

Time-Lapse of changes in surface water throughout the Murray-Darling Basin in southeastern Australia as a result of increased agricultural use.

Water is a limited resource in the Murray-Darling basin where ~95% of water resources are used for what is considered Australia's most important agricultural region. The objective of this project is to determine how mean annual flow of major streams in the Murray-Darling Basin have changed over the past 20 years (or as far as data permits) as a result of land use changes related to agricultural practices and variations in precipitation. Variations in mean annual flow of streams will be connected to variations in precipitation as well as changes in land cover by examining the rate of evapotranspiration over the period of study within southeastern Australia's Murray-Darling Basin. Maps displaying fluctuations in MAF as a result of precipitation changes, evapotranspiration changes, and changes in climate index ($AI = \text{Precipitation} / \text{Evapotranspiration}$) will be produced.

Data Collection Requirements and Steps:

1. Add DEM of study area
2. Add Basin's and Streams and set boundaries of study area.
3. Collect time-lapse data of mean annual flow of the streams in the study basin.
4. Display past and current Mean Annual Flow values as graduated symbols to determine the relative cfs of the streams in the basin. I am not sure yet how best to display time-lapse data, but I will most likely take screen shots of MAF for the streams in time-steps to develop a "video" of the changes in MAF OR the positive/negative changes in MAF will be displayed by taking the difference over time periods.
5. If streamflow (Q) is available determine Run-Off for subwatersheds ($w = Q/P$).
6. Other important parameters such as ESRI standard slope and 8-direction slope values will be mapped for the region as well as flow direction of streams. (DEM projected as raster → Flow Direction).
7. Precipitation values will be collected and mapped for the region. IDW or another interpolation method will be used to display the gradient in precipitation.
8. Land Use and Land Cover will be displayed and then Evapotranspiration will be determined using remote sensing (We have yet to learn how to do this). (How best to display Time-Lapse data in GIS - Video? Positive/Negative changes for multiple time steps? Other method?)
9. Hypothesis will be checked: Is there a decrease in MAF over time merely as a result of drought conditions or are decreases in MAF also tied to changes in in evapotranspiration rates?

Data Sources:

- I can get almost all the data I need from the Murray-Darling Basin Authority (Vegetation Cover, MAF, etc.). But I need to request the data from them.
http://www.mdba.gov.au/services/spatial_data
- Australian Government: Geoscience Australia:
<http://www.ga.gov.au/map/national/>
- I have contacted a colleague in Australia about obtaining data.
- Can request Data for University of Melbourne: They have Vegetation cover and DEM's.