

Project Objective:

Create a spatially variable “water budget” for all reservoirs and corresponding service areas served by the Lower Colorado River Authority. Using historical data, establish year round model of total water within the Lower Colorado River Basin and use model to forecast change scenarios in total water based on estimated reductions in municipal water usages for 2060, taking into account population changes. Anticipate and outline changes in water storage infrastructure needed to accommodate these changes.

Methodology (strikethrough indicates completed task):~~1. Water Budget Formula (with respect to reservoirs)~~

$$S = Q_{in} + R - E - W - I - Q_{out}$$

S= total change in storage

Q_{in}=inflow from previous reservoir and tributaries

R= Precipitation over reservoir area

E=Losses from evapotranspiration over reservoir area

W=Municipal Withdrawals from reservoir

I=Infiltration

Q_{out}= Discharge from reservoir

~~2. Delineation of Lower Colorado River Basin and Sub basins (GIS)~~~~3. Delineation of Stream Network (GIS)~~

4. Collect historical water budget data (if possible) from USGS. Adjust water budget formula as required based on data availability.
5. Projection of spatial variability of water budget data (GIS)
 - a. Collect and assign water budget data (rasters) for area within each reservoir in GIS
 - b. Use map algebra to calculate water budget in GIS to maximize spatial accuracy
6. Application of water budget to historical data (Excel/GIS)
7. Visualization of changes in water budget for each reservoir w/r/t time (GIS)
8. Collection of census data for counties within LCR Basin (manual)
9. Separation of populations based on reservoir used (in GIS)
10. Correlation of changes of population to historical changes in water budget w/r/t time (time-series GIS analysis)
11. Application of municipal conservation estimates w/ regional variability (across reservoirs)
12. Analysis of changes in infrastructure requirements
13. Documentation of results and analysis
14. Project Presentation

Issues, Concerns, Etc.

I'm doubtful that I will be able to find all of the data I'd like to include into the water budget formula. Additionally, I'm not quite sure where to find high enough resolution water withdrawal and population data so I need to investigate (LCRA? City of Austin?). If data isn't available, I will leave analysis at water budgeting for each reservoir however there will be less spatial analysis and less effective use of GIS. Finally, time is always a concern.

Map of Study Area

Highland Lakes Map

