Mixed-Methods GIS Instruction

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- **MIXED-METHODS GIS INSTRUCTION**: Creating class projects and lessons that allows students opportunities to conduct GIS using a wide variety of formats/media.

**Understanding of GIS**
- The Science, Geography,
- The Potential

**Tools Available**
- Arc Desktop
- Extensions
- Arc GIS Online
- Web Maps
- Story Maps
- Applications

**Outcomes**
- Paper Based
- Electronic
- **MIXED METHODS**
<table>
<thead>
<tr>
<th>Task</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Census data about Arlington Co. is downloaded from the factfinder tool and joined to a block group, block, or tract shapefile of Arlington.</td>
<td>(1-15 Points)</td>
</tr>
<tr>
<td>2. A well designed map layout is created in Arcmap that tells a unique story about Arlington County, Virginia and includes an explanation of the how the maps were made (no 1st person) and offers an analysis of the data trends observed on the map(s).</td>
<td>(1-45 Points)</td>
</tr>
<tr>
<td>3. A component of or the entire thesis of the map layout is also presented in some form on a well-designed arcgis.com storymap. Information about this storymap is also presented on the map layout.</td>
<td>(1-20 Points)</td>
</tr>
<tr>
<td>4. Good cartographic principles are demonstrated on both the map layout and the storymap.</td>
<td>(1-20 Points)</td>
</tr>
</tbody>
</table>

**Total 100 Points**
Super Earners in Arlington County, Virginia in 2013

Super Earner: an individual who earns $200,000+ per year

Total Number of Super Earners per Tract vs. Total Population per Tract

Despite differing average salaries, the population of Arlington County is more evenly distributed. The trend shows larger populations towards the centrally located tracts in Arlington County.

Sources: Arlington 2013 Database, U.S. Census Bureau 2013, ACS 2013, ArcGIS.com
Story Map comparison of Total Super Earners per Tract Vs. Percentage of Super Earners per Tract Population

Arlington County, VA Super Earners ($200,000+) Per Tract

Link to story map: http://bit.ly/1H0tssm
Air Pollution in Idaho: Change Over Time and Effects on Health


Legend
- AQI Levels
  - No data
  - 1 - 50
  - 51 - 100
  - 101 - 150
  - 151 - 200

Background Information

AQI stands for air quality index. It is a measurement tool that tells how polluted the air is. The scale goes from 0-500 and is broken into 6 different color groups as shown in the diagram to the right.

The three maps under the title "Percent of Population with a Lung Disease" have areas outlined in green marked as 'nonattainment'. Nonattainment areas are locations where the air pollution levels consistently do not reach the National Ambient Air Quality Standards. These areas are required to have plans of action to reduce the air pollution.

Analysis

- Geography of lung diseases give deeper look into air pollution. Respiratory diseases have not been clearly linked to air pollution, according to the American Lung Association, poor air quality can "cause or contribute to the development of infections, lung cancer, or chronic lung diseases such as asthma".
- Maps of adult asthma and COPD suggest the upper northeast region has worse air quality. - AQI levels in this region, as shown in top 3 maps, had peaks of unhealthy air quality levels at least once.
- Child asthma diagnosis was concentrated in lower south west region of Idaho.

- Child, much more recent analysis, is difficult to do and not every county had AQI data.
- This may be a statistical error as the normalization data was total population, not total child population.

Story Map

A story map accompanies this project, created on ArcGIS. To see the Story Map, follow this link:
http://webgis.org/apps/MapJournal/index.html?appid=92c46e4a6e4a4e8a96e4a8e696e617

Sponsored and used by this project:
- Idaho Department of Environmental Quality
- AirNow
- American Lung Association
- United States Environmental Protection Agency
- Idaho Air Pollution
Story Map

A Story map accompanies this project, created on ArcGis.com. To see the StoryMap, follow this link:

http://wlhs.maps.arcgis.com/apps/MapJournal/index.html?appid=902d4e266b9b43a0a8526f376d286ea3

Sources used for this project:

Idaho Department of Environmental Quality
American Lung Association
United States Environmental Protection Agency
AirNow.gov
Wildlife Hazard Assessment of Hazardous Habitat Attractants on the Greeley-Weld County Airport In Colorado

Observations of Species

Being in an area that experiences seasonal changes, the Greeley-Weld County airport is visited by many species of wildlife, mostly by birds. The areas of high concentration are displayed by a density heat map with the highest and lowest concentrations being clearly represented. The top three most frequent encounters are of the Horned lark, with 613 observed instances, Western Meadowlark, with 583 observed instances, and the Mourning Dove, with 193 observed instances. Although, the instances that were observed with more than 1,000 animals per observation were Canadian geese with approximately 7,000, 4,000, 3,498, 2,367, 1,345, and 1,000 animals observed, Horned larks with 1,905 animals observed, and Franklin’s gull with 1,800 animals observed. The influx of Canadian geese is indicative of a migration pattern since most of the recorded observations of Canadian geese occurred during late December right before the peak of the winter season. Although having the least amount of data points, winter was the most prominent season which consisted of 72.9% of all observed wildlife (represented in the pie charts below). Winter also had the most wildlife observed in a single data point, which was approximately 7,000 animals, and the day with the most animals observed, which was 24,023 animals.
More Examples of Student GIS Work:

Electronic - Story and Web Maps

Paper Based and “Mixed Methods” Projects
- [http://www.apsva.us/Page/23900](http://www.apsva.us/Page/23900)