

**Midterm independent project**  
**Task 1: GIS Analysis of US Water Use**  
**(80 points)**

You are provided a zip file for the Mid Term Project. Download and unzip it in your folder. In the “Data” folder, you will find two files, “US-wateruse-by-county2000.xls” and “US-water-use-parameters.pdf”. The excel file contains water use data for each US county and the pdf file explains the parameters and units of the data. In the “maps” folder, there are two shape files “US-counties” and “US-major rivers” for GIS analysis. In the “Maps” Folder, you will find shape files of US counties, US rivers and world maps. You will use these maps for GIS analyses.

You need to get familiar with the real world issues by **reading the related portions** of the USGS report from the online source <http://pubs.usgs.gov/circ/2004/circ1268/index.html>. That report was about the states. You will do analysis about the counties. You need to choose a **special category** of the data (**bolded** in Table 1) for analysis. You are required to:

1. Open the excel file, replace the no-data cells with “-9999”, and “save as” a CSV (comma delimited value) file into the same folder. Click “yes” for all options in this project (**5 points**).
2. Start ArcMap program and add the two shape files “US-counties” and “US-major rivers” into the table of contents (**5 points**).
3. Add the table “US-wateruse-by-county2000.csv” into the GIS table of contents (use the “source” button at the bottom of the table of contents (**5 points**).
4. Join the two tables FROM “US-wateruse-by-county2000.csv” TO the table of the shape file “US-counties”: In ArcMap, right-click on the shape file and use “Joins and Relates”. Verify that the new data are added to the map (**5 points**).
5. Save the map with the new table using Data exporting (right click – Data), and reload the map into the table of contents. Rename it as US\_Water\_Use. Remove the old map “US-counties” and the table “US-wateruse-by-county2000.csv” (**5 points**).
6. **Print a pdf map of US Water\_Use** showing the “TO-WTotl” or “Total withdrawals, total, in Mgal/d”, using quantitative “graduated colors” with 4 classes in “quantiles” (**5 points**).
7. **Print pdf maps** showing the total water-use (TO-WTotl) **per-person** and the total water-use (TO-WTotl) **per square miles**, using quantitative symbologies (**10 points**).
8. **Print a pdf map** showing the “top 10” counties (names and color depths) that consume the largest quantities of water for the category you were assigned to analyze (e.g., irrigation, using surface, ground, fresh or saline waters). Export the selected polygons and reload the map. In a separate chart/table, **show the sequence and information of the selected counties only** (**10 points**).
9. **Print pdf maps** showing the “top 10” counties that consume the largest quantities of water **per person** and **per square miles**, for the purposes you were assigned to analyze (e.g., irrigation, using surface, ground, fresh or saline waters). Export the selected polygons and reload the map. **Show the sequence and information of the selected counties only** (**10 points**).
10. **Print a pdf map** showing a special pattern of your data that may show relations to local rivers, cities, and other possible connections (**10 points**).

**Table 1. Water use status in 2000 by US counties**

<b>Column Tag</b>	<b>Data Element</b>
STATE	State postal abbreviation
STATEFIPS	State FIPS code
COUNTYFIPS	County FIPS code
FIPS	Combined State-county FIPS codes
TP-TotPop	<b>Total population of county, in thousands</b>
PS-TOPop	<b>Public supply</b> , total population served, in thousands
PS-WGWFr	Public supply, ground-water withdrawals, fresh, in Mgal/d
PS-WSWFr	Public supply, surface-water withdrawals, fresh, in Mgal/d
PS-WFrTo	Public supply, total withdrawals, fresh, in Mgal/d
DO-SSPop	<b>Domestic</b> , self-supplied population, in thousands
DO-WGWFr	Domestic, ground-water self-supplied withdrawals, fresh, in Mgal/d
DO-WSWFr	Domestic, surface-water self-supplied withdrawals, fresh, in Mgal/d
DO-WFrTo	Domestic, total self-supplied withdrawals, fresh, in Mgal/d
IN-WGWFr	<b>Industrial</b> , ground-water self-supplied withdrawals, fresh, in Mgal/d
IN-WGWSa	Industrial, ground-water self-supplied withdrawals, saline, in Mgal/d
IN-WGWTo	Industrial, ground-water self-supplied withdrawals, total, in Mgal/d
IN-WSWFr	Industrial, surface-water self-supplied withdrawals, fresh, in Mgal/d
IN-WSWSa	Industrial, surface-water self-supplied withdrawals, saline, in Mgal/d
IN-WSWTo	Industrial, surface-water self-supplied withdrawals, total, in Mgal/d
IN-WFrTo	Industrial, total self-supplied withdrawals, fresh, in Mgal/d
IN-WSaTo	Industrial, total self-supplied withdrawals, saline, in Mgal/d
IN-Wtotl	Industrial, total self-supplied withdrawals, total, in Mgal/d
IT-IrSpr	<b>Irrigation</b> , acres irrigated, sprinkler, in thousands
IT-IrMic	Irrigation, acres irrigated, microirrigation, in thousands
IT-IrSur	Irrigation, acres irrigated, surface, in thousands
IT-IrTot	Irrigation, acres irrigated, total, in thousands
IT-WGWFr	Irrigation, ground-water withdrawals, fresh, in Mgal/d
IT-WSWFr	Irrigation, surface-water withdrawals, fresh, in Mgal/d
IT-WFrTo	Irrigation, total withdrawals, fresh, in Mgal/d
LA-WGWFr	<b>Aquaculture</b> , ground-water withdrawals, fresh, in Mgal/d
LA-WSWFr	Aquaculture, surface-water withdrawals, fresh, in Mgal/d
LA-WFrTo	Aquaculture, total withdrawals, fresh, in Mgal/d
LS-WGWFr	<b>Livestock</b> , ground-water withdrawals, fresh, in Mgal/d
LS-WSWFr	Livestock, surface-water withdrawals, fresh, in Mgal/d
LS-WFrTo	Livestock, total withdrawals, fresh, in Mgal/d

MI-WGWF	<b>Mining</b> , ground-water withdrawals, fresh, in Mgal/d
MI-WGWSa	Mining, ground-water withdrawals, saline, in Mgal/d
MI-WGWTo	Mining, ground-water withdrawals, total, in Mgal/d
MI-WSWF	Mining, surface-water withdrawals, fresh, in Mgal/d
MI-WSWSa	Mining, surface-water withdrawals, saline, in Mgal/d
MI-WSWTo	Mining, surface-water withdrawals, total, in Mgal/d
MI-WFrTo	Mining, total withdrawals, fresh, in Mgal/d
MI-WSaTo	Mining, total withdrawals, saline, in Mgal/d
MI-Wtotl	Mining, total withdrawals, total, in Mgal/d
PT-WGWF	<b>Thermoelectric power</b> , ground-water withdrawals, fresh, in Mgal/d
PT-WSWF	Thermoelectric power, surface-water withdrawals, fresh, in Mgal/d
PT-WSWSa	Thermoelectric power, surface-water withdrawals, saline, in Mgal/d
PT-WSWTo	Thermoelectric power, surface-water withdrawals, total, in Mgal/d
PT-WFrTo	Thermoelectric power, total withdrawals, fresh, in Mgal/d
PT-WSaTo	Thermoelectric power, total withdrawals, saline, in Mgal/d
PT-Wtotl	Thermoelectric power, total withdrawals, total, in Mgal/d
PO-WSWF	Thermoelectric power once-through, surface-water withdrawals, fresh, in Mgal/d
PO-WSWSa	Thermoelectric power once-through, surface-water withdrawals, saline, in Mgal/d
PO-WSWTo	Thermoelectric power once-through, surface-water withdrawals, total, in Mgal/d
PE-WGWF	Thermoelectric power closed-loop, ground-water withdrawals, fresh, in Mgal/d
PE-WSWF	Thermoelectric power closed-loop, surface-water withdrawals, fresh, in Mgal/d
PE-WSWSa	Thermoelectric power closed-loop, surface-water withdrawals, saline, in Mgal/d
PE-WSWTo	Thermoelectric power closed-loop, surface-water withdrawals, total, in Mgal/d
PE-WFrTo	Thermoelectric power closed-loop, total withdrawals, fresh, in Mgal/d
PE-WSaTo	Thermoelectric power closed-loop, total withdrawals, saline, in Mgal/d
PE-Wtotl	Thermoelectric power closed-loop, total withdrawals, total, in Mgal/d
TO-WGWF	<b>Total, ground-water withdrawals</b> , fresh, in Mgal/d
TO-WGWSa	Total, ground-water withdrawals, saline, in Mgal/d
TO-WGWTo	Total, ground-water withdrawals, total, in Mgal/d
TO-WSWF	Total, surface-water withdrawals, fresh, in Mgal/d
TO-WSWSa	Total, surface-water withdrawals, saline, in Mgal/d
TO-WSWTo	Total, surface-water withdrawals, total, in Mgal/d
TO-WFrTo	<b>Total withdrawals</b> , fresh, in Mgal/d
TO-WSaTo	Total withdrawals, saline, in Mgal/d
TO-WTotl	Total withdrawals, total, in Mgal/d

## **Task 2: Analysis of Recent Natural Disasters in the World (20 Points)**

This task has the minimum amount of instruction! You are asked to explore recent data on natural disasters in the world and do a “live” GIS analysis on yourself. The base map of the world can be found under MidTerm/Maps/World, or other sources found by yourself.

You can search for recent large natural disasters from the USGS website at:  
[http://www.usgs.gov/natural\\_hazards/](http://www.usgs.gov/natural_hazards/).

Search for pages listing the major events, copy and paste the lists to Excel, reformat the data and replace the no-data cells with “-9999”. Then, save as CSV files for plotting on the GIS map. If you find polygon shape files on the areal disaster events (such as tsunami coverage), download to your folder for use.

You may need to join tables whenever possible for your analyses on the effects of the selected events on lithosphere, hydrosphere, biosphere (including humanity), and atmosphere systems on Earth.

You are required to produce a standard GIS map for display, showing the recent disaster events and their distribution on Earth. Write up a mini-report to list these events, maps and your analysis

## **Submit Your Project Report and Map Files**

### **(10 points)**

1. Write out one-to-two pages of analysis (single space, 11-point font, not including maps and tables) on the results from Tasks 1 and 2 and compare your analysis with that of USGS.
2. Write in MS Word or any text editing software, paste screen captures from ArcGIS, save all pages, print or convert the file into **one pdf file** and **submit it to instructor through e-mail**.
3. Archive all the map files into **one zip file** and **submit it through Blackboard**. The methods to zip and unzip files are described in Day One Orientation and Software Installation on Blackboard. Your ArcMap, ArcScene or ArcGlobe files must be saved using the Relative Paths mode (see Day One Orientation and Software Installation) so that they will open and display properly in another computer. Try to open the map files in another computer by yourself first.

### Midterm Project Tips on Task 1:

1. Before saving your Excel data as CSV text file, you need to use the top line for field names only (no other title lines). Each field name should not be longer than 8 characters and contain no special letters (better Replace the slash sign using underscores). Make sure you format the data to contain certain decimals, then **Select** the active cells only (not all worksheet), Save as CSV file. Otherwise, the table may not be accepted by ArcMap.
2. Work in ArcMap first, save your results as Final shape files, then try to show these maps in ArcScene or ArcGlobe, if you like.
3. When calculating the per capita or per area amounts, you may see quantity errors due to division by zero. Many counties did not report population (TP-TotPop), thus you may use POP1999 in the table of the County map.
4. The Symbology can be in any form in Quantities or in Charts, play around and see what could be the best way to display your data. You can also use normalization for display of per capita and unit area data.
5. The write-up analysis should be the first few pages followed by maps.
6. In the write-up analysis, make references to maps or figures (e.g., "see details in Figure 1"; Then Figure 1 should be entitled "Figure 1. US Water Use by County - total water use in billion gallons per day");
7. Each map or figure is a high resolution PDF or Jpeg file exported from ArcGIS with all contents well balanced within the main frame, showing the continuous 48 states (without framing) and two separate small frames showing the status of Hawaii and Alaska;
8. The top users should be named in the map and listed in a sorted separate table (this table is exported from the selected attribute table, show the selected in the attribute table, sort the selected and then export from "options").
9. Do not show the unnecessary layers in the data frames (such as the "streams" layer in the first few maps), thus uncheck it if it is not helpful for display;
10. Combine the write-up analysis and the maps into one PDF file for submission.