
Medium
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IsRegular
TimeStep
TimeUnits
NoDataVal
Vocabulary
VarCode
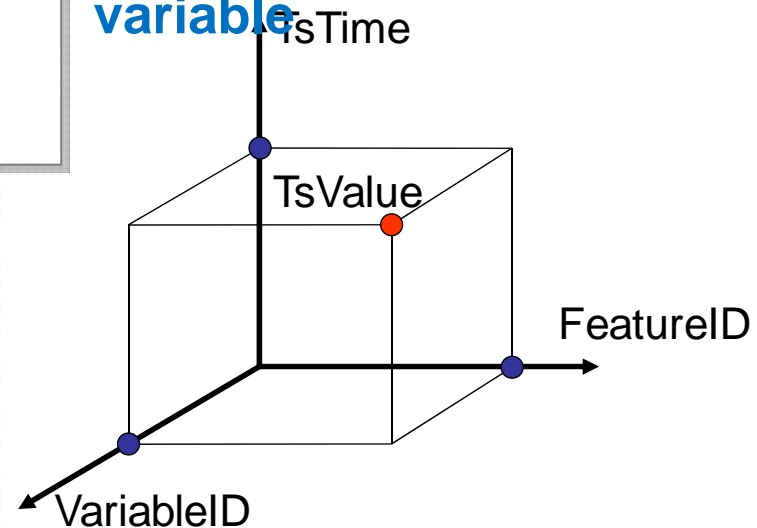
Terrain Processing: Computing Watersheds from Elevation Data
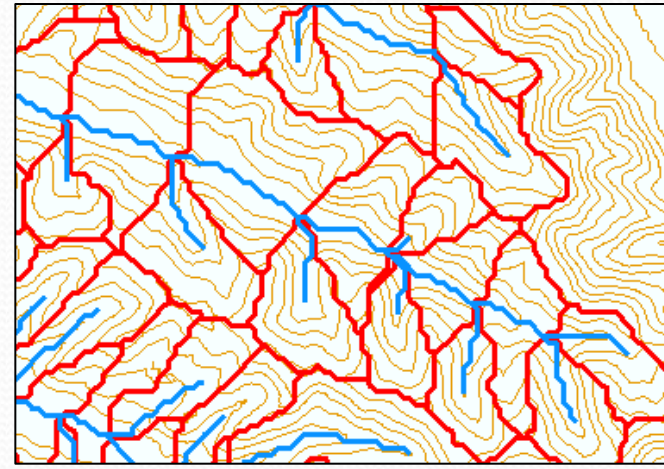
Raw DEM
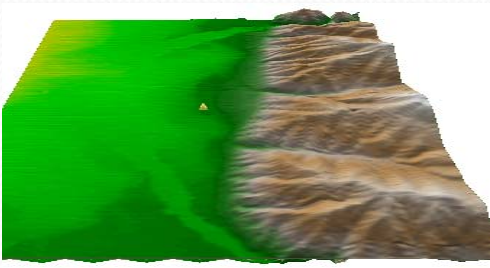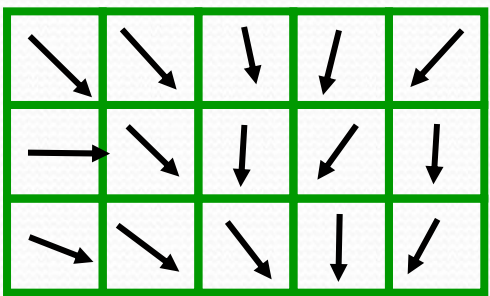
Pit Removal (Filling)

Flow Field

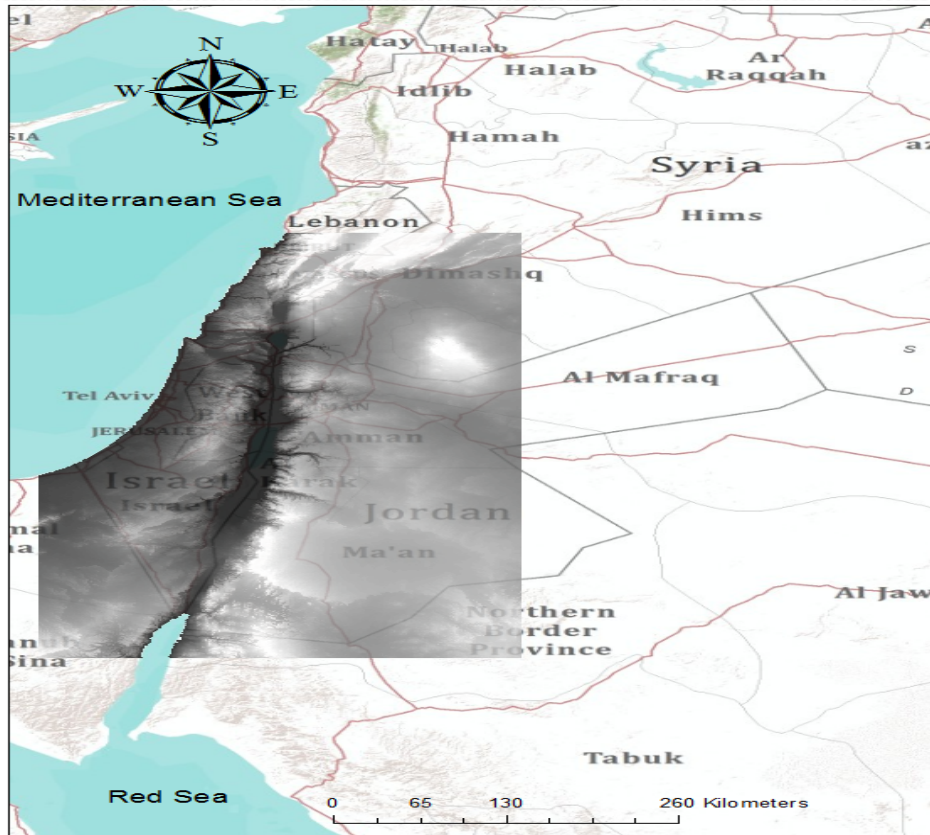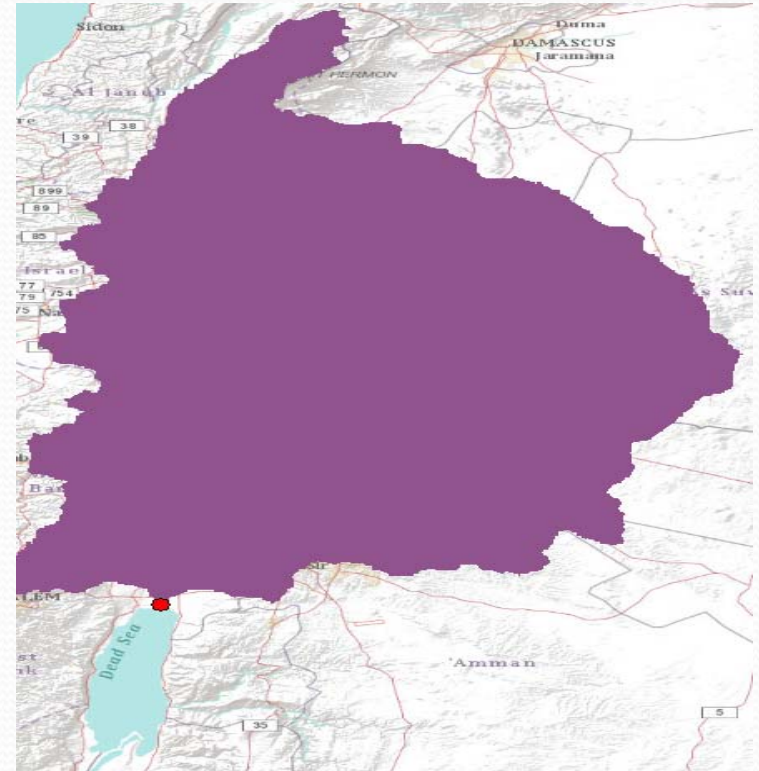**Channels, Watersheds, Flow Related Terrain Information**

Summary of Key Processing Steps

1. DEM Reconditioning
2. Pit Removal (Fill Sinks)
3. Flow Direction
4. Flow Accumulation
5. Stream Definition
6. Stream Segmentation
7. Catchment Grid Delineation
8. Raster to Vector Conversion (Catchment Polygon, Drainage Line)
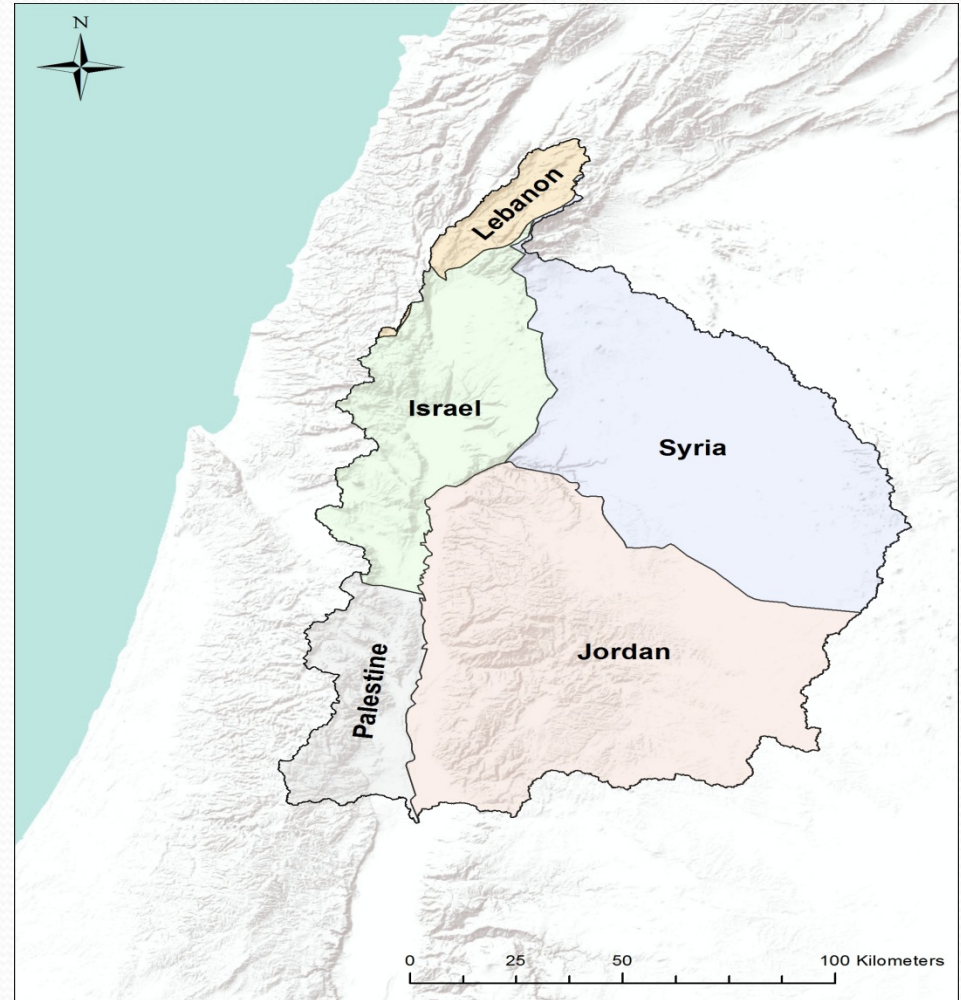
Watershed delineation

DEM
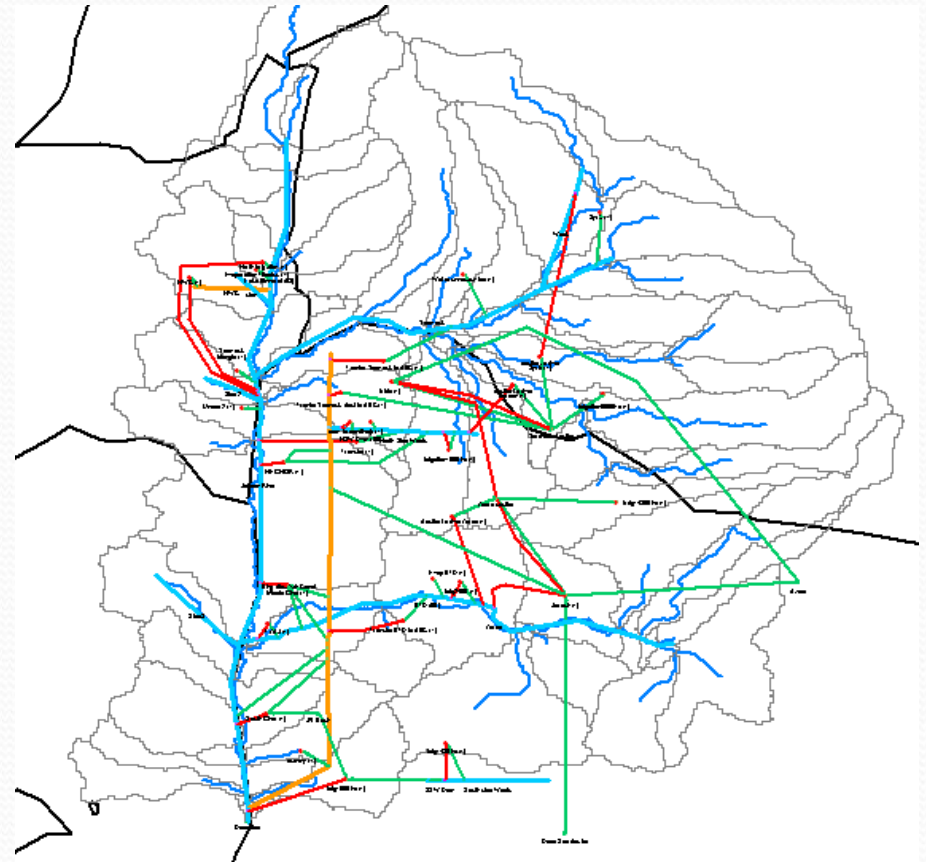

Basin

Contribution to the JRB

Work done in the JRB

- Collecting the hydrologic information from the co-Riparians
- Raster network technique: large region are divided into subregions
- Drainage area
- Average precipitation
- ET
- Run-off calculations
- Time series records collection

# Connecting Geodatabase to Models

- Improve water management

- Identify water management scenarios and modeling using WEAP

- Tools to read data from the Geodatabase and input into WEAP

Mexico/USA case study : The Rio Grande Basin

- Shared between USA and Mexico

- Watershed area of 557,722 km2

- Treaty of 1906 & 1944 governs water allocation in the basin

- Severe drought 1992-2003

Mexico/USA case study
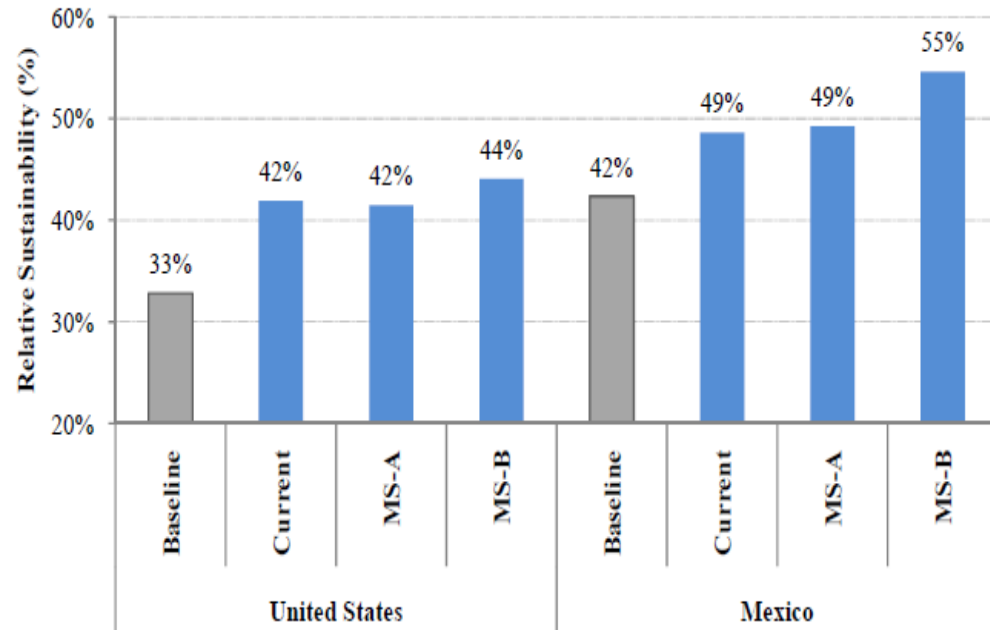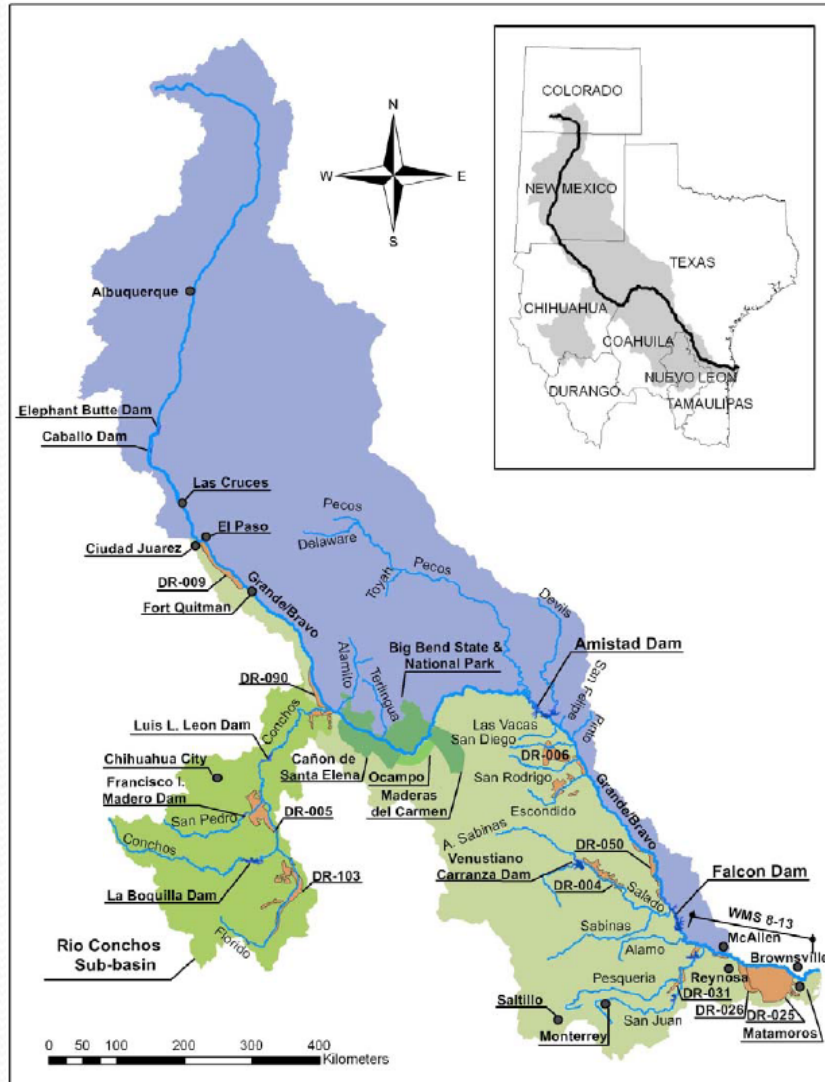
Rio Grande geodatabase

- Data is stored at basin scale
- Facilitates access to data for hydrologic and water management modeling
- Includes information from both riparians
- Provides accurate and reliable data
- Helps to enhance bi-national cooperation over Rio Grande water

The use of GIS database

- Facilitates the analysis of various scenarios to aid water resource management in the basin

- Allows easy sharing of geographic and historical information among various agencies

- Enables implementation of the treaties signed between the USA and Mexico

- Can be used along with WEAP to identify optimum water management scenarios

Future work

- World Water Consortium-World Water Online

- Make the Geodatabase available to the public

- Water management model for Lebanon